The London School of Economics and Political Science

Designing technology to innovate teaching practices: A critical assessment of a learning design support environment

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I declare that my thesis consists of 80,391 words (including footnotes, but excluding references and appendices).

I can confirm that a small part of the literature review is based on a literature review that I previously wrote for a course in the MSc in New Media, Information and Society at the LSE.

I can confirm that part of the fieldwork was undertaken as part of the LDSE research project, and therefore, as part of a collaborative effort. I clearly indicate in the methodology chapter what parts of the fieldwork were carried out jointly.

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Abstract

This thesis, at the meeting point of information systems and education research, starts with a critical assessment of the theoretical assumptions underlying ICT-mediated learning research, and takes issue with instrumentalist approaches to technology as a means of encouraging learning through collaboration and of achieving innovation in work practices. I argue that technologies and knowledge (as well as what is considered worth learning) are imbricated in an ongoing "scene of struggle" where different interests, institutional logics, rationalities, and realities are negotiated.

This research draws on an empirical case study which follows the efforts of an interdisciplinary research team in a 3-year project while developing and evaluating a Learning Design Support Environment (LDSE). The expected aim of the LDSE project was to foster a community of practice among academics that would share knowledge of teaching practices, and collaboratively discover innovative approaches to technology-enhanced learning. I also bring the broader sociotechnical context into the discussion, to understand the different institutional logics entangled with this technology.

A conceptual framework is developed that integrates insights from recent contributions in institutional theory and actor-network theory. The former sensitise us to the broader social context and the complex interaction of different institutional logics. The latter emphasizes the entanglement of technology, knowledge, and practices. This framework offers an effective lens to understand how technologies aimed at supporting collaborative learning at work, and particularly in teaching, are bound up with practices and institutional logics in a given sociopolitical context. Such understanding will reveal the assumptions of straightforward means-to-ends innovation in technological interventions aimed at achieving learning and change, by laying bare the complex sociotechnical processes involved in making "a technology work" and in legitimating knowledge and practices.

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Acronyms

ANT	Actor-Network Theory
Becta	British Educational Communications and Technology Agency
CoP	Communities of Practice
CPD	Continuing Professional Development
CSCL	Computer-Supported Collaborative Learning
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
FE	Further Education
HE	Higher Education
HEA	Higher Education Academy
ICTs	Information and Communication Technologies
IS	Information Systems
ITT	Initial Teacher-Training
JISC	Joint Information Systems Committee
KM	Knowledge Management
LAMS	Learning Activity Management System
LD	Learning Designer (Technology designed by the LDSE, called LDSE at the beginning)
LDSE	Learning Design Support Environment (research project)
MOOC	Massive Open Online Course
OER	Open Education Resources
OL	Organisational Learning
OMS	Organisation and Management Studies
OS	Organisation Studies
PGCertHE	Postgraduate Certificate of Higher Education
PPC	Pedagogical Patterns Collector

QAA	Quality Assurance Agency
SCOT	Social Construction of Technology
SSK	Sociology of Scientific Knowledge
STS	Science and Technology Studies
TEL	Technology-Enhanced Learning
TLAs	Teaching and Learning Activities (term used in the LD)
TLRP	Teaching and Learning Research Programme
TLTP	Teaching and Learning Technologies Programme
VLE	Virtual Learning Environment (e.g. Moodle, BlackBoard, etc.)

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1 Introduction

1.1 ICTs, knowledge, learning, and innovation

Information and communication technologies (ICTs) have become pervasively engrained in our social life, and they are implicated in the ongoing transformation of organizational arrangements and practices. ICTs and the "digitization of everything" play an important role in the accumulation and generation of data and information. Furthermore, the networking capabilities of the Internet support new forms of interaction, communication, and distribution of information across geographical and organizational boundaries, which have resulted in successful non-commercial international collaborative ventures, such as Wikipedia, and Open Source software production projects. In addition, Open Innovation, which is based on the idea of sharing knowledge beyond organizations, is seen as a new paradigm for firms that want to stimulate innovation in a "landscape of abundant knowledge" (Chesbrough, 2003). Concepts of openness, peer collaboration and open innovation have also penetrated the discourse of the public sector, with projects being developed in areas of eGovernment, eHealth or education. In these projects and their discourses there is an association between ICTs, collaboration, knowledge transfer, and innovation.

Furthermore, in the so-called knowledge economy or learning society, learning has become a pervasive discourse: there are learning organizations, learning communities, learning cities, etc.; workers are expected to update their knowledge and skills, and be lifelong learners, reflective practitioners, teamworkers; and policy discourses present education and lifelong learning as a priority. In this context, a recurrent rhetoric praises the possibilities that ICTs offer to support collaborative environments of learning and communities of practice, resonating with the now prevailing constructivist approaches to learning in learning science and organizational learning research.

Literature around knowledge transfer and learning in the fields of learning sciences, education, and OMS has traditionally been dominated by psychology-inspired theories. Cognitive and behavioural aspects of knowledge and learning are unquestionably important to consider, particularly when researching issues such as

knowledge transfer and acquisition. However, constructivist perspectives on knowledge and learning have contributed in revealing the social and situated character of knowledge and learning. Among these theories, the anthropological study of Lave and Wenger's (1991) *Communities of practice* became very influential, and it has been adopted by managers as a way to promote collaboration and learning among peers. However, the application of such analytical theory as an instrumental model for intervention does not come without problems, as it assumes that learning through collaboration can be engineered. In addition, in much of this research the use of technology to support learning and communities of practice is taken for granted and it remains to a large extent undertheorized.

The underlying assumption of important investment in ICTs is that innovation stems from purposeful action; that is, that the adequate design of technological interventions will lead to the expected outcomes. From this perspective ICTs are reduced to their functionality. However, project failures, unintended consequences, resistance to use, are just some illustrative examples of the limitations of such approaches in practice. Tinkering, improvisation and politics are all part of the sociotechnical assemblage of IS (Ciborra, 2004).

Research in information systems (IS) has shown that the development and implementation of IS cannot be explained by focusing exclusively on technical and rational perspectives, and that the development and use of ICTs in organisations is only partly the result of formal decisions deriving from specific economic, managerial or technical rationales (Avgerou, 2002). The concept of "information system", in this regard, in contrast to IT or ICTs, has to be taken to refer not only to the technology but the sociotechnical system. Especially since the 1990s, some IS scholars have been engaged in developing more nuanced theorizations regarding the entwinement of technology and the social or organizational contexts of development and use.

In the recent years OS and IS scholars have developed a growing interest in practice-based perspectives (Gherardi, 2009; Nicolini, 2012) and sociomaterial approaches (Orlikowski & Scott, 2008) in their efforts to develop theorizations that based on a relational ontology overcome the dichotomy social / material. They have

suggested the need to consider the role of the material in the constitution of reality. In line with this research in this thesis I take the view that technology design can be understood as contributing to constitute the world in specific ways, as a process of mattering taking place within a larger configuration of the world, and as such in constant process of negotiation (Barad, 2007).

1.2 The case study: The LDSE

In the fields of organization studies and IS, empirical studies analysing ICT-mediated collaborative learning and decision-support tools have predominantly focused on business organizations. More generally, a dominant body of literature in IS is concerned with the analysis of IS in business organizations. As Avgerou (2002) argues, this is a limitation, because distinct concerns arise in different organizational settings where processes of IS innovation take place. As regards the public sector, the important investment in information systems to support clinical decision-making has been accompanied by an extensive body of research in the area of health, most of which is published in specialized journals, but it has also reached mainstream organization studies, information systems, and science and technology studies (STS) journals. Nevertheless, areas such as education have received very marginal attention.

Admittedly, the use of ICTs to support workplace learning and decision-making is not as widespread in education as it is in other sectors, but it does exist, and technologies are increasingly being developed which aim to support the design of learning and teaching plans, and facilitate sharing best practices and resources. This thesis draws on an empirical case study of one of such technologies. I followed the work of an interdisciplinary research team in a 3-year research project while developing and evaluating a Learning Design Support Environment, which seeks to foster a community of practice of academics, and facilitate knowledge-sharing of teaching practices to promote the discovery of innovative approaches to technology-enhanced learning. The LDSE project team takes on board the agenda of improving teaching and learning quality in higher education (HE) based on contemporary views of learning and integration of technology-enhanced learning

(TEL) within teaching practices. Thus, it wants to encourage adoption of TEL in HE.

Educational technology literature is dominated by optimistic and instrumentalist views about the possibilities that technology offers to assist or improve teaching and learning. A recurrent rhetoric praises the possibilities that ICTs offer to support collaborative environments, resonating with the widespread constructivist approaches to learning in learning science research. However, as I will discuss in the literature review, this literature adopts a restricted view of "social" constructivist perspectives on learning. With some exceptions (e.g. Selwyn & Facer, 2013), this research tends to omit any reference to organizational, political, social or cultural aspects implicated in e-learning. Despite the hopes and large investment in ICTs, the claimed potential of digital technology to reform education has not been realized. Notwithstanding the gap between expectations and reality, research in this area remains mostly uncritical and, as some authors have recently lamented (Selwyn & Facer, 2013; Selwyn, forthcoming; Oliver, 2013), it tends to be framed with naive theorizations of technology, and psychology-inspired theories of learning, resulting in reductionist views of the education process.

Similarly, higher education research predominantly adopts learning sciences approaches, with largely psychological concerns. There are also researchers that from a sociological perspective have studied issues such as the history of higher education systems or the change towards managerial forms of organizing universities. Only recently some researchers in the education sciences field (Fanghanel & Trowler, 2008) have started to show an interest in studying teaching practices at a meso-level, focusing on the teacher as a practitioner in an organizational setting; that is, it considers teaching practice beyond the teacher-learner interaction, by situating it in the organizational context. This is a promising area of research, as it goes beyond individualist and rationalist accounts of human behaviour implicit in literature and policy interventions concerned with changing teaching practices.

Contributing to these recent calls in higher education research and educational technology research to move beyond a-contextual studies of learning and

technological change, I frame my research from a socio-technical IS perspective and the related fields of STS and organization studies, as they offer fruitful insights in relation to the theorization of technological change and learning in organizations. This thesis, at the point of intersection of information systems and education research, takes as its starting point the critical assessment of the theoretical assumptions underlying ICT-mediated learning research, and seeks to address some of the limitations of received theorisations of learning and technology, which underlie important investments in developing technologies to support learning. Furthermore, overcoming humanistic and individualistic views of learning, in this thesis I analyse how the technologies aimed at supporting learning participate in the ongoing configurations of the world.

1.3 Overview of the thesis

In **chapter 2** I present a critical literature review, starting with a brief discussion of the influence of design thinking in OMS and education. Next, I offer an overview of literature on teaching, learning and technology in higher education, where I point out the limitations of the dominant literature just mentioned. After a brief overview of research on the sociology of professions, I refer to the changes that traditional professions have experienced since the 1980s and how, as a consequence, research tended to move away from the notion of a profession to undertake, more generally, research on knowledge work. Connected to the spread of ICTs and the discourse of "knowledge economy" since the 1990s we have witnessed an unprecedented interest in studying aspects related to knowledge work and organizational learning. I argue that an important body of literature in knowledge management (KM) adopts positivist and cognitivist views of knowledge. I then review literature that from a social constructivist perspective has revealed the social and situated nature of learning and knowledge. However, I conclude in accordance with some authors (Contu & Willmott, 2003; Selwyn & Facer, 2013) that popularized versions of constructivist and situated approaches to learning in organization and management literature, and in education, tend to be too localized, and they ignore aspects such as contradiction, the entanglement of learning processes with power relations, and the importance of considering the historical and social context of learning. This aspect, and the need to frame the discussion accounting for organizational aspects

and institutional logics, is all the more necessary when we discuss professional or work-based learning. In addition, I conclude that most of the literature adopts a tool view of technology; that is, it takes for granted the outcomes of the implementation of technologies, and it conceives technologies as neutral mediators of knowledge and learning. Critical towards these dominant approaches, I take on board recent calls to consider the entanglement of technology with practices and learning (Gherardi, 2009; Nicolini, 2011; Fenwick & Landri, 2012; Fenwick et al., 2011), in line with the practice turn (Schatzki et al., 2001) and the more recent sociomaterial turn in social sciences, strongly influenced by the reception of science and technology studies (STS) literature.

After offering a critical review of theories in Information Systems and STS that delve into technology and social and organizational change, I present the research question that this thesis seeks to answer, and three research sub-questions:

RQ: How is technology implicated in the configuration and negotiation of educational practices in Higher Education in the United Kingdom?

In **chapter 3** I propose a conceptual framework integrating insights of recent contributions in institutional theory, and actor-network theory. The former sensitise us to consider the broader social context and the complex interaction of different institutional logics. The latter emphasizes the entanglement of technology, knowledge and practices. I claim that such a framework offers an adequate lens to understand how technologies aimed at supporting work-based ICT-mediated learning are entangled with practices and diverse institutional logics and actors. Such understanding will reveal the assumptions of straightforward means-to-ends innovation in technological interventions aimed at achieving learning and change, by lying bare the complex sociotechnical processes involved in making "a technology work" and in legitimating knowledge and practices.

In **chapter 4** I discuss and justify the methodology of this research, which is based on a case study, and in **chapter 5** I offer a case study narrative, with a contextualization of the LDSE project in the context of recent changes in HE in the UK. As I explain in these chapters, this research is based on my participation during 3 years in the LDSE research project, while they were developing a technology,

the LD, with the purpose of fostering a community of reflective practitioners, with the final aim of encouraging innovation in teaching practices in HE. My sources of empirical data are my participation in monthly meetings, the documents and articles produced by the research project, and the three different versions of the software developed. I also participated as a researcher in workshops with practitioners to gather user requirements and to evaluate the system. I also conducted interviews with practitioners. Furthermore, second sources allowed me to construct the contextualisation of the LDSE project presented in chapter 5.

In **chapter 6** I offer the analysis of the case study, which I divide in 3 parts to give answer to each of the sub-questions**. Chapter 7** contains the discussion, where I present the key findings of this thesis. Finally, in **chapter 8** I conclude this thesis by presenting the main contributions, and I discuss the limitations of this research and possible future research.

2 Literature review: ICT-mediated learning and innovation in work practices — The case of teaching in higher education

2.1 Introduction

The case study under research, the LDSE project, seeks to encourage innovation in teaching practices in higher education in the UK. To achieve this aim, they designed a technology to foster learning and knowledge sharing among academics in their role as teachers. Thus, the underlying assumptions are that technology can foster and support a community of practice, and that by learning from each other practitioners will innovate their practices. As I will discuss in this literature review, such an approach is not exclusive of this project. Virtual communities of practice and other forms of ICT-mediated collaboration have been presented in academic literature as means to promote effective learning and innovation.

The LDSE was constituted by education researchers and computer scientists, and it was part of a network of ESRC/EPSRC-funded projects researching technology-enhanced learning. However, while most research in education tends to focus on students' learning, this project was concerned with learning at two levels: it aimed to achieve that academics would *learn from each other* about innovative teaching practices to support *students' learning*. Thus, in this literature review I show where LDSE seats within education literature, but then I justify the framing of this thesis from an organisation and management studies (OMS) and information systems (IS) perspective, as this project intended to encourage learning among practitioners (more specifically, academics as teachers).

One of the contributions of this thesis is that it brings together these different fields of research. Whereas learning has traditionally been studied from the learning sciences perspective, other disciplines have been concerned with issues such as expertise, knowledge sharing, and learning communities, particularly in the context of the knowledge economy. As I will show, different disciplines focus on different concerns, but also commonalities are apparent, for instance the successful reception of the concept of communities of practice and collaborative learning, understood as means to achieve innovation.

Another aspect shared by IS, OMS and education science is that they are applied social sciences; therefore an important part of the knowledge produced in these fields aims to provide practical insights. As a result, as I will show in this chapter, an important body of the literature adopts instrumental or technical-rational perspectives; that is, they intend to guide practitioners by proposing best practices or satisfactory courses of action. This thesis sits among contributions in OS (Townley, 2008) and IS (Avgerou, 2002) who have adopted a non-universalist view of rationality, and suggest the need to consider the social embeddedness of practices. From this perspective, practical action does not follow universal rational calculations.

I start this critical literature review by briefly discussing the influence of design thinking in various disciplines, and I contrast it with the performative perspective that I adopt in this research. Then, I review literature in the areas of higher education and learning technologies, followed by literature on professional knowledge, and knowledge and learning in organisations. Next, I focus on how technology has been theorized in terms of its implication in knowing and learning, and social change. In the conclusions I point at the gaps found in the literature. Finally, I introduce the research questions.

2.2 On designing to achieve change

The LDSE, which constitutes the case study of this thesis, defines itself as an action research project. That is, concerned with the gap between theory and practice in learning science, it aims to induce change in UK's higher education (HE) teaching practice by following a design science approach. More specifically, through the design of a digital tool it seeks to foster a community of practice in which teachers can test, share, and take inspiration from each other's learning designs (i.e. lesson plans or instructional products). In this way, it is hoped that innovation in teaching practice will result from a knowledge building process similar to the one that operates in the academic research community or other community-based, open innovation projects (Laurillard et al., In preparation).

While not new, the design science paradigm has recently attracted the interest of a growing number of researchers in diverse social science fields. As an indication, in

2008 *Organization Studies* published a special issue on 'Organization Studies as a Science for Design', and the theme of the 2012 EGOS conference in Helsinki was Design. In 2004 *MISQ* published 'Design Science in Information Systems Research' (Hevner et al., 2004), the most cited article of a new body of design research that has reached mainstream Information Systems' journals. In the field of education studies, design research has gained popularity in the last couple of decades and has been frequently applied in the area of technologies for learning (Cobb et al., 2003; Mor & Winters, 2007).

In the aforementioned research, *The Sciences of the Artificial* (1996), by Herbert A. Simon, remains highly influential. In this seminal book the author formulates the relevance and characteristics of a science of design. He asserts that "everyone designs who devises courses of action aimed at changing existing situations into preferred ones" (p.111), and suggests that if natural sciences deal with natural objects and phenomena, a different sort of sciences are needed to study the artificial, the man-made. Historically, Simon's efforts to develop a science of design can be seen as the culmination of a decade, the 60s, marked by the aspiration to scientize design, in a context where science, technology and rationalism were seen as the way forward to tackle human and environmental problems that politics and economics were not able to solve (Cross, 2001).

In contrast to the natural sciences, the sciences of the artificial are concerned with the contingent, not with how things are but "with how things ought to be in order to *attain goals* and to *function*." (Simon, 1996, p.4). Thus, Simon's perspective on design is framed by a technical rationality and concerned with aspects such as efficiency and utility.

Indeed, technology development and learning interventions share a designerly disposition, and a focus on intervention and positive change, which tends to be frequently associated to discourses of innovation. Not surprisingly, IS, learning sciences, and education research and practice have tended to adopt technical rational, or instrumental perspectives, in their efforts to develop, for instance, knowledge that can guide the construction of robust technologies to support organisations and work practices, or efficient methods to assist people or

organizations in the acquisition of new knowledge. In the following sections of this literature review I will discuss the contributions and underlying theoretical assumptions of literature concerned with the use of technology to support learning in the fields of education, OMS, and IS.

Research in IS, however, has shown that the development and implementation of IS cannot be explained by focusing exclusively on technical and rational perspectives, and that the development and use of ICTs in organisations is only partly the result of formal decisions deriving from specific economic, managerial or technical rationales (Avgerou, 2002). More generally, a socially embedded perspective to the study of design and technological and learning interventions can contribute to our understanding of the difficulties of achieving change by design.

Design thinking tends to assume a position of externality, even of neutrality, in its aim of taming the world, and it frequently assumes that designers are the main agents of design. However, some authors (Kimbell, 2011; Margolin, 2002; Suchman, 2011) have argued the need to rethink design in its political dimension and as a distributed social accomplishment in which humans and the material play a part. Furthermore, from a performative approach based on a relational ontology design can be understood as contributing to constitute the world in specific ways, as a process of mattering taking place within a larger configuration of the world, and as such in constant process of negotiation (Barad, 2007). This is the view adopted in this thesis, and it will be developed further in the theoretical chapter.

2.3 Teaching, learning, and technology in higher education

Teaching and learning in higher education (HE) is quite a recent field of research in the UK. Following some sporadic works in the 1960s and 1970s, scholarship in this area started to thrive in the 1980s, coinciding with the transformation of HE from an elite to a mass higher education system, and with the subsequent growth of staff development in HE (Malcolm & Zukas, 2001). As some scholars have argued (Case, 2007; Haggis, 2003; Malcolm & Zukas, 2001; Trowler, 2005; Webb, 1997b), literature of teaching and learning in HE mostly draws on learning sciences.

As stated in *The Cambridge handbook of the learning sciences* (Sawyer, 2006), the goal of learning sciences is "to better understand the cognitive and social processes that result in the most effective learning, and to use this knowledge to redesign classrooms and other learning environments." From this definition it is possible to appreciate that the main concern of learning sciences is instrumental or technical-rational. That is, it aims to produce knowledge that can inform practitioners on how to achieve the goal of students' learning by designing effective learning interventions.

The most influential learning theories, grounded on psychology, are behaviourism, cognitivism and constructivism (Carlile & Jordan, 2005). While they tend to be presented as competing theories, each of them have brought important insights on to how learning takes place and can be supported, and have influenced teaching practice in higher education.

Behaviourism is primarily associated with Pavlov (Russia) and Skinner (USA). It posits that there is an association between stimuli and response, and concentrates on developing strategies to achieve desired changes on observable behaviours. From this perspective, teachers can condition the behaviours and learning of their students, and this can be reinforced with rewards or punishments. For instance, established practices in higher education in the UK such as examinations, assessment, and feedback are forms of recognition that do have an effect in the effort students put in their studies and what they learn (Boud & Falchikov, 2007; Walker, 2014) and assume a certain correspondence between learning design and achieved changes in students' behaviour or learning. In this regard, the established practice of defining tangible learning outcomes is based on a behaviourist perspective, which assumes that teachers can design courses of action leading to specific changes in learner's behaviour, skills or knowledge. Such view underlie Gagné's (1974) instructional learning sequences, which assume a correspondence between the design of a learning action by a teacher and a given response by the learner.

From another standpoint, cognitivism focuses on how learners process and organise their knowledge in their brains. Cognitivism has been both influential in

the development of pedagogical knowledge, and in the study of expert knowledge underlying important contributions in artificial intelligence (Piaget, 1954; Bobrow & Collins, 1975; Liebowitz, 1997). Techniques and learning interventions that develop strategies for thinking draw on cognitivist insights. To exemplify these, in HE, cognitive approaches underlie the "Critical thinking movement" (Carlile & Jordan, 2005, p.18), which has resulted in explicit efforts in practice to develop student's critical thinking, and has lead to a questioning of dominant didactic approaches. Also influential are studies on memory and knowledge retention (Miller, 1956), the theory of scaffolding learning (Cameron, 2007; Reingold et al., 2008; Vygotsky, 1987), and Bloom's (1956) taxonomy, offering a model of the different levels of cognition that students need to develop.

While much of the teaching practice in HE is grounded on the two previous perspectives, we can perceive a certain shift towards more constructivist approaches among educational theorists in the recent years, which have also penetrated in discourses of best practices in higher education institutions. Constructivism has highlighted that our knowledge is constructed and that we build it on previous knowledge and experience. Thus, learning theories that draw on a constructivist paradigm point at the importance of considering students' previous knowledge and experiences, and have put forward notions such as experiential learning (Kolb, 1984), and student-centred learning. Whereas behaviourism assumes that teachers have control of learning interventions and understands students as passive receivers, constructivism understands the role of the teacher as a facilitator that supports students' learning. As a result, research has suggested the need to facilitate students' independent learning (Biggs, 1999), reflective learning (Brockbank & McGill, 1998), and to support a variety of learning styles (Gardner, 1983; Honey & Mumford, 1992), by adopting a range of teaching strategies.

A branch of constructivism that has recently gained support among educationalists is social constructivism. Grounded on Vygotsky's research (Vygotsky, 1987), social constructivism reacts against the view of the learner as an isolated rational being. They suggest that knowledge is socially constructed and highlight the importance of others as learning mediators (Carlile & Jordan, 2005). This has resulted in the view that collaborative or peer learning should be promoted. As I

will discuss later, it is interesting to see how such notions have been mutually reinforced by a positive view of ICT-mediated learning as facilitating collaborative environments for learning.

While social constructivism is gaining acceptation, Case (2007) contends that dominant theories on students' learning are grounded on psychology, and they still predominantly focus on the cognitive aspects of the learning experience, with concepts such as 'learning styles' or 'approaches to learning'. In a critical review of the literature on learning styles, Coffield et al. (2004) claim that research on learning styles is overall not convincing and that it does not seem to be the most straightforward or effective way to support students' learning. Again, one of the criticisms is that this literature tends to focus on intrinsic and cognitive characteristics of students, disregarding important social and contextual aspects.

In this regard research such as that of Mora & Escadíbul (2007) show how several aspects related to students' previous learning experiences and their social environment affect their performance at university: the kind of school that they attended, school location, mother's work, etc. Furthermore, as Case (2007, p.330) puts it, "a wide range of aspects of student life all have a crucial bearing on the quality of learning that they are able to experience."

Similarly, Towler (2005) suggests that research on teaching and learning in higher education tends to adopt psychologically-based approaches, and it is interested in analysing how the process of teaching and learning can be enhanced. While this body of research has resulted with some helpful advice for practitioners, and has been influential in the way teaching quality is assessed, the focus of analysis situated at the level of interaction teacher-student in the classroom, promotes a "limited conceptualisation of pedagogy as an educational 'transaction' between individual learners and teachers." (Malcolm & Zukas, 2001, p.33). This focus leaves out of view the influence of the socioeconomic and cultural context on learning experiences (Case, 2007; Mora & Escardíbul, 2007), and learning is usually discussed without consideration of the content of that learning, or the aims of education (Biesta, 2005). Thus, the aforementioned scholars suggest a shift towards a view of learners and HE as socially and historically located.

Trowler (2005) argues that literature in the area of HE mostly falls within two groups. On the one hand, a dominant body of research adopts the very situated, cognitive view of learning just described, and focuses on the micro-level of analysis of teaching and learning practices in the class setting. On the other hand, research in the field of the sociology of education has traditionally delved with compulsory education, but some scholars have studied aspects of HE. This research adopts a macro-social perspective and discusses issues such as the history of education systems, education policy, and the differential effects of social class, ethnicity, or gender on educational attainment (e.g. Case, 2007; Mora & Escardíbul, 2007). From a social science perspective there is also research on HE undertaken by organization studies and education science scholars at the level of the organization; however this literature tends to focus on organizational aspects—for instance the introduction of new public management forms of organizing—, or on the research side of academic work (Bleiklie & Henkel, 2005; Bleiklie & Kogan, 2007; Gläser, 2012; Kogan, 2000; Prichard & Willmott, 1997). Only recently some researchers in the education sciences field have started to show interest in studying learning and teaching practices at a meso-level, focusing on the teacher as a practitioner in an organizational setting (Fanghanel & Trowler, 2008; Trowler, 2005). This research examines teaching and learning from a socio-cultural theoretical perspective of practice, and explores how the institution, the discipline, pedagogical beliefs, academic labour, and external factors, all play a role in how teaching is practiced. This thesis contributes to this literature.

A similar diagnosis can be applied to research in the area of educational technologies. While there is some literature with a sociological sensitivity that has analysed issues such as the relationship between the knowledge economy discourse, economic interests, and the expansion of information and communication technologies (ICTs) in HE (Clegg et al., 2003; Darking, 2004; Garnham, 2000; Selwyn, 2008; Selwyn, 2013), research in e-learning, or educational technology, is overwhelmingly dominated by “learning science” approaches, which adopt psychologically inspired perspectives on learning. This research is concerned with analysing how the use of ICTs can enhance learning.

Research in this area has tried to provide advice on how different media and e-learning practices can support different approaches to learning (Conole et al., 2004; Laurillard, 2002); for instance it has been suggested that web2.0 can promote the interaction among learners and active learning as learners can become content producers (Siemens, 2008). Without adequately considering organizational, institutional, or contextual aspects implicated in the implementation and use of technologies for learning, much literature tends to focus on how the functionalities of certain technologies can support pedagogical interventions. For instance, research praises and analyses how ICTs can support personalisation, collaboration and socio-constructivist approaches of learning (Conole & Alevizou, 2010, p.10). In fact, as some authors have suggested, the advent of ICTs in education has mutually reinforced the adoption of diluted versions of social-constructivist approaches to learning that talk about facilitating learning through collaboration (Haugsbakk & Nordkvelle, 2007; Holley & Oliver, 2000).

While some education technology researchers seem to assume that ICTs will lead to social forms of learning, as some research suggests (Selwyn, 2009; Selwyn, 2010b) there is no evidence that the penetration of ICTs in formal education has significantly changed learning practices, nor that the idea of many-to-many participation fostered by Web 2.0 corresponds to reality. In fact, even in successful projects outside education, like Wikipedia, most people consume passively instead of contributing to make the content, as the enthusiastic discourse about Web 2.0 would have it.

Despite the remarkable influence of social constructivist approaches in learning sciences, it tends to be narrowly reinterpreted in consonance with the psychologically inspired orientation of this research. In fact, literature in the area of learning technologies that refers to “socio-constructivism” frequently omits any reference to organizational, political, social or cultural aspects implicated in e-learning. Social constructivist approaches like communities of practice (Wenger, 1998), which are analytical, are taken almost as a normative theory of learning to justify the advantages of collaborative environments and even the use of TEL in formal education (e.g. Evenbeck & Kahn, 2001; Hodgkinson-Williams et al., 2008; Rogers, 2000). However, collaboration is frequently reduced to interaction among

individuals, in an acontextual way, resulting in individualistic and monistic perspectives of learning.[1] In the recent years these received perspectives of CoP have received several critiques from some educational scientists (Barton & Tusting, 2005; Hughes et al., 2007).

Furthermore, this body of literature has been dominated by optimistic and technological deterministic views of technology, with discourses ranging from the assumption of the transformational effects of technology in education (Bonk, 2009; Iiyosh & Kumar, 2007), also present in policy discourses in the UK and Europe, or a milder, more common version, which focuses on the potentials of such technologies to support learning, with the implicit or explicit assumption that it will improve education (Conole & Alevizou, 2010). There are also those that see it as an imperative in the digital age, because digital literacy is essential (Plowman et al., 2010), because students are digital natives and that is how they are used to doing things (Palfrey & Gasser, 2008), or because this is the only way to ensure that education can expand despite limited resources (Laurillard, 2008a). In much of this writing there is a sense that education is lagging and that it needs to keep up with changes in society, which generates the impression that we need to keep "running just to keep in place". (Boody, 2001).

The lack of consideration of social aspects in both theories of learning and technology in dominant approaches in the study of educational technology results in this gap between rhetoric and outcomes. As some authors have recently argued (Oliver, 2013; Selwyn, 2011b) more research is needed that moves beyond instrumentalist views of educational technology. Indeed, with few exceptions, and mainly by authors who are not educationists (Darking, 2004; Dutton et al., 2004;

[1] I share with Kotzee (2010) the view that in much of the literature in learning sciences the notion of constructivism used to refer to pedagogical interventions is very different than what constructivism as a theory of knowledge conveys. Learning collaboratively or through discussion in formal education, does not lead to a social construction of knowledge, because "what needs to be learned" has usually been (at least to a degree) already determined by the teacher. Indeed, a social constructivist approach would emphasize, for instance, that the teacher, with the influence of the discipline, institution, etc. has the authority to establish what the legitimate knowledge is, what is considered correct or incorrect. And from a critical perspective (which is present in some social constructivist theories such as CoP), one could discuss which voices cannot speak, and which sort of realities the dominant discourses and knowledge of a discipline helps reinforce. All these issues are out of view in most of the literature on teaching and learning, particularly in HE research.

Selwyn, 2011b), not much research has considered the organizational, socio-economic, cultural and political contexts in which educational technology is designed and used to try to explain why and how educational technologies are implemented and used (or not) in practice. While literature in the field of education tends to undertheorize technology and give it for granted, only recently there seems to be an effort by a small number of authors to consider seriously how technologies and materiality are implicated in learning (Fenwick & Edwards, 2013; Fenwick & Landri, 2012; Oliver, 2013). Finally, adopting a critical approach, Selwyn (2011b), and Selwyn and Facer (2013) are spot on when they argue that many substantial questions remain unasked in the area of educational technology, not least why technology is really needed in education, or whose interests this serves.

Not only many questions remain unasked and many assumptions remain unchallenged, but also there is not much discussion around other implications of the introduction of ICTs in educational settings beyond the area of students' learning, while in the meantime, for instance, an important process of data-driven audit culture is taking place, in a move towards "governing education through data" (Ozga, 2009). In this regard, there is almost no research analysing how technologies affect or support teacher's work, or properly addressing why educational technology is adopted or not.

However, technologies are starting to be developed which aim to support the design of learning and teaching plans, and facilitate that teachers can share teaching practices and resources. Learning design is an incipient but international field of study, and several research projects have developed technologies with the view of facilitating the exchange of ideas about teaching (Agostinho et al., 2009; Conole et al., 2006; Dalziel, 2012; Koper & Olivier, 2004; Laurillard et al., 2013). Thus, these technologies are frequently presented as collaborative environments designed to help teachers learning from each other's experiences, and building on the work of others. It is an area of research developed by educational technologists and it has an important component of trying to promote the reuse of digital educational resources and to encourage the use of educational technologies to support learning in formal learning (especially in higher education). Therefore, it frequently takes for granted that the adoption of ICTs for learning is necessary to improve the

quality of education (e.g. Agostinho, 2006; 2009), and that what is needed to promote wider adoption and innovative uses of technology enhanced learning (TEL) is to help teachers to do so with such tools.

Some of these technologies are just prototypes, but some are being used, for instance LAMS[2] and Cloudworks[3]. The still marginal but increasingly influential literature on learning design technologies tends to be undertaken by those that promote or develop them. It refers to the aims and underpinnings of such projects, and even to design aspects and methods. We also find research that evaluates how this technology is being used in individual cases. Therefore, it is a literature that assumes the positive potential of such technologies, and adopting a technical rational perspective is interested in developing technologies that can better capture knowledge about teaching practice and students' learning, and that aims to facilitate that practitioners can share this knowledge (Agostinho et al., 2009; Bond et al., 2007; Britain, 2004; Conole et al., 2004; Conole et al., 2006; Conole, 2010; Hernández-Leo et al., 2006; Koper & Olivier, 2004; Laurillard et al., 2013; Lucas et al., 2006; Masterman & Lee, 2005). Research remains to be done considering the entwinement of such technologies with their social context of production and expected use, and critically assessing the rationales and values driving these projects. Such research would challenge some of the implicit epistemological underpinnings, perceptible in developing *neural* frameworks and representations in technologies that support the design of learning interventions in HE, and knowledge sharing among teachers / academics, with the aim of achieving innovation in teaching practices.

This thesis addresses this gap. To do so, I draw on OMS and IS literature as the Learning Designer can be seen as a case of professional ICT-mediated learning. In fact researchers of the LDSE project have drawn in their publications on concepts such as organisational learning, knowledge management, and open innovation (Laurillard, 2002; Laurillard et al., In preparation). I take the LDSE as a case of the

[2] The Learning Activity Management System (LAMS), is an authoring tool, and it is a project led by James Dalziel: http://www.lamsinternational.com/

[3] Cloudworks is defined as "a social networking site for finding, sharing and discussing learning and teaching ideas and designs" (http://cloudworks.ac.uk/).

more general phenomenon of ICT-mediated collaborative learning initiatives aimed at achieving innovation in work practices, based on concepts such as communities of practice and reflective practitioners; therefore, I discuss in more detail the specific characteristics and theoretical underpinnings of the Learning Design approach in the case narrative chapter and I analyse it in the analysis chapter.

Historically research on learning has been developed mainly in the fields of psychology, learning sciences, and education research. However, since the mid-1990s, in the context of the so-called knowledge economy, learning and knowing in the workplace has attracted strong interest in management and organization sciences (Fenwick, 2008a; 2008b). In what follows I review this literature, but before doing so, I will briefly refer to an area of research that had delved with "expert knowledge" decades before: I am referring to the sociology of professions.

2.4 Professionals and expert knowledge

A profession has been defined as "an occupational group with some special skill" (Abbott, 1988, p.7) that possesses specialized expert knowledge, a certain level of autonomy and power, and shared norms and values that establish legitimate professional conduct (Johnson, 1972). In the mid-20th century traditional professions (medicine, law, architecture, scientists and academics, etc.) enjoyed a "golden age"; with it the classical sociology of the professions flourished and established professions as one of the institutions sustaining social order (Parsons, 1951; Merton, 1958). Professionalism was seen as a distinctive way of controlling and organizing work, differentiated from the hierarchical, bureaucratic and managerial forms of organization and control of industrial and commercial settings (Evetts, 2013). Earlier studies mostly adopted an essentialist and taxonomist perspective, and concentrated efforts on conceptualizing profession and professionalism, and in determining which occupations met those definitions, without reaching a clear agreement (Carr-Saunders & Wilson, 1933; Cogan, 1953; Goode, 1957; Becker, 1962). In addition, the definition of traditional professions as being an essentially different category can be seen to reproduce a classist value system that reinforced the hegemony of some occupations in contrast to others, by

establishing what counts as knowledgeable jobs. In trying to overcome the difficulty of offering a clear and fixed picture of what a profession was, some authors turned to study professionalization (Freidson, 1973) and professional projects (Larson, 1977). In this way they introduced power as a key explanatory variable and offered analyses of the complex processes by which occupations tried to achieve power and gained the status of a profession (Gläser, 2012). From this perspective an occupation becomes to be considered a profession, not because of its intrinsic characteristics or the sort of knowledge used, but it is a status achieved through complex social processes.

Four main attributes of professionalism were emphasized in the earlier literature: 1) expert knowledge, 2) technical autonomy and professional association, 3) high status and income, and other rewards, and 4) a normative orientation toward the service of others (Gorman & Sandefur, 2011). For Abbot (1988) and others, a hallmark of professionals is that they draw on expert, abstract knowledge, which they apply to solve particular issues. The possession of such knowledge legitimises the status and prestige of professionals, and it is a source of power and authority. Some scholars suggested that when this knowledge cannot be easily codified and professionals need to draw on tacit, experiential knowledge, the legitimacy of such profession might be more easily sustained as it is not so easily appropriated by others (Wilensky, 1964; Jamous & Peloille, 1970). In addition, professionals exert control over their specialist knowledge and enjoy technical autonomy. As experts, they are the ones with the power to determine what is correct or not. To protect this autonomy professional groups are typically organized into associations that regulate the profession without interferences from outside (Freidson, 1970). Professional associations act as gatekeepers and boundary-makers of the professional jurisdiction (Abbott, 1988), by protecting their rights and interests, and by regulating access to the profession. Associations define the necessary skills to become a legitimate member, and establish standard professional behaviour, values and norms. Thus, professionals are bound to a specific regime of work.

Furthermore, Goode (1957) suggested that a main distinctive trait of professionalism is a normative orientation toward the service of others; that is, professionals serve the public good and they serve the client’s interest above their

own. Professional communities and associations are the ones enforcing ethical norms through socialization and social control. Finally, professionals enjoy a relatively high status and income, and they receive other rewards. Scholars have offered divergent explanations for this. Functionalist approaches claimed that the tasks professionals perform are of vital necessity for society (Davis & Moore, 1945), while others suggested that professions protect their jurisdiction and rights (Abbott, 1988), and actively seek to achieve status, power and wealth (Freidson, 1970).

In the 1970s and 1980s, while the classic sociology of professions was still focussed on determining the essential attributes of professionals and developing a taxonomy of professions, the important process of transformation of professional and occupational work, still under way, had already started (Gorman & Sandefur, 2011). Traditional professionals are now mostly employed by organizations, which have increasingly adopted managerial forms of governance. In this context, professionalism is mostly defined and imposed "from above" (McClellend, 1990); that is, the relation professional-client and the services to be offered are decided by the employing organizations. In addition, in our audit society (Power, 1997), management enforces audit and performance measures that interfere with the autonomy of professionals, and trust becomes suspended. In this culture of performativity, faith in the judgement of professional or expert knowledge is relegated in favour of sophisticated regimes of accountability, and efficiency measures (Brint, 2001; Dent & Whitehead, 2002b). In the public sector, with the implementation of the new public management the state is redefining professionalism so that it becomes more commercially aware, efficient, and entrepreneurial (Hanlon, 1999, p.121), blurring the boundaries between public and private sectors, and between professionalism and managerialism. In this context, the discourse of professionalism becomes a new disciplinary technique, in which professionals are in a constant quest for improvement in an increasingly competitive and scrutinized environment (Dent & Whitehead, 2002b; Evetts, 2013). As Dent and Whitehead put it (2002a, p.3):

> "The new professional that is given birth is identified by the discourses that usher it into existence. These discourses speak of the flexible, reflective

> practitioner, the teamworker, lifelong learner, a person concerned to constantly update their knowledge and skills base, to be market-orientated, managerial, if not entrepreneurial"

In this milieu, decision-support systems and ICT-mediated professional learning have been heralded as a means to improve, rationalize, and innovate professional practices. In addition, the internationalization of the economy further challenges the control that professionals had over their jurisdiction: on the one hand, professional labour has become transnational, and professionals have to face market and labour competition beyond their jurisdiction (Faulconbridge & Muzio, 2008); on the other hand governments have made an effort to standardize higher education degrees—specially across Europe—to facilitate workers' mobility, interfering in professionals' control over the skills required to become a legitimate member of the professional community. Furthermore, with the opening of higher education to larger—and previously excluded—portions of the population in the 1980s professions have faced a demographic transformation (Epstein, 1993). Besides, new occupations have emerged that offer services based on expert knowledge (financial analysts, public relations and management consultants, biochemists, etc.) without sharing other characteristics of the traditional professional logics (Gorman & Sandefur, 2011).

As Gorman and Sandefur (2011) argue all these changes undermined the traditional theoretical frameworks in the sociology of professions. Medicine, law, etc. could not be seen anymore to be essentially different from other occupations, and from 1990s the field became quiescent. However, framed in different ways and in various disciplines research on professional (now understood in a broader sense) and expert or knowledge-based work has continued, and it has gained momentum due to the importance and growth of what is considered knowledge-based work in our economy. While contemporary research is not interested anymore in offering categorical definitions about professions and professionalism, much of this literature explores some of the themes of the traditional sociology of professions, which are still relevant, namely issues of expertise, autonomy, status, etc. Now the attributes of the traditional professional work and the difference between

profession and occupation are seen as a matter of degree (Evetts, 2003) and the scope of research has broadened to new forms of knowledge-based work.

Across different disciplines, substantial attention has been paid to understanding what constitutes expert knowledge and how it is acquired (Dreyfus & Dreyfus, 2005). Research has also examined how professionals or knowledge-based workers apply their knowledge to solve specific problems (Barley, 1996; Blasi, 1995; Cimino, 1999; Mertz, 2007). A significant body of literature has been concerned with exploring how expert knowledge is or can be communicated, codified and transmitted, and how learning can be supported (Brown & Duguid, 1991; Nonaka, 1994). A smaller but instructive body of research, mainly in the area of health, has examined processes of rationalization and codification of expert knowledge and the implications for the nature of professional work (Berg, 1997; Timmermans & Berg, 2003). As I will discuss later, a central theoretical device in all this research is the distinction between tacit, experiential knowledge, and explicit, formal knowledge (Collins, 2010; Polanyi, 1958). Finally, a smaller group of researchers, from critical perspectives have questioned the discourses on expert knowledge, knowledge economy, and learning as reinforcing a specific social order (Contu et al., 2003; Contu & Willmott, 2003).

In what follows I expand the discussion on these issues, by offering a review of the main topics and perspectives in the fields of organization and management sciences, and information systems, regarding the role of ICTs to support knowledge sharing, learning, and innovation within organisations and beyond. I start by framing the burgeoning of this area of research in the context of the so-called knowledge economy.

2.5 Knowledge and learning in organizations

2.5.1 The imperatives of the knowledge economy & the blooming of a new academic field

ICTs play an important role in the accumulation and generation of data and information. In the context of what has been labelled the ‘Information age’ or ‘Knowledge society’ (Bell, 1999; Castells, 2001), ICTs have been portrayed as making a wealth of information readily available and driving the development of a

knowledge society, in which knowledge work and innovation take central stage in the economy, and education and lifelong learning are presented as a priority in policy discourses.

Furthermore, the networking capabilities of the Internet, which allow easy distribution of information across geographical and organizational boundaries, has supported geographically distributed collaborative projects, and the rise of nonmarket production undertaken by effective, large-scale cooperative efforts, in what Benkler labels Commons-based peer production, and other authors put under the umbrella of crowdsourcing. In addition, Open Innovation (Chesbrough, 2003) is seen as a new paradigm for firms that want to stimulate innovation in a "landscape of abundant knowledge", which suggests that firms can and should use external ideas as well as internal ideas, and internal and external paths to the market. (Chesbrough, 2003, p.xxiv). Learning and knowledge sharing are therefore conceived as resources to achieve innovation.

In this milieu, information and communication technologies (ICTs) have been perceived as key 'tools' to facilitate knowledge sharing, collaborative learning, and as means to improve, rationalise and innovate working practices. Therefore, since the 90s, important investments and research efforts have been directed into devising technologies to foster learning and knowledge sharing in organisations.

In the field of organization studies the discourse on knowledge and learning in organizations finds its origins in the concept of organizational learning (OL), introduced by Cyert and March (1963). These authors proposed the idea of organizational learning as part of their behavioural theory of the firm, to refer to the fact that organizations learn from their experience and learn to adapt to the environment. The book by Argyris and Schön (1978) on organizational learning is regarded as laying the foundations of this area of research; however, it was in the 90s that the identification of knowledge and learning as sources of competitive advantage gave rise to an unprecedented interest in the study of knowledge and learning in the research fields of management, organisation studies (OS), and information systems (IS).

A special issue of *Organization Science* in 1991, with articles broadly concerned with how to maximize the efficient use of knowledge, popularized the study of organizational learning. In the same decade, and coinciding with the internet boom, knowledge management (KM) arose as a new managerial practice and academic field. The work of Nonaka (Nonaka, 1994; Nonaka & Takeuchi, 1995) gave a certain academic legitimacy to this field, and it became very popular among management consultancies.

2.5.2 The codification debate

One of the most central and controversial issues in the literature about knowledge in organization studies is the very definition of knowledge. Similarly, the concept of learning is used to refer to a broad range of phenomena, "from individual information acquisition to cultural transformation or even political emancipation" (Fenwick, 2008a, p.231). Diverse epistemological perspectives have generated different views on the ways in which individual and organisational learning takes place, knowledge is created and shared, and the way ICTs can support or be involved with these tasks. As I will further discuss, we can basically distinguish the more positivistic approaches, which objectify knowledge, from approaches that take a more interpretive or constructivist perspective regarding knowledge, and conceive it as embedded in and inseparable from practices.

A key concept in this debate, grounded in the highly influential work of Polanyi (1958), is that of tacit knowledge. In contrast to explicit or codified knowledge, tacit knowledge has been described as residing within the individual, "known but extremely difficult or in some cases impossible to articulate or communicate adequately" (Newell et al., 2002). An example repeatedly used to illustrate this notion is riding a bike: it is something that you can do easily once you have learned how to do it, but it is difficult to explain or to articulate the rules behind the ability to balance the bike. Based on this dichotomy, the debate around codification and transmission of knowledge dominated the early literature of KM: What knowledge can be codified? Can tacit knowledge be transferred? How can ICTs support it?

In the mid-90s, coinciding with the optimism of the potentials of ICTs, some literature was concerned with the use of ICTs to facilitate and reduce costs of

knowledge codification and transfer. In the more extreme view, all knowledge is considered to be codifiable. Tacit knowledge, in this view, is knowledge that has not been spelled out, and it is more difficult to codify, but with enough effort and "codebooks" it can be made explicit. For example, Dasgupta and David (1994) and Cowan *et al*. (2000), consider that ICTs favour the falling costs of the transmission of information, and that codification reduces the degree of tacitness. Following an economic rationality, the decision as whether knowledge ought to be codified or not should be based, in their view, on an analysis of costs and benefits. Adopting an objectivist perspective of knowledge, in their argument underlies the assumption that codified or codifiable knowledge is the most relevant to economists.

We find also some KM literature that while acknowledging the existence of some tacit knowledge, still focuses on the use of ICTs to codify and transmit explicit knowledge. In this view, tacit knowledge is embedded in people and highly contextual and sticky (Hippel, 1994), and it cannot be properly codified or decodified. Yet, the use of ICTs to codify and transmit explicit knowledge is seen as fairly straightforward by some commentators (e.g. Meso & Smith, 2000). Similarly, in management practice Davenport and Prusak (2000) found that 80% of the knowledge management projects they reviewed involved some form of knowledge repository.

From a managerial perspective, articles such as Desouza (2003), Hansen *et al*. (1999), Kankanhalli *et al*. (2003) or Zack (1999), put forward best practices to manage knowledge in organisations and discuss the role of ICTs in supporting knowledge exchange. In all cases a knowledge-based view of the organisation[4] is somehow present, and knowledge is seen as an asset to build competitive advantage. As Zack (1999, p.45) points out, "to remain competitive, an organization must efficiently and effectively create, locate, capture, and share knowledge and expertise in order to apply that knowledge to solve problems and exploit opportunities." Hansen *et al*. (1999) and Kankanhalli *et al*. (2003) make reference to two possible approaches to manage knowledge, i.e. codification and

[4] The knowledge-based view is based on the resource based view of the firm, but knowledge is seen as the main resource or asset to achieve competitive advantage.

personalization. In this second approach “more tacit and unstructured knowledge is shared largely through direct personal communication.” (Kankanhalli et al., 2003, p.69). These articles suggest that firms should focus on one approach or the other, depending on the characteristics of the organisation.

Some of the previous articles (e.g. Desouza, 2003; Roberts, 2000) hint at an interest that is focal for many contributors in KM and organizational learning (OL): given the importance of tacit knowledge and the fact that it cannot be codified (or can be codified only with great difficulty), how can it be transmitted and shared? In this sense, one of the recurrent concerns of managerial approaches is how to ensure that expertise is shared. Much literature suggests that organizations can promote the sharing of tacit knowledge by facilitating face-to-face communication and observation of practices. Changes in organisational culture are seen as necessary, so that those who are experts are rewarded for sharing their knowledge.

Nonaka, one of the most influential authors in KM, criticises the fact that many researchers and managers have focused on the transfer and sharing of knowledge, as if information and knowledge were inputs given to organisations, which needed to be processed. This implies a static and passive view of the organisation. In contrast, he offers a processual perspective, and proposes a “dynamic theory of organizational knowledge creation’” (Nonaka, 1994), conveying the active and creative character of organisations. The importance of organisational knowledge[5] creation in a managerial perspective lies in the fact that it is highly situated and therefore difficult to imitate and becomes a competitive advantage. Several other models share this perspective and the idea of the processual and embedded character of knowledge.

For Nonaka, the most important role of KM is to facilitate a dynamic creation of organisational knowledge and its distribution. Grounded in empirical research of Japanese companies (see also Nonaka & Takeuchi, 1995), he suggests an analytical and normative model, in which he identifies four different processes through which

[5] Some authors distinguish the field of organizational knowledge from knowledge management (Easterby-Smith & Lyles, 2012). The latter has an important focus on the use of ICTs to transmit knowledge, understood asinformation; the former introduces a processual view of knowledge acquisition and creation.

knowledge is created: socialization, combination, externalization and internalization. He concludes that organizations play a critical role in mobilizing tacit knowledge held by individuals and provide the forum for a "spiral of knowledge" creation. In his view, a middle-up-down management is the most appropriate to facilitate such knowledge creation.

All in all, an important part of knowledge management literature falls within the "codification debate" (Ancori et al., 2000). That is, concerned with implementing strategies to create and exchange knowledge, it has put forward different taxonomies of knowledge (tacit/explicit, know-what/know-how, etc.) and different strategies to facilitate the generation and management of these different sorts of knowledge. Therefore, it mostly takes an instrumentalist perspective. In addition, KM grants an important role to ICTs in leveraging knowledge. Easterby-Smith et al. (2000) assert that 70 per cent of publications on knowledge management focus on technological aspects. Indeed, much of the earlier literature was written from an information technology perspective that neglected social and cultural factors.

As regards organizational learning, an important body of literature has also adopted a cognitivist perspective, and it has discussed issues such as knowledge acquisition, information distribution and interpretation, and organizational memory (Huber, 1991). From this perspective, organizational learning is an efficient method to acquire and respond to internal and external information (Chiva & Alegre, 2005). One of the long-standing debates in this literature is whether organizational learning refers to what individuals learn in the context of an organization (March & Olsen, 1975; Simon, 1991), or if organizational learning is more than the sum of the individual learning (Hedberg, 1981). From this second perspective, organizational memory preserves certain mental maps, behaviours, norms and values over time, while individuals come and go. The problem of this perspective is that it tends to project theories of individual learning into organizations, treating them as if they were human beings (Cook & Yanow, 1993).

2.5.3 Social constructivist perspectives on knowledge: Knowing and learning in practice

Several authors (Brown & Duguid, 2001; Cook & Brown, 1999; Gherardi, 2000; Newell et al., 2002; Orlikowski, 2002; Tsoukas, 1996) have been critical towards the way knowledge and learning in organizations has been studied in mainstream KM and OL literature, tending to conceive knowledge as an asset, static and objective, and therefore universal. Even authors such as Nonaka, who recognise social aspects in the process of knowledge creation, they still assume the separability of tacit and explicit knowledge and they tend to focus on the importance of making knowledge explicit. Conversely, authors adopting practice-based theories of learning suggest that tacit knowledge is present in all knowledge, and that it cannot be separated from explicit knowledge. They recognise that knowledge is dynamic, provisional, socially constructed and situated, and that it is continuously shaping people, and being shaped. This literature mostly situates knowing and learning in practice, and has adopted new units of analysis such as "communities of practice" (Lave & Wenger, 1991; Brown & Duguid, 1991), "activity systems" (Engeström, 1999) or "actor-networks" (Law, 1992).

In the 1991 special issue of *Organization Science* dedicated to organizational learning, Brown and Duguid (1991) published an article that initiated this alternative tradition in the study of knowledge and learning in organizations. They draw on Lave and Wenger's (1991) concept of communities of practice to highlight that those are sites of learning and innovation frequently overlooked by management. But it was the article by Cook & Brown (1999) that offered a full critique of the epistemological underpinnings of the codification debate in KM and introduced the concept of knowing. Drawing on structuration theory, they suggest that much KM literature is based on an "epistemology of possession", and they call for the need to consider the interplay of knowing and knowledge. Knowing is seen as dynamic, concrete and relational, in contrast to knowledge, which is a tool for knowing. Knowing needs action and interaction with the social and physical world. Therefore, the authors argue, the management of organisational knowledge should not focus only on the knowledge that is possessed by individuals and organizations, but on organisational practices.

Orlikowski (2002), however, also drawing on structuration theory as well as the anthropological studies of Lave (1988), Hutchins (1991; 1995), and Suchman (1987), suggests pushing Cook & Brown's (1999) argument further, emphasizing the concept of knowing in practice. While Cook & Brown (1999) introduced the concept of knowing, they maintain the distinction between tacit and explicit knowledge. Tacit knowledge, in Orlikowski's view, is a form of knowing. She asserts that much literature treats "knowledge as either a thing (to be captured, stored, transmitted, etc.) or a disposition (whether individual or collective) resulting in 'objectivist reification' on the one hand or 'subjectivist reduction'." (p. 250). In this second literature she includes the work of authors like Brown and Duguid (1998), who distinguish between know-what and know-how, and define know-how as the ability to put the know-what in practice. In contrast, Orlikowski (2002) stresses the mutual constitution of knowing and practice. From this perspective, knowledge does not exist out there; knowing is enacted in every day practices over time.

Critical of the concept of 'best practices' and transfer of knowledge of managerial approaches, Orlikowski highlights that "continuity of competence, of skilful practice, is thus achieved not given. It is a recurrently but nevertheless situated and enacted accomplishment which cannot simply be presumed." (p. 253) Thus, competence or expertise is provisional, always enacted, always to be achieved, and it cannot be transferred. What is considered a "useful practice" is contextual and provisional.

What approaches based on structuration theory did not account for adequately is the role of technologies and the material in mediating social practices and learning, as they are based in a humanist tradition that makes humans the centre of action. As Ira Cohen (1996) suggests, a clear distinction can be made between, on the one hand, theories of action that privilege the study of individuals and the intentionality of actors and assume meaningful action, and on the other hand theories of practice interested in analysing how conduct is enacted, performed and produced, and that assume that agency is distributed among humans and non-humans.

Gherardi (2000) criticises the commodification of knowledge and the mentalistic view of knowledge that dominates much of the literature on knowledge and learning in organizations, particularly in the KM discourse. In contrast to such functionalist views of knowledge, underpinned by notions of fixity and control, analysing knowledge as a practice invites us to research the processes of knowing at work and in organizing, and to articulate them as historical processes, material and indeterminate. Thus, practice lens approaches assume an epistemological approach that is critical towards the modernist conceptions of knowledge dominant in management and organization studies (Gherardi, 2009, p.115).

Gherardi (2000, p.212) groups under the heading of practice-based theorizing on learning and knowing in organizations several traditions of research: activity theory, actor-network theory (ANT), situated learning theory and cultural perspectives to organizational learning. It is specially the contribution of ANT, which has offered comprehensive accounts of the constitutive role of technologies or artifacts in practice. What these approaches have in common is that they move away from individualist accounts of human behaviour, and cognitivist approaches to learning and knowing, and share instead an interest in the social construction of knowledge, and a view that knowing cannot be separated from situated practices. Research undertaken from these perspectives also challenges the objectivism very much present in KM accounts, which seem to assume that knowledge and the objects of knowledge exist prior to and independently of the knowing subject and the social and cultural context of its production. Practice-based accounts have explored how learning and knowing are mediated by social relations, and have shed light on the mutually constitutive nature of the objects, instruments, and subjects of knowledge.

Practice-based approaches do not constitute a homogenous body of research, as they draw on a variety of schools of thought, such as phenomenology, Marxism or Wittgenstein's linguistics (Gherardi, 2000). Practice theory has indeed been influential in a wide range of academic disciplines in areas of social and cultural research, and we find a broad range of theorists that share an interest in studying social practices, such as: Bourdieu (1977), Foucault (1976; 1980), Garfinkel (1967), Giddens (1984), Lyotard (1984); and more recently Knorr-Cetina (1999),

Pickering (1995), Rouse (1996) and Schatzki (1996). What practice approaches share is that they promulgate “a distinct social ontology: the social is a field of embodied, materially interwoven practices centrally organized around shared practical understandings. This conception contrasts with accounts that privilege individuals, (inter)actions, language, signifying systems, the life world, institutions/roles, structures, or systems in defining the social.” (Schatzki, 2001, p.3)

Orlikowski (2010a) distinguishes three modes of engaging practice in research: 1) as a phenomenon: this research emphasises that practices matter, 2) as a perspective: from this view practices shape reality, or 3) as a philosophy: practices are constitutive of reality. These are not mutually exclusive. The first notion—practice as a phenomenon—draws on the dichotomy theory / practice, and it refers to research that is committed to analyse what really happens in practice, the everyday life realities, in contrast to how abstract scientific knowledge represents it. What this research emphasises is that practices matter. We find an example in the article by Brown and Duguid (1991) previously mentioned, in which they analyse practitioners at work, to overcome some gaps in the KM abstract representation of knowledge. This sort of research challenges the abstract and universal models that portray organizational life as an orderly, rational and invariant phenomenon. This research uses methods that range from immersive participant observation to action research, which allow researchers to immerse in the field and observe working practitioners in action.

Practice as analytical perspective is grounded in practice theories, which, as mentioned before, are multifarious. This research pays attention to the routines an everyday activity as well; however, the purpose is not to offer micro-level analyses that reveal the mundane, but it connects the micro and macro levels and asserts that “it is through the situated and recurrent nature of everyday activity that structural consequences are produced and become reinforced or changed over time.” (Orlikowski, 2010a, p.25). Practice, from this view, has an institutionalizing and normative dimension: it reflects and at the same time it reproduces norms, values, and knowledge over time. When practices become institutionalized, they become the taken for granted way of performing an activity (Bourdieu, 1977; Foucault,

1973). Practice is, at the same time a site of variation and change. Thus, what this research emphasises is that practices shape reality. We find an example of this approach in the previously discussed article by Orlikowski (2002), who draws on Giddens (1984); another example is Lave (1988), who offered a renewed view of human cognition as enacted in practice, which has been highly influential in the study of knowledge and learning in organization sciences.

Practice as a philosophy is a mode of engaging practice in research that assumes that practices are reality, that is, that social life is constituted in and through ongoing practices. Research adopting a practice philosophy engages with the three modes of practice: empirically, theoretically and philosophically. This literature postulates an alternative social ontology from the dominant ones: individualism and societism (Schatzki, 2005). From this perspective, social reality is seen to be "an ongoing, dynamic, and practical accomplishment" (Orlikowski, 2010a, p.27). In addition, this literature posits an anti-essentialist and relational ontology, which assumes that there are no independent entities with inherent attributes, but shifting and heterogeneous associations; thus, it postulates the ontological entanglement of humans and non-humans. Furthermore, in contrast to the dominant representationalism, this literature adopts a performative epistemology, which posits that "knowing does not come from standing at a distance and representing, but rather from a direct material engagement with the world" (Barad, 2007, p.49). Thus, knowing is not, as realists would have it, like carrying a mirror to reflect the world, but "our models also help *constitute* the world we experience" (Tsoukas, 1998, p.792). An important contribution in this literature comes from proponents of actor-network theory (Callon, 1986; Latour, 1987; Law, 1992) or newer versions of it—sometimes referred to as after ANT or material semiotics— (Law, 2002; Law & Singleton, 2005; Mol, 2002), which have revealed that knowledges, rationalities, and orders are sociomaterially constructed, and embodied in material forms.

2.5.4 The reception of practice-based theories: The success of communities of practice

I have just presented the diversity of research orientations associated with the study of practice, which reveal and offer alternatives to cognitivist and rationalist

approaches of learning dominant in KM. I now want to draw attention to how practice-based theories have been generally received and interpreted in managerial and organizational studies, and in IS studies. In agreement with some scholars (Contu & Willmott, 2003; Geiger, 2009; Gherardi, 2009; Østerlund & Carlile, 2005) I will argue that the diffusion and acceptance of practice-based theories has been accompanied by a loss of critical power of the practice concept. I will exemplify this by focusing on the theory of communities of practice, as it has been very influential in organisation studies and also educational research, and has frequently been adopted to guide educational and managerial interventions. In fact, this is one of the theoretical underpinnings of the research project that constitutes my case study. I will first present the main tenets of the theory of Communities of Practice, and I will then discuss how this theory has been reinterpreted in managerial and organizational studies, IS, and also in education literature.

An important body of literature in managerial and organizational studies engages with practice research as a phenomenon; that is, scholars are interested in exploring what people really do, the activities performed by individuals in organizations (Brown & Duguid, 1991; Orr, 1990). In addition, the term practice is frequently used to refer to routines (Feldman & Rafaeli, 2002). Geiger (2009) suggests that these approaches tend to employ practice as process perspective. While useful in challenging static views of organizations, and abstract, universalist views of knowledge, as Geiger (2009) and Gherardi (2009) suggest, such approaches do not unfold the critical power of practice theorizing as a critique of modernist conceptions of knowledge. In addition, practice-based theories are being used and presented as a device to design interventions, converting these analytical and critical theories as tools for rationalization and innovation, understood in economic terms. I will illustrate this by discussing different versions of the theory of communities of practice and a variety of ways in which it has been appropriated.

Situated learning theories, and more specifically the concept of communities of practice developed by Lave and Wenger (1991), have attracted remarkable interest in organisation studies, information systems and education research. In contrast to traditional approaches that conceive learning as an individual cognitive process, situated approaches to learning stress the social character of learning, and pay

attention to the cultural and organizational artifacts involved, and the embeddedness of learning practices in power relations.

Following the work of the anthropologist Lave (1988), Lave and Wenger (1991) analysed in *Situated learning: Legitimate peripheral participation* the situated process of learning that takes place in apprenticeship. Interested in studying how the process of learning takes place outside formal education, they explored how apprentices learn from other members in a community of practice how to do things, and what is considered to be adequate knowledge on that community, in what they named legitimate peripheral participation. By participating from the periphery and contributing with their work, novices gradually learn to master the practice and gradually gain legitimacy within the community until they become full members. Thus, to know is to be able to participate competently in that community. They also offer a social explanation to the distinction between tacit and explicit knowledge, by revealing that the knowledge that remains tacit or needs to be made explicit depends on the community of practice. Furthermore, this study revealed the mutual relation between learning and the construction of identities, hence challenging the view that learning can be reduced to acquiring information or a new skill. For instance, being an engineer—i.e. being considered one by other engineers—means showing to have certain knowledge, using certain vocabulary, doing things in certain ways.

This study stresses the reproductive and historical dimension of practices, and routine practices take central stage in their analysis; however there is a focus on change as they follow the evolution of newcomers. There is also acknowledgement of the changes in the practices of the community when there is a generational change. In this regard, communities are seen to shape practitioners but, in turn, practitioners shape the community and its practices. In addition, following the critical tradition of Marx, Bourdieu and Giddens, Lave and Wenger address the unequal relations of power within communities and how power is implicated in enabling or excluding access to learning practices that might allow a person to become a legitimate member. In this regard, masters exert control over the access of new members to the community. In addition, they refer to the uneven access and control over resources of different members in the community. Furthermore,

resonating with a Foucaultian critical approach to knowledge, these authors suggest that what comes to be considered knowledge is a contested matter, it is established within the communities where power relations exist, and it varies across different communities of practice.

In this work by Lave and Wenger, the authors also refer to the broader sociocultural context and shared systems of meaning in which communities of practice are embedded. They argue: “it is important to consider how shared cultural systems of meaning and political-economic structuring help to co-constitute learning in the communities of practices.” (Lave & Wenger, 1991, p.54). However, as some authors have pointed out, perhaps as a result of the choice of communities of practice studied, there is no reference to the interconnection or relation between communities (Østerlund & Carlile, 2005).

The work on communities of practice was then taken up by Wenger on his own, who helped to popularize the term ‘communities of practice (CoP)’ with his book *Communities of practice: Learning, meaning and identity* (Wenger, 1998). Based on the theoretical ideas explored in the previous book co-authored with Lave, here Wenger organizes the book as an exposition of a social theory of learning that is positioned in the intersection of several theoretical perspectives in social theory, and which adopts as a unit of analysis neither the individual, nor social institutions but informal communities of practice.

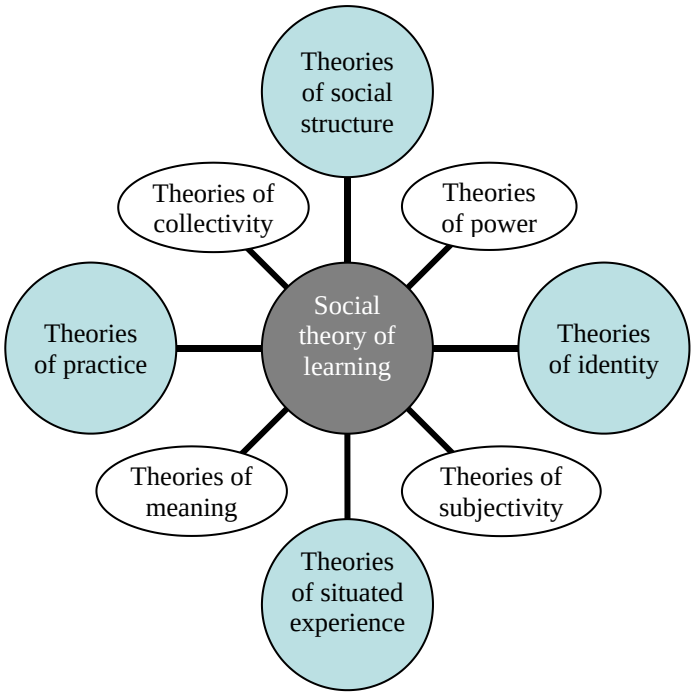

Figure 1. Social theory of learning, and related theories.
(Wenger, 1998, p.14).

Wenger points at the difference between institutionalized plans and practice: what happens in a community of practice is not the result of design but a reaction to design. He also asserts that “learning cannot be designed. (...) Learning happens, designed or not” (Wenger, 1998, p.225) In this sense, as in the previous work with Lave, he presents CoP as a theory of informal learning; thus, Wenger does not embrace the idea that CoP can be created, but that they can be supported and nurtured. However, he dedicates a full chapter to “design for learning”, and the subsequent chapters are dedicated to “organization” and “education”, where he reveals how CoP can be nurtured in organizational and educational settings. In this regard, we see a slight turn towards a more normative view of CoP. Some other differences can be perceived between this and the previous publication with Lave: Related to the previous point, in this book reference to power and inequalities becomes marginal; in addition, there is a stronger focus on the issue of identity formation, and he suggests that individuals need to negotiate their participation in multiple communities. In this regard, there is a stronger focus in this book, compared to the previous one, on the individual identity formation and learning.

In management and organization science, interest in situated learning theories grew in parallel to an interest in understanding and promoting a processual approach to organizational learning, which was already considered in the influential work of authors like Nonaka and Takeuchi (1995), previously discussed. In this context it might not be surprising that some authors selectively appropriated some of the ideas of situated learning, diluting or ignoring the more critical or radical elements of Lave and Wenger's theorization (e.g. Hildreth & Kimble, 2002; Lesser et al., 2000; Pan & Leidner, 2003).

In the 1991 article published by Brown and Duguid in the special issue of *Organization Science* dedicated to organizational learning, the authors draw on Lave and Wenger's (1991) concept of communities of practice to highlight that those are sites of learning and innovation frequently overlooked. They conclude by proposing that organizations should redesign their architectures to ensure that communities of practice enjoy enough autonomy to fulfil their innovative potential, and simultaneously to facilitate the communication and links among different communities. However, doing so is not straightforward as it would involve loosening procedures that are traditionally in place to ensure accountability and competition, define responsibility, etc. As we can see, Brown and Duguid's interest in CoP is as a tool to support innovation, and even to avoid conflict in organizations:

> "It has been our unstated assumption that a unified understanding of working, learning, and innovating is potentially highly beneficial, allowing, it seems likely, a synergistic collaboration rather than a conflicting separation among workers, learners, and innovators." (Brown & Duguid, 1991, p.55)

As Contu and Willmott (2003), and Østerlund & Carlile (2005) suggest, an analysis of the adoption of situated learning theory in organization studies and management shows that the popularization of such theories took place through the reception of influential authors such as Brown and Duguid (1991), which adopted and disseminated the more conservative aspects of situated learning theory. These authors discussed situated learning "as a medium, and even as a technology, of

consensus and stability" (Contu & Willmott, 2003, p.284), and presented communities of practice as significant sites of innovation. Thus, the popularized version of situated learning tends to ignore aspects such as contradiction, the entanglement of learning processes with power relations, the unequal access to resources, and the importance of considering the historical and cultural context of learning (Contu & Willmott, 2003). Even Wenger, joining the bandwagon, continued publishing extensively but, somehow in contradistinction with his first publications, he further shifted the theorization of CoP towards a management audience. That is, we see a move from a heuristic and critical theory, to an adoption of CoP as an instrumental approach to improve performance and innovation, and adopting a consensual view of progress. For instance, in the abstract of an article published in *Organization*, Wenger (2000, p.225) states: "This essay argues that the success of organizations depends on their ability to *design* themselves as social learning systems" [my emphasis]. Also in Wenger et al. (2002) the authors frame CoP theory within the field of knowledge management and they offer advice on how to foster communities of practice to improve economic competitiveness. Thus, far from the Marxist-inspired vocabulary and critical sensitivity of Lave and Wenger (1991), he seems in his later publications comfortable with a neoliberal narrative. Such drift corresponds to a more general "translation" of situated learning theories in the field of management into a functionalist approach for organization, from a radical analytical theory into "a technocratic tool of organisational engineering." (Contu & Willmott, 2003, p.289)

Similarly, CoP became very well received in the area of education as constructivist approaches to learning became dominant. Educational science literature, which shares with management an interest in devising interventions to support learning, has tended to adopt a diluted and uncritical version of situated learning and CoP theory that focuses on the idea that we learn from each other. Especially in the area of e-learning CoP has been taken almost as a normative theory of learning, and it has been used as a justification for promoting collaborative environments and even the use of TEL in formal education (e.g. Evenbeck & Kahn, 2001; Hodgkinson-Williams et al., 2008; Rogers, 2000). We can exemplify the mutual reinforcement

of the optimistic discourses on technology for learning and collaborative learning with the following excerpt:

> "The social interface of Web 2.0 offers novel ways for connecting people and sharing and discussing ideas. It can be used to support and enhance existing communities or to foster the development of new communities of inquiry and exploration. There seems to be a tantalising alignment between the affordances of digital networked media (the focus on user-generated content, the emphasis on communication and collective collaboration) and the fundamentals of what is perceived to be good pedagogy (socio-constructivist approaches, personalised and experiential learning)." (Conole & Alevizou, 2010, p.10)

Such adoption of CoP to design interventions in formal learning dismisses any aspects that relate to power relations, issues of legitimacy, or the broader sociocultural context in which learning takes place. Such simplistic notions of CoP have received in the recent years several critiques from some educational scientists (Barton & Tusting, 2005; Hughes et al., 2007), and some have suggested bringing back the critical power of practice-based conceptions of learning by drawing on actor-network theory, which foregrounds the materiality of educational processes (Fenwick & Landri, 2012). This is the view I take in my research.

2.5.5 Critical perspectives to organizational learning: Reclaiming the critical power of the practice lens

From the previous discussion it becomes apparent that critical approaches to organizational learning and knowledge management are not abundant, and that the critical power of some theories has been diluted. Critical approaches have much to contribute in this literature dominated by instrumentalist notions of knowledge and learning. In an assessment of the organizational learning literature with suggestions for future research, Easterby-Smith et al. (2000) argue that issues of power, politics and trust are fundamental dimensions of learning that have been neglected in the literature, but that there is a renewed interest, and they conclude the article by stating:

> Maybe the times in which the organizational learning debate, with its consensual and conflict-free flavour could be accused of being a cover up for non-developmental, and at times authoritarian, management regimes are finally behind us. The time is ripe to start addressing learning and knowing in the light of the inherent conflicts between shareholders' goals, economic pressure, institutionalized professional interests and political agendas. This should also enable us to address the diversity in the personal expectations and fears, which characterize this important aspect of the organizational learning process. (Easterby-Smith et al., 2000, p.793)

Contu and Willmott have significantly contributed to this literature with several publications that, adopting critical theory and going back to the original practice-based theorizations of learning (e.g. Lave & Wenger, 1991), offer critical insights to dominant conceptualizations of learning in organizations, some of which have been previously outlined (Contu & Willmott, 2000; Contu & Willmott, 2003; Contu et al., 2003; Contu & Willmott, 2006). Some of the issues revealed by these authors are that dominant views in knowledge management and organizational learning literature tend to take it for granted that knowledge and learning is useful for achieving competitive advantage, but, to be true, knowledge (or knowing) and learning is present in all sorts of activities. Power relations are implicated in what comes to be considered worth learning or knowing. In addition, the discourse of knowledge management and organizational learning by valuing certain sorts of knowledge and learning over others tends to legitimate a particular division of labour. That is, the discourse on knowledge and knowledge work creates an *other*, the non-knowledge work. Furthermore, they are critical of universalist views of learning, and they emphasize that learning is specific to particular historical conditions, and "implicated in social structures involving relations of power" (Lave & Wenger, 1991, p.36). In this regard, we need to consider that ideas of openness, sharing knowledge, learning from each other, which are sometimes taken for granted, are conditional to issues of power, trust, job (in)security, motivation and rewards, and from a critical perspective the questions that arise is learning for what purpose? for whose interest?

In this regard, in an article with the provocative title “Against learning”, Contu et al. (2003) offer an insightful critique of the dominant “learning discourse”, which has become pervasive and naturalized in the context of the learning society or the knowledge economy, and which presents learning as an inherently good thing for all, as benign and apolitical. In this regard, organizational learning is seen as more than a management fad: it is part of a wider discourse of learning that has invoked learning as empowering and progressive, whilst legitimizing and reinforcing a neoliberal ethos. Even further, organizational learning draws upon and reinforces this discourse, with actual effects:[6] Most organizational learning literature justifies the need for it by reference to the relentless changes in the economy, helping to maintain the “knowledge era” as the actual and only reality. In addition, offering an interpretation that resonates with an ANT sensitivity, the authors add:

> “when learning is invoked in one context it stands in relation to the whole network that is learning discourse. It is this ensemble, which makes learning a significant ideological tool and a real, practical force. It expresses a kind of mood, or summons up a nebulous but seductive and futuristic vision, in which ‘old’ conflicts, whether organizational or social—e.g. access to resources, the distribution of wealth, the operations of power—are rendered invisible.” (Contu et al., 2003, pp.946–947)

In the economic sector, the lifelong learning discourse and some of the discourses in organizational learning that link learning to innovation talk about knowledge-workers with enquiring minds, creative, critical, and innovative. However, the enquiring and critical mind is expected to be at the service of economic competitiveness. In addition the learning discourse tends to reinforce an individualistic and individualizing view of learners, as responsible agents of their employability. Among the various agents that constitute the learning discourse in the UK, an important one is the programme of *modernization* initiated in 1997 by the New Labour government.

[6] Related to this point, see in the next chapter my discussion about the performative effects of science.

In this knowledge era and in the programme of modernization, knowledge and learning are presented as drivers of the economy, and since the 1980s a utilitarian conception of education has gradually become established. Learning in education institutions and in the discourse of lifelong learning becomes training for economic functioning. In this sense, it is significant and concerning that not only much of the policy discourse and quality assessment measures, but also educational literature is preoccupied more with the procedural aspects of learning than with defining the content of what is learned or critically challenging the assumption that the aim of education is to serve the needs of the economy (Biesta, 2012; Fenwick, 1998). As Biesta (2005) points out in an article also titled "Against learning", the discourse on learning in education focuses on the learners and the need to support their needs, styles, etc., characterizing them as costumers whom teachers and education institutions need to serve. And this is, he adds, the difference between a professional and a market model: in a professional model the professional defines the needs and offers a service accordingly; in contrast, in a market model consumers define what they need and producers bid in price and quality to offer the services. Thus, Biesta's insights offer a good complement to Contu's et al. (2003) arguments, as they show how education is shaped by and reinforces this learning discourse.

Also offering a critique of the dominant discourse of the knowledge economy Tsoukas (1997) and Strathern (2000) suggest that while knowledge is always presented as enlightening, the dominant view of knowledge as information and the wealth of information that ICTs make possible bring some paradoxes. For instance, ideas of accountability and transparency, which are seen as bringing justice and better services, have performative effects that reshape and reframe that which is audited, in some cases with contradictory and unexpected consequences.

Contributing to the critical literature within organizational learning, we can also mention the work of Coopey (1995), who offered an early and insightful critique of organizational learning as a possible new form of control; Fenwick (2008b; 2013), who has contributed to organizational learning and educational literature by offering critical approaches to learning at work and in educational settings, and has recently elaborated on the critical power of ANT; Fox (2000), who has also

contributed to both organization studies and education science literature, suggests combining CoP with insights from ANT and Foucault, to unlock its potential critical power; Gherardi (2009) has discussed the critical power of practice-based approaches; Marshall and Bradi (2001) from an IS perspective and drawing on Habermas offer a critique of knowledge management literature by discussing the politics of knowledge; Örtenbald (2002) offers a good literature review of critical perspectives within organizational learning; and Pant (2001), who challenges the idea that organizational learning empowers workers.

In conclusion, we can see that scholars draw from classical critical theorists and critical discourse analysis, and are also exploring the critical lens of practice-based theorizations such as ANT, which challenges the modernist conceptions of knowledge dominant in management and organization studies. If we engage with what Orlikowski (2010a) refers to as practice as a philosophy, with approaches such as ANT, new and largely unexplored research questions about knowledge and learning arise. While the cognitivist approach asks questions about the objectivity or truth of knowledge, and is interested in exploring the best procedures to learn, that is, to acquire that knowledge (frequently understood as information), now we might want to ask questions that refer to how knowing is sociomaterially constructed and sustained in practice; how materiality is implicated in learning; how what comes to be considered knowledge travels, and how it is transformed in the process of circulation; or what agents are involved in the circulation of that knowledge (Gherardi & Nicolini, 2000). It is also possible to develop Contu's et al. (2003) exploration further by analysing how the learning discourse is sociomaterially sustained. In line with this, in this research I will be exploring sociomaterial practices of knowledge-technology construction, and the agents—humans and non-humans—mobilized or implicated in the enterprise. I will consider the contingency, plurality, interaction and divergence of rationalities, the situatedness of the knowledge-technology and why it might encounter difficulties to travel and become institutionalized.

In the next section I will justify further the need to theorize technology when studying ICT-mediated learning. To achieve this aim, I will offer a brief overview of the way technology is presented in organizational learning and knowledge

management literature, and the ways in which technology has been theorized in organizational studies and IS literature.

2.6 Theorizing technology

There is a kind of reinforcing mechanism between the discourse of learning in the so-called knowledge economy and the use of ICTs. On the one hand, the concept of the knowledge economy or information society is connected to the spread of ICTs (Castells, 2010) and a paradigm of globalized economy. In this milieu, learning and "producing" knowledge is perceived as an imperative. At the same time, ICTs are seen as facilitating learning and knowledge sharing, provoking what Tsoukas (1997) refers to the persistent temptation to reduce knowledge to information. In this context, we find a shared interest in some managers and educationists in devising interventions that use technology to foster learning and knowledge sharing.

A dominant body of academic literature in organization sciences, management, and education technology, but also an important part of information systems literature that study the use of technologies to support knowledge exchange and learning with technologies, tends to adopt what Orlikowski and Iacono (2001) refer to as a tool view of technology; that is, technology is presented as a tool that supports or mediates learning or knowledge exchange, implicitly assuming that the effects of the technology will be those that it had been designed for.

Such approaches have two main limitations, which are interrelated: on the one hand technology is taken to be neutral, just a conduit to transmit knowledge (in fact, data or information). On the other hand such views are based on a technical rationality that assumes that, through technological intervention, action can be unambiguously steered towards the desired outcomes (Avgerou & McGrath, 2007). These two limitations result from not adequately considering the significance of the social and organizational context of technology design and use, and the entanglement of technology and society. In what follows I will offer an overview of the literature discussing these issues, drawing from social studies of IS and science and technology studies (STS).

As I have already stated in the previous section I believe that ANT offers a particularly adequate lens to study how technology is implicated in learning, and in knowledge construction. The following discussion will allow me to further justify why I believe that it offers robust theoretical underpinnings for the critical study of technology and modernist notions of knowledge. At the same time, I will explain that one of the possible limitations of such approach is that it is not necessarily the best suited to account for the wider social milieu that affects the actions of localized actors. That is why I will argue that institutional logics approaches can offer a good complement. In chapter 3 I will develop a conceptual framework that combines insights from both approaches.

2.6.1 The role of technology in knowing and learning. The codification debate revisited.

As I will further discuss in the following section, a good body of literature in IS takes an exogenous, autonomous view of technology, which equates IS with IT, and is "based on the "input-process-output" model according to which data are collected (input), stored and processed in order to produce information (output) for the users." (Boell & Cecez-Kecmanov, 2012, n.pag.) The underlying assumption is that technology can objectively record knowledge, practices, or processes, and thus, represent reality. From this perspective, technologies are devised to store repositories of knowledge or to build decision-support tools, frequently assuming both that they are able to map the reality of working practices, and that there is an unproblematic fit between the tool and its rationality (assumed to be acontextual) and the practices.

Critical with such approaches, we find authors like Collins (2010) or Dreyfus (1992) who have argued that machines cannot capture knowledge or expertise because of the embedded and embodied character of knowledge. Much of what we know, they argue, cannot be formally expressed, because it is context-bound. Both arguments, and the codification debate in KM, are based on a representationalist view of knowledge, according to which there is a reality out there that we can (or cannot) be captured through knowledge, language or technology. That is, it posits a separation between tools and the practices they try to support (Berg, 1997), and between knowledge and the reality it represents.

As some authors have suggested (Berg, 1997; Boell & Cecez-Kecmanov, 2012) the problem with such perspectives is that they do not adequately consider the entanglement of practices with the material. As Berg (1997) has convincingly argued in his study of diverse decision-support tools in medical practice, "the tools and the worlds in which they become embedded thoroughly transform each other" (p. 165). In contrast to predominant representationalist view of IS and knowledge, I agree with STS and ANT scholars who propose a performative view of IS. From this perspective there are no entities, practices, etc. out there waiting to be mapped in a technology, independently of the sociomaterial context (Barad, 2003; Latour, 2005). I will discuss these ideas further in the next chapter.

2.6.2 ICTs and social change

The debate in the theorization of technology mainly turns around two interconnected concerns. The first one delves with the relationship between technology and society, and its mutual influence or entanglement; the second one tackles the debated issue in social sciences of the limits of agency, and the relationship between agency and structure.

As regards the relationship between technology and society, we find at one extreme technological deterministic positions that posit that technology determine (or enable) social or organizational change. At the other extreme social determinism tends to see technological innovation as determined by social structures. As an example, some Marxist and Feminist analysis portrayed technology as oppressive instruments in the context of capitalist or patriarchal societies, without considering that there is a degree of re-interpretation of the technology in the context of use.

New technologies and scientific innovations tend to capture the hopes and fears of people and are frequently perceived as drivers of social, economic, and organizational change. Nowadays the Internet and ICTs are embraced as enablers of economic development and democratization, and frequently portrayed as an inevitable necessity in the context of a globalized knowledge economy. The view that technology and material forces determine the outcome of social events is known as technological determinism, a term first coined by the American sociologist and economist Thorstein Veblen (1857–1929).

Technological determinism tends to assume a non-problematic causal relation between the characteristics of technology and the social or organizational effects resulting from its implementation. In contrast to “hard” technological determinism, a “soft” version of it implies that technology enables rather than determines social change. However, in both streams technology tends to be presented abstractly as a relatively stable artifact with its inner logic, and as an autonomous driver of social change.

A large body of literature in Information Systems, Organization Studies, and Management has implicitly or explicitly adopted elements of technological determinism by taking for granted the technological artifact and overlooking its interdependence with the social context of development and use. In two recent literature reviews Orlikowski & Iacono (2001) and Orlikowski (2010b) revealed that the majority of research in these fields either ignores technology, referring to it in passing (that does not apply to IS literature), without considering the significance of artifacts in the phenomena studied; or technology is black boxed and taken for granted as exogenous force of organizational change, tipically at the service of managerial, economic or administrative requirements.

Indeed, the study of IS innovation and organizational change in the Information Systems field has been dominated by a functionalist research paradigm, concerned with providing prescriptive and predictive lessons to inform practice in the development, implementation, and use of ICTs in organizations. The underlying assumption of these studies is that innovation stems from purposeful action, and drawing from technical-rational theories they provide methods and models for the efficient and reliable development or deployment of ICTs (Avgerou & McGrath, 2007, p.295). However, project failures, unintended consequences, resistance to use, are just some illustrative examples of the limitations of such approaches in practice. Tinkering, improvisation, politics, are part of the sociotechnical assemblage of IS (Ciborra, 2004).

Research in IS has shown that the development and implementation of IS cannot be explained by focusing exclusively on technical and rational perspectives, and that the development and use of ICTs in organisations is only partly the result of

formal decisions deriving from specific economic, managerial or technical rationales (Avgerou, 2002). Specially since the 1990s, some IS scholars have been engaged in developing more nuanced theorizations as regards the entanglement of technology and the social or organizational contexts of development and use.

Sociotechnical approaches in IS do not constitute a uniform body of research, but they tend to adopt an interpretative stance—in contrast to the positivist ontology of mainstream IS. This body of research has drawn on insights from several social sciences disciplines to theorise the relationship of the technical and social dimensions of IS innovation. We can highlight as specially influential science and technology studies, particularly actor-network theory (Walsham, 1997; Monteiro, 2000), ethnomethodology (Suchman, 1987), structuration theory (Orlikowski, 1992; Orlikowski, 2000), and activity theory (Kuutti, 1991).

Researchers in the area of STS[7] have particularly contributed to the critique of technological determinism since the publication in the mid-1980s of two influential books (MacKenzie & Wajcman, 1985; Bijker et al., 1987). From a broad variety of perspectives and schools of thought, this research has challenged the portrayal of technology as a neutral and exogenous force, and the conception of technological development as a smooth enterprise. Moving beyond the focus on the "impacts" of technology in society, this literature revealed the technical, social, economic, political, and institutional aspects involved and intertwined in sociotechnical change. The Social Shaping of Technology approach (MacKenzie & Wajcman, 1985; Winner, 1980) illustrated with diverse case studies how technology is shaped by the social context of production (including social relations, economics, existing technology, etc.). This research took issue with the idea of technological neutrality and autonomy, and argued that social interests and beliefs are inscribed in technology, with consequences for subsequent deployment.

While this critique to pervasive technological deterministic views was welcome, some researchers suggested that some of this literature tends to fall into the other

[7] In much of this section I will draw on contributions from science and technology studies, but it is not my aim to offer an in-depth account. For a good overview of the reception of STS in IS, see Howcraft et al. (2004)

extreme and does not give due account of technology. As Button (1992, p.16) puts it, “technology seems to vanish from view” in many of these narratives. However, it should be noted that this literature was able to show that there are many actors, interests, and previous technologies influencing the development of technology.

Another limitation perceived in some of this research—e.g. in Winner’s (1980) account of the construction of Moses Bridge[8]—is that it tends to grant unduly power to the designer of the technology, and it does not account for social, material, or historical factors influencing the technological design. Finally, it has been pointed that this literature tends to focus exclusively on the development process, and it seems to take for granted that technology is a finished, static product. Alternative accounts suggest that technology can be reinterpreted, domesticated, and reconfigured in use (see for instance (Orlikowski, 1992).

This final aspect is linked to the concept of interpretative flexibility, which has become a heated topic of debate. The Social Construction of Technology (SCOT) (Bijker et al., 1987) emphasized that the development of technology does not follow a smooth, linear, teleological path, as portrayed by technological deterministic accounts. Instead, relevant social groups, with different interests, interfere in the development of technologies. These authors introduced the concept of interpretive flexibility to convey that different people perceive differently problems and solutions associated with technology; that is, that there is no “one best way” of designing technology.

The term interpretative flexibility has been used beyond the context of design to refer to the fact that technology is reinterpreted in use (Orlikowski, 1992; Cadili & Whitley, 2005). Focusing on the implementation and use of ICTs in organizations, IS researchers have highlighted that technology is not a closed, stable object, but emergent in use. In this regards, the functionalities of a technology are not sufficient to predict its use. The question that remains highly debated is the extent

[8] In this article Winner discusses how the construction of that bridge contributed to racial segregation, as it was too low to allow buses to drive under it, and therefore it become a barrier that limited the access to the other side of the bridge to those using public transport.

to which technology is interpretable, or if technology imposes certain constraints of use and behaviour.

In an extreme position we can find anti-essentialist positions that defend that technology cannot be defined by some inherent or essential features (Grint & Woolgar, 1997). Inspired by postmodern literary studies, such approaches defend that technologies are open to multiple "readings" by different people in different social contexts. Most IS researchers are uncomfortable with such position, and while acknowledging a certain level of reconfiguration in use, they have also used concepts like affordances, scripts, enframing, etc., that capture the view that the logics inscribed in technologies matter. The debate has also reached epistemological and ontological discussions, with some authors being critical with the strong constructivist claims in research that view technology as locally negotiable (Kallinikos, 2004).

Orlikowski (2010b) groups under the label "emergent process perspective" several conceptual positions on the study of technology in organizational settings that share the view that "technology results from the ongoing interaction of human choices, actions, social histories and institutional contexts." (p. 131). From this perspective, technology is socially shaped and produced in a specific context. This, however, does not constitute a homogeneous body of research. On the one hand, the social shaping perspective previously discussed (MacKenzie & Wajcman, 1985), accounts for the sociohistorical processes involved in shaping a technology. Another group of authors like (Kling & Scacchi, 1982; Kling & Iacono, 1989) developed the idea of considering the broader ecology of people, infrastructures, policies, and social relations that affect the development, adoption, appropriation and adaptation of information technology. Finally several authors adopted Gidden's (1984) structuration theory, and studied how "the same" technology was differently appropriated in different organizations, resulting in distinct structuring dynamics (Barley, 1986), or studied how work practices and social structures mediate and are mediated by ICTs, developing concepts like technologies-in-practice (Orlikowski, 2000) to refer to the idea that technologies emerge in use.

It is especially this very last sort of accounts that Kallinikos (2004) and other authors (Pollock & Williams, 2008; Orlikowski, 2010b; Winner, 1993) criticise on two accounts. Firstly because in focusing on the social and interpretative side, it does not duly account for the technology; but also, in contrast to other "emergent perspectives" because situated approaches, by focusing on the contingent micro-interactions and located interpretations of technology, neglect the wider milieu of technology development, and also the political and societal consequences of technology. As Pollock and Williams (2008) have revealed IS tend to be such complex systems that they cannot be fully pinned down in the here and now of a particular setting of use.

This debate is also concerned with the limits of action, intentionality, and free will. The tension between agency and structure, and the limits of freedom of action, is an ongoing and fundamental debate in social theory. The pendulum in this debate moves from individualist and atomistic perspectives that seem to consider actors as autonomous and able to make rational free choices, to structuralist perspectives that understand human behaviour as constrained and patterned by social structures. Underlying this debate is the ontological question of what the social world is made of, and if there are discernable mechanisms governing social and human action. Some authors like Bourdieu (1977), with his theory of practice, or Giddens (1984), with his structuration theory, have tried to find a balanced approach as regards this tension.

A growing scholarly attention has been paid to practices in the social sciences. Practice-based approaches (Gherardi, 2009) offer a valuable theoretical contribution, in trying to overcome the dichotomies agency/structure and social/material, and therefore some of the limitations of previous research in the "emergent process perspective" and technological deterministic approaches. Under the label of practice turn (Schatzki et al., 2001) a variety of academic research has been grouped that "promulgates a distinct social ontology: the social is a field of embodied, materially interwoven practices centrally organized around shared practical understandings." (p.3). In the area of organization sciences, researchers are recently drawing on practice-based approaches (Gherardi, 2009) or "entanglement in practice" perspectives (Orlikowski, 2010b); that is, on theories

that emphasize that human behaviour cannot be separated from the material conditions in which the unfolding activity takes place. Thus, action cannot be reduced to human intentionality, but is the result of the ensemble of humans and materiality.

Actor-network theory has been one of the most influential approaches in IS, among those that Orlikowski (2010b) labels "entanglement in practice." More recently sociomateriality (Orlikowski & Scott, 2008; Orlikowski, 2007), which draws on STS theorists like Barad (2007), has also become an influential notion in IS research. Orlikowski, who had previously been one of the introducers of structuration theory in IS, suggests that emergent process perspectives minimise the role of technology and adopt human-centric views, dismissing the agential power of technology. In contrast, as she (Orlikowski, 2010b) argues, "entanglement in practice" approaches such as ANT are able to overcome the ontological priority given to humans in most social sciences accounts.

ANT transcends any sort of determinism by adopting a relational ontology, which rejects the separation of humans and non-humans (Latour, 2005; Callon, 1986). From this perspective, reality is in constant construction, through the agency resulting from heterogeneous networks of various actors. As ANT students argue, by focusing exclusively on human action, social sciences have traditionally disregarded the important role of materiality in the constitution of reality. As I will further justify in the next chapter, this theoretical perspective is very well suited to understand the implication of technology in the constitution of reality, and I have also argued that it offers strong theoretical underpinnings that challenge dominant modernist views of knowledge. In this regard, ANT provides a suitable lens to critically assess the weaknesses of dominant instrumental views of knowledge, learning, and technology, in managerial and educational interventions.

Critical with structuralist conceptions, Latour offers in *Reassembling the Social* (2005) a strong critique to the 'templates' imposed by social scientists in their analysis of social facts, who see the social as a sort of external material domain with stabilized state of affairs. In this sense, ANT scholars argue that "the social" (i.e. reality) is in constant construction, and therefore they proceed their research

by following assemblages of human and non-human actors, and the ways and processes by which those hold together or not. However, like emergent perspective approaches to the study of technology, ANT has also been criticised for offering localized descriptions that are unable to account for contextual and institutional aspects, which are important to understand the actions of actors. (Avgerou, 2002; Kallinikos, 2004). Indeed, a limitation of ANT is that in this suggestion of having to trace the actors every time anew, and situating them in a sort of *tabula rasa*, it can easily overlook those forces (let them be actors, or institutions), which transcend the specific setting of study.

In trying to overcome this limitation, some IS scholars have combined insights of ANT with the analysis of institutional forces (Avgerou, 2002). As Avgerou (2002, p.45) points out: "Innovation involves *institutional actors*, not just individuals applying their particular skills and technologies, but networks of actors who are immersed in institutions."

Institutional theory, one of the dominant theories in organization studies, is interested in the study of the processes by which social structures or patterns become taken for granted. The concept of institution can be defined as "more-or-less taken-for-granted repetitive social behaviour that is underpinned by normative systems and cognitive understandings that give meaning to social exchange and thus enable self-reproducing social order." (Greenwood et al., 2008, p.4)

Institutional theory has been criticised because in its application to organization studies, research tended to focus on isomorphism and stability. However, more recent contributions have shown that the institutional forces of an organizational field may be contradictory, and exert conflicting pressures on organizations and actors. In addition, neoinstitutional theory has been criticised for not being able to account sufficiently for agency. Trying to give answer to this, some researchers within institutional studies have recently developed a new framework to study institutional logics, that moves beyond neoinstitutional theorisations:

"Our aim is not to revive neoinstitutional theory, but to transform it. Recognizing both its strengths, the original insights on how macro structures and culture shape organizations, and its weaknesses—limited capacity to explain agency and the

micro foundations of institutions, institutional heterogeneity, and change—the institutional logics perspective provides a new approach that incorporates macro structure, culture, and agency, through cross-level processes (society, institutional field, organization, interactions, and individual) that explain how institutions both enable and constrain action." (Thornton et al., 2012, p.vi)

As regards the agency / structure divide, institutional logics researchers, in trying to account for agency, have suggested that it might be productive to adopt insights from practice approaches (Lounsbury, 2008; Thornton et al., 2012). Instead of considering practices as institutionalized and stabilized, as portrayed in some neoinstitutionalist approaches, the institutional logics perspective "provides an embedded-agency approach that locates the identities and practices of actors within broader cultural structures that both enable and constrain behavior." (Thornton et al., 2012, p.132) Some of these authors (Lounsbury, 2008) have adopted ANT insights in their research.

Following these recent calls to combine institutional logics with ANT, I will offer in the next chapter a conceptual framework that draws insights from these two perspectives. With this approach my aim is to tackle the two main weaknesses present in dominant theorizations of both the study of technology and the study of learning and knowledge sharing in organizations: 1) they do not duly account for the role of technology in the constitution of reality, and 2) there is a tendency to overlook the social milieu in which learning and technology are situated.

2.7 Conclusions

In this literature review I have identified several gaps and limitations in the literature. First, research in e-learning in the area of education tends to discuss the use of ICTs for teaching and learning in reference to students' learning and there is not much discussion around other implications of the introduction of ICTs in educational settings. More specifically, there is almost no research analysing technologies aimed at supporting teacher's work and collaboration. Second, literature in education that deals with teaching and learning takes either a very situated view and studies at a micro-level the teaching practices in the class setting, or it takes a macro-social perspective and discusses issues such as education policy.

Research in organization studies on academic work tends to focus on the research side of academic work. Only recently some researchers in the education sciences field have started to show interest in studying teaching practices at a meso-level, focusing on the teacher as a practitioner in an organizational setting. Third, e-learning literature frequently adopts a restricted view of social constructivist perspectives of learning. With the exception of literature engaged with informal learning, this research tends to omit any reference to organizational, political, social or cultural aspects implicated in e-learning. Therefore, in these perspectives, collaboration is frequently reduced to interaction among individuals, in an acontextual way, resulting in individualistic and monistic perspectives of learning. This frequently results from applying descriptive theories as normative theories to design learning interventions. Finally, in relation to e-learning only recently there seems to be an effort to consider seriously how technologies and materiality are implicated in learning. In general, literature in the field of education tends to undertheorize technology and assumes a tool view of technology or gives it for granted.

For all these reasons I consider that the analysis of the case study presented in this thesis can contribute to the literature in the area of education. Considering these gaps, or under-researched areas in the literature, and that the case study focuses on the design of a technology to support academics-as-teachers' learning through peer collaboration, I suggest that framing this research from a socio-technical IS perspective and the related field of organization studies offers fruitful insights as regards the theorization of technology and organizational learning. Consequently, in the following section I reviewed literature in areas of knowledge work and professions, knowledge management and organizational learning, and in the final section I offered a review of the theorization of technology and IS innovation.

I briefly exposed the main tenets from the traditional sociology of professions and I explained the important changes that professional work is undergoing since the 1980s. I referred to the blooming of knowledge-based work since the internet boom and the expansion of the knowledge economy. Coinciding with these changes since the 1990s we have witnessed an unprecedented interest in studying aspects related to knowledge work, knowledge management and organizational learning. Drawing

mainly on literature in the organization sciences, management and IS fields, I distinguish two main schools of thought. On the one hand, we have a large body of research interested in knowledge management and suggesting ways in which ICTs can support the codification and transmission of knowledge. This research is functionalists and mainly adopts a positivistic stance. It adopts an individualist and cognitivist view of knowledge, and it frequently focuses on knowledge as information. On the other hand, we have a body of research critical with the previous one that adopts a social perspective on learning, and focuses on learning and knowing in practice. Practice-based theories of learning and knowing have many flavours and engage in approach the study of practices in different ways. In general, these theories recognize that knowing and learning are situated and that they are co-constitutive of practices. Especially in the recent years researchers are increasingly recognizing the implication of materiality and artifacts in practices, and are starting to adopt approaches like actor-network theory (ANT). More marginally education researchers are also starting to adopt such perspectives. Finally, like in the area of education, we can see that the practice-based theory of communities of practice has become very popular in organizational learning initiatives, as it is seen as a site of innovation. Like in the case of education, we can see that in many occasions this theory, which is in its origins critical and analytical, is being used in an instrumental way and stripped of its critical insights.

2.8 Research questions

Learning tends to be studied as “learning about the world”, and the subject and object of knowledge tend to be taken for granted. In this view, technology is seen as enabling the connection among a community of practitioners and offering a platform to share knowledge. Conversely, adopting a performative perspective, in this thesis I want to study how reality is being configured through learning and technological interventions.

Practice-based perspectives have suggested the need to consider the material entanglements in knowing and learning, and have analysed practitioners in action, in their local settings (Gherardi, 2010; Nicolini, 2011). While there has been some consideration of the broader setting (Nicolini, 2009), this research has not

sufficiently considered the ways in which expert knowledge and learning is negotiated beyond the local setting of practice in processes of technology design. In this thesis I will analyse how the LDSE and the LD participate in the ongoing becoming of the world.

In the last part of the literature review I offered an overview of the ways technology has been theorized in IS and STS, and I have argued that ANT approaches offer a particularly suitable lens for the study of technology, knowledge and learning. On the one hand, ANT offers strong theoretical underpinnings that reveal the limitations of dominant modernist views of knowledge. On the other hand, the relational ontology of ANT, and the concept of performativity sensitise us of the implication of knowledge and technology in the constitution of reality. However, I also referred to critiques that argue for the need to consider the institutional forces affecting the actions of actors. I have argued the suitability of integrating ANT and institutional logics theorizations, which I will present in the next chapter.

My research will be guided by the following research question:

RQ: How is the LDSE implicated in the configuration and negotiation of educational practices in Higher Education in the United Kingdom?

To give an answer to this question I consider the following 3 sub-questions:

Sub-Q 1. How are institutional logics entangled with the development of the Learning Designer?

Decentering the designers, with this question my aim is to analyse the entanglements of the LDSE with institutional logics and other actors.

Sub-Q 2. How does the LDSE frame the problem of education and how is this framing constituted?

In answering this question my aim is to show the modes of ordering that the LDSE helps sustain.

Sub-Q 3. How is the LD "received" by academics and why?

In this section I will explore possible tensions between the values and logics inscribed in the technology and how the institutional logics in the context of implementation are revealed by academic users of the LD.

3 Conceptual Framework

3.1 Overview

Drawing on the previous discussion, I will present a conceptual framework that seeks to address the main limitations found in previous approaches. I suggest that Science and Technology Studies (STS) literature, and more specifically contributions from Actor-Network Theory (ANT) and post-ANT, offer valuable insights to approach the study of ICT-mediated learning, as this field of research has developed a very strong theoretical construct to understand the entanglement of humans and non-humans in social practices, the situated and contested construction of knowledge, and the important role of artifacts in learning.

However, I will suggest that institutional theory offers a valuable lens to overcome the limitations of overly situated approaches to learning and to the study of technology, as it considers that actors and their practices are influenced by the values and norms that have become institutionalized. While these two theoretical approaches might seem at first sight epistemologically incompatible, I will justify the way they can be fruitfully combined.

Thus, in what follows I will first present some of the main theoretical tenets of STS. More specifically, I draw insights from actor-network theory and material semiotics.[9] No body of research is homogeneous, and of course we can find different "flavours" within this research; however, my aim is not to offer an exhaustive and detailed overview of this field, but to present some of the more relevant insights of this literature that can equip me with a useful framework for my research. At the end of this section, I indicate some limitations of this approach, and I suggest that new institutional theory can offer a good complement.

In the next section I offer an overview of the main insights of new institutional theory, and of the more recent conceptualization of "institutional logics

[9] Actor-network theory (ANT) emerged in the 80s mainly from the work of Bruno Latour, Michel Callon, and John Law. It has since then been well received in other social science fields, including organisation studies, information systems, and more recently education research. Law (1999; 2009), however, has adopted from Donna Haraway the term "material semiotics" or "semiotics of materiality" to refer to his recent research.

perspective", which addresses the coexistence of multiple logics and the negotiated and political nature of institutional change. I will also draw on recent research that considers how ICTs are intertwined with such processes.

Finally, in the last section of this chapter I justify my conceptual framework, which combines insights from both theoretical approaches, and I will argue that this conceptual framework contributes to recent calls in new institutional theory to understand how institutional logics interact and are materially negotiated in practice (Lounsbury, 2008). It also contributes to tackle a relevant concern in IS literature which is how to reconcile situated and emergent accounts of sociomaterial practice with the recognition that such practices are embedded in a broader institutional context.

3.2 A posthumanist performative approach to practice

3.2.1 Introduction

Until quite recently, social sciences have uncritically accepted the dichotomy society / nature, and the related human / non-human, with consequences for the study of technology and social change. Researchers in the area of Science and Technology Studies (STS) have contributed to the critique of these dualisms by revealing the entanglement of human and material agency.[10] Furthermore, investigating areas that social sciences had traditionally excluded from the social realm, and influenced by insights from the sociology of scientific knowledge (SSK), STS has revealed how facts and objects are socially constructed, and has evidenced the social nature of knowledge.

While the important contribution of these studies in challenging dominant technological deterministic positions and positivistic views of science has been recognized, some of the earlier research in STS has been criticised for being overly social deterministic, and in some cases for giving too much power to "the inventor" in their accounts of technology design and its social implications. However, research in STS has increasingly and more explicitly distanced itself from social

[10] Other disciplines have contributed to the debate, notably Feminist studies, with prominent authors such as Donna Haraway and Judith Butler.

constructivist approaches that give predominance to ‘social explanations’, and has further developed performative, posthumanist perspectives. I am drawing in this research on authors such as Latour, Callon, Law, Pickering, Mol, and Berg, which under the umbrella of STS, ANT and especially post-ANT or material-semiotics have offered posthumanist, performative accounts.

Such theoretical underpinnings challenge modernist conceptions of knowledge in OMS, IS and e-learning that underlie an important body of research concerned with how to best support learning with technology. From a performative, posthumanist perspective new questions arise, such as how knowing is sociomaterially constructed, negotiated and sustained in practice. Thus, this theoretical approach supports our exploration in this thesis of how technology and knowledge participate in the ongoing negotiations of our world in becoming. This theoretical approach, with its anti-essentialist underpinnings, encourage us to question categories such as “the community”, “the practice”, “the experts and their knowledge”, and thus “what is considered worth learning” very much present in interventions aimed at fostering virtual communities of practice. It shifts our focus of attention, instead, towards trying to understand the participation of heterogeneous actors in the contested negotiation of such categories in the construction of reality. Consequently, it also helps explaining the difficulty of achieving change by design.

This perspective, which we present in detail in the following sections, is in line with recent calls in OMS and IS to analyse sociomaterial configurations. That is, to research the entanglement of humans and non-humans in the constitution of reality.

3.2.2 A posthumanist approach

Actor-Network Theory (ANT) has become an increasingly influential framework for the study of sociotechnical systems, and it has been adopted in Information Systems research (Walsham, 1997; Monteiro, 2000; Hanseth et al., 2004; Ramiller, 2007), and also recently in education research (Fenwick & Landri, 2012; Fenwick & Edwards, 2013). It provides a valuable lens to tackle the “desperate” need for theorizing the IT artifact in the social study of IS (Orlikowski & Iacono, 2001), as

it foregrounds the role of technology in society, by treating technology as an actor in its own right. It also allows us to explore the ways in which "human and non-human materialities combine to produce particular purposes and particular effects in education." (Fenwick & Landri, 2012, p.3)

Proponents of ANT suggest that there is a need to transcend the social/technical divide and pay attention to the "missing masses" (Latour, 1992), by recognizing the important role of artifacts in the construction of social order (Latour, 2005; Callon, 1986). Imagine, Latour (Latour, 1992, p.155) suggests, what humans would have to do in every given situation if nonhumans were not there to help. Let's assume we have no doors, for instance. To be able to live in an enclosed space, you would have to destroy and build up a new wall every time you wanted to get in or out. In fact, if we look around us, we realize that we *delegate* many programs of action to nonhumans. To be true, any social interaction is materially mediated. Society is an heterogeneous network of people, machines, animals, texts, money, organizations, etc. (Law, 1992), and therefore reality is sociotechnical, sociomaterial. Furthermore, ANT scholars argue that agency is distributed between humans and non-humans, and that despite the appearance of stabilities in the world reality is in constant construction.

Bruno Latour, one of the leading proponents of ANT, offers in *Reassembling the Social* (2005)[11] a poignant critique of the way 'the social' is generally studied, and justifies the contribution of a sociology of associations. He regrets that social sciences have not only tended to disregard objects, facts, matter, as topics of study, but they have also constructed 'the social' as a sort of external material domain with stabilized state of affairs. Critical with structuralist conceptions and with the taken for granted categories of sociology, Latour argues that sociologists tend to impose 'templates' in their analysis of social order; however, by replacing the object of study by social functions or social factors, sociologists do not really elucidate anything.

[11] For a briefer account, see (Latour, 2000)

In Latour's view, "the social has never explained anything; the social has to be explained instead" (Latour, 2005, p.97). That is, society should not be taken as the source of causal explanation for the existence of stability, but it is such very (provisional) stability that needs to be explained. "'Society' has to be composed, made up, constructed, established, maintained, and assembled." (Latour, 2000, p.113) Thus, it is the aim of ANT to trace heterogeneous assemblages of actors, and describe them without imposing predefined categories on them. ANT is not a grand theory that tries to explain society, but is a method of approaching reality and explaining how specific actor-networks are bound together, by following the actors (or actants) that constitute it.

Thus, ANT researchers not only challenge the dichotomy agency/structure, but they also challenge the traditional sociological notion of "actor", which derives from the philosophical construct of the "rational man". ANT's principle of symmetry suggests that non-humans also act, they "do" things in the world, and therefore they should be given the same analytical status of actors as humans. Action cannot, in this view, be reduced to intentionality; "*any thing* that does modify a state of affairs by making a difference is an actor—or, if it has no figuration yet, an actant."[12] (Latour, 2005, p.71).

This implies that we cannot reduce the concept of agency to the action of a single, well-defined actor. Action is distributed, and "actors are network effects. They take attributes of the entities which they include." (Law, 1999, p.5)

> "The actor network is reducible neither to an actor alone nor to a network (...). An actor network is simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to redefine and transform what it is made of" (Callon, 1987, p.93)

[12] Latour offers different justifications for the distinction actant / actor. In (Latour, 1992, p.255) he asserts:" We use actant to mean anything that acts and actor to mean what is made the source of an action." However, in (Latour, 1999b, p.303) he offers the following justification: "Since in English "actor" is often limited to humans, the word "actant", borrowed from semiotics, is sometimes used to include nonhumans in the definition."

Actors and networks are therefore irreducible to each other. Actors are the effect of networks, because they are dynamically shaped and re-shaped by their relationship with other actors in an open-ended network of associations. But while they are effects of the network, at the same time, they are constitutive parts of the network. Callon (1991) offers a clear example when he describes a nuclear power station as an assemblage of heterogeneous actors such as machines, atoms, engineers, managers, operators, etc. In this sense, the nuclear power station is a network effect; but at the same time it is seen as an actor, as when nuclear power stations are referred to as a safety threat in environmentalist discourses. In this case, the elements constituting the actor-network are black boxed. Usually it is only when there is a conflict that the black box is opened.

As we can see from this conception of actor, ANT adopts an anti-essentialist relational ontology, which Law (1999; 2009) describes as semiotics of materiality.[13] Like semiotics, ANT assumes that entities are produced relationally, that they do not possess pre-given qualities; but ANT applies this to all materials and not only the linguistic or symbolic ones. Thus, this 'sociology of associations' traces assemblages of human and non-human actors and offers descriptive accounts of the ways and processes by which such actor-networks hold together or not.

[13] Actor-network theory (ANT) emerged in the 80s mainly from the work of Bruno Latour, Michel Callon, and John Law. While ANT has achieved a good reception in several social sciences fields, Latour and Law suggest that the name of the theory is confusing. As Latour put it, "there are four things that do not work with actor-network theory; the word actor, the word network, the word theory and the hyphen!" (Latour, 1999a, p.15) The problem is that these words take a renewed meaning for these authors, which sometimes gets lost when the theory travels. Actors are not well-bounded entities and they can be non-humans; the term network has come to be associated with the Internet, and in its popularized version is taken as neutral means of transport; however, for ANT the word network implies transformation. Finally, Latour claims that ANT is not a theory but a method to follow the actors, because unlike traditional sociology it does not aim to explain society by imposing theoretical categories. However, some time later Latour (2005) detracts himself. While he admits that some terms that have been suggested to refer to these approaches might be more accurate—"sociology of associations", "sociology of translation", "actant-rhizome ontology"— in this book he defends the use of the catchier name ANT. Law (1999; 2009), however, has adopted from Donna Haraway the term "material semiotics" or "semiotics of materiality". Such change of name comes with a critique towards the specific image of connectivity associated with the network metaphor, and the consideration of "other, non-Euclidean, non-network, spatialities." (Law & Mol, 2001)

3.2.3 The heterogeneous assemblage

Analytically, ANT is interested in describing associations among actors, and in providing accounts of the complex negotiations and disputes that result in more or less stable heterogeneous assemblages. While ANT has been applied in recent years to other areas of research, ANT scholarship was originally interested in exploring processes of knowledge-creation and innovation in science and engineering practices, by studying "science and technology in the making" (Latour, 1987). Particularly earlier ANT research (Callon, 1986; Latour, 1987; Latour, 1988; Latour, 1992; Law, 1991) strived to uncover how technoscientific projects get accomplished (or not), by following engineers and scientists in their efforts to enrol actants to achieve their aims. From this perspective, a project succeeds if enough actors are aligned and assembled in a relatively stable network. As summarized by Law (1992, p.381):

> "this is the actor-network diagnosis of science: that it is a process of "heterogeneous engineering" in which bits and pieces from the social, the technical, the conceptual, and the textual are fitted together, and so converted (or "translated") into a set of equally heterogeneous scientific products."

For instance, Latour (1988) reveals how Pasteur was able to create unexpected and heterogeneous associations, which resulted in *The pasteurization of France*. Unexpected, for example, because sometimes experiments did not go to plan and substances seemed to be in charge, they would "speak back at him", and he had to change his course of action. Moreover, Pasteur had to associate actors with very heterogeneous interests through a series of translations. He needed to enrol microbes, cows, machines, farmers interested in healing, public health workers interested in a theory of disease and pollution, statisticians interested in data, etc. Latour evidences with his analysis that scientific 'discoveries' and innovations cannot be explained as a simple matter of reason, as the rational acceptance of a scientific theory. "Science is not politics. It is politics by other means" (Latour, 1988, p.229). In addition, it shows how, speaking as a spokesperson of the network, the scientist tends to black box the complex actor-network that he and his

‘discoveries’ depend on. Pasteur was inventive and a good strategist, but while he appears as a hero, we can see that nobody acts alone. The activities of many others are attributed to him, but an actor is never single: it is an actor-network.

These earlier ANT works developed a whole range of vocabulary to describe the actor-network, and the mechanisms by which actors are aligned and assembled in support of a project or program of action. Such vocabulary has been adopted in Information Systems research to describe processes of systems design and implementation (Monteiro, 2000; Ramiller, 2007). From this perspective, actor-networks are built and temporarily stabilized by enrolling actors in processes of translation. *Translation* is political in nature, and it refers to “all the negotiations, intrigues, calculations, acts of persuasion and violence thanks to which an actor or force takes, or causes to be conferred to itself, authority to speak or act on behalf of another actor or force.” (Callon & Latour, 1981, p.279).

Callon (1986) distinguishes four main phases of translation: problematization, interessement, enrolment, and mobilization. In a first phase of *problematization*, an actor—in this case a group of researchers—who has identified a problem tries to persuade other actors of the significance of the problem and they establish themselves as indispensable. Then, they align and negotiate the different interests of the actors, so that their interests can be served by a common project, which then becomes an obligatory passage point. In this process of problematization the identity of the actors, and what they want is defined in relation to the problem. *Interessement* is the set of actions by which the researchers “attempt to impose and stabilize the identity of the other actors it defines through its problematization.” (Callon, 1986, p.207) In this way actors are persuaded to commit resources to the project by playing a role in the programme. If interessement is successful, the actors become *enrolled* to the network and they perform the roles assigned. Finally, *mobilisation* is the process by which researchers try to ensure that the actor-network can be sustained in the future. For this, the initial actors have to be able to represent adequately a relevant collective, and make sure that members of the collective will align to the project. If all these processes of translation are successful, closure is achieved. However, closure is always fragile, because networks are inherently unstable.

This earlier ANT work (Callon, 1986; Latour, 1987; Latour, 1992; Law, 1991) has been criticised for imposing a priori theoretical concepts, despite ANT's critique of sociology for doing this; and for offering overly managerial (strategic), even Machiavellian stories, that privilege the powerful, male, technoscientist actors (Star, 1991). More recent research has taken on board some of these critiques, and the vocabulary of ANT has been simplified and diversified at the same time. In addition, some authors prefer to focus on practices and enactment, so that they do not need to predefine actors (Mol, 2002).

In the recent years some authors have adopted new concepts to substitute the term network (assemblage, *agencement*) and have also challenged the idea that stability of the network is necessary to make an object work. They have also focused on actors that do not necessarily try to strategically dominate others (like Pasteur, or the scientists described by Callon, 1986), and that are not well bounded. For instance, adaptable, fluid, objects like the Zimbabwe Bush Pump can travel as mutable mobiles, being redefined in each new location. The pump might just be successful because the network never does come to a closure, and because the "inventor" is also fluid, he has disappeared from view, without trying to take control or recognition from it (Laet & Mol, 2000; Law & Singleton, 2005). However, Mol (2010) argues that the use of new terms and the exploration of new topics is not a matter of new research overcoming the old one; this is because ANT is not a theory that offers an overarching explanatory framework with fixed categories. In addition, ANT always tries to open new territories; and with new stories, it develops new vocabularies. We could say that ANT, like the objects it studies, is fluid. It just tells us to trace the associations, the processes of translation.

3.2.4 Theorising technology with ANT

From an Information Systems perspective, ANT offers useful insights to theorize technology in a way that overcomes social and technological determinisms, by focusing on sociotechnical or sociomaterial systems. ANT considers that artifacts are embedded in a heterogeneous assemblage; they are always part of an actor-network.

Latour (1991; 1992) offers several simple and clear examples to show how technologies can be aligned to programmes of action through processes of translation. For instance, in order to remind customers in a hotel to return their room keys at the front desk before they leave, we could attach a note next to the exit door asking customers to please return the keys. However, this inscription tends to be insufficient and most customers keep forgetting to return the key, or the moral obligation is not sufficient for them to care. To prescribe the desired pattern of action, a more effective translation was proposed: attaching a large and heavy weight to the room key. In this case, most customers become enrolled to the programme, because they prefer not to carry the weight around. From this perspective, the strength of the translation does not depend only on the inscription but also on the "listener".

What we can also perceive from this example is that translation is always a displacement; it implies the transformation of the actants in the actor-network. In this example, the message, the customers, and the key are no longer the same: customers do not return the key because they are well mannered; they get rid of it because it deforms their pockets. (Latour, 1991) Thus, any innovation embodies scripts of behaviours (Akrich, 1992), it prescribes patterns of action and it redefines the actor-network. It creates new actors, and new divisions in the world. It is performative (more on this in the next section). If we take the case of a technology implemented in an organization, as Ramiller (2007, p.S198) points out:

> "an information system, by its very design, involves assumptions about what kinds of information will be captured when and by whom, and how that information will be used and by whom. The system, accordingly, stipulates a set of relationships with its target users (...). In this way the technology, by virtue of its design, speaks for other actors, defining their duties, the knowledge and skills they must have, their contribution of value to the organization, and their very identities."

In addition a new translation and a new actor-network might create (new) exclusions. For instance, some workers might not be needed with the new system,

or they might need to possess different skills and therefore they might be valued differently or considered unsuitable for the redefined role.

It has been argued that technologies embody scripts of behaviours (Akrich, 1992), that they can be important allies to maintain a specific social order (Latour, 1991), and that they play an important role in structuring power relationships (Callon, 1986). However, this should not be taken as a deterministic view of technology, because the acceptance or expected appropriation of the technology cannot be taken for granted. Recall that different actants negotiate their forces in a process of translation and the actor-network results from the alignment of different actors. If interests do not become aligned, the network does not hold. It is quite well established in information systems literature that the uptake of an innovation cannot be taken for granted. Resistance to adopt the system or unexpected consequences are common. From an ANT perspective this can be understood as a failure in the process of translation.

Actor-networks are sociotechnical systems, so we cannot tease apart the social and the technical. If we go back to the example of the hotel key, even if the innovation has been appropriated, the stabilization of the network depends on all the elements; so, if for instance the hotel manager omits the note saying “please return your keys”, customers might carry the keys with them and just think that the weight is rather annoying, without understanding that they were meant to leave them at the desk.

As we mentioned, actors are defined in relationship to the other elements of the actor-network, therefore the concept of affordance, which has received renewed interest in information systems since recent calls to attend to materiality (Leonardi, 2011; Faraj & Azad, 2012; Robey et al., 2012), should not be taken as laying in the technology itself, but as a relational concept. Affordances should be understood as possibilities for action that arise from sociomaterial arrangements. In information systems literature, to move away from essentialist conceptions of technology Orlikowski (2000) introduced the concept of technology-in-practice to convey that users interpret the technology in use. However, considering ANT insights, this concept should be complemented by its counterpart: practices and users change as

well with the introduction of a new technology. Technology and practice are not pre-given but emerge through the development and intertwining of actor-networks (Berg, 1997). Thus, in trying to understand the success or failure of several decision-support techniques in health care, Berg (1997, p.165) suggests:

> "The tools and the worlds in which they become embedded thoroughly transform each other—and these mutual transformations are key to an understanding of their (non-)functioning. A working tool, I argue, is the outcome of these mutual transformations: of the *convergence* of tools and settings into a network in which heterogeneous elements are interconnected and transformed."

Thus, beyond social and technological determinisms, things are not conceived as "simply the hapless bearers of symbolic projection" (Latour, 2005, p.10), nor do they impose causality or determine outcomes a priori. In reference Langdon Winner's (1980) phrase that "artefacts have politics", Law (1992, p.383) argues: "artefacts may, indeed, have politics. But the character of those politics, how determinate they are, and whether it is possible to tease people and machines apart in the first instance—these are all contingent questions." Sociotechnical systems result from negotiations between humans and non-humans. They are heterogeneous networks of people, organizations, machines and other objects.

Not only artifacts are enacted and enacting as part of an actor-network, but "objects" of an actor-network can belong to more than one actor-network, being redefined in each of them. Or in fact, becoming different objects. As Mol (2010, p.260) puts it:

> "as actors come to participate in different "networks", discourses, logics, modes of ordering, practices, things get complex. The "actors" start to differ from one network, discourse, logic, mode of ordering, practice to the other. The anaemia diagnosed in the laboratory, is not the same thing entity/actor/object as the anaemia diagnosed in the clinic."

3.2.5 Performativity: against representationalism and the universality or neutrality of knowledge

> "We can perform, transform, deform, and thereby form and inform ourselves, but we cannot *describe* anything. In other words there is no representation, except in the theatrical or political senses of the term." (Latour, 1988, p.229)

Laboratory studies (Latour & Woolgar, 1979; Knorr-Cetina, 1981) and, later, ANT research (Callon 1986; Latour 1987) have engaged with the study of technoscience in practice, questioning the modernist assumption that technoscientific knowledge is able to map or control a reality out there, and that it is produced by a subject detached from the object of study. The dualism subject / object and society / nature is seen as a construction of modern science. Latour (1993) points at the double movement of translation and purification: On the one hand, modern science creates hybrids of nature and culture. On the other hand, it then proclaims the separation of nature and society, and tends to present problems and solutions as either technical or social.

Influenced by the sociology of scientific knowledge (SSK), works like (Latour & Woolgar, 1979) offered detailed empirical accounts of how scientific facts and objects are constructed in the 'making of' science, and showed how artificiality and objectivity go hand in hand. However, the concept 'construction of facts' should not be taken to mean—as some did—that facts are invented and are therefore false. Saying that a fact is fabricated does not imply that it is less real. As Latour (2005, p.91) puts it:

> "'constructivism' should not be confused with 'social constructivism'. When we say that a fact is constructed, we simply mean that we account for the solid objective reality by mobilizing various entities whose assemblage could fail; 'social constructivism' means, on the other hand, that we *replace* what this reality is made of with some *other stuff*, the social in which it is 'really' built."

Latour (2005) exemplifies this with the image of constructing a building: a building is constructed, artificial, but very real and objective. In addition, by paying

attention to the construction process one can realize that things could have gone otherwise, that different decisions, pressures, arrangements, etc. could have led to constructing a different object, perhaps one that was equally solid and stable. One can also experience that some construction efforts sometimes fail for various complex reasons, which involve many human and non-human actors.

To avoid the misunderstanding of equating social construction with invention, ANT authors frequently use the term “assemble” or “assemblage”, which indicates the need of mobilizing and enrolling heterogeneous actants to make a fact or an object hold. “Knowledge and action are never individual; they mobilize entities, humans and non-humans, who participate in the enterprise of knowledge or in action.” (Callon & Muniesa, 2005, p.1237)

The idea that (scientific) facts and objects are constructed has been understood by some critics as a postmodern, deconstructionist move that reduces reality to interpretation. However, ANT researchers, like other STS authors, distance themselves as much from the modernist, positivist, dream of controlling and dominating an external world through science, as from postmodernist accounts that reduce all to text. Such authors share with other contemporary thinkers a critical view towards representationalism, and tend to adopt instead a performative idiom (Hacking, 1983; Butler, 1990; Rouse, 1991; Pickering, 1995; Mol, 2002; Barad, 2003; Law, 2002).

Representationalism is the belief in the ontological distinction between representations and things, and the confidence in language to mirror pre-existing phenomena. Science and technology students started to question the representationalism that dominates scientific realism by shifting the focus of study from issues of knowledge, to the production of knowledge; that is, from questions regarding scientific representations and issues of correspondence between descriptions and reality, to an interest in how science is actually done in practice.

ANT and material-semiotic authors distance themselves as much from scientific realism as from social constructivism, which shares a representationalist idiom. As Barad (2003) argues, since the linguistic turn, the semiotic turn, and the interpretative turn, everything tends to be explained as a form of cultural

representation, in which "the only thing that does not seem to matter is matter" (p. 801). Social constructivism seems to assume that we can grant direct access to language and culture, but not to matter, and that only culture and language have historicity and agency.

In contrast, a performative idiom challenges the belief in the power of words to represent pre-existing things. It does not treat knowledge as statements *about* reality, but as a practice that interferes with other practices *in* reality. From this perspective, "knowledges and the objects that they know may be understood as being produced together." (Law, 2000, p.349) Thus, this body of research does not study objects, but objects-in-practice. It explores how realities and objects are being done, how they are enacted in practice.

In addition, focusing on practice and enactments evidences "the emergent interplay of human and material agency" (Pickering, 2002). And it is important to highlight this idea of 'emergent interplay', or the similar concepts of 'intra-action' (Barad, 2007) or 'interaction' (Mol, 2013), because a performative idiom is not claiming as 'new materialists' do that we need to attend to 'matter itself' and its ontological essence (e.g. Coole & Frost, 2010). Performative accounts suggest a relational ontology that acknowledges that whatever the entities involved in a practice are able to *do* inevitably depends on adjacent entities they may do something *with*. (Mol 2013) It is only in interaction that "objects afford each other their (always local, often fluid) 'essence'" (Mol, 2013, p.380).

In analysing how objects are enacted in practice, this literature shows that things that we usually take to be solid, single objects, are in fact multiple (Mol, 2002; Law, 2000; Law & Singleton, 2005). In the language of actor-network theory, we could say that they are reshaped in different networks, with new interactions. In this regard, the performative turn also challenges the focus on 'meanings' and 'interpretation' of social constructivism: It does not convey that one object is perceived differently in different contexts and by different subjects, but it argues that different objects are enacted in different practices.[14]

[14] Mol (2002, pp.42–43) prefers to talk about the 'enactment of objects' instead of using the term 'construction', because the term *construction* was introduced to mean that objects gradually come

The multiplicity of objects, and their relational ontology should not be taken to suggest fragmentation. As mentioned, performative accounts are critical of postmodernist deconstruction. Attending to multiplicity goes hand-in-hand with analysing the various coordination strategies involved in reassembling multiple versions of reality (Mol & Law, 2002, p.10) Different ways of ordering the world coexist and interfere with each other; some reinforce the same simplicities and silences, and some might have some overlaps.

To exemplify, Mol describes in *The body multiple* (2002) the day-to-day diagnosis and treatment practices for atherosclerosis and she illustrates that what we usually understand as a single condition, atherosclerosis, is in fact multiple. Different 'atherosclerosis' are discussed, measured or observed by different specialists using different apparatus. There are many versions of it. Mol argues that this is not an indication of a variety of perspectives on a single disease, but each medical practice generates its own material reality, in this case, for instance, multiple bodies. It is through the important work of coordination of these different professional practices (or actor-networks, we could say) that the disease is made to cohere. And in the process, through these assemblages also different patients and doctors are enacted.

In the area of medical practices as well, Berg (1997) and Berg and Timmermans (2000) are concerned with the different orders (with their others, their disorders) that several decision-support technologies construct in practice, the different universalities and rationalities that they help sustain. Thus, rationalizing can take many different forms. They also show how each order is tied to practices of ordering, to different dispositions and arrangements.

Finally, in this performative turn questions of ontological politics become important. This research reveals that multiple realities coexist, and that things can be otherwise, therefore, as researchers we might want to ask questions about the consequences and affordances of different configurations. We can make visible the

into being, but then they are stabilized and they acquire an identity that they hold on to (e.g. SCOT studies). In contrast, the term *enactment* highlights the idea that maintaining the identity of objects requires a continuous effort and that they may change over time. In addition, it is connected with the idea of decentring the object, and acknowledging that objects can perform different identities in different sites.

different values, and the different definitions of good, of purpose, in the different ontologies-in-practice. Indeed, “what to do” is not given in the order of things, but needs to be established; the good is inevitably multiple (Mol, 2002). While reaching consensus through rational argumentation (Habermas, 1989) is an ideal widely shared, as agonistic views of politics have shown (Mouffe, 1999) controversy is unavoidable.

3.2.6 Theorising design

In positivistic accounts of science and technology design, the scientist or designer is detached from the object, and devises, as if from nowhere, universal truths and technical solutions. Such is the prevailing discourse of modernity, which following the arrow of progress, put reason into reengineering the world. However, coinciding with a loss of faith in the modern project on the aftermath of Nazism, contemporary thinkers (post-structuralists, post-modernists, deconstructivists, cultural theorists, STS, etc.) have challenged most of the fundamental principles of the positive science and the Cartesian dualisms in which it is based: subject/object, nature/culture. In addition, particularly feminism, cultural anthropology, and postcolonialism helped making visible all those “others” that were left without voice, and revealed that truths were pronounced from very specific locations and bodies, and then presented as if representative of the whole. Thus, authors like Haraway (1991) suggested the need to replace “ways of being nowhere while claiming to see comprehensively” (Haraway, 1991, p.193) with “views from somewhere” (p. 196); that is, acknowledging that knowledge is always situated and partial. Suchman (2002), applying these ideas, has convincingly argued for the need to recognise that technological design is from *somewhere*, and to challenge dominant discourses that present technology design as unlocatable and a mere application of technical knowledge, which produces technologies that can travel anywhere.

Drawing on ANT (Law, 2002; Law & Singleton, 2005) and the contributions of Barad (2007) and Suchman (2011) I suggest to study the performative character of design, in terms of the configurations and entanglements that it sustains. Seen from a performative and sociomaterial perspective, design helps constituting the world

in specific ways but it is already part of a larger configuration of the world. Considering the relational character of our capacities for action, design can be seen as part of and participating in the ongoing reconfiguration of objects and subjects, and in the distribution of responsibilities. The practice of design is always boundary making, it makes intelligible some things and it excludes others, it materialises more or less contested configurations (Suchman, 2005). In doing so, it helps rendering those configurations more obdurate (Law, 2002).

3.2.7 Summary and limitations

ANT offers particularly useful and robust theoretical underpinnings to recognize the embeddedness of technologies in social practices and to understand how technology is implicated with organizational and social change. It emphasizes the need to consider the involvement of technologies in the construction of reality, and it reveals the "role played by science and technology in structuring power relationships" (Callon, 1986, p.197). In this regard, the concept of performativity challenges taken for granted notions of 'objectivity', knowledge, and that which is considered worth learning. Knowledges, rationalities, and orders are sociomaterially constructed, and embodied in material forms. Applied in the area of education, Fenwick and Landri (2012, p.6) argue that "power relations and the politics that infuse pedagogy are by no means confined to human interests and ideologies, but are created and sustained through materialising processes indelibly enmeshed with the social and semiotic."

ANT acknowledges that artifacts are constitutive elements of action. Beyond social and technological determinisms, it overcomes the dichotomy social / technical and attends at the ongoing relational interplay of human and non-humans in heterogeneous networks. The concept of actor-network invites us to consider the process of heterogeneous engineering needed to make a technology work; in addition, it suggests that while the characteristics and values inscribed in the technology do matter, we cannot determine *a priori* the settlement of the actor-network. ANT is a "theory of agency, a theory of knowledge, and a theory of machines" (Law, 1992, p.389). The insights it provides will inform my research,

and they will allow me to offer a critique of taken-for-granted assumptions of ICT-mediated collaborative learning.

ANT has been influential in IS and OMS (Chua & Yeow, 2010; Hanseth et al., 2004; Ramiller, 2007; Walsham, 1997), but it has also received several critiques. ANT and posthumansit performative approaches have been sometimes criticised for not being sufficiently critical, as they do not consider the social structures that might oppress some actors and empower others (McLean & Hassard, 2004; Star, 1991; Whittle & Spicer, 2008). I disagree with the argument that ANT cannot be critical because it is ontologically relativist (Whittle & Spicer, 2008). ANT is not relativist but realist. It is not positivist, and it understands reality as being in constant and ongoing construction, and even as multiple. However, it is true that the use of ANT in OMS and IS has not always fully explored the criticality of ANT (Alcadipani & Hassard, 2010) and that some of the earlier works in ANT seemed particularly concerned with "heroes" (Latour, 1988). However, my conceptual framework has been influenced by feminist authors (Barad, 2007; Suchman, 2011) that are very much concerned with the way realities and subject positions are sociomaterially constituted. From an ANT perspective it is precisely the structures and instruments of domination (race, gender, etc.) that need to be explained. ANT departs from a rejection of positivist assumptions and means-ends rationalities and objectivity, it shows how ordering is not inevitable and could be 'otherwise', and how different orderings bring with them different conceptions of "good" and different distributions of responsibility and accountability. Particularly the explicit consideration of performativity in more recent theorisations of post-ANT and STS very much stresses an ethical dimension in the construction of reality. In this thesis I particularly take on board a non-consensual view of reality (Mouffe, 1999; Barry, 2013; Venturini, 2009) and a questioning of the self-declared neutrality of the project under study.

Many of the criticisms directed to ANT are related to the concept of symmetry (McLean & Hassard, 2004). Indeed, I agree that the main limitation of ANT for my analysis is that it somehow flattens the world by considering all the actors symmetrically. For the purposes of this research I do not share the concerns of critics that are uncomfortable with analytically assuming the symmetry of humans

and non-humans. My main concern is that ANT has no straightforward way to acknowledge that actors do not act in a *tabula rasa*. By focusing on the situated practice as it emerges, ANT tends to dismiss that actors draw on and are affected by the social conditions, cultural and material resources, and institutional norms and values of the context where they are situated, and by sociotechnical forces that transcend the very localized situation, because they unfold in multiple contexts and they are historically shaped.

Admittedly, ANT could explain this by analysing the complex actor-network that constitutes the institutions and the stabilities in the social order in which and actor is situated. The problem is, as ANT authors admit, that the connections of the actor-network are limitless, and the semiotic regression infinite. Therefore such enterprise would be untenable. In fact, most ANT analysis tend to focus on what sociologists would refer as the micro level.

To illustrate this point, we are all aware of the strong influence that the market logics exert in our society and in our lives. If every time we wanted to refer to how the market logics influences an action we had to unpack the whole actor-network that sustains the market logics as a more or less stable heterogeneous network, our task as researchers would become like that of the cartographer in the story by Jorge Luis Borges (1972) who tried to make such a precise map of the world that it coincided with it. That is why, in fact, we always black box, we always have to take some things for granted, for example the meaning of the words we use. Different conceptual frameworks offer different lenses that open certain black boxes and not others. I share the sensitivity of ANT in terms of the need to open the black boxes that have become taken for granted. However, we cannot open them all at the same time.

In addition, and related to this, ANT is defined by its proponents as a method of following and describing actor-networks. In this sense, we can say that ANT research is more interested in answering questions about ‘how’ than ‘why’. In this regard I share the views of STS author Fujimura:

> “I want to examine the practices, activities, concerns and trajectories of *all the different participants*—including nonhumans—in scientific work. In

> contrast to Latour, I am still sociologically interested in understanding why and how some human perspectives win over others in the construction of technologies and truths, why and how some human actors will go along with the will of other actors, and why and how some human actors resist being enrolled." (Fujimura, 1991, p.222)

Answering to these concerns, new institutional theory tries to explain why some actors act the way they do influenced by institutional forces, and by considering the existing organizing regimes. As I will argue in the next section, however, I do not advocate a deterministic view of institutions, and therefore I do not intend to offer unidirectional cause-effect explanations.

In what follows I will offer an overview of the main tenets of new institutional theory and the more recent institutional logics perspective. Drawing on current literature, I will justify how this theoretical lens can be usefully applied to the study of ICTs. In the final section of this chapter I will further justify the value of integrating these two theoretical approaches into a conceptual framework.

3.3 New Institutionalism

3.3.1 Organizational Institutionalism

Meyer and Rowan's (1977) paper is taken to mark the beginning of the new institutional perspective in the study of organizations. It was written against the backdrop of prevailing over-rationalistic accounts within organization studies, which tended to portray managers as (boundedly) rational actors seeking efficiency and effectiveness, and organizations as adapting to its environment to secure an appropriate 'fit'. (Greenwood et al., 2008, p.3)

In contrast, new institutional theorists contend that organizational phenomena cannot be explained by only considering calculative rationality and instrumental functionality, and they seek to analyse why and with what consequences organizational arrangements defy traditional rational explanations. To answer to these questions, institutional perspectives emphasize the need to take into account the institutional context, that is, the values, norms, beliefs, and taken-for-granted

assumptions and rational myths that guide and constrain organizations' actions over time (Greenwood et al., 2008; Mignerat & Rivard, 2009).

According to new institutional theory, rationality and legitimate ways of acting are not universal but contingent. Institutions are generative of identities, models of practice, and values, and they are inscribed within sociocultural contexts (Dobbin, 1994). When in a specific location and time certain rationalities become taken-for-granted and institutionalized, alternative behaviours or organizations become almost unthinkable. Consequently, much of our actions and ways of organizing do not follow a calculative rational approach but respond to the norms, rules and legitimate ways of acting in the specific context or institutional field in which actors and organizations are embedded. Thus, from a new institutional perspective, legitimacy rather than efficiency drives the actions of actors and can better explain the success and survival of organizations (Tolbert & Zucker, 1996). Therefore, institutions play a very important role in the social construction of reality (Berger & Luckmann, 1967).

There is no simple and agreed definition of institution, but as stated by Scott in his influential book on institutionalism, "Institutions are comprised of regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life." (Scott, 2008, p.48) Different schools and disciplines tend to focus their attention on one of these three pillars; however, Scott and other researchers have indicated the relevance and interaction of all three pillars in the constitution, maintenance and change of institutions.

Earlier research from an institutional perspective delved into institutional effects on organizations and tended to focus on isomorphism and stability (Meyer & Rowan, 1977; Zucker, 1977). These authors were concerned with the important role of rationalization in western culture, and they viewed the isomorphic development of formal organizational structures as part of this cultural system and the project of modernization. In such studies institutional orders were treated as given, and more or less stable. Furthermore, institutions were considered as the

independent variable and organizations presented as conforming to institutional demands (Greenwood et al., 2008).

DiMaggio and Powell (1983) brought Meyer and Rowan's focus on isomorphism from the societal level to the organizational level. They viewed the behaviour of organizational actors as being shaped by cultural norms, and resulting in coercive, normative and mimetic sources of isomorphism. This research has been criticized for being over-deterministic and for not paying sufficient attention to agentic action and change. As stressed by Scott, it is important to consider the Janus-faced character of institutions: Much research has emphasized that institutions control and constrain behaviour, they "impose restrictions by defining legal, moral, and cultural boundaries, setting off legitimate from illegitimate activities. However, it is essential to recognize that institutions also support and empower activities and actors." (Scott, 2008, p.50)

Another aspect to consider is the level of analysis of institutional theory. Scott (2008, pp.85–90) reveals that different schools and varieties of institutional theory have focused on different levels of social analysis, from the micro- to the macro-phenomena. For analytical purposes he distinguishes 6 levels of analysis: world-system, societal, organizational field, organizational population, organization, organizational subsystem. To exemplify this, whereas economic history has traditionally focused on the regulative aspects at the world-system level, for instance analysing how property rights developed in the Western world (North & Thomas, 1973), ethno-methodological approaches tend to focus on the cultural-cognitive aspects at the level of organizational subsystem, analysing skills, habits, etc. In Scott's view research that is able to consider the interplay of some of these levels of analysis is specially revealing.

In this regard, and taking up the critiques of earlier research adopting new institutional theory, some scholars have advanced an institutional logics perspective, inspired by Friedland and Alford's (1991) seminal essay. They programmatically propose "not to revive neo-institutional theory, but to transform it. Recognizing both its strengths, the original insights on how macro structures and culture shape organizations, and its weaknesses—limited capacity to explain

agency and the micro foundations of institutions, institutional heterogeneity, and change—the institutional logics perspective provides a new approach that incorporates macro structure, culture, and agency, through cross-level processes (society, institutional field, organization, interactions, and individual) that explain how institutions both enable and constrain action." (Thornton et al., 2012, p.vi)

The concept of institutional logics refers to the symbolic systems and material practices that constitute the organizing principles of that institution (Friedland & Alford, 1991). Research on institutional logics is diverse and in continuous development, but the main tenet of an institutional logics perspective is that individual and organizational action needs to be understood as located in a social and institutional context with diverse underlying logics of action, which both regularizes behaviour and offers opportunities for action and change. It is a cross-level process approach that highlights the interplay between individuals, organizations and institutions (Thornton & Ocasio, 2008).

This perspective views society as an inter-institutional system (market, profession, corporation, etc.), and notes that institutional logics can develop at different levels (organizations, organizational fields, etc.); as a result, it is argued that several sources of rationality co-exist. Consequently, this approach emphasizes the diverse, and sometimes conflicting, logics present in any given context. In this way, rather than assuming deterministic isomorphic effects from institutions, the interaction of several logics and the ongoing conflicts and negotiations between and within institutions is seen as a source of heterogeneity and change.

In addition, this approach assumes that decisions and action result from the interplay between institutional logics and individual agency. In such interplay institutions shape and are shaped by individual and organizational action: on the one hand, action is embedded in institutions, on the other hand, institutions are socially constructed and constituted by the actions of organizations and individuals (Berger & Luckmann, 1967).

While new institutional theory has recently acknowledged the need to consider agency, and the micro-processes that can lead to heterogeneity and change, proponents of the institutional logics admit that this is an area that needs further

development (Thornton & Ocasio, 2008; Lounsbury, 2008). Some authors have recently suggested that incorporating a practice perspective and the insights of ANT can be fruitful for understanding how actors are implicated in the transformation and maintenance of institutions (Lawrence & Suddaby, 2006; Lounsbury & Crumley, 2007; Lounsbury, 2008; Hayes, 2008; Thornton et al., 2012).

The body of literature interested in institutional work offers a valuable contribution in this regard. Institutional work can be defined as "the purposive action of individuals and organizations aimed at creating, maintaining, and disrupting institutions." (Lawrence & Suddaby, 2006) Therefore, scholars researching institutional work have been concerned with analysing processes of institutionalization and deinstitutionalization, and in developing a better understanding of the interplay of agency and institutions. For these authors institutions result from purposive action (Jepperson, 1991).

In contrast to processual approaches to institutionalization interested in describing the transformation of institutions, an institutional work perspective zooms into those processes to explain how institutional change or stability is constituted by the work of institutional and collective actors and their practices. Similarly, from an institutional logics perspective Lounsbury (2008) criticizes that much literature interested in institutional change seems to assume that institutional shifts are period effects preceded and succeeded by periods of stability. In contradistinction he acknowledges the ongoing negotiations and institutional work required to achieve a certain level of stability, and suggests the need to expand research in this area. Lounsbury (2008) and Crumley (Lounsbury & Crumley, 2007) advocate for an integration of institutional and practice scholarship, specially ANT, to address the relatively unexplored question of how new practices arise.

In conclusion, while precursors of new institutional theory in organization studies took a structuralist stance that focused on the influence of institutions upon organizations, more recent research has adopted a social constructivist perspective that acknowledges the influence of institutional forces, but recognizes the complex

interplay of organizations with their contexts, and the ongoing conflicts between divergent values, which are negotiated in practice (Townley, 2002; Hayes, 2008).

Since the 1990s institutional theory literature has offered analyses that suggest a complex interplay of institutional pressures, with conflicting and contested logics. Organizations and individuals are not seen as passively and uniformly adapting to their institutional context, but as enacting, responding and working upon diverse institutional influences. This results in diverse organizational behaviours and structures rather than homogeneity (Westney, 1993). In a complex and reciprocal relationship with institutional processes, organizational identity is understood to mediate how organizations interpret and respond to institutional expectations (Glynn, 2008). Furthermore, institutionalism has analysed the emergence and change of institutions and their decline, and has advanced a process view of institutionalization that accounts for the politics and power relations and interests of the actors that mobilize around them, accounting for agency and self-interest, as reclaimed by DiMaggio (1988). In this regard, some authors have suggested an integration of institutional and practice perspectives to study institutional work (Lawrence & Suddaby, 2006), and to understand how new organizational practices arise (Lounsbury & Crumley, 2007).

3.3.2 Institutional theory and Information Systems

Organization studies, like most social sciences, has uncritically accepted the dichotomies society / nature, and society / technology until quite recently, with consequences for the study of technology (Czarniawska, 2008). New institutionalism, for instance, kept the distinction between ‘institutional environments’ and ‘technical environments’ (Meyer & Scott, 1981) in the 1980s. In the meantime, in the same decade, studies of science and technology (by authors such as Callon, Latour, Woolgar, Knorr-Cetina) revealed the social construction of facts and objects, and later research, particularly from an Actor Network Theory perspective, became influential in breaking the dualism society / technology. While technology still tends to remain absent from most social science research, this literature sensitized some researchers in organization studies to address technology

not only as socially constructed but also as a physical reality with agency (Czarniawska, 2008; Orlikowski, 2010b; Kallinikos, 2004).

In this regard, Orlikowski and Barley (2001) suggested that organization studies could benefit from "following the lead of information technology research in taking the material properties of technologies into account" (p. 145). In this article, the authors also propose that "information technology research can benefit from incorporating institutional analysis from organization studies" (p. 145). They note that not many IT researchers have considered the influence of the institutional context in the design, use, and consequences of technologies. The risk of not considering the embeddedness of technology in "complex interdependent social, economic, and political networks" (p. 154) is to offer overly rational explanations and technologically determined views of IT phenomena.

Institutional theory has been adopted in IS research since the 1980s, but more prolifically in the last decade. In a critical literature review Mignerat & Rivard (2009) found 53 articles that applied an institutional perspective in the main IS journals and in management journals that publish articles dealing with IS. The analysis of this literature shows that most research has traditionally focused on the study of institutional effects, that is, on the identification and measurement of institutional pressures affecting IT adoption and implementation. However, more recent research has examined the institutionalization process of systems or organizational practices as a whole (Swanson & Ramiller, 1997), and also the interaction between IT and existing institutions (Avgerou, 2000; Currie & Guah, 2007; Miscione, 2007).[15]

Research concerned with institutional effects has predominantly been undertaken at the organizational level of analysis. In this literature we find empirical studies that identify a variety of entities exerting institutional pressures on organizations, which affect the adoption, implementation and assimilation of an innovation.

[15] Of the 53 articles that Mignerat and Rivard (2009) analysed, 36 researched institutional effects; 10 analysed the process of institutionalization of software applications and management practices; and 9 studied the interaction between an IT and existing institutions and the consequences of such interaction. In terms of the level of study, most research remains at the organizational level. Nevertheless, some recent research analysing IS standardization has been done at the field level.

Following DiMaggio & Powell (1983), coercive, normative and mimetic pressures have been recognized. This research also analyses the responses of organizations to such institutional pressures, but for the most part it has focused on the compliance of organizations to institutional forces, seeing acquiescence as the main legitimating strategy. Therefore, in much of this literature, institutional forces are seen as non-technical factors leading to isomorphism and inhibiting change.

This is especially the case of earlier studies, which tended to portray IS innovation as resulting from an initial localized rational organizational choice, and then diffusing to other organizations due to a process of institutionalization. In this view, a new technology or a new practice is initially adopted, after rational deliberation, for its technical merits; but later, if such innovation becomes legitimated and widely accepted as good practice, it becomes institutionalized. Then the innovation is maintained following taken-for-granted assumptions of its benefits, and it easily diffuses to other organizations (Tolbert & Zucker, 1983; Zucker, 1987).

However, as already mentioned, this view of institutions as deterministic sources of stability and homogeneity has been challenged by more recent institutional research. Legitimating strategies other than acquiescence have been put forward (Oliver, 1991; Suchman, 1995), and deterministic views of institutions have been challenged by political views of institutional processes that account for the role of diverse actors and the presence of conflicting logics (Zilber, 2008). Also research in Information Systems has offered alternative views that point at the complex interaction between different institutions and processes of IS innovation and change (King et al., 1994; Swanson & Ramiller, 1997; Avgerou, 2002).

A body of literature has examined the complex institutionalization process of IS innovations (King et al., 1994; Swanson & Ramiller, 1997; Currie, 2004). In this regard, Swanson & Ramiller's (1997) concept of 'organizing vision' has become very influential. These authors disputed the view that early adoption of IS innovation is only the result of rational choice and localized deliberation. Conversely, they argued, "institutional processes are engaged from the beginning" (p. 458) and at the level of the organizational field. These authors developed the concept of organizing vision to explain how under the influence of several

institutional forces a diverse interorganizational community develops a view of an IS innovation. This organizing vision plays a central role in the early adoption and later diffusion of an IS innovation.

In addition, Swanson & Ramiller (1997) point at the reciprocal relationship between the organizing vision and the evolving technologies, thus moving beyond traditional analyses of institutions as external factors affecting IS innovation. This issue is taken further by Avgerou (2002), who challenges the tendency to portray institutions as non-technical factors impacting on IS innovation, and suggests to see "ICT as an institution in its own right" (p. 30) in mutual interaction with other institutions.

Opening a new theme in the study of ICTs from an institutional perspective, Avgerou (2000; 2002) argues that ICT applications have become pervasive and "taken-for-granted as fixtures of contemporary organizations" (Avgerou, 2002, p.31). The institutionalization of ICTs and its symbolic value as a tool for modernization has resulted in important investments in ICTs even in cases where there are no commensurable benefits (Avgerou, 2000; Avgerou, 2003; Noir & Walsham, 2007). Despite the institutionalization of IS innovation and the tendency to unquestioningly accept its value, Avgerou (2002) suggests that the results of IS innovation are difficult to predict due to the presence of multiple institutional logics, which vary in different contexts. Institutional forces are not deterministic and lead to uniformity, but they reciprocally shape each other and frequently exert conflicting pressures, generating variation.

Scott (2008, p.48) suggested that "institutions are transmitted by various types of carriers, including symbolic systems, relational systems, routines and artifacts". In consonance with this view, a stream of research has been interested in the study of technologies as reproducers of institutional orders (Kling & Iacono, 1989; Hasselbladh & Kallinikos, 2000; Kallinikos, 2011). From this perspective technologies are inscribed with institutional values and make certain institutional arrangements more durable as they become objectified. In this view, "technology could be seen as a distinctive regulative regime that considerably shapes the operations of organizations and institutions and governs social practice."

(Kallinikos, 2011, p.18). In addition, technological infrastructure and standards exert a strong influence on the possibilities of later technologies, creating a path dependency.

The idea that technologies are inscribed with institutional values has been taken up by some of the scholarship interested in the role of ICTs and organizational change. However, in contrast to some literature that portrays ICTs as enabling or constraining organizational change, recent research has revealed the complex interaction between different institutional logics and processes of IS innovation and change (Avgerou, 2002; Rajão & Hayes, 2009; Hayes & Rajão, 2011). For instance, research in the area of ICT for development (ICT4D) has revealed that for IS innovation to be successful it is necessary to be sensitive to cultural diversity and to address the specific contextual characteristics of the organization or country where the technology will be embedded (Avgerou & Walsham, 2000). A case in point, Miscione (2007) showed the mismatch between the Western scientific knowledge embedded in a telemedicine system, and the local health care practices in the context of implementation, which were based on a different understanding of health and illness. This suggests the need to attend to the possible tensions between the values and logics inscribed in a technology and the institutional logics in the context of implementation.

In addition, research has shown that, even within the same national context, different stakeholders may have different "technological frames" (expectations, assumptions and knowledge) mediating the understanding and use of technology (Puri, 2006). This indicates the need to bear in mind the differing and competing institutional logics and the ways in which technologies interact with them. Even further, some research has delved with the ways in which ICTs are implicated in institutional change in contexts where there are several competing logics. This research has revealed how IS innovation is intertwined with the ongoing negotiations between different logics, and it has emphasized the emergent, political and negotiated nature of institutional change. (Robey & Boudreau, 1999; Avgerou, 2002; Hayes, 2008; Rajão & Hayes, 2009). For instance, Hayes (2008) offers an in-depth analysis of how the introduction of a new ICT was implicated with the ongoing negotiations and conflicts arising from competing views and values in an

organization, which led to institutional change. Interestingly, this case shows how the same features of the technology that were in line with the institutional values of one group, at the same time provided the means to question its legitimacy.

Despite the contributions of institutional theory in the study of IS, we will briefly outline some limitations as seen from an ANT or sociomaterial perspective. While new institutionalism and institutional logics do not take a deterministic view of institutions, studies adopting such perspective tend to impose such theoretical construct in the study of social reality, without sufficiently discussing how institutional logics are maintained, and disregarding other important forces or actors that do have an agential effect. In fact, as I will discuss below recent research adopting institutional logics perspectives have suggested that practice perspectives could be fruitfully combined to better understand how institutions are sustained. Furthermore, institutional perspectives tend to maintain an ontological separations between the social and the material, which does not sufficiently account for how materiality is implicated in the constitution of reality and part of the worlds that we study. In trying to overcome these limitations I suggest a framework that combines insights from ANT and institutional logics.

3.4 Institutional logics and the actor-network

As previously discussed, ANT does not take stability or social order for granted. Orders are effects generated by heterogeneous means (Law, 1992), and therefore the apparent stabilities need to be explained as the result of a heterogeneous network: “Structure is not free-standing, like scaffolding on a building-site, but a site of struggle, a relational effect that recursively generates and reproduces itself.” (Law, 1992, pp.385–386) Institutions, organizations, social orders or actors are generated relationally, they are part of actor-networks, created and sustained through materializing processes, and never sewn up. Orderings are contestable and often contested. From this point of view, legitimacy or institutionalization requires work.

ANT could not be reconciled with earlier new institutionalism, which took institutions as stabilized and deterministic forces resulting in isomorphism. However recent research in institutional theory, above all in the institutional logics

perspective, has recognized the need to consider the emergent and negotiated nature of institutional change. In studying the processes by which social structures or patterns become taken for granted, some authors have recently recognized that incorporating a practice perspective and the insights of ANT can be fruitful for understanding how actors are implicated in the transformation and maintenance of institutions (Lawrence & Suddaby, 2006; Lounsbury & Crumley, 2007; Lounsbury, 2008; Hayes, 2008; Thornton et al., 2012). Studies integrating ANT with new institutionalism are not yet abundant, but we can find an example where this has been done in the field of Information Systems (Avgerou, 2002).

As previously argued, I consider that one of the limitations of ANT (and some of the situated theories of learning discussed in the literature review) is that it flattens the world. Recent contributions in ANT have offered new spatial metaphors, but I think that these are not sufficient to account for the different positions in which actors are placed, and the different enabling and constraining forces affecting them, the different values and norms that are considered legitimate in the environment, and the conditions and resources that transcend the situation but affect their action. While a performance takes place, a lot of work behind the scenes is necessary, and we need ways to try to account for it.

In this regard, while recent new institutional approaches account for agency, multiplicity of institutional logics, and institutional change, they take into consideration the broader social and historical context in which practices take place. An institutional logics perspective "provides an embedded-agency approach that locates the identities and practices of actors within broader cultural structures that both enable and constrain behavior." (Thornton et al., 2012, p.132) From this point of view, practices shape and are shaped by institutional logics.

In my research I will draw on concepts such as institutional logics or institution to explain how these affect the process of problematization and how the actor-network can travel. I insist that when doing so I am not assuming a structuralist stance that imposes a deterministic and taken for granted template on the social reality. ANT sensitizes us to see that institutional logics, and that which becomes taken for granted, results from negotiations, from a network of humans and non-humans.

However, I believe that in many analyses it can be useful to black box an institutional logics and consider it a strong actor in the actor-network we are trying to study at that point. In fact, when we undertake research we always have to black box, starting with the use of language. If I had to open up the black box of each word, its connections with other discourses and practices, I would never be able to finish this thesis. We always have to take some things for granted to be able to explain other things and to live in the world.

Law (1992) uses the concept of punctualization to refer to this. He argues that sometimes the network that makes up an institution or an object becomes concealed from view, and we see and interact with it as if it were a single block. For instance when we watch TV we do not consider all that is needed to make it work (cables, engineers, machines, electricity, etc.). This phenomenon, called punctualization tends to happen when network patterns are widely performed, for instance a relatively standardized organizational form. Punctualization, he adds, is precarious as it can always face resistance, but it also allows us to deal with complexity: "Punctualization is always precarious, it faces resistance, and may degenerate into a failing network. On the other hand, punctualized resources offer a way of drawing quickly on the networks of the social without having to deal with endless complexity." (Law, 1992, p.385)[16]

Following this notion of punctualization, we can understand an institutional logic as an actor in an actor-network, and the multiple institutional logics that we find in a given context can be seen as relationally interacting with each other. I suggest that ICTs may be conceived as resulting from and supporting a complex interplay of institutional logics, in a network of institutions, organizations, humans and non-humans, each of them forming part of other complex networks. Institutional logics are implicated (together with other actants in the network) in the production of technology, and at the same time technology might help reinforce some institutional logics: the actor-network is relational, and results from ongoing processes of negotiation.

[16] Law adds that "this is one of the places where actor-network theory maps onto the sociology of organizations: the affinity between this argument and the theory of institutional isomorphism is evident." (Law 1992, p.385)

This integration of ANT and institutional theory proposed offers a robust conceptual framework for the study of ICT-supported collaborative professional learning, which will allow us to move beyond functionalist views of knowledge and also very situated approaches to learning that do not account for the network of institutions in which actors and technologies are embedded. From this perspective, knowledge, practices, and learning are seen as materially mediated and as embedded in institutional dynamics. In this approach actors are seen not as mainly guided by rational choice, nor as completely autonomous, but as social actors situated in a network of institutional forces. Also ICT "is not seen as a set of material products functioning according to the technical rules embedded in their physical components, but as products [and we could add, also producers] of a social [or socio-technical] network embedded in social [socio-technical] institutions." (Avgerou, 2002, p.30)

As already advanced in the literature review, this combined conceptual framework will allow me to tackle the limitations found in the literature on ICT-mediated learning and virtual communities of practice. ANT departs from a rejection of positivist assumptions and means-ends rationalities and objectivity, and it is a useful theoretical perspective to critically assess the dominant instrumental views of knowledge, learning, and technology, in managerial and educational interventions. However, I also take on board critiques that argue for the need to consider the contextual and institutional aspects affecting the actions of actors, particularly in the study of technology design, and also of teaching practice, which has been almost exclusively studied at the micro-level as a teacher-student interaction, disregarding that teaching practice and teaching knowledge is shaped beyond the class; thus, the suitability of integrating ANT and institutional logics theorizations.

4 Methodology

> *"Method is not (...) a more or less successful set of procedures for reporting on a given reality. Rather it is performative. It helps produce realities"* (Law, 2004, p.143)

4.1 Introduction: ontological, epistemological and theoretical considerations

In the previous chapter I presented the philosophical and theoretical underpinnings of this thesis. The discussion about knowledge and knowing presented was consistent with a constructionist epistemological perspective, which assumes that all knowledge, and therefore all meaningful reality, is contingent upon human practices (Crotty, 1998). Whereas the positivist tradition assumes that scientific knowledge can explain an external and independent reality by using methods that ensure the objectivity of the research undertaken, constructionism challenges the view of an objectivist epistemology. From this perspective, knowledge is not discovered, but constructed.

Contrary to some critiques, suggesting that reality is socially or sociomaterially constructed does not make it less real. However, constructionism cannot be seen as a homogeneous epistemological position, since different theoretical perspectives adopt different views of the concept of construction and the purpose of social research. For instance, this thesis does not fall within the established tradition in IS of interpretivism, which developed as a reaction against the dominant positivism of this field of study (Walsham, 1993; Walsham, 2006). Interpretivism is broadly speaking concerned with presenting the different meanings that different actors attach to the world. Conversely, a practice lens, like the one adopted here, suggests a shift of focus from meanings to doings, and the order-production of practices (Silverman, 1998; Barad, 2003; Nicolini, 2012); from an interest in understanding the view of the world of different actors to trying to reveal how the world gets constructed by social and material actors, and how concurrently actor-ship is made possible in practice. Thus, the theoretical perspective adopted calls for an understanding of how the connections of a complex heterogeneous network might

or might not become stabilized, while revealing alliances and tensions in the configuration of practices.

From this perspective, the "social" in "social construction" points at the "process through which any thing, including matters of fact, has been built" (Latour, 2003, p.28) and does not refer to a sort of softer material made of social ties. That is, practice approaches pay attention to the work and ties necessary to maintain the apparently durable features of our worlds. This does not lead to relativism or the dissolution of the solidity of the world. We have defended a realist view, in which matter matters (Barad, 2003). In this regard, a constructionist approach can be distinguished from the subjectivist epistemology of some postmodernist theoretical perspectives, represented for instance by the linguistic turn, which postulates that meaning is imposed on the object by the subject, and thus tends to adopt an idealist ontology. I have also distanced myself from sociological approaches that see social structures and "the social" as already there. As Latour puts it, instead of using social constructs to explain science and technology, we need to study how science and technology participate in the very making of "society" and its stabilities.

Some IS and OS literature adopting practice theories (Nicolini, 2012) such as structuration theory (Orlikowski, 2000), ethnometodology (Suchman, 1987), ANT, and certain phenomenological and process approaches, has offered detailed analyses of situated practices. While this literature has provided very valuable insights that show how the reproduction and change of our world is played out in the everyday life performances of social practices, one of the limitations of such studies is that a focus on microprocess renders invisible the fact that practices do not take place in a vacuum, but are situated and affected by interconnections that go beyond the here and now. The theoretical perspective adopted in this thesis suggests "zooming out" (Nicolini, 2009) to consider how the specific phenomena and practice under study relate and are built. This has methodological consequences in terms of adopting a level of analysis that moves beyond a very situated focus of analysis.

Moving from representationalism to performativism has important consequences for how we understand and approach the study of technoscientific phenomena such

as LDSE and technology-enhanced learning initiatives, but also for how we understand our role as social scientists, and the methods and theories adopted. From this theoretical perspective, apparatuses and subject/objects mutually create and define each other (Barad, 2007; Foucault, 1980). Thus, scientific methods and scientific knowledge are not seen as tools to apprehend the world, but as part of material-discursive practices that configure the world in specific ways, as part of a complex assemblage. We do not do science standing outside the world but as part of the world, and take part in its constitution (Barad, 2003; Law et al., 2011).

This has political and ethical implications. In this regard, the theoretical position adopted here can be situated, broadly speaking, within the critical tradition of social research. However, while the Frankfurt School, in their call for the emancipation from the tyranny of instrumental reason (Horkheimer, 2013), postulates a distinction between instrumental and critical reason (Habermas, 1972) and is interested in revealing the commonly held values and assumptions in society, we maintain that science is never neutral, or just instrumental, but is always world-making; it performs different possible versions of reality and thus it might help sustain some configurations and not others (Carlile et al., 2013; Introna, 2007; Mol, 2013). Furthermore, in contrast to dominant consensual views of knowledge and meaning creation, present in the interpretivist tradition and some of the critical tradition (e.g. Habermas, 1989), I hold a conflictual view of society. From this perspective, consensus is understood to be provisional, "precarious and necessarily unstable" (Mouffe, 2000, p.11) and underpinned by differing rationales that arise from the different positions of actors and their web of relations with other actors. From this perspective no research leads to closure but it is open to scrutiny and discrepancy.

4.2 Research design

The theoretical perspective adopted and the research question envisaged calls for an in-depth analysis of the phenomena under study, to show how the expertise and practice of teaching in HE gets negotiated (and not just represented) with technoscientific interventions of knowledge management and learning in organisations.

4.2.1 Case study approach

This research is based on a single case study. This is a suitable method; because the type of question that I am trying to answer is explanatory, I investigate a contemporary phenomenon (the development of a system to support innovation in teaching and its reception) within its real-life context, and the boundaries between this phenomenon and context are not clearly defined at the outset of the research (Benbasat et al., 1987; Yin, 2009, p.18). In fact, from the theoretical perspective adopted in this thesis, which takes reality to be a sociomaterial assemblage, context cannot be seen as something external to social practices, but as mutually constitutive. Furthermore, adopting a performative perspective on science, it is assumed that the context and the social phenomena are not out there waiting to be revealed, but that the researcher plays a role in constructing them. It is an accomplishment that results from the agential cuts performed (Barad, 2007) as part of a complex assemblage. In this regard, this research is situated, and it engages with theoretical discourses and research in the areas of information systems, education and STS. Thus, I do not embrace empiricism, and I keep at some distance the very grounded perspectives defended by some STS and ANT scholars, which seem to present themselves as transparent narrators of the "world as it is" (Schneider, 2002). I have used "tools at hand" (theories, concepts, discourses) to offer an alternative, diffractive (Haraway, 1997) reading that contrasts with the instrumental approach of the research project studied (LDSE).

4.2.2 Field access and construction of the narrative (corpus & analysis)

My case study is the LDSE research project (November 2008 - December 2011), which I describe in the next section. This case study has been chosen for practical reasons: I had a studentship linked to the project.17 However, it is also a relevant case, first of all, because it is not an isolated project. There are increasing efforts to develop technologies that support teaching practices and that want to facilitate the reuse of teaching/learning resources, and encourage the use of TEL among academics. In addition, LDSE draws on previous experience and it is trying to

[17] My studentship was linked to the project, and my research is expected to provide some insights that can be useful to the project, but I was not expected to contribute directly to the development of the system.

follow a new approach to learning design, which allegedly should be more flexible yet more 'informative' and 'supportive' than previous systems, as explained before. In this sense, I find it interesting how this project relates to previous projects and with academic literature in the area. This is made explicit in documents of the project and also in the published research papers that have resulted.

The abundant explicit reflection on and justification of the project is one of the interesting aspects of analysing a research project in contrast to a commercial development, and it has allowed me to gain easy access to its rationales and theoretical underpinnings. However, as part of my observation I also paid attention to the distance between what is being said and what is being made, i.e. what is being inscribed in the technology, and the possible limitations on achieving its goals. Thus, part of my analysis consists of revealing what is materialised in the technology. Also relevant to my research is a consideration of the distance between expectations and outcomes. In this regard, a drawback of this case study is that the system that was finally built was a prototype and not a fully implemented system. However, through interviews and workshops, I tried to understand the perceptions that expected users had of this technology, and I took into consideration the context of ongoing changes in HE in the UK.

Having a studentship linked to the project facilitated enormously the issue of gaining access to "the field". I attended the monthly project meetings during the three years of the project, and attended the advisory board meetings. I also had access to all the documents that the project produced, which were many (ontology, evaluation reports, etc.), and all the exchange of emails. All the documents and messages were posted in a project management software, and at the end of the project I downloaded all these documents and organized them.

I was also present, and participated actively in most of the workshops that the project organized to assess user requirements and to evaluate the technology with expected users, and I interviewed some informants for the project with questions devised by the project team. Liz Masterman, from the LDSE project, coordinated these workshops and interviews. I specify below my participation in the fieldwork.

Moreover, I conducted six follow-up interviews with informants (and expected users) of the project. I attach in the appendix the interview guide.

From a performative perspective, “data collection” is always “data construction”, that is, I am not claiming that there was data just out there for me to be collected, but as a researcher I made certain cuts, I constructed certain apparatus (Barad, 2007). My sources for “data collection”/construction were the following:

1) Observation of the research project meetings and workshops with informants. I recorded and transcribed the parts that I found relevant, and I took field notes.
2) Documents delivered by the project, such as minutes of the meetings, evaluation reports, etc., and the software developed.
3) Participation in user requirements and evaluation workshops organized by the project. I took my own field notes and I participated in “data collection” and in some of the analysis of the data for the project. I draw on the project documents where all this data is brought together (transcriptions, selection of quotes, analysis)
4) Semi-structured interviews of “expected users” of the LD, which is an appropriate method of understanding the “beliefs, attitudes, values and motivations in relation to the behaviours of people in particular social contexts.” (Gaskell, 2000, p.39).
5) Secondary literature to be able to construct the case narrative, and to understand the entanglement of the LDSE with other actors and logics beyond the local context of technology design. It also allowed me to reveal the non-consensual nature of ICT-mediated learning interventions.

Thus, while this research is not mainly based on the analysis of documents, for validation purposes I always refer to the documents where the transcription of interviews, notes taken during meetings, or analysis of workshops can be found. In the final section of this chapter I list the data corpus, my participation in data collection as part of the project team, and the coding used for the documents.

The selection of these sources of data collection is guided by my constructionist approach. In this regard, using Kvale’s metaphor (1996, pp. 3–5), I understand my

task as an interviewer—and the parallel can also apply to the ethnographic observation—not as that of a miner seeking for “nuggets of essential meaning” (3) but more as that of a traveller. I understand the interview as a meaning-making process, and recognize the active role of the respondent, together with the interviewer, in the construction of knowledge produced through the process of interviewing.

One of the disadvantages of these methods is handling the large amounts of “data collected” (Berger, 1998, p.57) to construct a coherent narrative according to the standards and expectations of the IS discipline. Based on the ‘explanation building’ technique (Yin, 2009, pp.141–144), to analyse “my data” I followed an iterative process of reading the notes and trying to identify categories and themes, and suggesting a link with the theory; then revising my arguments and propositions, and refining my results by repeating the process again and again until I could link together the field story with the theoretical storyline.

As stated in the research question, and based on the conceptual approach adopted I was interested in tracing the entanglements of the LD and the LDSE with other actors and institutional logics. For clarity of argument, I decided to divide my research questions and analysis in three sections. In the first one I traced the key actors and institutional logics bound up with the design of the technology. In the second I analysed the inscriptions into the technology to discuss the performative character of the LD and LDSE. In the third part of the analysis I focused on the entanglements of this technology with actors and institutional logics in the context of use.

One of the difficulties of this sort of analysis is choosing what actors and logics to trace as the links are multiple and the regression of connections could be infinite. Therefore, I have to acknowledge that my (and any) analysis is incomplete, as it was not possible to capture in the length of this thesis all the connections I found. The selection of what to present in this thesis was based on relevance. Relevance was determined in terms of what this case was telling me, in the sense that some topics and logics were clearly recurrent in the project (the need to promote TEL, the need to embed pedagogical knowledge, the concern among academics that the

LDSE could be used as a managerial tool to control teaching practice). However, in academic research relevance is necessarily based on being able to dialogue with existing literature. Therefore I acknowledge that "relevance" was determined by an iterative process of analysing my date, and reading academic literature in the fields of IS, OMS, and education. In this sense, I am critical towards ANT's reference of "just following the actors". While I agree that it is important to make an effort for not imposing social constructs, I think that grounded approaches tend to be dangerously naive. Drawing on performative approaches (also ANT) I assume that as a researcher I am of the world (Barad, 2007): affecting but being affected by it.

Generalizability, reliability, and validity are concepts inherited from a positivistic approach to science and are difficult to apply in the strict sense to this qualitative research. Qualitative research methods are sometimes criticized by positivists as just offering subjective and non-generalizable opinions of an issue. Admittedly, it is not the purpose of this research to generalise the findings, but to do an in-depth analysis of a phenomenon. My contribution comes by refining theory. More specifically I have offered a conceptual framework that combines ANT and institutional logics, which can be used in future research. I have also offered insights to understand some of the limitations. I have also contributed to discussions in OMS and IS on practice-based perspective and the sociomaterial or entangled nature of reality. Thus, my results will not be generalizable in statistical terms, but the contribution consists of refining theoretical approaches and received views in my area of study. Thus, the only kind of generalization that I expect to offer is analytical. (Yin, 2009, p.15)

In terms of reliability and validity, I acknowledge that my findings are the result of my own and my respondents' interpretations, and that the research will not follow an analysis procedure that would make possible the reproduction of exactly the same results, particularly as the phenomenon studied is framed in time. At the end, I see my research as performative and entangled with the world; therefore I have conducted this research by conversing not only with my respondents but also with previous theoretical contributions of the research community. However, following the canons of the discipline, I have stored all my data, which will be available for inspection by a third party.

4.2.3 Data corpus and coding

Single case study: LDSE project (November 2008 - December 2011)

I attended monthly LDSE project meetings January 2009 - December 2011.

- Direct observation
- Audio-recording
- Agenda, Minutes [LDSE Minutes date], and my own notes [LDSE Notes date]
- Documents used in the meetings

I attended 3 annual advisory group meetings

- Direct observation
- Notes

Documents produced by the project and related:

- TLRP Call for research proposals, LDSE Case for support and LDSE End of award report
- User requirements
- Technical specifications
- Evaluation
- Various others (e.g. workshop plans, TLRP documents, etc.)

Published academic articles by the LDSE team members about the LDSE

Project workshops and interviews to gather user requirements and to evaluate the software. There was one researcher in the LDSE team responsible for the organisation, design and analysis of user requirements elicitation and evaluation workshops and interviews, but:

- I helped running most of the workshops with other LDSE team members and I interviewed several informants for the project.
- I helped planning one workshop and some interviews for user requirements
- I did the analysis of some of the workshops and interviews

Interviews and evaluation workshops I participated in, with specification of my involvement in analysing or planning some of them, with the name of the transcription, notes, or analysis documents in square brackets:

- 8 Dec 2008: I helped out at the UnivG (post-1992 university) workshop to elicit user requirements
  [D1-5A G-workshop]

- 29 June 2009: I helped out at the UnivM (post-1992 university) workshop and I interviewed 2 informants. I also suggested questions for a questionnaire.
  [D1-5B M-workshop]

- May 2010: 5 interviews to informant practitioners from several universities to gather user requirements + several meetings to plan them
  I did the analysis of the part corresponding to the knowledge base.
  [D4.2 SCO Spring] and [TransIP1], ..., [TransIP5]

- Sep 2010: ALT-C Conference: I helped out at the workshop
  (no data collected for the project)

- 5 April 2011: UnivR (University of London) evaluation workshop: I attended the workshop (in this case, basically just as an observer because there were many project members)
  [D4-4 R-evaluation]

- 18 April 2011: PPC evaluation workshop in LKL, with participants from several universities: I helped Joanna for some hours planning the workshop; I helped out in the workshop; and I did the analysis with Brock.
  [D4-5 PPC-workshop]

- 15 June 2011: I attended the UnivL (Russell Group) embedded session in PGCert in HE. Evaluation of LD v3.0
  [D4-6 L-evaluation], [L-PGCertHE-Notes]
  + 5 follow-up interviews [Inter1],..., [Inter5]

- July 2011: Evaluation walkthroughs in UnivB (post-1992 university, not in London)
  [D4-7 Module-Level]
  + 1 follow-up interview for me [Interv1-B]

- Nov 2011, 2-5pm, UnivG (post-1992 university): 'embedded' session in PGCert in HE course looking at how the LD might support trainee lecturers' engagement with theory. I did the analysis with Joanna
  [D4-8 G-evaluation]

- 10 Nov 2011, UniR (University of London): Evaluation of Patterns Collector workshop.
  Carrie and I did the analysis and wrote the evaluation
  [D4-9 PPC R-workshop]

5 Case narrative: The LDSE research project in context

5.1 Introduction

As discussed in the literature review, the study of learning has predominantly adopted psychologically based theorisations. This research provides valuable insights into the cognitive processes and behavioural aspects involved in knowledge acquisition and skill development. However, practice-based theories in social sciences have revealed the situated and identity-forming character of learning, and the inseparability of knowing and practicing. These socially embedded and explanatory theories of learning have become very influential in OMS, IS, and education research and practice, and concepts such as the reflective practitioner (Schön, 1983; Schön, 1987) or communities of practice (Lave & Wenger, 1991) have been adopted as guiding principles for interventions aimed at encouraging innovation in and improvement of working practices. Furthermore, the networking capabilities of ICTs are seen as enabling collaboration and learning, and supporting cross-organisational communities of practice.

This thesis is based on the case study of a research project, the Learning Design Support Environment (LDSE), in an effort to develop a technology to support a community of practice (CoP) of reflective practitioners. The motivation behind the project was to encourage innovation in teaching practices in HE in the UK, and the key assumptions were, firstly, that such innovation needs to come from practitioners (i.e. academics) adopting a reflective attitude towards their teaching practice, and from learning from each other and, secondly, that the best way to foster a community of practice in which practitioners can learn from each other is through technological means: specifically, with the LD technology, which embeds pedagogical knowledge, and which supports collaboration by providing a standardised layout and vocabulary to share knowledge about teaching.

Moving away from dominant positivist, consensual, and human-centric notions of learning, but also away from over-localised and reified notions of practice, I argue that technologies designed with the aim of supporting practitioners to innovate practices by learning from each other in fact participate in the ongoing reconfigurations of such “practices”. Adopting the theoretical framework presented

in the previous chapter, I want to show the performative character of IT-mediated learning, as a mode of ordering (Law) that participates in the configuration of subjects and objects of learning, and in the distribution of agency and accountability. Who needs to learn and what needs to be learned is contested and not given in the order of things, and what counts as learning and improvement of practices do not precede the strategies and technologies through which this is to be achieved. However, such strategies and technologies are not developed in a vacuum, so we need to consider the entanglements of projects, such as the LDSE, and the communities of practice they aim to support, beyond the local setting.

Thus, in the next sub-section (5.2) I will present the context in which the LDSE has been developed. Following STS insights, I do not understand context as something out there, fixed, and pre-given, but as a researcher I have traced the entanglements that are relevant for this study. I have drawn on policy discourses and secondary literature to construct this context, and in doing so it has become apparent that "how things should be" but also "how things are" are both debatable; therefore, I have outlined some controversies that are relevant in understanding the contested nature of reality and of what the LDSE project tries to achieve.

Research on learning in organisations within OMS and IS fields has mainly focused on business organisations and the health sector. However, different concerns arise when we study other areas, frequently neglected in IS, such as education. One of the complexities, however, of delving into (almost) uncharted territory is that we cannot assume that the reader is aware of the specificities of the domain in which technology is developed. In the following sub-section (5.3), I will present the aims of the LDSE and the LD in detail, as not all tools to support collaborative learning are the same. In addition, part of the argument of this thesis is the need to consider the contested nature of "what needs to be learned", so I will need to present some of the relevant controversies around teaching and learning in HE, as they might be unknown to the IS or OMS reader. In the final part of this chapter I also provide a detailed account of the LDSE team and their workings, the functionality of the LD, and the overall outcomes of the project.

5.2 Contextualisation

5.2.1 Mass higher education in the UK: Increasing student numbers, while decreasing public funding

Despite the frequent rhetoric regarding universities' resistance to change, HE in the UK, as in most other OECD countries, has been transformed in many respects since the 1960s, when a process of expansion started. There were two waves of rapid expansion in the number of students entering HE, one in the 1960s and a faster one at the end of the 1980s and beginning of the 1990s (Mayhew et al., 2004).

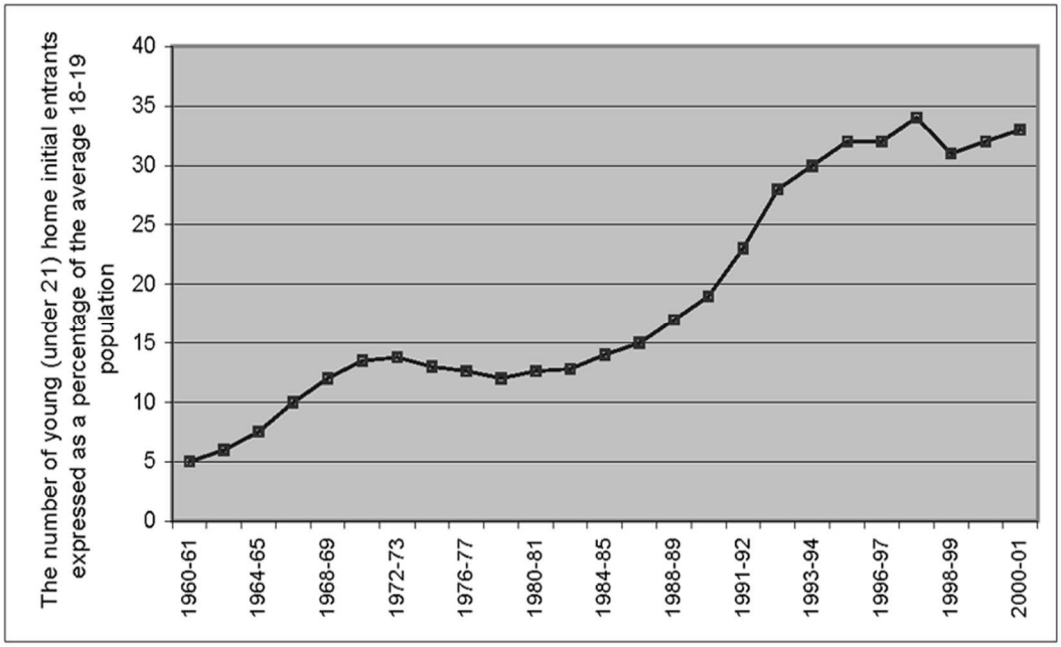

Figure 2. HE Age Participation Index, 1961–2001 (GB institutions).
Sources: Greenaway Report (2000) until 1996–97 and DfES for 1997–98 to 2000–01. Extracted from (Mayhew et al., 2004, p.66).

With the first expansion of the 1960s, which was well funded (Mayhew et al., 2004; Perkin, 1991), new universities opened: the Open University, "new" universities, such as Sussex, East Anglia, and York, and "technological" universities, such as Loughborough, and Brunel, which developed from Colleges of Advanced Technology. The second expansion, from mid-80s, resulted from the conversion of polytechnics into universities, but there was also an internal growth in the number of students, especially in the ex-polytechnics. This second important expansion was not as well funded as the previous one. Since the early 1980s public funding

tightened, and if calculated in relation to the number of students, it fell year by year, and at the end of the 1990s it had gone back to the level of the early 1960s (Mayhew et al., 2004).

This expansion was largely policy-driven. If we compare the Robbins Report (1963) and the Dearing Report (NCIHE, 1997), we can see in the latter the penetration of economic discourse, as HE is expected to "serve the needs of an adaptable, sustainable, knowledge-based economy" (para. 23), even if there is also reference to the important role it plays in "shaping a democratic, civilised, inclusive society", and individual intellectual growth and personal fulfilment. However, over the years, official discourse and attitudes towards HE have become more instrumentalist and vocationalist: that is, more concerned with the role of HE in supporting the economy (Mayhew et al., 2004; Holmes et al., 2012). For instance, Charles Clarke, former Secretary of State for Education and Skills, stated in 2003 that "wider non-economic benefits [of HE] are overrated (...) universities exist to enable the British economy and society to deal with the challenges posed by the increasingly rapid process of global change" (quoted in Mayhew et al., 2004, p.69). Also, European policies promoted this idea that HE ought to play a key role in the knowledge economy. After the Lisbon agreement of 2000 that EU should become "the world's most competitive and dynamic knowledge-based economy by 2010" (Laurillard, 2012, p.13), the following action was proposed:

> "In order to overcome persistent mismatches between graduate qualifications and the needs of the labour market, university programmes should be structured to **enhance directly the employability of graduates** and to offer broad support to the workforce more generally" (CEC, 2006, p.6) (original bold)

With the advent of the coalition government in the UK, the discourse on the important role of HE for the economy remained, and it was presented as a key driver of economic growth and international competitiveness, therefore, young people were encouraged to go to university and discourse on widening participation became part of the political agenda (Holmes et al., 2012). Indeed, since the 1960s there has been political concern about unequal access to university, but despite the

expansion of HE, inequalities in social class participation persist.[18] Despite this discourse on widening participation, the government is determined to shrink the HE budget (Freedman, 2011, p.3), and reduce public expenditure on HE by 50% in real terms over a four-year period, in line with their neoliberal programme of privatisation and spending cuts (Williams, 2011, p.2).

These important cuts in further and HE are justified politically by rejecting the principle that the state has responsibility to support non-compulsory education, and have resulted in soaring tuition fees in HE. This is expressed in similar terms by the HM Treasury (2010) and the Browne Report (2010), which had already been commissioned under the New Labour government.

> "In further and higher education, the Government believes that there must be a shift away from public spending towards greater contributions from those that benefit most and who can afford to pay, to maintain high quality provision while ensuring the sustainability of the public finances." (HM Treasury, 2010, para 1.47)

To compensate for this reduction in public funding, many of the member institutions of the Russell Group have positively embraced the Browne Review and the introduction of higher fees (Freedman, 2011, p.5) and have also turned to private funding. According to this model, initiated already by New Labour policies, universities have become part of a competitive market in which they have to compete for students and funding, and must be adaptable to the market's needs.

In contrast to most other European countries in which the state has traditionally taken responsibility for the support of HE, "British universities have always prized their financial as well as their academic autonomy" (Williams, 2011, p.2).

[18] A recent report from the National Equality Panel, conducted by the Centre for Analysis of Social Exclusion at LSE, concluded that "it matters more in Britain who your parents are than in many other countries" (Hillis et al., 2010, p.36). As regards HE "considerable differences remain, even after allowing for attainment at 16, in entry into higher education, and the kind of institution attended by social class and ethnicity, and experience of private education" (p.33). While political discourse seems to blame universities for this, research has shown that inequalities at lower levels of education have an effect on access to HE; therefore, it has been suggested that reducing inequalities in nursery, primary, and secondary education would be a more effective solution (Galindo-Rueda et al., 2004; Galindo-Rueda & Vignoles, 2005; Hillis et al., 2010; Williams, 2011).

Paradoxically, while HE in the UK continues to lose public financial support, the sector is increasingly subject to audit and accountability mechanisms, and academics' freedom in delivering teaching and research is being reduced.

5.2.2 Managerialism and professionalisation of teaching in HE

In the literature review I briefly outlined the important transformation of professional work in the context of the knowledge economy. These changes have also affected academics and HE institutions, which are seen as assuming an important role in training workers for the knowledge economy. As the state seeks control over the training of people to respond to the exigencies of the global market, universities are losing their autonomy and becoming more externally accountable (Dent & Whitehead, 2002a). For instance, to facilitate workers' mobility, degrees have become modularised and standardised at the national and European level, through the Bologna process (Parker, 2002). Furthermore, universities need to compete for resources and students, and have become more enterprising, adopting new management models.

While academics, and particularly professors, still hold power within their institutions, they are no longer committed mainly to their disciplines.[19] In this new HE model, their activities have become aligned to their organisations' strategies and interests, whilst also being subject to external accountability, validation, and benchmarking. There are three major types of audit and performance measures in HE: institutional audit, teaching quality assessment, and research assessment. The establishment of new forms of governance and top-down managerialism in HE, with the introduction of standards and bureaucratic systems of quality assurance, and involving certain technological "solutions", is challenging the traditional autonomy of academics (Clegg et al., 2003; Trowler, 1998). In addition, an ethos where things need to get done efficiently has become dominant (Cribb, 1998). This

[19] There are important differences between the amounts of time that academics can devote to research in traditional and new or post-1992 universities. Tight (2010) suggests that in traditional universities the amount of time academics dedicate to research has not changed significantly. However, in both post-1992 and traditional universities the time that academics dedicate to administration has increased.

new ethos sidelines arguments in favour of the political, cultural and economic benefits of intellectual freedom (Bastalich, 2010, p.848).

In this context, as Parker (2002) points out, teaching and administration are asked to make explicit their aims and objectives at all levels: from lectures to courses or from departments to colleges. Definitions are required as to what educators are seeking to achieve, and these are required in a way in which results can be measured and assessed: thus, the introduction of the learning outcomes language in HE.[20] Indeed, following the Dearing Report (NCIHE, 1997), institutions were asked to introduce a credit framework, and with it a semester system, modularisation courses, and clear definitions of the learning outcomes of each module.[21]

The concept of "learning outcomes" arises from education sciences as a way of planning students' learning and assessment, by encouraging teachers to reflect on what they want their students' to achieve from a given session or module and how they can best support students' learning. However, the adoption of "learning outcomes" as an accountability and validation tool in HE has been polemic, as it is seen as simplifying the complexity of the learning process, reducing it to auditable, measurable outcomes, without considering, for instance, that the results of learning might be delayed, that unpredicted outcomes might emerge, or that it is not straightforward that certain teaching methods will lead to an easily measurable and homogeneous change in students' abilities (Bennett & Brady, 2012; Furedi, 2012; Hussey & Smith, 2003; Maher, 2004; Scott, 2011; Strathern, 2000).

As regards teaching and learning, the expansion of HE since the 1960s and the adoption of new public management have resulted in several changes in teaching practices, still under way. According to Gibbs et al. (2000), up to 1980 academics enjoyed much autonomy: it was largely the responsibility of individual academics to decide their approach to teaching and if they wanted to introduce any changes. With a smaller ratio of students per academic, it was possible to offer personal tutor

[20] Several scholars have suggested the need to rethink quality assurance in ways that respect professional autonomy, are based on trust, and accept that there are aspects that are not easily measured or appraised. (McArthur, 2012; Hoecht, 2006).

[21] In the case of the Open University, the aim of modularisation was also to promote re-use of teaching material and to allow students to create customised courses (Holley & Oliver, 2000).

support. At that time, there were no evaluation systems; however, the first quality assurance mechanism was established in the 1960s to oversee the polytechnic sector: the Council for National Academic Awards (Hoecht, 2006). During the 1980s, with the increase in the number and variety of students in most universities, but especially in polytechnics, traditional teaching methods started to seem insufficient to ensure students' performance in large classes. At this point, many institutions introduced educational development units, which generally worked by offering support to individual teachers. In the late 1980s, some strategies, such as the Enterprise in Higher Education initiative, tried to promote institution-wide strategic approaches to change structures and to reorient goals to increase emphasis on students' future employability, but these initiatives were mostly unsuccessful.

In the 1990s, continued growth in student numbers, especially in the new universities, was unmatched by growth in resources, leading to a steady increase in class sizes, a reduction in the number of class contact hours and, thus, a reconfiguration in personal tutor support systems. To reduce the impact of these changes, "learning resources centres" were set up to support the increased independent learning time. It is in this context that blended learning was heralded as a solution to cope. That is, technology-enhanced learning (TEL) was seen as the way to support students' learning beyond the limited individualised face-to-face encounters in a context where HE had scaled up.

Aside from the changes in teaching practices and introduction of accountability measures, a process of 'professionalisation' of teaching in HE is taking place. Traditionally, academics held most of the power in universities, enjoying a high degree of autonomy and self-governance. In this milieu, academics, as experts in their disciplines, transmitted their knowledge to a student elite (Kaulisch & Enders, 2005; Parker, 2002). That is, expertise in the discipline was considered sufficient to be an academic, and expertise in teaching was traditionally acquired only in practice, as no specific teacher training was deemed necessary.

However, the move to mass education strained "the craft practices of teaching" of the elite system (Clegg, 2009), and new theories of learning challenged traditional methods of teaching, while a process of 'pedagogisation' of HE started to take

place within a broader pedagogisation of society (Bernstein, 2001). Pedagogy historically developed in the field of psychology, as the science that studied children's mental development and learning. More recently, it has become more broadly understood as the science and art of education and teaching (at any level of education), and therefore pedagogy or learning sciences have extended their focus of interest and influence to areas such as HE.

In this context, psychologically informed approaches to learning promoted a "teachers need fixing" (McAlpine, 2006) model of academic development, which resulted in various policy driven teaching development strategies and the controversial establishment of the Institute of Learning and Teaching.[22] This body, among others, is responsible for teacher training accreditation (Malcolm & Zukas, 2001), which has become a requirement for new academics.

In this regard, the LDSE presents itself as an alternative to top-down measures to improve teaching practice, and a move from positioning academics as passive learners in staff development sessions, to active actors learning from each other as members of a community of practice. From this perspective, innovation arises from active involvement in practices of reflective practitioners, sharing practices and learning from each other.

In this sub-section I have presented some important changes that have taken place in HE as regards teaching: we can observe a process of 'professionalisation' of teaching in which academics are expected to be trained not only in their disciplines but also in the practice of teaching; accountability and benchmarking measures have been introduced; and teaching practices have changed in the move from an elite to a mass HE; among such changes has been the introduction of TEL, as I expand on further in the next sub-section.

[22] The Institute of Learning and Teaching is the only professional body representing academics and it was a government initiative to formalise and attain greater control over teaching qualification. Hoecht (2006, p.548) argues that "without a professional body of their own and without real control over the nature of their knowledge, academics are vulnerable to redefinitions of their purpose by their monopoly employers."

5.2.3 Technology enhanced learning in the Knowledge Economy

In education, as in the social and economic spheres, technological deterministic views have nurtured high expectations of the transformational capacities of new technologies. To be sure, over the last decade we have witnessed significant investment in Information and Communication Technologies (ICTs) in all education sectors. New Labour directed over £5 billion of funding towards ICTs for the educational system during the period 1997-2007, following one of the central educational themes of New Labour's 1997 election manifesto: "Realising the potential of new technology" (Selwyn, 2008).

The hype surrounding e-learning in HE has its origins around the late 1990s, and it should be understood in the context of the Internet boom. In this period, there was a pervasive discourse on globalisation and the rise of the "knowledge society": political and economic arenas met the interests of private companies, who saw education as another potential market to invest in (Darking, 2004).

On the one hand, education, and HE particularly, is depicted in policy discourses in the UK and in Europe as a key asset for the knowledge society and central to economic growth. Consequently, policy-makers require both an increment in the number of students, which has resulted in a move towards mass higher education, an improvement of learners' achievement levels in all educational levels, and the orientation of HE towards the employability of graduates in the labour market (CEC, 2006; DfES, 2005a; DfES, 2005b; HEFCE, 2006). In turn, the use of new technologies is perceived as a cost-effective way to assist the achievement of these expectations and thus, the same policy documents urge teachers and academics to take advantage of technology-enhanced learning (TEL) to support students' learning (Laurillard, 2007). In this context, the deployment of new technologies to support blended learning (i.e. combining face-to-face instruction with computer-mediated instruction) is presented as a solution to help those institutions that have suffered most dramatically from the shift towards mass higher education. Furthermore, considering that the demand for international education places is forecasted to reach 5.8 million worldwide and up to 870,000 in the UK by 2020 (British Council, 2003), even some educationists claim that "the scale of the

problem cannot be tackled through our traditional technologies for teaching" (Laurillard, 2008a, pp.319–320).

On the other hand, but related to the previous point, HE and private initiatives are encouraged to take advantage of the economic opportunities offered by the global education market (Darking, 2004). As David Blunkett (2000), former British Minister of State for Education, stated: "learning has become a big business". In this sense, one of the big business opportunities that ICTs are deemed to offer, is distance learning, following the open university model. More recently, David Willetts, Minister of State for Universities and Science, declared in a public appearance in front of e-learning researchers of TLRP projects (Royal Society, 06/11/2012) that the expansion of UK education into foreign markets, with the support of new technologies, is seen as a strategic priority to be supported by the government.

Critical of these discourses that frame education policy and the introduction of ICTs for education in the UK in terms of the imperatives of the knowledge economy, researchers have questioned several of their underlying assumptions. Garnham (2000) argues that linking the alleged changes brought about in the "information society" with those in higher education planning, technology investment, and employment, does not hold. He suggests that the term "information society" is used as an ideological mantra in policy discourse and conceals old social struggles and pervasive issues regarding the role of HE in society. In Garnham's view (2000, p.139) "the current push towards the creation of virtual universities is the desire to cut educational labour costs rather than to upgrade the economic status of so-called knowledge workers."

Thus, as it has been argued, UK government policy discourse on HE shows the imprint of a technological deterministic view, influenced by a neoliberal globalisation paradigm in which ICTs are presented as both causes and drivers of change in HE in the context of the knowledge economy, presenting as unavoidable

the need for HE to serve the economy and provide skilled labour (Clegg et al., 2003; Garnham, 2000).[23]

In addition, the problem with the infiltration of the economic rationality in education is that productivity and economic value do not necessarily go together with quality and other social values that education is associated with. These values might include social equality and inclusion, intellectual growth or valuing critical thinking as essential for enabling the participation of (fairly) free individuals in a democratic society. As Bastalich (2010, p.845) argues, this knowledge economy discourse "undermines older understandings of the role of universities within a democracy."

In this regard, educationists insist that the penetration of ICTs in HE should not be led by economic or managerial approaches but by pedagogical sensitivity (Clegg et al., 2003; Laurillard, 2002). It is in this context that we have to situate the interest of some educationists, such as the LDSE project researchers, in investigating the possibilities of encouraging innovative and pedagogically sound uses of ICTs. It is interesting to keep in mind, however, what this sort of research takes for granted: mass education and the imperatives of the knowledge economy, and the need to use and promote TEL. I will refer to some of this in the analysis chapter.

5.2.4 Collaboration, re-use, and technology: Open education, learning objects, and learning designs

In the 1980s universities started using digital technology and developing digital content, and the reproducibility of digital resources encouraged the idea of sharing educational material between teaching practitioners. The emerging success of object-oriented programming led to the conceptualisation of learning objects. Linked to the idea of "design patterns", which facilitated reuse of objects in new collections, the idea behind the concept of learning objects is the modularisation of

[23] Similarly, in a very interesting critique towards 'the imperialism of neoliberal reason', which uncritically assumes theses *with* which one argues but *over* which there is no argument (such as globalisation, multiculturalism, etc.), Bourdieu & Wacquant (2001, p.4) suggest: "An empirical analysis of the trajectory of the advanced economies over the *longue durée* suggests, in contrast, that 'globalization' is not a new phase of capitalism, but a rhetoric invoked by governments in order to justify their voluntary surrender to the financial markets and their conversion to a fiduciary conception of the firm."

educational resources, so that they can be more easily reused and recombined with other learning objects to form new educational resources (Lane & McAndrew, 2010; Wiley, 2002; Boyle et al., 2006; Weller et al., 2006).

The notion of learning objects is still explored in some education literature and educational settings that produce digital educational resources, and its rationale is present in some Open Educational Resources repositories literature and projects. The interest in replicating and reusing digital material is encouraged by the considerable costs of producing new digital educational resources, which can be compensated by an economy of scale. Interesting, in this regard, is the self-reinforcing discourse on the use of TEL: e-learning is presented in policy discourses as a cost effective solution to widen participation and democratise education, but the reality is that developing new quality digital resources is costly, and ways of making such products more modular and reusable "need" to be researched.[24] This, in addition, proves not to be a straightforward task.

Projects developing repositories of learning objects that can be reused face several challenges. Just to mention some briefly, metadata needs to be attached to learning objects so that they can be retrieved from repositories, but deciding which information will best facilitate finding those learning objects for different learning purposes or contexts is not straightforward and time-consuming for those developing learning materials. It is not evident either the level of granularity that learning objects should have to be most useful. Related to this, an added challenge is that, on many occasions, the different parts that cohere to create a learning resource are very much interrelated and it is thus difficult to reuse its parts in different contexts. Reusing, moreover, demands standardisation, with its added challenges. (Littlejohn, 2003) The objectification of learning and knowledge expressed by the very name of learning object, and the economic rationality that

[24] Economic rationality is very much present in the discourses of researchers in the area of learning objects. For instance, in the introduction of an edited book on reusing online resources, Littlejohn (2003, p.xi) asserts: "Many believe that to meet the challenge [of the expansion in HE] we will need to teach differently, to embrace the new technologies and to exploit cost effective ways of teaching and learning. The growth of open, distance and flexible learning programmes and use of communications and information technology is evidence of institutions striving to meet these challenges; of teaching differently. The reuse of existing materials (...) is an obvious strategy."

underlies the discourses surrounding such enterprises, can be challenged in many ways, but it is out of the scope of this short overview.

With the expansion of the Internet and the development of Web 2.0 technologies, new forms of content development, sharing and reuse of educational resources and teaching practices have developed. In addition to this, the adoption of open licensing by many individuals, communities and institutions has given rise to the Open Education movement.

Open Education is a very broad term used to refer to a heterogeneous phenomenon, diversity of practices, products, and visions, which encapsulate the paradoxes of the use of social media in our societies. The concept of Open Education is adopted in discourses that defend the democratisation of education and widening participation. These discourses have inspired educational projects, such as the Open University in the UK or the area of ICTs4D.[25] In this sense, openness is linked to the values of the right to education, equality, plurality and freedom of thought.

In recent years, an increasing number of prestigious institutions (MIT, Oxford, and so on) have made educational resources freely available, and the MOOC (Massive Open Online Course) phenomenon has very recently taken off with some force.[26] OER projects in the UK seem to respond to policy agendas linked to ideas of widening participation, and making more explicit the contribution of HE to the economy and society. At the same time, however, in contradiction with the notion of openness as equal access to education, the UK Government approved a controversial dramatic increase in students' fees in HE, and significantly reduced the budget for education, which resulted, for instance, in the closure of several schools for further education and academic departments in HE. Moreover, to have equal opportunities in society people do not only need "information" but also knowledge (e.g. how to make sense of certain information, knowing the language

[25] Hall (2011), however, alerts us that the development of OERs 'connects to an increasingly neoliberal higher education that is being exported from the West to "developing" nations, as part of a social contract enforced upon them' Such projects also raise questions in terms of a possible homogenization of the academic discourse.

[26] Moreover, such investments have the added value of promoting those institutions globally and perhaps expand their market.

of the discipline and the ability to use that language and so on) and they need to have that knowledge recognised. In this regard, the ranking system in all education sectors in the UK results in much differentiation in the worth socially attributed to different degrees (i.e. a degree from Oxford is not valued equally as the same degree from London Metropolitan University). A degree does not only provide academic knowledge, but also social recognition.[27]

We can investigate Open Education Resources as resources that individuals can access and enjoy that facilitate personalised and informal learning and that can also be used in formal education. From this perspective, any sort of resource freely available online can be seen as an Open Education Resource (from resources specifically designed with educational purposes, such as online courses, to any other resource that can support learning, such as YouTube videos, or even Wikipedia). If we look at Open Education Resources from the perspective of those who produce them, we can distinguish between collaborative projects in which several individuals or institutions might produce a specific educational resource (such as an e-book or an online course) and repositories of resources with very different levels of granularity (Alevizou, 2011).

Parallel to these developments, some educationists have suggested the need for platforms that support collaboration between teachers to share teaching ideas. Among such platforms, several teams and institutions around the world have developed different Learning Design software. The term Learning Design is used to refer to a "formalism for documenting educational practice to facilitate sharing and reuse by teachers" (Agostinho et al., 2009, p.11), and is rooted in the view that if we want to facilitate sharing practices, teaching practices and knowledge need to be made explicit and a common language to communicate teaching ideas is needed.

The concept of learning design arose in the area of e-learning to encourage the reuse of digital educational resources and innovative uses of TEL. The Educational

[27] For a critique of the discourse of openness regarding OER from a critical social theory perspective, see Hall (2010; 2011). He highlights the need to consider the neoliberal context of production of such discourses, and criticises the positioning of OER within discourses of cost-effectiveness, economic value, and efficiency. He suggests that open education should encourage a critique of institutionalised forms of education.

Modelling Language project, led by Rob Koper, in the Open University of the Netherlands, is taken to be the foundational project in the area. This project was then adopted as the basis for the IMS Learning Design technical specification in 2003. Then, UK scholars led several projects: Diana Laurillard, Grainne Conole, and Helen Beetham among others. A third group of projects were developed in Australian universities, for instance, the AUTC (Australian University Teaching Committee) Learning Design project, led by Ron Oliver, Barry Harper, John Hedberg and Sandra Wills; and the Learning Activity Management System (LAMS), led by James Dalziel.

The aim of these projects was also to assist teachers when designing for learning (in common language: planning their teaching),[28] and to help them taking pedagogically informed decisions about what technologies to use to support learning activities. Some authors suggested that Learning Designs might be helpful in facilitating the reuse of OERs, by providing pedagogical support for teachers wanting to incorporate OERs in their teaching (Masterman et al., 2011).

In 2012 experts in Learning Design met, and as a result of their conversations they wrote the Larnaca Declaration (Dalziel, 2012), where they explained how the field of learning design contributes to improving teaching and learning. In this document the concept of learning design is defined as a framework or meta-language to describe teaching and learning activities, a sort of "educational notation", similar to musical notation. However, the research presented resulted in technological solutions (several of these being merely prototypes and not implemented). These solutions, which were expected to support the task of designing for learning, or facilitate sharing ideas about teaching practices, used a range of software or systems that incorporated some sort of framework or meta-language.

[28] In this literature the use of "learning design" is used instead of "teaching plan" because the term "plan" is seen to imply a more rigid, or pre-defined way of thinking, whereas "design" offers connotations of creativity. And much of the contemporary learning sciences literature avoids the word "teaching" in favour of "learning", because writers prefer to think of the teacher as a "facilitator of learning". For a convincing critique on the "new language of learning", see Biesta (2005; 2013), and to see the connections of this "new language of learning" to the technological push in education, see (Haugsbakk & Nordkvelle, 2007).

5.3 The learning design support environment (LDSE) research project

In line with the policy discourse that ICTs should play a key role in the expansion and provision of HE, ambitious research programmes have been financed to investigate how TEL could support productivity and efficiency in education. For instance, the Teaching and Learning Technologies Programme (TLTP) was launched in 1992 and funded 76 projects with around £75M with the aim of "achieving productivity and efficiency gains whilst maintaining and improving quality in the provision of teaching and learning." A continuation of this programme, the Teaching and Learning Research Programme (TLRP), a £40M initiative, is still ongoing. The TLRP is funded by the research councils ESRC and EPSRC, in partnership with the e-Science Core Programme, JISC and Becta. As expressed in their "Second call for research proposals" (TLRP, 2007, p.1):

> "The aim of the call is to support innovative interdisciplinary research collaborations focusing on the creation, development and exploitation of digital technologies for learning through a better understanding of their capability to transform the quality of learning experiences and lead to enhancements in learning outcomes."

In addition, this call defined four key areas of research: productivity, personalisation, inclusion, and flexibility (TLRP, 2007, p.8).

5.3.1 Aims of the LDSE project: The Learning Designer as a tool to support teaching innovation in HE

The LDSE project (November 2008—December 2011) was one of the research projects funded by TLRP, in their second call for proposals. It was composed of a team of education researchers and computer science researchers, with the aim of developing a Learning Design Support Environment (LDSE), a technology which later received the name of Learning Designer (LD).[29] The project leader was Prof. Diana Laurillard, author of the influential book *Rethinking university teaching. A framework for the effective use of learning technologies* (Laurillard, 2002), in

[29] LDSE refers to the research project and LD to the software designed by this project.

which she put forward the Conversational Framework to evaluate how various media support different learning experiences in the context of HE. Shortly following the project's completion, she put forward the idea of the learning design in *Teaching as a design science* (Laurillard, 2012). In this section, I will present the aims, rationale and theoretical underpinnings of the LDSE project, based mostly on the project team's research proposal that was used to apply for funding (Laurillard et al., 2007) , but also on some articles written by project team members that refer to the LDSE. In some cases I will draw on other literature to elaborate on the theoretical underpinnings of the project. The main aim of this section is to describe the project mainly as seen and understood by the project team. I only briefly address some aspects that need to be problematised, but in the analysis chapter I will offer a critical analysis of some aspects of the project and its theoretical underpinnings.

The LDSE project team takes on board the agenda of improving teaching and learning quality in HE based on contemporary views of learning and integration of ICTs within teaching practices (Agostinho, 2006), and argues that HE teachers need effective and time-efficient guidance to implement innovative teaching practices. Thus, its objective is to design a Learning Design Support Environment, i.e., an "interactive environment which enables academics to lead the discovery of innovative pedagogical designs that exploit the potential of technology to enhance learning" (Laurillard et al., 2007, p.1).

The project is ambitious in that it aims not only to create a **collaborative** environment with which to foster a community of practice for sharing good practices and encouraging **innovation**, but also to **embed knowledge** of teaching and learning within the system, so that it can **support** academics in preparing their teaching, and also so that their learning designs can be shared and **reused** in different contexts.

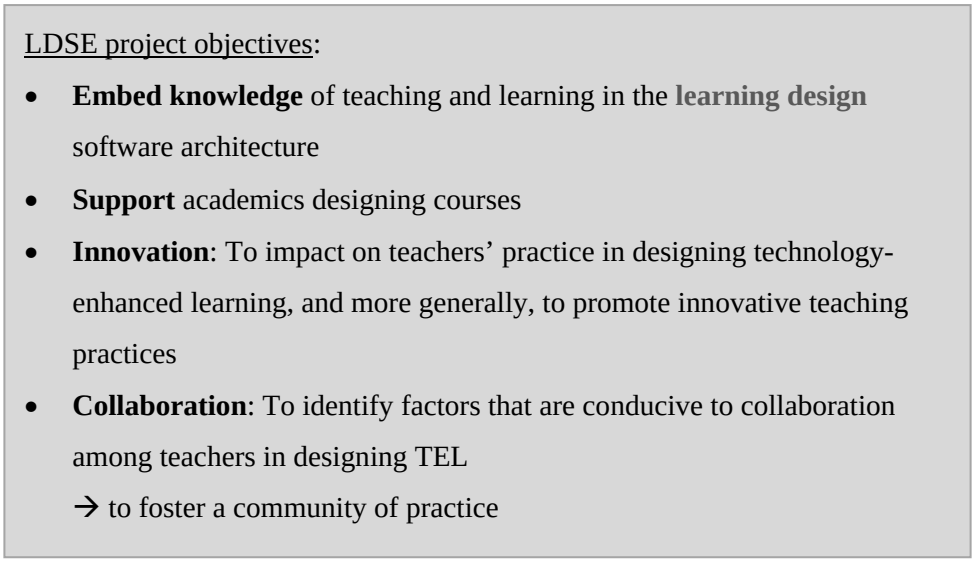

Figure 3. LDSE project objectives.

The LDSE project embraces design research as well as scientific research. Therefore the output of the research is envisaged to be a usable technological artefact from which educators can derive new knowledge about teaching with technology. Thus, the objectives outlined in Figure 3 are expected to be instantiated in the LD software.

5.3.2 Methodological aspects

The LDSE project team departs from the idea that the discovery of innovative approaches to TEL should be led by teachers themselves. This has methodological and theoretical implications, and also practical, in terms of the kind of system that it wishes to design.

Methodologically, the LDSE members accept that academics need to be involved from the start in the development of the LD. Therefore, they followed an iterative cycle of design and evaluation informed by an "informant design" framework, in which representatives of the practitioner community were consulted at specific stages of the project. More specifically, they recruited around 24 lecturers, and various other tutors and support staff from a range of subject disciplines and from institutions with whom they had current relationships. They acted as "practitioner-

informants" in the requirements gathering and usability testing process (through interviews and workshops), and as "critical friends" in the formative evaluation of the evolving LD. They also looked for partners in deploying the LD in initial teacher-training (ITT) and continuing professional development (CPD) activities in their institutions as part of the summative evaluation. This was done more as a workshop than a proper integration of the LD in ITT and CPD activities, because the LD was developed at the level of prototype. In the process of identifying user requirements, the team conducted interviews and organised workshops with several practitioners. The process of evaluation was done mostly through workshops, but also with some interviews. Finally, more than 24 lecturers were engaged. Participants for the summative evaluation were recruited via the practitioner-informants (through "cascading" the LDSE within their institutions) and partner agencies including JISC, HEA subject centres and Becta (Laurillard et al., 2007, p.14).

From my observation of workshops and analysis of some of the user requirements gathered, I should note that the "practitioner-informants" do not necessarily represent an "average user". They tend to be academics or support staff interested in TEL and/or pedagogical approaches and in many cases (not all) with an apparent positive attitude towards the aim of the project. This is connected to the fact—which I will discuss later—that the project also aims to foster innovation and embed knowledge of teaching in the system, and, in to achieve these goals, they preferred to rely on "practitioner-informants" with insights into teaching, learning design and the use of TEL, as justified in the case for support. Somehow this might create a certain tension between the idea of supporting academics (all of them? on their current practices?) and offering a pedagogically informed system. This will be discussed in the analysis. In the evaluation workshops there was more variety of informants, in terms of their background, interest in TEL or adoption of theories of learning.

5.3.3 Theoretical underpinnings and approach to learning design

In the literature review I framed this thesis in terms of the ongoing debates in OS and IS around learning in organisations, and more specifically the recent adoption of practice-based lenses. In contributing to this literature, I am analysing this case study, and the LD, as an example of a technology designed to support a community of reflective practitioners. However, technologies developed with this aim can take many forms, and it is important to understand the specific characteristics of the technology being studied to avoid over-generalisations. In this case, specific concerns related to education arise.

Furthermore, the LD is not an isolated artefact with essential properties. We understand LDSE discourse and its dissemination through academic articles and conference papers as performative: it helps constitute what "learning design is" and problematises teaching in HE in specific ways. As we will see, LDSE draws on a range of theories, and so it is worth understanding the complexity of the justification as to the viability of the LD for inducing innovation in teaching practices. I will point out some discursive dissonances, some of which will help us explain in the last part of this chapter some of the design decisions, which do not result (only) from the idea of fostering a community of practice but (also) from understanding reflective practice in terms of designing for learning.

I open each of the sub-sections with a quote taken from the LDSE Case for Support (Laurillard et al., 2007). The only exception is the last sub-section, "Patterns", where the quote is extracted from an article published by two project members, as this was a later and parallel development of the project, not yet envisaged when the LDSE Case for Support was written. These quotes concisely express the LDSE's core facets, which I subsequently develop.

5.3.3.1 Collaborative learning and innovation

> If the education system is to achieve radical change through TEL it should be the teaching community who are the driving force of the innovation—they are closest to learners, and best placed to discover how to use TEL to meet their needs. (Laurillard et al. 2007, p. 1)

Apart from methodological aspects, the idea that the discovery of innovative approaches to TEL should be led by teachers themselves lies behind the very objective of LDSE: to build a collaborative environment to promote innovation. Two main notions seem to guide this approach: the concepts of teaching as a design science (Laurillard, 2008b) and collaborative learning approach. However these theoretical underpinning are not discussed in detail in the Case for Support. There is a section "supporting teaching innovation as a collaborative activity" (Laurillard et al., 2007, p.10), where the authors refer to the notion of "reflective practicum" that Schön (1987) developed from professional practices engaged in design, such as architecture. They also refer to the LD as a "'computer-supported collaborative learning' (CSCL) environment that would enable teachers to work together on TEL innovation" (p. 10), and throughout the document there is reference to the notion of "communities of practice". Thus, there is little discussion of the theory of learning underpinning the collaborative learning of LD, and no discussion about theories of change or innovation. The project is a design research project, and thus most of the literature and theoretical underpinnings reviewed in the Case for Support refer to the area of learning design, and there is a discussion about how the LDSE will go about designing the LD. There is also discussion about the research methodology.

In publications by LDSE members there is reference to the theoretical approach to learning of the LD, but the theoretical references are diverse. Laurillard (2008b) adopts the widespread concept of "teacher as an action researcher" in educational literature to liken the academic as a researcher and the academic as a teacher. She suggests that, in the same manner as academics respond and contribute to rapid advances in their fields of research, they should take the same attitude towards teaching. In a changing context for HE, with a shift from elite to mass higher education, internationalisation of students, a constant pressure to rethink the curriculum and the introduction of ICTs, she claims that academics should also be reflective teacher-practitioners to address these challenges:

> "The teaching community can only manage effectively the degree of innovation being demanded if we find ways of making teaching more like research. As researchers progressively build the knowledge of their field,

> so teaching must build the knowledge of what it takes to support learning. To progress, teaching needs to be problematised, exploratory, apprenticed, built on the work of others, experimental, subject to revision, with frequent sharing of ideas and solutions, communitarian in approach. It has to practise the 'scholarship of discovery' (Boyer, 1990), or more explicitly, the 'scholarship of engagement' (Kreber, 2005); it has to treat teaching as 'professional learning' (Knight et al., 2006); it has to foster a form of action research, with teachers as 'professionals who theorize in practice', and who in turn foster the learner's search for their own meaning (Noffke, 1994). And like research, it needs time." (Laurillard, 2008b, p.144)

However, she admits that this is far from being the case in practice and not institutionally encouraged:

> "The ideal of the reflective practitioner (Schön, 1987), or the peer in a community of practice that seeks to progress knowledge (Wenger, 1998), or a teacher researcher in the tradition of action research (Noffke, 1994), is very far from the reality of teaching practice. Teachers and academics are not encouraged to be, and are not supported in the kind of reflective practice of teaching that moves the field forward. They may choose to do it, and many in the teaching community do—this is where innovative teaching ideas come from—but they are not well supported in doing so." (Laurillard, 2008b, p.144)

For this reason, she argues, tools such as LD are needed to support academics in their role of teachers as action researchers. As I will further discuss in the analysis chapter, this discourse has the imprints of technological determinism in its aim of promoting collaboration and innovation by design and its implicit rational choice approach to change.

As we can read in the previous quotations, but also in the research proposal document (Laurillard et al., 2007), the concept of "community of practice" is also embraced. As already discussed in the literature review, the term community of practice was coined by Lave and Wegner (1991) and it has become very influential for explaining the relationship between practice, learning, knowledge creation and

sharing, and innovation. The adoption of the "community of practice" approach in education needs to be understood in a context in which constructivists perspectives of knowledge and learning have become dominant. However, as in other areas of research, the popularised version of situated learning in much of education literature, but particularly in the area of e-learning, is stripped of the more critical aspects of that theorisation. As we can see in this and other projects the *descriptive* and analytical theory of CoP, which analyses *informal* learning, is taken as a *normative* model to guide interventions to induce learning. Even more, as I will attempt to show in the following sections and chapters, when taken as a normative theory, it is frequently reinterpreted as a cognitivist, acontextual theory of learning, in which individual learners learn collaboratively.

5.3.3.2 Technology for collaboration

> Teachers trying to innovate, especially with technology, need time and the tools that would support a more collaborative approach (Dönmez et al., 2005, Hernández-Leo et al., 2006, van Drie et al., 2005). This would enable them to build on each others' work, and on existing resources. (...) The research issue here, therefore, is to discover the kind of 'computer-supported collaborative learning' (CSCL) environment that would enable teachers to work together on TEL innovation, building on each others' work, and making use of existing learning designs. CSCL has been extensively researched for implementation with learners as an important new form of pedagogy enabled by technology, but it has not been applied to teachers as learners themselves. (Laurillard et al. 2007, p. 10)

The LDSE research team assumes that new technologies can enhance collaboration among academics and "foster a community of practice". While much of the literature and technological developments in the area of learning technologies have focused on technologies that support the delivery of teaching and students' learning in formal education, the project's objective is to develop a computer-supported collaborative learning (CSCL) environment for teachers.

In the project's proposal there is little theoretical justification as to why face-to-face collaboration is not sufficient or effective. It seems to be assumed that the

characteristics of new technologies facilitate collaboration. The proposal also draws on e-learning literature that suggests that “CSCL has been extensively researched for implementation with learners as an important new form of pedagogy enabled by technology” (Laurillard et al., 2007, p.10)

However, indirectly, the use of technology to support collaboration among practitioners and induce innovation is also justified by the learning design approach, which we will present in the following section. As already mentioned, in the view of the project team, “teachers need encouragement and practical guidance (...) in understanding how best to design TEL activities for their learners both in ‘conventional’ educational institutions (...), and in part-time, distance, or workplace settings” (Laurillard et al., 2007, p.4). In this view, therefore, the mediated collaboration of practitioners through a learning design tool would result in a more informed and productive collaboration.

In fact, despite references to CoP in the Case for Support (Laurillard et al., 2007), the notion of collaboration that seems to reflect better the LDSE’s conception is Papert’s constructionist approach to learning (Papert & Harel, 1991), which is one of the theoretical underpinnings referred to in a publication of the LDSE research team (Laurillard et al., 2013). Papert’s constructionism is a cognitivist theory of learning that embraces discovery learning. Papert, a mathematician and artificial intelligence researcher, disciple of Piaget, devised the computer language LOGO so that children could learn mathematics through discovery learning. The idea is that LOGO could scaffold children’s learning, and that they could learn together without the need of having a tutor guiding their learning. In the aforementioned journal articles, the LD is described as “a constructionist environment”, which supports conceptual learning through practice and collaboration (Laurillard et al., 2013). From this perspective, the LD is presented as “an explorable and manipulable computational model of an aspect of the world, with its own constraints and assumptions, in which a user can experience all the necessary concepts by interacting with it.” (Laurillard et al., 2013, p.16).

5.3.3.3 Learning design

> Being able to express theory-based principles of learning design as visual representations, and as decisions to be made in an interactive design tool, will help to make learning theory and good practice more accessible. By engaging teachers in the everyday practice of a more research-based approach to teaching, we hope to accelerate the development of understanding by the teaching community of how best to use TEL. (Laurillard et al. 2007, p. 20)

The term Learning Design is used to refer to a 'formalism for documenting educational practice to facilitate sharing and reuse by teachers' (Agostinho et al. 2009, p.11). For the purposes of developing the LD the term 'learning design' is more specifically defined by the LDSE research team as 'a product of design that makes explicit the learning activities, methods to be used, objectives to be reached and assessments to be used to evaluate the learning achieved.' (Charlton, 2009).

The aforementioned formalisation of learning designs is an important aim of the LDSE project, and is directly connected to the objective of embedding knowledge of teaching and learning in the LD. The assumption is that, if we want to facilitate the sharing of practices, teaching practices and knowledge need to be made explicit and a common language to communicate teaching ideas is needed. In addition, the Learning Designer aims to assist teachers in making pedagogically informed decisions as to what technologies to use to support learning activities, and in this way it is expected to encourage innovative uses of TEL.

The learning design approach has only been recently introduced in educational theory. It arose in the area of e-learning to encourage the reuse of digital educational resources. It was first used in instructivist approaches (Gagné, 1970; Merrill, 1994), which provided clear instructional sequences for teachers to follow, with the idea that educationists needed to make theory readily available to teachers. This developed into Instructional Design Theory (Reigeluth, 1999), which is widely adopted in USA.

However, constructivism is becoming one of the prevailing learning paradigms in educational theory, and these theories are difficult to operationalise for teachers (Laurillard et al., 2007; Oliver et al., 2002). The LDSE refers to a constructivist approach to learning based on Vygotskian theory, which suggests that knowledge is constructed collaboratively in social settings, creating a culture of shared artefacts and meanings. In contrast to the most traditional didactic approaches (which objectify knowledge and consider that the aim of teaching is transmitting knowledge), constructivism suggests that learning is situated. Since, in this view, knowledge construction is so context-specific, some authors argue that it is not possible to produce any firm models guiding the design of constructivist settings (Jonassen, 1994), but others argue that learning design theory today can provide principles and general concepts with which learning environments can be planned, even if they admit that the process is far less rigid and has fewer guidelines than in instructional design (Lefoe, 1998; Oliver et al., 2002).

Thus, despite acknowledging the limitations of instructional design, some educationists suggest that it is worth pursuing the formalisation of learning designs, which can serve as templates adaptable by a teacher to suit a context (Agostinho, 2006; Conole et al., 2004; Goodyear, 2005; Jovanovic et al., 2007; Laurillard & McAndrew, 2003). These authors claim that such representations of learning designs can serve as reflection tools for teachers, and communicate and share pedagogical strategies. This is perceived as “increasingly necessary” as access to open education resources improves, for example, with open repositories, such as JORUM, OpenLearn or LabSpace in the UK (Jovanovic et al., 2007; Laurillard, 2008a).

Several learning design systems and authoring tools have been built, and some of them have been successfully adopted, for example, LAMS (http://www.lamsinternational.com/). However, the LDSE project team argues that learning design tools still show limitations: firstly, in terms of support and usability, some are poorly adapted to teachers’ needs and practices; secondly, in many of these tools there is no good integration of learning design theories, and therefore, they do not provide advice on effective practices; thirdly, they are not able to

accommodate the extremely diverse terminology of teaching and learning whilst making the exchange of learning designs possible (Laurillard et al., 2007).

To tackle these perceived limitations, the LDSE project suggests building a more intelligent system following a knowledge engineering approach. In contrast to other learning design systems, the LDSE wishes to bridge learning theory and practice. To do so, the project suggests combining the results of knowledge engineering modelling with functional requirements based on human factors, and embedding in the system a domain ontology of practice and theory, which include the relationships between concepts of practice and theory (Charlton et al., 2009). The LDSE first produced a draft of the terms, and definitions, based on several sources, but mainly from Laurillard's (2002) Conversational Framework and Bloom's (1956) taxonomy of learning outcomes. This ontology was to be broadened, connecting gradually with the concepts elicited from the information from the informants, but the changes in the ontology have not been very significant. However, after gathering user requirements, changes or additions were made as regards the interface, some of the terminology, and some elements were dropped; for instance, the page in which users were prompted to choose the learning approach they wanted to follow (see Figure 4, next page).

Finally, for the LDSE project team it is important to account for TEL in the formalisation of learning designs. This is an additional challenge and "a key element of the research arm of the LDSE" (Laurillard et al., 2007, p.5), because an effective representation of a decontextualised practice model of effective uses of e-learning tools remains elusive (Falconer, 2007). The main theoretical approach that guides this part of the research is the Conversational Framework, formulated by the leader of the project, Diana Laurillard (2002). The justification is that this framework links different types of technology to pedagogical elements, and it does so being neutral with respect to all teaching methods: it tests technology-based methods for their comparative pedagogical value against conventional methods, and assumes that for many learning objectives no single method, either conventional or technology-based is ideal, and it is better to adopt a blended approach. (Laurillard et al., 2007, p.5).

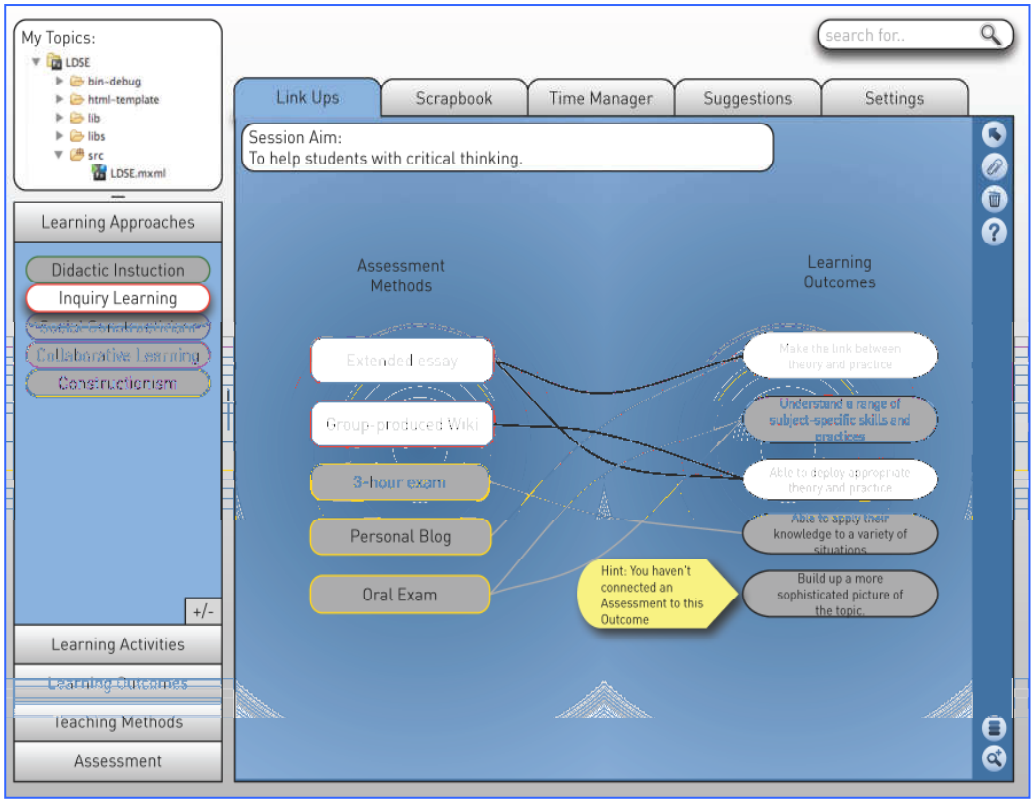

Figure 4. A prototype of the LD, v.1.
In this screen capture we can see some of the concepts embedded in the system. In this version, users were asked to choose a learning approach from the start. In the final version of LD, while learning approaches were part of the knowledge-base of the system so that it could make inferences, they were not visible to the user.

5.3.3.4 Patterns

> "The particular problem we are focused on in this regard is how to enable teachers to engage with what counts as a good piece of learning design, in other words, where is the pedagogy in the learning design that really makes the difference. To emphasise this focus, we adopt the term *pedagogical pattern* or *pedagogical design pattern* instead of *learning pattern*, to refer to the core design property of a teaching-learning design instance." (Laurillard & Ljubojevic, 2010, p. 1)

Due to technical reasons but also to research priorities, the LD was finally developed as a desktop version and not as an online version, which seems to limit the collaborative capabilities of the tool. However, to research the collaborative aspect of the learning design approach, in parallel to the development of the main LD system, some members of the LDSE team worked on developing the Pedagogical Pattern Collector (PPC). According to Laurillard, another of the

advantages of the formalisation of learning designs is that it can favour the discovery of pedagogical patterns. A pedagogical pattern is defined as "a teaching-learning activity sequence that is designed to lead to a specific learning outcome" (Laurillard & Ljubojevic, 2010, p.4). The PPC aims to, firstly, collect learning designs from teachers (the PPC offers a sort of simplified version of the LD, without the intelligent system), secondly, prompt users to generalise their learning design into abstract or generic forms of these designs and, through analysis of these, thirdly, identify pattern templates that would assist in the aim of evaluating pedagogy in a learning design. (p. 4)

While the researchers acknowledge that such research is still in progress, they hope to find some pattern templates of good teaching associated with specific (but generic) learning outcomes. If such templates could be properly constructed, the researchers suggest, it would be possible to add an **automated evaluation** of the designs against the learning theory to tools, such as the LD. They suggest that "[c]omputationally interpretable representations of pedagogical patterns … bear the promise of automated evaluation of the designs against the learning theory, ultimately saving teachers' time and possibly also improving the quality of student's learning" (Laurillard & Ljubojevic, 2010, p. 9). That is, the LDSE researchers hope to be able to find some **pattern templates of good teaching** associated with learning outcomes. Thus, as I will further discuss in the analysis, the PPC assumes the possibility of abstracting—therefore " decontextualising"—learning designs and patterns so that teaching practice can be shared. Also LD assumes that collaboration can take place across different educational contexts such as different institutions or disciplines and so on.

5.3.4 The LDSE team and the development of the LD

The LDSE project (November 2008—December 2011), led by Prof. Diana Laurillard, comprised an interdisciplinary and interorganisational team of UK-based education researchers specialising in technology-enhanced learning, computer science researchers, and learning technologists. In addition, two PhD students were associated with the project, and an administrator provided support.

LDSE team

Principal investigator

Prof. Diana Laurillard (London Knowledge Lab, Institute of Education)

Co-investigators

Prof. Tom Boyle (CETL for Reusable Learning Objects, London Metropolitan University), **Dr Liz Masterman** (Learning Technologies Group, Oxford University Computing Services, University of Oxford), **Marion Manton** (Technology-Assisted Lifelong Learning, Department for Continuing Education, University of Oxford), **Dr George Magoulas** (Reader in Computer Science at the School of Computer Science and Information Systems, Birkbeck University of London), **Steve Ryan** (Director of the Centre for Learning Technology, LSE), **Dr Kim Whittlestone** (Senior Lecturer in Independent Learning, LIVE CETL, Royal Veterinary College)

Researchers

Patricia Charlton (Birkbeck University of London), **Brock Craft** (Institute of Education), **Dionisis Dimakopoulos** (Birkbeck University of London), **Dejan Ljubojevic** (Institute of Education), **Joanna Wild** (University of Oxford)

PhD students

Roser Pujadas (Information Systems and Innovation Group, LSE), **Carrie Roder** (LIVE CETL, Royal Veterinary College)

The work was divided in workpackages (WP) led by investigators, but it was undertaken with the support of other members of the team:

- WP1: Research into user and technical requirements, analysis of current practice and usage scenarios (led by LM and MM)
- WP2: Learning design knowledge and activity representation (led by TB and DL)
- WP3: Research on the design and implementation of the LDSE (led by GM and TB)
- WP4: Research-based evaluation of the effectiveness of the LDSE (led by LM and MM)
- WP5: Project coordination and presentation (led by DL)

All the documents produced by the project were shared through a project management environment (Basecamp), which kept the whole team up to date with

all the developments of the project, and it was also used to communicate and share information, and articles.

The team met monthly. The meetings followed an agenda distributed in advance, they were chaired by the project leader, and minutes were circulated afterwards. In these meetings theoretical and practical concerns related to the project were discussed. We also delivered progress reports regarding each of the workpackages, and decisions were taken as to what to do next. Meetings also provided an opportunities to share knowledge, so there were presentations by members of the team and invited speakers, and summaries of lectures or conferences that researchers had attended. Also frequently discussed were ways to find links with other organisations, systems, or projects, to promote and ensure the continuation of the LD project beyond the three years of funding. However, much of the work took place outside the meetings, as researchers and investigators dedicated themselves full- or part-time to the project, which was to deliver on the objective set out in the research proposal: the development of "an interactive environment to enable teachers to lead the discovery of innovative pedagogical designs that exploit the potential of TEL" (Laurillard et al. 2007, p.1).

WP1 was dedicated to gathering user requirements. This was done mainly through interviews and workshops with practitioners, but also through drawing on literature. At this stage informants were not "average users". The "representatives of the practitioner community" (Laurillard et al., 2007) were around 24 informants known to the researchers, chosen for their interest and knowledge of TEL and pedagogy (learning technologists, staff developers, academics and researchers). They were considered "critical friends" that could provide valuable input. WP2 and WP3 worked in parallel investigating the best ways to represent pedagogical knowledge in the system, both in terms of the interface and the nature of the relationship between concepts, so that these could be translated into the ontology and the knowledge-base of the system. Finally, mainly during the last year, and still with the system under construction, WP4 evaluated the system. In a sense, WP4 became a continuity of WP1, and new versions of the LD were tested in workshops with informants and in teacher training sessions.

There were some paper-based versions of the LD used in the initial stages of user requirement gathering. Then a system was developed and tested. Based on this, refinements were introduced. By the end of the third year of the project, three versions of the LD had been built. However, the last version at this stage (LDv.3) was still considered to be a prototype, and not a fully functional system ready for implementation. Nevertheless, it was made accessible online to allow interested users to test it (https://sites.google.com/a/lkl.ac.uk/ldse/)

If we look at the objectives of the project previously summarised, we can say that most of the efforts went into exploring the best way to support academics designing courses and embed knowledge of teaching and learning in the system. Particularly during the first year, we spent a significant amount of time in monthly meetings discussing ideas regarding how to best capture knowledge about teaching and learning in the system. It became apparent that there was no straightforward way to do this, among other reasons, because different institutions use different vocabularies, but also because the relationships between concepts and the nature of these relationships is not straightforward. Education scientists and learning technologists seemed to understand this as part of the research being undertaken by the project, as they proposed a standardised way of sharing ideas about teaching and learning. However, it also became apparent that there was a certain frustration among computer scientists, particularly those in charge of the programming, as they were not receiving sufficiently clear definitions of concepts or relationships between concepts with which to build the ontology for the LDSE.

Furthermore, two other difficulties arose. First there was a question of timing: gathering user requirements through interviews and workshops with practitioners was time-consuming, and computer scientists needed to start working, so there was an overlap. Second, the translation of education / teaching concerns into an ontology that computer scientists could build into the system was more challenging than had been anticipated. This increasingly was dealt with in small working group meetings, attended only by the project leader and developers.

Partly due to this, but also because the LDSE was building on previous projects involving some of the investigators and the project leader (London Pedagogy

Planner and Phoebe), I do not think it is unfair to say that the ontology and the core assumptions of the intelligent support system of the LD draw on psychology-based theories of learning, and that the user requirements mainly served to refine some of the vocabulary, interface, and relevance of concepts. As mentioned in Section 5.3.3.3, the ontology and knowledge of the LDSE were built in to the system by relying on several sources, but mainly from Laurillard's (2002) Conversational Framework and Bloom's (1956) taxonomy of learning outcomes. In the project document, where definitions and concepts of the ontology developed by WP3 are outlined, it is made explicit that many of these concepts are taken from the above-mentioned sources.

Bloom's taxonomy provides a description of different sorts of learning outcomes (comprehension, application, analysis... of knowledge) that can be achieved in a learning session. And the LD system, like much research in learning sciences, assumes a link between the nature of teaching activities and the learning outcomes that students can achieve. This, however, as already mentioned before, is a debated issue, as some education researchers believe that this relationship is much more complex and might be delayed; therefore, it is difficult to guarantee beforehand that all students will achieve immediately after a session the learning outcomes that were envisaged. .

As previously explained, Laurillard's (2002) Conversational Framework offers a framework for evaluating how various media support different learning experiences in the context of HE. This framework links different types of technology to pedagogical elements. It compares technology-based methods for their comparative pedagogical value against conventional methods, and it assumes that for many learning objectives no single method, either conventional or technology-based, is ideal. Thus, it supports the idea of adopting blended approaches to learning in HE.

Following these ideas, and to support academics' processes of designing for learning, it is assumed that a module is constituted by several sessions, each of which has one or more teaching and learning activities (TLAs). According to LDSE/LD there are 6 different types of sessions, which can be delivered by many

different TLAs, some face-to-face, others through TEL. It is assumed that different session types and TLAs lead to different learning experiences (defined as acquisition, discussion, inquiry, practice and production)

When designing a module academics/teachers using the LD are prompted to first define the properties of the module in the “module level properties” screen (see full-page screen captures of all LDv.3 sections/screens in the appendix), where they can introduce properties such as the name of the module, the length of the module and calendar start date the number of students and so on. Then, in the “module level planning” screen (see Figure 5; a larger panel can be found in the Appendix, Figure 16), they can choose the session types that will constitute the module, and drag and drop them onto the timeline.

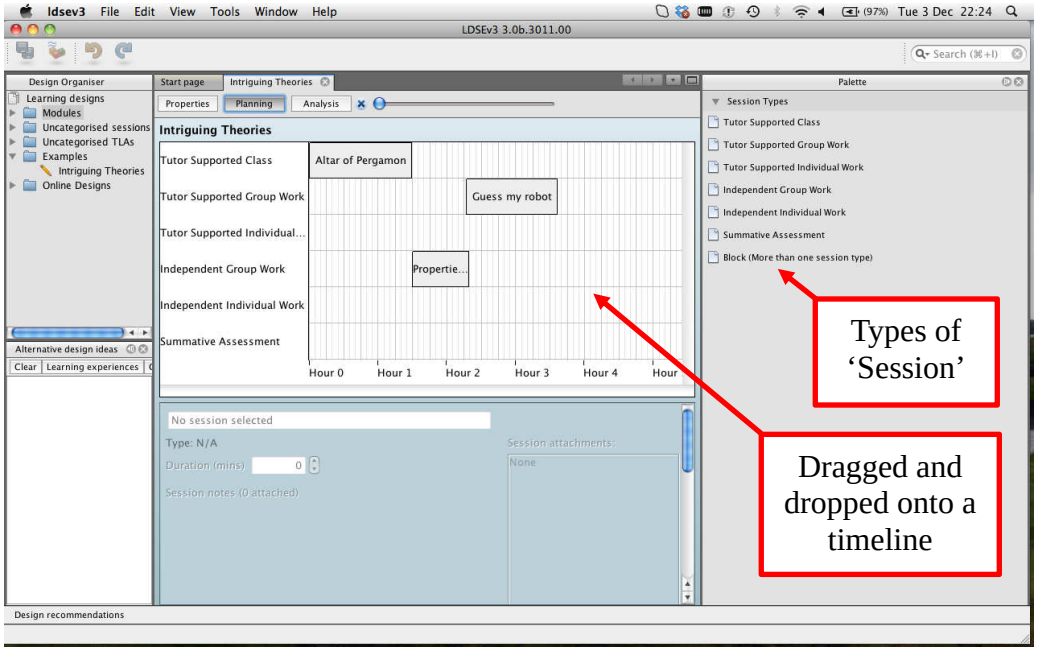

Figure 5. Module level planning.

Subsequently, each session can be designed in more detail in the session level screens. First, in the “session level properties”(see Figure 6 on the next page; a larger panel can be found in the Appendix, Figure 18), it is possible to define again the name, duration, number of students, description, learning outcomes of the session and other features.

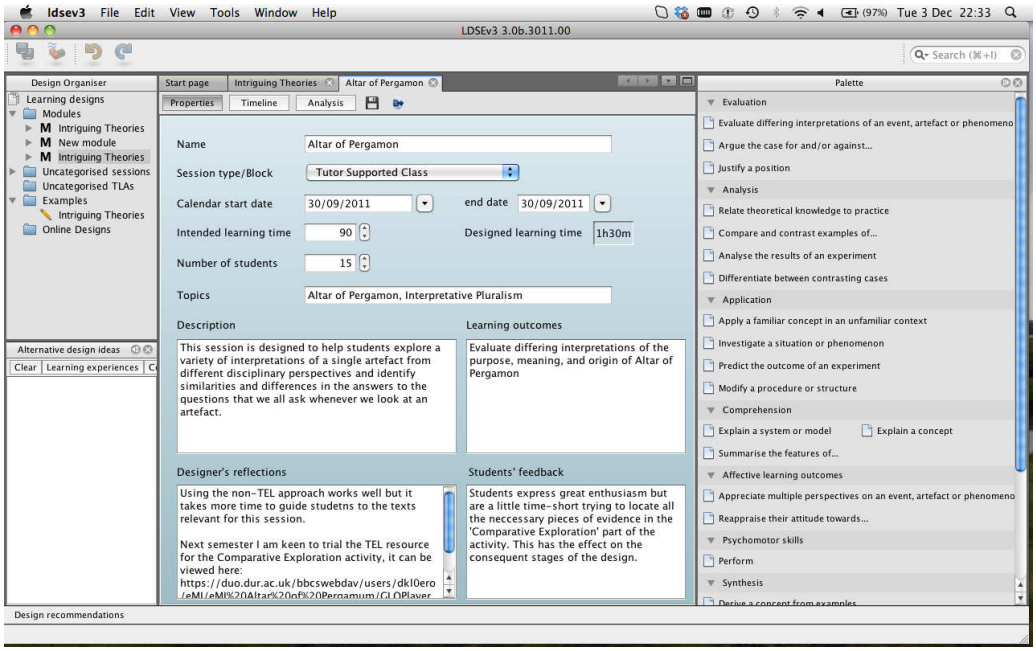

Figure 6. Session level properties.

Then, in the "session level timeline" screen (see Figure 7; a larger panel can be found in the Appendix, Figure 19), the user is prompted to select and drag TLAs onto the timeline. Each TLA is analysed by the system and information is provided about the learning experience associated with each of them. Furthermore, the system offers alternative design ideas, intended to make the user aware of the possibility of substituting face-to-face activities with TEL activities.

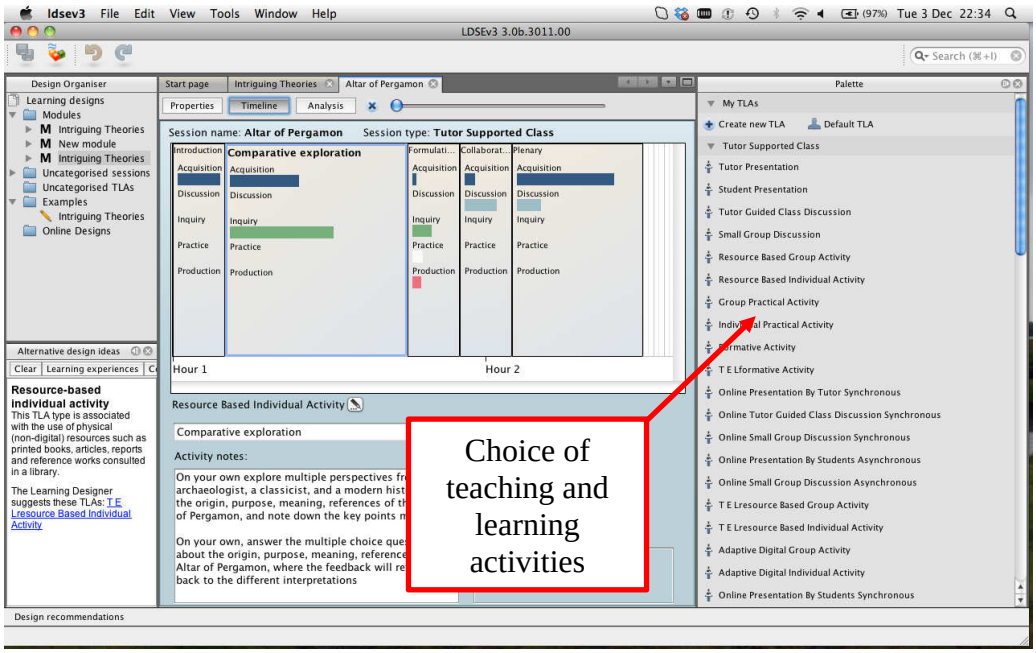

Figure 7. Session level timeline.

Based on inferences built in the ontology, the LD also offers an analysis of the module and session level learning experience. The aim is to help the teacher reflect on the learning designed by, for instance, highlighting the tendency to choose TLAs that follow didactic approaches and lead mainly to acquisition (e.g. lecturing). It also offers a calculation of the teaching and preparation time needed to deliver the module or session. The aim of this (time modeller) is to show the time and resources that could be saved by, in some cases, introducing TEL. The system assumes, for instance, that the time needed to offer the same face-to-face lecture to three different groups could be reduced if the lecture were recorded for later student access.

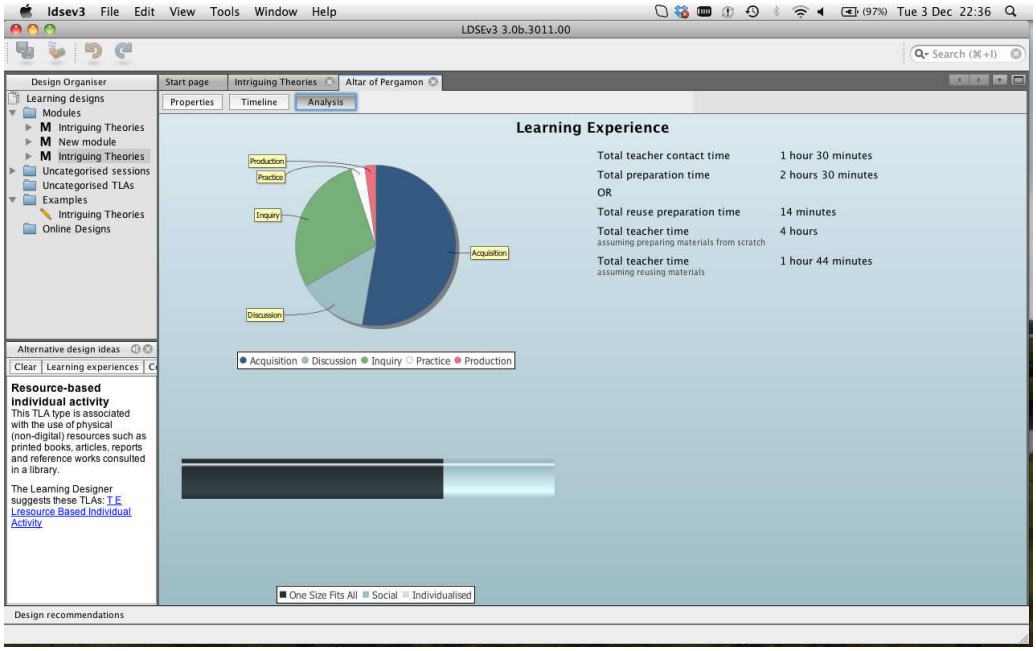

Figure 8. Session level analysis.

As previously mentioned, another of the objectives of the LDSE was to identify the factors conducive to collaboration among teachers in designing TEL, and to foster a community of practice. In practice, the first instantiation of a collaborative environment in the LD environment was the "Community Knowledge Builder", called LDSEeker, which was devised to support learning design as a collaborative activity (see Figure 9). Thus, the collaboration allowed by the system was of a very

specific sort. The idea of the LDSEeker was that the user could browse from several repositories that the LD would be linked to, and could bring into educators' learning designs other learning objects, learning designs, resources and so on. At this point, one goal concerned bringing software resources designed elsewhere into the LD. This, which was technically challenging, was dropped in the first year, and the project then concentrated efforts into embedding pedagogical knowledge and inferences in the system.

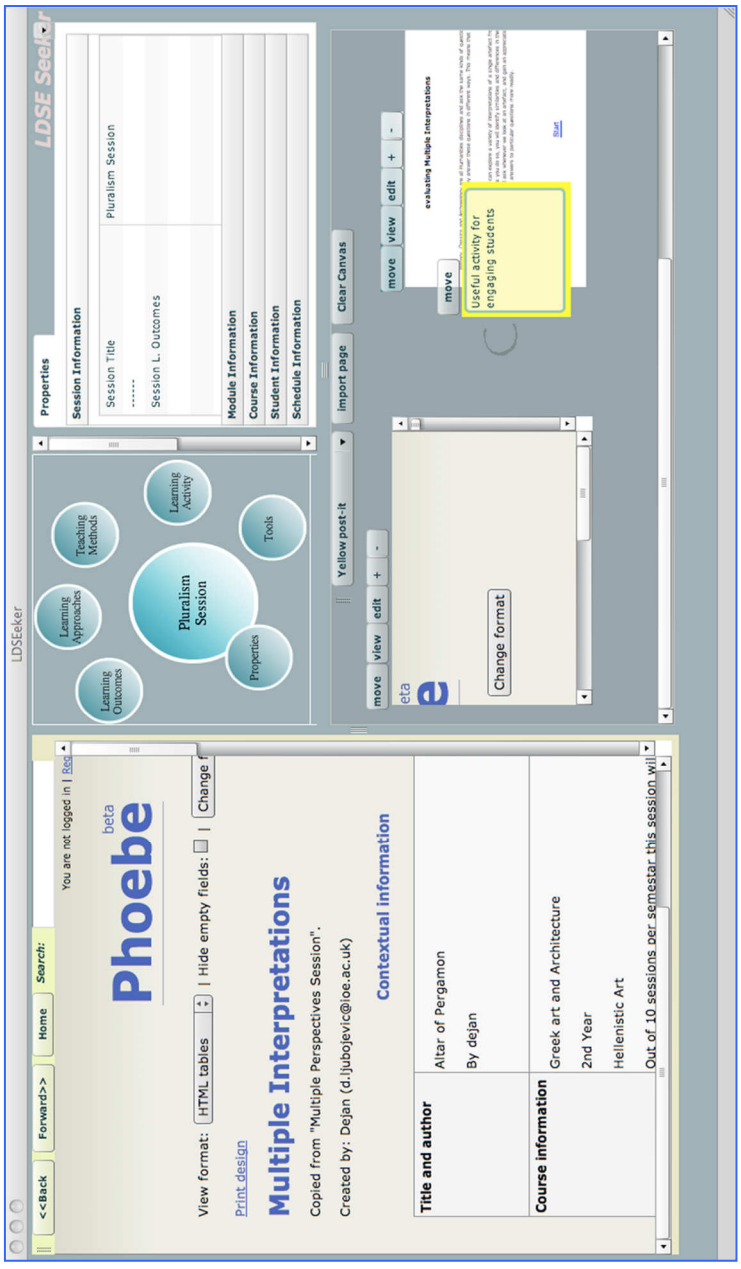

Figure 9. LDSEeker. Screen capture of LD v.1.
The left section allows the user to search resources in repositories of learning designs, reusable learning objects and so on. These can be dragged into a collecting area on the right side of the screen, to be reused and modified by the user while designing for learning.

One assumption underlying the learning design approach is that the main limitation preventing academics from sharing knowledge about teaching and learning is the lack of a standardised vocabulary and representations of teaching ideas. In this regard, the LDSE seemed to assume a technological deterministic view: once the system and vocabulary have been established, users can easily share information (in this case learning designs) through ICTs, and collaboration will spontaneously take place.

As regards the objective of achieving innovation in teaching practices, and promoting the adoption of TEL, quite clearly the project's implementation fell short of expectations. Furthermore, as we will show in more detail in the analysis chapter, while some informants perceived the LD as helping them reflect on their teaching, many others expressed scepticism (as seen from practices in workshops where informants were prompted, and sometimes paid, to trial the system). It is however important to note that the research articles written by members of the team proposing this learning design approach have been very well received and have had an important impact within the education research community. Therefore, it seems likely that more research will be pursued in this area. If we consider, as mentioned at the beginning of this chapter, the increased influence of learning sciences in HE education, and the pedagogisation of HE and society, the possibility that learning design tools will used in HE in the future cannot be excluded. In addition, in the analysis section the assumed unproblematic notions of community, and learning, and thus of the adoption of such a tool will be challenged.

6 Analysis

6.1 Introduction

6.1.1 The actor-network: a brief outline

From an actor-network theory perspective, the LDSE is an interesting case study to show how the construction of science and technology involves a heterogeneous assemblage of *actants*,[30] and a series of negotiations that are more complex than the way epistemology and technology design methods tend to portray knowledge and technology production. From this point of view, the Learning Designer (LD) cannot be reduced to its functionality, or its code. Like any other actor, it is part of an actor-network and results from processes of *translation* that associate a variety of *actants* with different interests which they need to negotiate to become allies. In this section, I will briefly set the scene by narrating the role that a variety of *actants* play in constituting the LD: researchers, software, learning theories, documents and journal articles, funding institutions, teachers, etc. In section 6.1.2 I will justify why adopting the theoretical underpinnings presented in chapter 3 can enrich this study, which will frame the analysis of the following sections.

The Teaching and Learning Research Programme (TLRP)—funded by the research councils ESRC and EPSRC, in partnership with the e-Science Core Programme, JISC and Becta—*inscribed* their interests in a "Second call for research proposals", and by offering funding for research projects, *enrolled* research teams, like the LDSE, to their *project*. The interests of the TLRP were to encourage "innovative interdisciplinary research collaborations focusing on the creation, development and exploitation of digital technologies for learning through a better understanding of their capability to transform the quality of learning experiences and lead to enhancements in learning outcomes." Proposals had to integrate social and technological sciences and had to address one or more of these issues: productivity, personalization, inclusion and flexibility. User engagement, and knowledge transfer was also a requirement, as

[30] In this specific section 6.1.1 I am using italics to highlight that I am using ANT terminology (which thus should be understood in the ANT sense).

> "recent educational research on TEL has found that teachers, lecturers and trainers continue to be centrally important in designing and supporting learning with digital technologies. The potential of these technologies will not be realised unless the role of teachers, lecturers and trainers is taken into account in the plans for take-up of the research." (p. 7)

As I explained in the conceptual framework, the actor-network is a relational concept, so as much as LDSE was *enrolled* to TLRP's project, we can say that LDSE enrolled TLRP on their interest to pursue their research, and managed to get funding. Consequently, the LDSE (with the LD, academic publications, etc.) has become an *actant* in the large actor-network that constitutes TEL and education in the UK (which I will discuss further in section 6.3). In any case, the *alignment of allies* is secured through processes of *translation* in which a variety of interests are negotiated. The formation of the LDSE team and the research proposal that they wrote can be understood in these terms: as part of the process of *translation* and negotiation that resulted in the alignment of interests of TLRP and LDSE.[31] Several education researchers and computer scientists became *allies*, *enrolled* in the same project, the LDSE, which offered the social and technological sciences expertise required by the TLRP. They also *enrolled* staff developers and learning technologists of several HE institutions in the project who could provide "institutional test-bed support for developing LDSE" [Case for support, p. 33], which is in line with TLRP's requirement of engaging users in the process of development of the technology. Rhetoric plays an important role in *translation* (Ramiller, 2007; Walsham & Sahay, 1999), and indeed in the "Case for support" that the LDSE wrote for the proposal we can see that LDSE interests are *inscribed*, and *aligned* with TLRP interests.

LDSE's proposal was "to develop an interactive environment to enable teachers to lead the discovery of innovative pedagogical designs that exploit the potential of TEL" [Case for support, p. 1] In line with TLRP's call for research proposals, LDSE defends the idea that "to achieve radical change through TEL it should be

[31] In line with ANT, it is not my intention to assess the intentionality of the actors. What I mean is that it is because there is an alignment between LDSE and TLRP interests, that they can be enrolled together in an actor-network.

the teaching community who are the driving force of the innovation" (p. 1), in that sense, they *enrolled* practitioners in the development of the system to gather user requirements, and they draw on the concept of communities of practice (Lave & Wenger, 1991) and activity theory (Engeström, 2000) to defend the idea of building a "kind of 'computer-supported collaborative learning' (CSCL) environment that would enable teachers to work together on TEL innovation, building on each others' work, and making use of existing learning designs." (*ibid.*, p. 10). LDSE's proposal was also aligned with the TLRP in their aim to encourage the use of TEL to support learning and increase teaching productivity.

As summarised in the "End of award report", "the fundamental principle underpinning the tool is that teachers should be enabled to play a driving role in the improvement of teaching and learning." (p. 8). Thus, the LDSE project sought to *enrol* technology to achieve that main aim. Drawing on the "Case for support" and other project documents and publications, we can see that they want to achieve other specific goals: foster collaboration among teachers, encourage teachers to make pedagogically informed decisions when they design their teaching, facilitate sharing and reuse of learning designs and learning resources, encourage innovation in the use of TEL, and promote the use of TEL in teaching. From this perspective, the 3-year research project can be seen as a process of negotiations and *translations* in which LDSE members tried to *inscribe* their interests in the LD[32] and they also tried to *enrol* other actors in the actor-network to put forward and secure their *project*. As it is to be expected, the process was not completely smooth, and there were some changes of direction in the way the software developed or more specifically in the priorities set. In addition, teaching practices were shown to be difficult to *domesticate*, and long discussions in the research project meetings were held that showed the challenge of establishing a formalization and an ontology that could encompass the variety of teaching, and a knowledge-base that could

[32] It is not the aim of this research to enter into detail in analysing the negotiations among members of the team, and therefore I tend to consider the LDSE team as an actor, but of course it is an actor-network, so I do not intend to give the image that the LDSE was a single, consensual, voice. Just to mention a significant aspect in this regard, members of this interdisciplinary team expressed the challenge of communicating across disciplines, and the difficulty of translating pedagogical knowledge into technological requirements. Also there were long and productive discussions during the project meetings, for instance, about how to best define some concepts and properties of the ontology, and how to design a clear and useful interface.

effectively offer feedback on the learning designs. However, a prototype was built that could be tested by practitioners.

The LDSE team first defined an ontology for the knowledge-base and devised a formalization of learning design and inferences or relations among concepts, based on pedagogical knowledge and theories —most notably Bloom's (1956) taxonomy and Laurillard's (2002) conversational framework —and they *enrolled* academics, staff developers, and learning technologists to test the concepts and LD prototypes to refine these specifications and also the interface of the LD. Some of their suggestions resulted in requirements that were implemented in the LD. In an iterative process the LDSE produced several prototypes that could be tested. This can be understood in actor-network theory's terms as a process of translation, in which the LD changes to try and secure allies. From the evaluation workshops and interviews it is possible to say that there were mixed reactions among the possible future users as regards the usefulness of LD, which do not allow us to guarantee that the LDSE managed to enrol enough allies on this side. For the moment, the LD has not travelled much out of the laboratory because by the end of the project it was "a research prototype [that] lacks the robustness for use over an extended period" [End of award report, p. 5]; in addition, there is recognition that the informants that tested the LD might not be *representative* of university teaching staff [D1-6 Digest], which might suppose a challenge to *mobilize* this larger group, and with significant *dissidence*, the network might fail to *stabilize* or hold (Ramiller, 2007, p.S198).

Thus, the project also tried to *enrol* practitioners and institutions to try to ensure that the LD actor-network would hold after the 3-year research project, and that the LD could become a working tool in the future. As specified in the "End of award report", by the end of the project the LDSE had secured collaborations with several institutions around the world that would test the LD or they would hold workshops to learn about and give feedback on the LD. They also tried to enrol other technologies in the actor-network, to make it more *stabile*: the LDSE was in negotiations with representatives of LAMS, Blackboard, Moodle and MyCeLS to investigate the interoperability of these tools with LD, and study if it would be possible to embed the LD in these existing tools.

In addition, all the journal articles and books published by the project team (e.g. Charlton et al., 2009; Charlton et al., 2012; Laurillard, 2008b; Laurillard, 2012; Laurillard et al., 2013; Laurillard & Masterman, 2009; Masterman et al., 2011) and papers presented in conferences have a *performative* effect in that they help constitute the LD as a learning-design-support-environment-that-fosters-collaboration-among-teachers-and-innovation-in-teaching-with-TEL, even if it is just a prototype, and many of its proposed outcomes have not (yet) been realized. They are also significant in trying to reach an audience and *enrol* more *allies* so that the *project* can continue and the actor-network can hold beyond the end of the 3-year research grant. In institutional theory terms, they are also important in trying to shape an organizing vision.

Also in trying to hold the LD actor-network after the 3-year research project, the team were clear of the need to establish the right *alliances* and have a good PR plan to try and attract more funding for the future [see for instance, LDSE Minutes 19 Oct 2010]. In this regard, they tried to establish *alliances* with other "hot topics" in the academic and policy agenda in the quest for funding. For instance, along the 3 years many references are made to the need to engage with the Open Education Resources (OER) community, because considerable funding and initiatives are directed to this area: "We must have a symbiotic relationship with OER" [LDSE Notes 27 Sept 2011]. Thus, through rhetoric (academic articles) (e.g. Masterman et al., 2011) and specific contacts and collaborations with OER initiatives, the LDSE tries to position the LD as a useful tool that can support OER reuse.[33] Another example is how they try to *align* with policy discourse, as a way of trying to enrol more allies. In a research meeting [LDSE Notes 19 Oct 2012], reporting from a TLRP-TEL forum, it was said that there has been a change in the vocabulary in policy, and the LibDems talk about trying to support less advantaged learners, therefore "we should focus on productivity and personalization", and so they did, as can be seen in the "End of award report". The malleability of the LDSE discourse in search for allies confirms the importance of rhetoric mentioned before, and it is

[33] We also find references to this connection (or need to establish relations) between LD and OER in [Case for support], [LDSE Minutes 16 Dec 2010], [LDSE Notes 10 Feb 2011], [LDSE Notes 18 Oct 2011].

apparent also in more minor details such as the naming of the tool, which was discussed several times. At some point, when it was considered to rename the LD 'The Teaching Designer', one of the research members defended to keep the name Learner Designer, pointing that an 'anti-teaching, pro-learning' tendency still prevails among education researchers.

6.1.2 Sociotechnical context and institutional logics

As argued in the conceptual framework, ANT tends to disregard the fact that actors draw on and are affected by the social conditions, cultural and material resources, and institutional norms and values of the context where they are situated, and by sociotechnical forces that transcend the very localized situation. Giving answer to these concerns, new institutional theory tries to explain why some actors act the way they do influenced by institutional forces, and by considering the existing organizing regimes. For instance, given the previous ANT narrative, it would be possible to ask: why is it that such technology and similar ones around the world are now emerging and they receive public funding? Why is that the LDSE inscribes in the technology the need to encourage the use of TEL in HE, and to reuse learning designs and resources? And why is it that some academics find some potential in such technology but are also reluctant to assert that they would use it?

While I do not intend to offer straightforward causal explanations to these questions, I do consider that the previous ANT narrative can gain depth of analysis by taking into account the sociotechnical context in which the technology is situated and the dominant institutional logics, as well as the possible tensions between the values and logics inscribed in a technology and the institutional logics in the context of implementation. As argued in the conceptual framework I suggest to conceive of ICTs as resulting from and supporting a complex interplay of institutional logics, in a network of institutions, organizations, humans and non-humans, each of them forming part of other complex networks. Institutional logics are implicated (together with other actants in the network) in the production of technology, and at the same time technology might help reinforce some institutional logics: the actor-network is relational, and results from ongoing processes of negotiation.

Thus, in the remaining sections of this chapter I will expand the previous analysis by considering how the sociotechnical context, material resources, and institutional norms and logics, sometimes difficult to pin down as specific actors in the very situated context, are imbricated in IS innovation. In section 6.2 I focus on the sociotechnical context of design, and I analyse how certain logics, values are inscribed in the technology in specific ways. In section 6.3 I analyse how the LD helps performing a specific reality, and I therefore argue for the need to move beyond a tool view of technology, and consider instead the performative character of knowledge and technologies when studying ICT-mediated learning. Finally, in section 6.4 I focus on the sociotechnical context of expected use, which will reveal the non-consensual character of knowledge, learning and technology use.

6.2 Design is from somewhere

Sub-Q 1. How are institutional logics entangled with the development of the Learning Designer?

Moving beyond overly-localised analysis of design that grant too much power to individual designers, in this section I will consider the network of relations within which the design of the LD is situated. Drawing on secondary literature to understand the context of design (which I presented in the previous chapter), and through the analysis of documents and academic publications of the project, and my own observation of the process of development of the technology, I traced the discourses, institutional logics and previous technological interventions entangled with the development of the Learning Designer. In this section I present the results of such analysis. The aim is to examine how the sociotechnical context constituted of institutional logics, discourses, and technologies is implicated in the LD design.[34] By this I do not mean that the technology is "influenced" by them but, as argued in the conceptual framework, that technology is a product and producer of a sociotechnical network embedding and embedded in sociotechnical institutions.

[34] For clarity of argument I present the results of my analysis from the broader sociotechnical context to the specificities of the technology. However the process of analysis has been an iterative process of contrasting the characteristics of the technology and discourses of the LDSE with the broader sociotechnical context as discussed in secondary literature. In this way, I have been able to associate certain actions of actors to the broader contextual setting.

In the following section (6.3) I will discuss in further detail the performativity of the LD/LDSE; that is, the ways in which it helps reinforce or create certain realities.

In the previous chapter I already offered a contextualization of the case study, in which I suggested that the logic of the knowledge economy is deeply involved in major changes in Higher Education (HE) in the UK in the last 30 years. I am referring to the transformation of HE to mass education without a commensurable increase in resources or funding, the standardization and modularization of education, an increasing perception that HE should serve the needs of the market and have a *measurable* impact on society, and the adoption of new public management forms of governance with systems of quality assurance, which challenge academics' freedom. Also to the increasing commodification of education with growing competition among institutions, the consideration of students as costumers, soaring students' fees, the introduction of private providers of HE, and increasingly the view that education is a sector that should expand to the global market. In this context TEL is presented in policy discourses in Europe and the UK, and frequently taken for granted, as the solution to tackle the need to serve a growing number of students, and to expand this new economic sector globally.

6.2.1 ICT as an institution: The technological fixture

As discussed in the conceptual framework, ICT applications have become pervasive and "taken-for-granted as fixtures of contemporary organizations" (Avgerou, 2002, p.31), notwithstanding much research in the area of IS that has revealed that it is not possible to establish a deterministic outcome from the implementation of technologies. Like in other contexts, also in the area of education, technological deterministic views have nurtured high expectations in the transformational capacities of new technologies, and much investment has gone into TEL. This utopian view of technology in education has somehow impregnated the academic discourse: as some scholars have recently lamented (Darking, 2004; Selwyn, 2011a; Selwyn & Facer, 2013) much academic literature in the area of e-learning tends to focus on the potentials of technologies despite the gap between the rhetoric of its transformational effects and reality. In this regard, the TLRP call

for research proposals is framed as the need to explore technical solutions for education, or more specifically, how to transform the quality of learning through technology:

> "The aim of the call is to support innovative interdisciplinary research collaborations focusing on the creation, development and exploitation of digital technologies for learning through a better understanding of **their capability to transform** the quality of learning experiences and lead to enhancements in learning outcomes." (p.1)[35]

This TLRP call, in turn, falls under the umbrella of the Digital Economy Programme, led by the ESPRC, and supported by ESRC and the other Research councils. As made explicit in the "Context" section of the "TLRP second call for proposals" (pp. 3-4), TEL "has been identified as being of key importance for the UK government", and it is "an area that is recognised as crucial to the future of learning in the UK but which also has global implications" (p. 3). Thus, we can see that a strong actor-network nourishes the institutionalization of TEL.

The LDSE project tries to give answer to the aforementioned distance between the potentials of TEL and real use, by supporting teachers in the adoption of TEL: "This proposal has been developed in the context of an education system that has put significant resources into the use of technology to enhance learning, but has not yet fully realized the benefits for learners." [Case for support, p. 1]. Nevertheless, in this context, the need to increase the use of TEL in HE is taken for granted. In the "Case for support" the main aim of the LDSE project is summarised as "to develop an interactive environment to enable teachers to lead the discovery of **innovative** pedagogical designs that **exploit the potential of TEL**" (p. 1); and the need to boost the use of TEL is considered as unavoidable because "the current situation in all education sectors, then, is an increasing requirement for teachers to use TEL in order to achieve the ambitions of an expansionist education policy" (p. 1). Also referring to lifelong learning—a key area in the policy discourse, framed as one of the knowledge economy imperatives—members of the LDSE research

[35] In this analysis chapter I use bold to highlight important and recurrent concepts in the discourses analysed.

team assert: “Within the context of increasing demand for improvements in the quality and scale of lifelong learning consequent on the Lisbon strategy, this chapter is based on the assumption that technology-enhanced learning **(TEL) will be needed** because of its potential to improve the quality of students’ learning and broaden access to HE without commensurate increases in funding.” (Laurillard & Masterman, 2009). Therefore, in an LDSE project meeting it was clearly stated: “one of the main purposes of the LDSE is helping teachers to **shift** from face-to-face **to using TEL**” [LDSE Notes 27 Sept 2011].

This ambition of promoting the shift from conventional to blended or open learning models is inscribed in the LD in the following ways. First of all, when designing a session, the user of the LD needs to choose from a series of Teaching and Learning Activities [TLAs] (or create a new one). In that list, there are as many face-to-face activities as TEL, so by making TEL activities visible the idea is that the teacher might consider using TEL. In addition, in the “Alternative design ideas” box, when you choose a face-to-face activity the system suggests that you could substitute or complement the activity by using TEL (see Figure 10, next page).

In such approach there seems to be an implicit assumption that the adoption of TEL can be explained through rational choice. That is, the rationale seems to be that if, through collaboration with LD, we learn—with the support of the system and interacting with others—”innovative uses of TEL” we will adopt them. However, some research has revealed that the adoption of TEL is subject to technical, institutional, economic and other social constraints, and that important social and institutional factors affect e-learning innovation, and that “for innovations to gain widespread support and acceptance it is likely to be necessary for them to support or be adaptable to the diverse goals of multiple actors in different games” (Dutton et al., 2004, p.147).

Some research has revealed that the institutionalization of ICTs in our technological society goes hand-in-hand with discourses of modernisation (Avgerou, 2002) and innovation (Barry, 2001; Suchman & Bishop, 2000), and how in such discourse change and innovation are frequently equated with technical intervention. The influence of such dominant discourse can be found in the LDSE

discourse about TEL: “If the education system is to achieve **radical change through TEL** it should be the teaching community who are the driving force of the **innovation**.” [Case for support, p. 1] And: “There has been a demand on teachers to **modernise** education **by using technology** enhanced learning” [End of award report, p. 1]. Also in the Case for support (p. 8) there is a table summarising “what it takes to enable a teacher to move **from conventional to innovative teaching**”, in which there is reference to considering educational theories and concepts, but there is an important stress on using TEL and “**innovative tools**”.

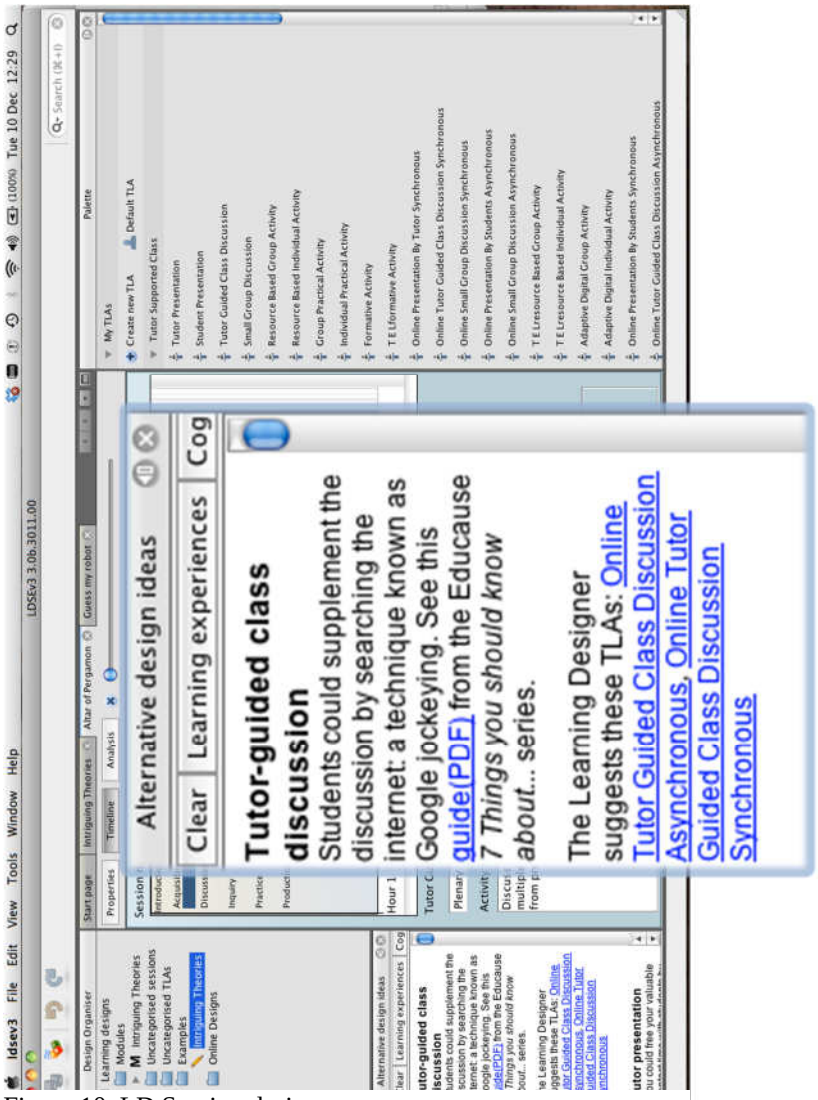

Figure 10. LD Session design page.
With a palette of TLAs on the right, containing TEL activities, and with “Alternative design ideas” on the left down corner, suggesting TEL alternatives and complements to face-to-face activities.

Also at another level a certain taken-for-grantedness of technology and a soft determinism underlies the discourse of the LDSE project, in the sense of trying to achieve change through the LD. That is, there is a discourse on trying to change teachers' attitudes towards the use of TEL through technology: "the main aim of The Learning Designer is to have a positive **impact** on teachers' practice in making effective use of learning technologies" (Laurillard et al., 2013, p.21). Also the aim of the LD is to achieve collaboration among teachers: "**foster** a community of practice in which teachers can share, and take inspiration from each others' TEL designs" [Case for support, p. 2]. And even transform the professional practice of teaching into a design science, and promote that academics share and peer-review their knowledge about teaching as they share and peer-review their scientific knowledge: "In addressing both of these questions, we have conceptualized the Learning Design Support Environment (LDSE) project as the development of an interactive microworld that **enables teacher-designers to act like researchers** by developing knowledge and practice about teaching and learning. We call this system The Learning Designer." (Laurillard et al., 2013, p.17) We know, however, that the functionality of a technology is not sufficient to achieve the expected changes in working practices (Orlikowski & Baroudi, 1991), and that communities of practice can be supported but not created (Lave & Wenger, 1991). There is in the LDSE "Case for support" recognition of some of these challenges; however, there is somehow a sense in which this can be technically overcome if participants are engaged in the process of design:

> "While teachers are often prepared to share and reuse their ideas (Day et al., 2006), the exchange of professional practice, across institutions or sectors, is often hampered. Factors include a wide variation in learning cultures and approaches (Hodkinson & James, 2003), and in subject disciplines (Knight et al., 2006), the context-dependent nature of many teaching materials, and the privileging of research over teaching (Masterman & Lee, 2005). This, then, is a key challenge of the current proposal: to develop, *in conjunction with teachers themselves*, a supportive environment in which **teachers at large feel encouraged** to explore new

> tools and pedagogies, building where appropriate on examples of innovative work by others." (p. 4)

While the rhetoric of technological change is part of the justification of the LDSE project, and their aim to develop the LD, admittedly, in one of the academic articles published by members of the LDSE team (Laurillard & Masterman, 2009), an awareness that the LD is not sufficient to guarantee collaborative learning among teachers, and that organizational and institutional factors need to be considered has been more clearly spelled out:

> "the motivation [of academics] to share their designs [with a tool like the LD] is probably outweighed by the requirement to teach, and by the lack of reward for sharing teaching as opposed to sharing research. (...) [In addition,] peers with whom one might share similar interests and challenges may reside in different institutions, and there may be competition (i.e. to attract students to one's own programme) as well as collaboration. The online collaborative environments that we provide for teachers' professional development must therefore be careful to recognise and adapt to the realities of teachers' mainstream work."

> "universities and colleges must become "learning organisations" in the fullest sense. The teaching community orients itself towards what it perceives to be the principal incentives and drivers, and these rarely focus on the quality of teaching innovation or on extending the same quality to a larger number of students. This means that institutions themselves must take responsibility for enabling and motivating their academic communities to take on the task of professional development in order to innovate, and improve practice."

However, the focus of the LDSE research project has been on designing a technology that can support collaboration among teachers and "scaffold the learning design process" [Case for support, p. 2]. Thus, the Case for support and some of the journal articles contain arguments or expressions that hint at technologically induced change, e.g. "Table 1 illustrates a selection of the kinds of

changes in teaching practice that should result from using the LDSE" [Case for support, p. 7].

In the following sections I will explore further the contextual and institutional logics that can explain the actions of the actors in the actor-network, and the interests inscribed in the LD. As we will see, in the current context, the technological and economic institutional logics reinforce each other as TEL is seen as a cost effective solution to the "problems of education". Also a pedagogical logic is interconnected with these two logics in the discussions about ICTs for learning, as TEL is seen to support personalization in learning and also collaborative learning.

6.2.2 Economic logic: productivity

Laurillard, the project leader of the LDSE project, in her academic publications has argued that much of the technological expansion in HE has been led by an economic logic. She suggests that the penetration of ICTs in HE should not be guided by economic or managerial approaches but by pedagogical sensitivity. (Laurillard, 2002). In line with this argument, in the Case for support, the LDSE project presented itself in terms of the need to offer pedagogical support to academics to bridge the gap between the important investments in ICTs in education and the lack of training that academics have received to incorporate them in their teaching. More specifically there is reference in the "Case for support" (Laurillard et al., 2007, p.1) to the "expansionist education policy" which expects education at all levels to improve achievement levels and increase the number of students, and the assumption from policy bodies that these requirements can be met by taking advantage of technology-enhanced learning (TEL). Therefore, teachers in all sectors are increasingly required to use TEL in order to achieve policy targets. However, while much investment has gone into funding infrastructure and educational software, teachers "have little support in this, in terms of time, training or resources." (p. 1)

In a sense, we can read this as an implicit critique to the dominant economic logic that in the context of the knowledge economy and mass education drives the investment of ICTs. Clearer than this, however, it is a critique to the lack of

pedagogical knowledge guiding TEL implementation. However, the economic logic is infiltrated in LDSE documents and technology in several ways with notions like *productivity* and *cost-benefit*. We find this in the language used to express the distance between the high expectations of the transformational potential of TEL and the widely held impression that it has not lived up to expectations:

> "given the significant investment in TEL across the education sectors over the past decade, there should by now be a noticeable difference in the outputs of the education system. However, researchers struggle to identify large-scale benefits commensurate with the investment. Just as economist Robert Solow noted in relation to the commercial sector ten years ago: "You can see the computer age everywhere but in the productivity statistics" (Madrick, 1998)." (Laurillard et al., 2007, p.1).

While this reference to economic notions of productivity, and cost-benefits could be considered as "just a metaphor", I will very soon show that the trope of productivity is recurrent. What is perhaps telling is that there is no clear sense of what those "benefits" are apart from those defined by policy bodies and mentioned before, i.e. using TEL to improve achievement and increase students' numbers without support "in terms of time, training or resources". But what are the expected benefits that TEL could bring? What does it actually mean "to improve achievement"? How should the "difference in the outputs of the education system" be measured? I will delve with it further in section 6.3.

In the section "Research challenges" of the "Case for support", there is a specific part dedicated to productivity:

> "*Productivity:* The resource planning stage of the LDSE will offer **a 'benefits-costs' model of teaching resources** (Laurillard, 2006), focusing on the teacher time needed for different teaching methods and their relationship to the learning quality and time benefits for learners. This helps teachers to model the productive use of both their own and their students' time and to appreciate that, although introducing TEL entails high fixed costs, the variable costs can be low. (...).

> The LDSE is designed to encourage and facilitate **re-use of digital resources**, and in that sense should help teachers to **use their time more productively**. Advice and guidance on TEL methods would also make the learning curve shorter, and help teachers to set the ground-rules, e.g. for online conferencing, which helps them avoid the overload of too many responses to handle.
>
> If we succeed in the aim of greater teacher collaboration, learning together in an interdisciplinary community of teaching peers, similar to a 'virtual research environment' (Procter & Carmichael, 2005), then the result should be **more productive use of their teaching time**, another element of the evaluation." (Laurillard et al., 2007, pp.11–12)

And what I need to add is that the sentence introducing this section is: "The planned research will rise to the **challenges posed by TLRP** in several ways" (p. 11). Indeed, here we have to introduce another actor in the actor-network which is the Teaching and Learning Research Programme (TLRP)—funded by the research councils ESRC and EPSRC, in partnership with the e-Science Core Programme, JISC and Becta—speaking through their "Second call for research proposals":

> "Applications under this Call should consider how technology enhanced learning can contribute to one or more of the challenges to the research community identified for this Call: ***Productivity**, Personalisation, Inclusion and Flexibility*." (TLRP, 2007, p.8)

In fact, this focus on productivity is persistent: it was already present in the Teaching and Learning Technologies Programme (TLTP), launched in 1992, which funded 76 projects with around £75M. The aim of the programme was "achieving **productivity** and **efficiency** gains whilst maintaining and improving quality in the provision of teaching and learning."[36] Some scholars have questioned the success of this programme and argue that "there is no evidence that existing staff were made more productive and efficient as a result of using these products [i.e. the courseware produced by these projects]." (Michaelson, 2002, p.18)

[36] See http://www.naec.org.uk/organisations/the-teaching-and-learning-technology-programme

The LDSE Case for support refers to the four themes of the TLRP call, but acknowledges that inclusion is only an indirect focus, and productivity is the section that they seem to put a slight stronger emphasis in the proposal. But when the LDSE project was already running, the TLRP director asked LDSE to become the leader of the "productivity" research area of interest, which meant, for example, that members of the LDSE project had to lead the writing of the section in the TLRP website on productivity[37], and they also wrote a briefing document of 7 pages (Laurillard, 2011) where the argument is made that TEL can contribute in "achieving higher quality and more effective learning in affordable and acceptable ways." (p. 2). Improved productivity is defined as "improved quantity or quality of learner achievement per unit of teacher time, and/or learner time." (p. 2) In this regard, the view is that TEL can help 1) by improving the quality of teaching and therefore the quality of learner achievement; 2) by increasing the number of learners keeping teaching time the same, 3) reducing both teaching and learning time for the same learner achievement, 4) improving the quality of learning achievement against the learner's time. Then, there is an outline of how different projects of the TLRP can contribute to productivity understood in these different ways; that is, how the diverse technologies can for instance improve the quality of the learning experience, reduce teaching time, etc.

Thus, the general message put forward is that investing in technologies for learning is cost-effective and inevitable: "TEL will be needed because of its potential to improve the quality of students' learning and broaden access to HE without commensurate increases in funding." (Laurillard & Masterman, 2009). However, there is no proper reference to costs—economic, learning, social or otherwise. Just to illustrate this point, let's remember that, even if not mentioned in this document, the funding of the second call for TLRP research proposals was a non-depreciable £6m, and the total of the TLRP initiative is £40M, and research in IS has revealed that keeping a technology running can have many other costs related to implementation, maintenance, training; and can also have non-economic costs or draw-backs. All in all the message seems to be the recurrent in e-learning about the

[37] See: http://tel.ioe.ac.uk/productivity/productivity-achieving-higher-quality-and-more-effective-learning-in-affordable-and-acceptable-ways/

potentials of technology, without detailed consideration of the complexity of bringing technologies to work outside the laboratory, and possible unintended consequences.

In the Learning Designer (LD) this concern on productivity is translated most clearly into the time modeller (see Figure 11), which based on the activities of a module, and considering if they are face-to-face or TEL, it calculates the teaching time necessary to prepare and deliver the module. It also distinguishes between the time needed when it is the first time that the module is taught or when the teacher is reusing the materials, emphasising how much more productive it is to reuse activities. The time modeller is part of the learning experience webpage, in which the system analyses the activities selected by the teacher in the LD and shows a pie chart to help the teacher reflect on the students' learning experience. It allows the teacher to assess, for instance, how given an increase of students' numbers they can maintain the quality without increasing staff workload [WP2 - Time modeller guide.doc]. In this regard, the LD conveys that productivity cannot be considered independently of the pedagogical benefits: it is not just about reducing or maintaining teaching time, but also keeping or improving the learning experience. According to the calculations of the time modeller, long term, online or blended learning tends to be more productive than face-to-face. That is, the preparation costs (in terms of time) for the first year are higher in online learning, but the reuse is more efficient.

Figure 11. Screen capture of the Analysis page of the LD with the Learning Experience and Time Modeller.

In a document prepared by the project leader explaining how the time modeller works, it is explicitly stated that some of the aims of the time modeller, and therefore of the LD, are to promote reuse, and encourage the use of TEL:

> "The objectives of the **cost-benefit** modelling activity are as follows:
> 1 Promote awareness of the costs of teaching
> 2 Clarify the sensitivity of costs to student numbers
> 3 Focus awareness on learner time as a constant across all models
> 4 **Promote reuse** of teaching materials
> 5 Allow comparison of pedagogic value and teaching time between conventional, blended and distance learning models
> 6 **Promote a shift from conventional to blended or open learning models**
> 7 Enable teachers to plan the degree of personalisation in a teaching model
> 8 Provide a way of estimating the break-even costs of teaching preparation and presentation
> 9 Focus awareness on how staff and student time is spent in different teaching models
> 10 Enable forward planning to determine how to achieve better teaching **productivity**" [WP2 - Time modeller guide.doc]

I will now describe an example of what better teaching productivity might mean when using the LD. If we add a lecture in our session (TLA: tutor presentation) the learning experience is 100% acquisition (there is no discussion, inquiry, practice or production) according to the pie chart. In the "alternative design ideas" box, which offers support to the teacher designing the course, the following message pops up: "You could free your valuable contact time with students by pre-recording your presentation / lecture as a podcast that they can listen to in their own time. Or, you could make a podcast of your 'live' lecture so they can listen to it again for revision. The Learning Designer suggests these TLAs: Online Presentation By Tutor Synchronous". I follow this advice, and I substitute the face-to-face lecture by a video recorded version of it. Now the pie chart shows exactly the same learning experience: 100% acquisition, and I can save contact time and preparation time next time if I reuse it.

Now, out of consideration in these calculations are once again the possible associated costs of transforming the face-to-face activity into an online activity, that is, the costs not only for the teacher, but for the institution or other support staff, in terms of implementing and maintaining a working technology, for instance. Also nuanced aspects about what is gained or lost from having a face-to-face

lecture in contrast to an online one are not reflected in the learning experience. For instance in the transformation suggested by the LD from a face-to-face to an online presentation there is no consideration of aspects such as empathy and proximity, ability to adapt to the audience, to answer questions on the fly, to readapt slightly the lecture considering contemporary events, to say things that a lecturer would not like to have recorded, to create a sense of community among students and thus facilitate that students from different backgrounds mangle and discuss the lecture or whatever else outside class, etc.[38] Or, just to bring another example of how these calculations hide a higher complexity, in most Open University models to compensate for the lack of face-to-face contact with students, students have constant online interaction with their tutors by email or through forums in an online space for the course, which can be quite time consuming for the teacher; in addition, to ensure that students follow the course adequately there is a much tighter control over their learning through very regular formative assessments, adding to teacher's time. Furthermore, as the teacher is "only reusing the material" of the course, they tend to have a precarious contractual relation with the institution. Research has indeed documented that the division of labour in distance learning does not correspond to that of traditional universities (Michaelson, 2002; Peters, 1989; Tunstall, 1974). Thus, the implications (and costs) of the turn from face-to-face to online learning are complex and go beyond the teacher-student interaction.

In an LDSE project meeting, the project leader, answering to another researcher, admitted that the calculations in the time modeller will "never be accurate" but, she argued, they allow you to play around and think about it. For instance, she explained, "TEL is expensive the first year, and perhaps it gets cheaper from the third year. But you need to know where the teaching time is going" [LDSE Notes 30 Nov 2011]. Indeed, any technology or any categorization simplifies complexity, and this is not bad *per se*, it is unavoidable. We always need ways to simplify to be

[38] The LSE organized a debate during a teaching day session in 2010 about the advantages and disadvantages of video recording lectures, and several pros and cons were emphasised by academics and students. Afterwards, Jane Secker et al. (2010), from the Teaching and Learning Centre, undertook a research about LSE academics' perceptions on lecture capture. The conclusion was that there is no straightforward answer, and some strong feelings in favour or against. In no case it was suggested that the lecture capture would substitute the face-to-face lecture.

able to communicate and live in the world. However, with this analysis my intention is to show the implications of the simplifications made: what is left out of sight and what is emphasized (Bowker & Star, 1999; Law & Mol, 2002).

The LDSE project also aims to increase the productivity of teachers with the LD by enabling teachers to build on the work or others when they design their teaching [End of award report, p. 6]. In addition, they see the LD as an efficient tool to support teachers in designing for learning in a context in which "time for staff development has to compete with developing administrative skills and research skills, so there is little time for learning about teaching, even of a conventional form." (Laurillard et al., 2013, p.17)

By the end of the 3-year project the issue of productivity had evolved into a key aspect of the LDSE project, as reflected in the LDSE End of Award report: "Although the design tool highlights the value of personalisation and flexibility, the LDSE project focused particularly on the 'productivity' theme of the TEL programme" [End of award report, p. 5]. By following the project, we realize how several actors were involved in relationally defining LDSE in such a way: first, TLRP call for proposals; then, the TLRP director asking the LDSE team to become the leaders of the 'productivity' theme, and even the UNESCO, which incorporated some of LDSE's take on productivity: As stated in the same report, "the project's work on the productivity objective of TEL, especially the modelling of teacher time for activities with and without TEL, led to a commission for the UNESCO policy brief on 'Cost-benefit modelling for open learning'."

Finally, it is interesting to see how the issue of widening participation (i.e. not just mass education) is brought into the arena in an academic article written by two of the researchers, and connected to the issue of productivity. So here productivity is linked to social justice. They state: "However, the widening participation agenda, which aims to open up HE to those in lower socioeconomic groups, calls the affordability of these ambitions into question unless universities can also find ways of improving the productivity of learning and teaching. If we are to improve both quality and reach, as governments demand, improving productivity will be essential."

To sum up, I have shown in this section 6.2.2 how the concept of productivity is very much present in the actor-network of which the LD is part, and put forward by several actors: TLRP, the LDSE discourse and (some of) their members, and the LD software. This concept of productivity inscribed in the technology needs to be understood in a sociotechnical context in which TEL is taken for granted as the solution to tackle the expansion of HE. Thus, in this context economic and technological logics reinforce each other. I will later discuss further the pedagogical logic embedded in the LDSE, but I have also mentioned that this idea of productivity is presented not only in economic / resources terms but taking into consideration the pedagogical value of the learning experience. Therefore, in this case pedagogical, economic and technological logics coexist. I have also suggested that in this cost-benefit approach costs tend not to be adequately accounted for and reduced to "teacher's time consumed" and that the complexity of considering what is "gained" or "lost" (in economic, pedagogic, or social terms) can hardly be captured in the system. Thus, productivity is defined and translated in very specific ways (it could have been otherwise), which reinforce the idea that we need to use TEL, and reuse is encouraged. I have also revealed the role that several actors played in shaping the LDSE as regards the productivity aspect.

6.2.3 Pedagogical logic and collaborative learning

Pedagogy, originally the science that studied children's mental development and learning, historically developed in the field of psychology. Behaviourism and cognitivism have been the most influential schools of thought in pedagogy, which has become to be more broadly understood as the science and art of education and teaching (for any level of education). In the recent years, education research, which has broadened to areas such as education policy, informal learning, etc., has been influenced, like other social sciences, by constructivist approaches. Popularized or institutionalized versions of constructivist theories of learning, specially when applied in formal educational settings, and in particular in the area of e-learning, frequently stress the idea of learner-centric education and learning through collaboration. In this context TEL are frequently seen as able to support collaborative learning. I have also discussed in the literature review how in organizational learning scholarship, institutionalized versions of situated theories

of learning such as CoP present collaboration and communities of practice as sites of innovation.

In this context, in which collaborative learning has become institutionalized as an effective method for learning and innovation, it does not come as a surprise that the Learning Designer is defined as a computer-supported collaborative learning (CSCL) environment, that aims to support teachers' professional development by fostering an online learning community of practice (Case for support; Laurillard & Masterman, 2009). In the LDSE Case for support there is reference to constructivist theories of learning, such as activity theory (Engeström, 2000) and communities of practice (Lave & Wenger, 1991) as theoretical underpinnings for the construction of the LD. As stated in the Case for support, "The research issue here, therefore, is to discover the kind of 'computer-supported **collaborative learning**' (CSCL) environment that would enable teachers to **work together** on TEL **innovation**, **building on each others' work**, and making use of existing learning designs. CSCL has been extensively researched for implementation with learners as an important new form of **pedagogy enabled by technology**." (p. 10)

In the conceptualization of the LD as a CSCL, we can find additional theoretical underpinnings in the project: Drawing on the constructionist approach to learning (Papert & Harel, 1991)[39], in one of the journal articles of the LDSE research team, the LD is described as "a constructionist environment", which supports conceptual learning through practice and collaboration (Laurillard et al., 2013). From this perspective, the Learning Designer can be seen as a microworld for the domain of learning design. A microworld is "an explorable and manipulable computational model of an aspect of the world, with its own constraints and assumptions, in which a user can experience all the necessary concepts by interacting with it." (Laurillard et al., 2013, p.16). In this sense, the LDSE distances itself from those learner-centric views that drawing on theories like CoP assume that all learning must be lead by the learner; in contrast, the LDSE sees value in scaffolding or assisting the learning process of teachers-as-learners with a tool like the LD, which can help

[39] Papert, a mathematician and artificial intelligence researcher, disciple of Piaget, devised the computer language LOGO so that children could learn mathematics through discovery learning, by immersing in the use of LOGO.

teachers in structuring and representing their learning designs, and it can offer advice and guidance. Therefore, most of the efforts of the 3-year LDSE research project have been directed to “embed knowledge of teaching and learning in the learning design software architecture” and “improve representations of the theory and practice of learning design.” [Case for support, p. 2]

The rationale of the LDSE is that teachers have little time and support to explore innovative approaches to learning and exploit the potential of TEL, and that they “need encouragement and practical **guidance**, therefore, in understanding how best to design TEL activities for their learners” [Case for support, p. 4]. In this regard, the LDSE assumes a pedagogical logic in trying to explain why teachers have not exploited the use of TEL and “innovated” their teaching: because they do not know all the potentials that TEL offer for education, or they have not realized (because of lack of time, training) about the pedagogical benefits of it. The solution is also framed with a (psychology informed) pedagogical logic: Innovation in teaching and in the use of TEL will come from the reflexive engagement of teachers in learning design, i.e. in making explicit the pedagogical knowledge behind their choices when designing learning activities. As mentioned, this pedagogical logic is intertwined with a technological logic in the assumption that a tool like the LD can be the solution. This framing of the problem is quite persistent: in a critical analysis of the Teaching and Learning Technologies Programme (TLTP), launched in 1992, and mentioned before, Michaelson (2002, p.18) points out that the “lack of take-up [of the courseware produced by 67 of the projects] is not seen as a failure of the initiative but as a **need to educate lecturers** about the merits of computer-based learning”.

In contrast, the CoP approach (Lave & Wenger, 1991) and new institutionalism would consider that actual teaching practices result not only from rational choice, but depend on resources and time available, expectations and rewards, on the legitimate way of doing things in the institution where they work, on the assessment requirements established by the institution or other education bodies that define the sort of learning that students need to achieve, quality assurance mechanisms, etc. That is, the established practices in the community and the broader sociotechnical context.

As we can start to see, and I will further demonstrate in this section, the adoption of the concept of community of practice by the LDSE results from the institutionalisation of the concept of CoP as a "best practice" to achieve learning and innovation, and not from a truthful interpretaion of the this explanatory theoretical approach. Thus, we find in the LDSE yet another example of an instrumental application of CoP.

Following a pedagogical (pychologically-based) logic, then, the aim of the LDSE project, is to design a "supportive environment" like the LD that can "scaffold the learning design process" (p. 2). At the same time, there is "recognition of teaching innovation as a product of necessarily **collaborative** activity" (p. 10) and that "it should be the teaching **community** who are the driving force of the **innovation** [of education through TEL]" (p. 1). Thus, LDSE's vision is that "teaching could become more like a **science** of *learning **design*** that will be both a personal, reflective journey, and also a social, **collaborative** activity." (p. 1). "It could be similar to the development of knowledge and practice in the context of research", in which academics are used to building on the work of others, test their own ideas through experiment or debate, and share their results.[40]

Thus, there is a certain tension between the view that the **community** are the driving force of innovation, but at the same time that such "innovation" has not happened, and therefore the community needs the support of a tool that embeds pedagogical knowledge for this innovation to happen:

> "As the main aim of *The Learning Designer* is to have a positive impact on teachers' practice in making effective use of learning technologies, its design cannot be driven by users' requirements alone. It must also contain the expectations derived from theory that will challenge and develop their existing practice." (Laurillard et al., 2013, p.21)

[40] The project takes as a model of collaboration academic research, and its peer reviewed journals. However, in the recent years such model has become increasingly affected by external accountability measures, such as the grading of journals. The received view of a smooth, disinterested, and conflict-free peer collaboration is an idealisation (see e.g. Mingers & Willmott, 2012; Mitchell et al., 2001).

The learning design approach is based on the idea of formalizing and capturing educational practice to facilitate sharing and building on the work of others: “The LDSE should support the planning and design of learning in such a way that teachers can **externalise** their ideas about teaching and learning. Then they are more able to **reflect** and **share**, and gradually build their own knowledge base around the use of TEL.” [Case for support, p. 7] As we can see, the approach shares with knowledge management interventions the idea of using ICTs to codify knowledge and build repositories that can be shared; and also an atomistic view of actors, as individuals that follow rational choices. In this regard, part of the efforts of the LDSE team have been directed towards developing “an effective representation of a decontextualised practice model” [Case for support, p. 5], so that teaching practices can be shared across institutions and disciplines (p. 2). This formalization and visual representation of learning designs was developed taking into consideration previous research in the area of learning design, learning theories, and also considering the feedback of informant practitioners that were enrolled in the project. The challenge was to integrate learning theory in the LD [Case for support, p. 4], but in a way that could be “more intelligible to teaching practitioners than current specifications (UML or IMS LD)” (p. 2), considering the variation across institutions and disciplines. In this regard, the system has a specific interface and it embeds certain specifications and assumptions, but it offers a certain degree of personalization and allows users to customise the terminology and to add new categories for instance in the lists of learning outcomes, and teaching and learning activities [TLAs]; users can also introduce changes in some of the assumptions of the system, etc.

Figure 12. Partial screen capture of the properties page of a session in the LD with a palette on the right with a list of learning outcomes to choose from.

As I have already mentioned, the Learning Designer aims not only at facilitating collaboration but also at supporting reflection, and scaffolding the process of learning design. In this regard, the LD is not only a repository, but it is also an intelligent system that embeds knowledge of teaching and learning so that it can "offer theory-based support for analysing" learning designs [Case for support, p. 8]. The aim is to offer advice and guidance at key decision points in the design process and challenge teacher's current pedagogy; and also to allow teachers "to model the benefits of different approaches to conventional, blended, and online learning." [Case for support, p. 2]. Therefore, the project team developed "an ontology of the concepts and relations relevant to learning design, in order to assist the user in ensuring that the components of their design are aligned" (Laurillard et al., 2013, p.21). For instance, following Biggs (1999), "the ontology defines the nature of the pairwise relationships among learning outcomes, teaching and learning activities, and form of assessment" (Laurillard et al., 2013, p.20); also the TLAs are associated to specific properties based on Laurillard's (2002) Conversational Framework: acquisition, discussion, inquiry, practice, production, which are used to analyse the session or module designed and to offer a visual representation of the learning experience of sessions and modules. However, the LDSE seeks "teacher autonomy, not acquiescence" [Case for support, p. 9] and, therefore, the system does not want to impose theoretical perspectives, that is why the conversational framework was used, as "it is **neutral** with respect to all teaching methods" (p. 5).

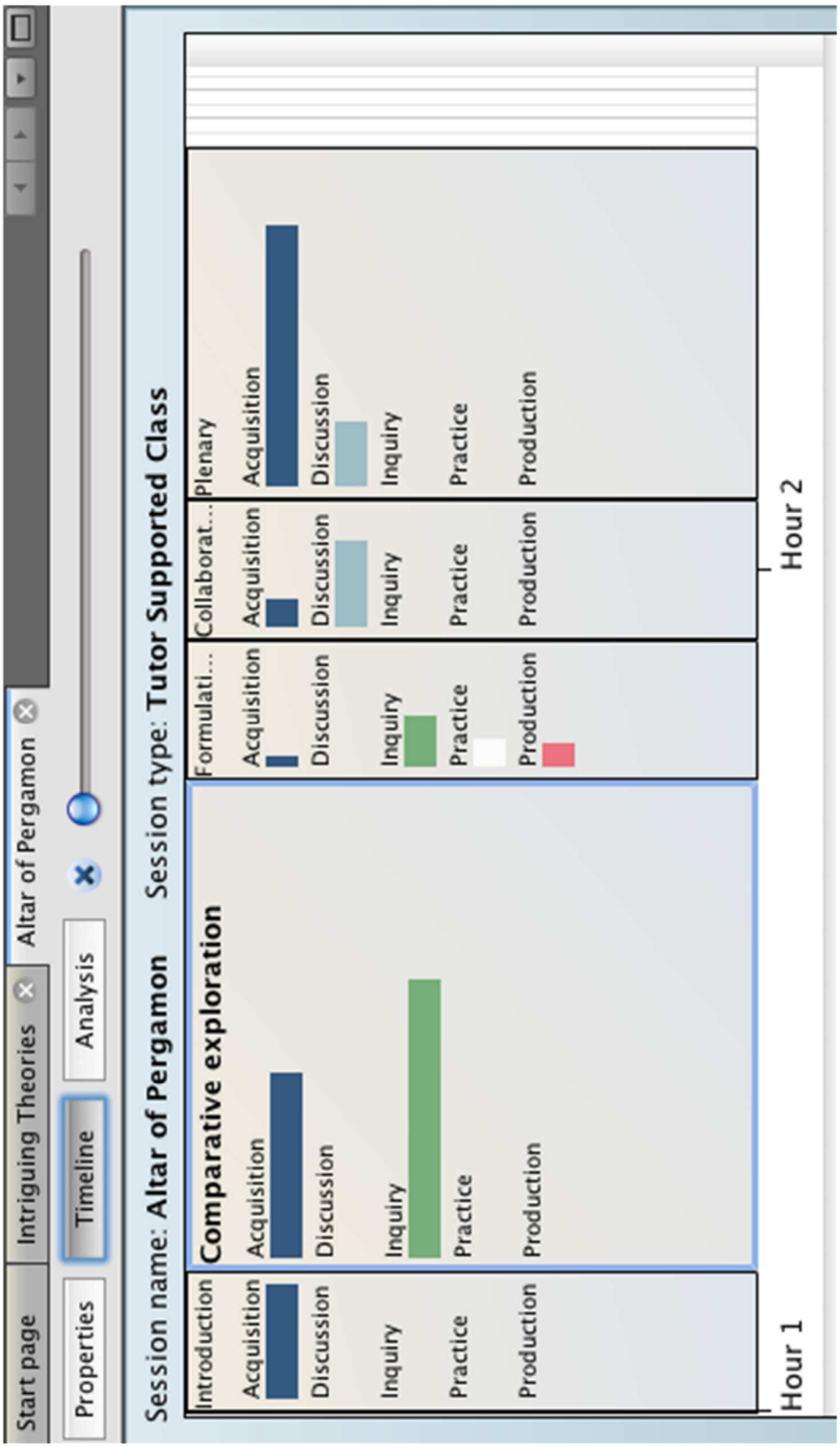

Figure 13. Partial screen capture of the LD. Timeline with TLAs of a session.

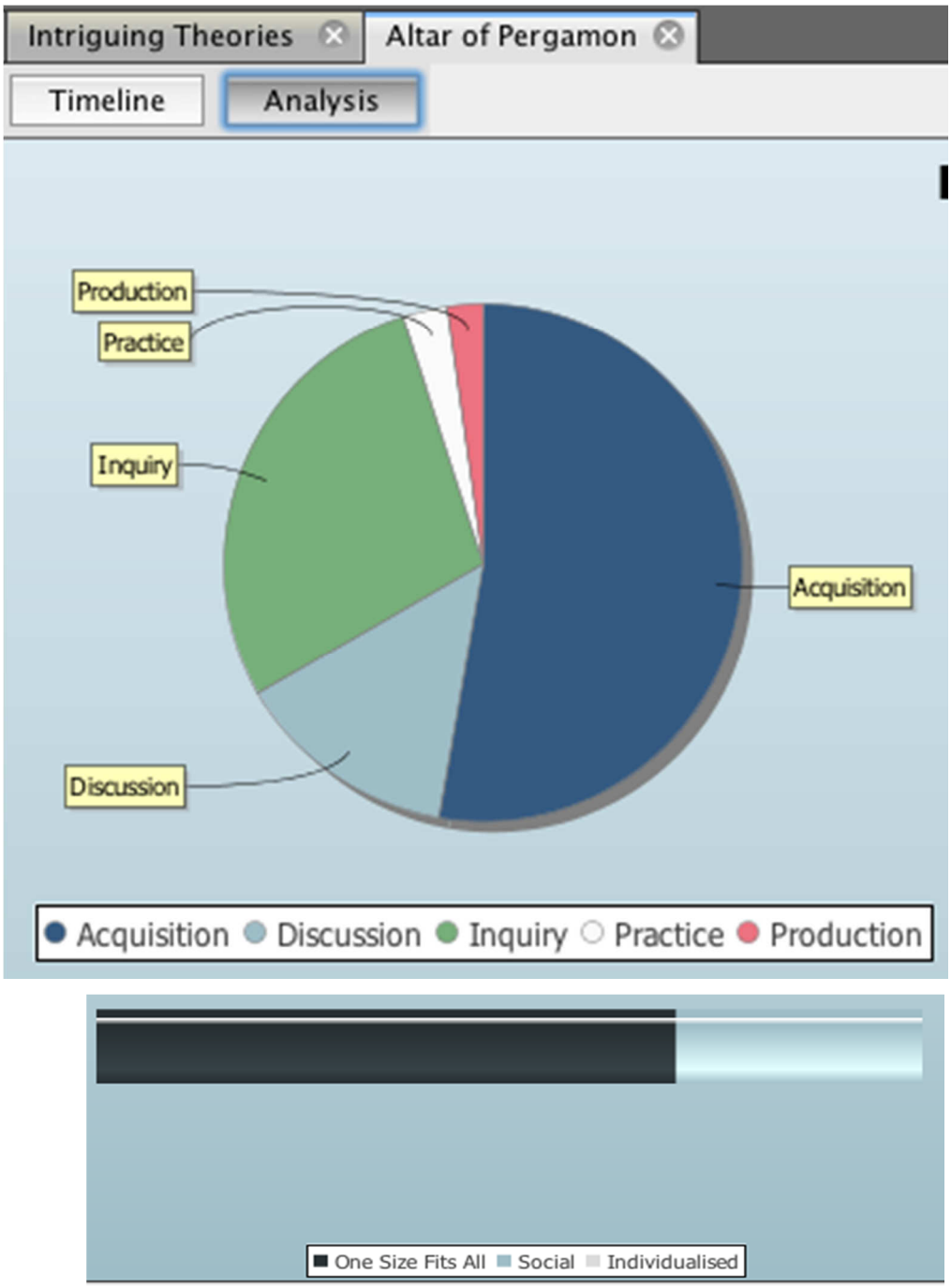

Figure 14. Partial screen capture of the LD. Analysis of the learning experience of the same session as Figure 13.

It seems sensible to assume that LD's representation, scaffolding, and analysis of the learning design might prompt some teachers to reflect on their teaching. Also, the list of TLAs, learning outcomes and advice and guidance, might inspire some teachers into trying or considering new aspects or activities in their teaching. In the next section, however, I will show that not all informants received positively the system, and that the terminology and theoretical concepts underlying the system were not always understood. The system has a wiki with advice and guidance, where users could expand this information. But the question remains as to what extent the system *per se* would encourage deeper learning or reflection. An informant, who is a staff developer, expressed this concern in an interview. The informant explained that he does workshops about teaching methods and teachers do not necessarily walk out of the session and introduce changes in their practices, because there is always a "cost of adoption". In this sense he was sceptical that "a software will ever sell a change of behaviour sufficiently well such that people will adopt it" [D4.2 SCO Spring].

Even less convincing is the notion of "neutrality": as mentioned in the previous section, any classification, any rationalisation entails simplification, and therefore it foregrounds some aspects, while ignoring others, and it conceals complexity. It is true, as the project leader once argued in a discussion I had with her, that the LD does not impose best practices, or specific teaching methods or approaches. However, through the system's recommendations and the framing of how to "improve teaching practices" the LD performs specific cuts.

In fact in LDSE project meetings this issue arose. One of the project team members, an academic in the computer sciences field, said: "the LD has a particular view on pedagogy and learning, so not everybody will be happy to use it." [LDSE Notes 27 Sept 2011]. In another project meeting the following dialogue took place, in which some researchers expressed that some informants did not seem to agree with the theoretical underpinnings of the LD: "X: Some people [informants] asked: If you don't agree with the conversational framework, what's the use of the LD? // Y: It doesn't model the conversational framework. It has 5 cognitive types, that's true, and it's true that's fixed, but nobody has come up with another type of (...).// Z: For some, this can't be separated" [LDSE Notes 30 Nov 2011].

Indeed the conflictual nature of knowledge on education, teaching and learning, will be discussed further in the next section, when presenting the informants' views on the system. But in what follows, without intending to offer an exhaustive analysis in educational terms of the assumptions of the LD and what it leaves in the background, I will justify this point with some reflections and examples. More specifically, I will briefly refer to some of the ongoing discussions taking place in the field of education research, of which the LDSE is part. I see educational research as performative, as an instable, conflictual, actor-network participating in the ongoing negotiations of educational reality.

Something like making explicit the "learning outcomes", which has become taken for granted and a requirement for the validation of courses in HE since the Dearing Report (NCIHE, 1997) has been a topic of discussion of abundant scholarly literature. As already mentioned in the case narrative, many education scientist find value in defining learning outcomes as a way to plan students' learning, specially in student-centred approaches (e.g. Barr & Tagg, 1995; Knight & Trowler, 2001). However, several scholars have questioned how learning outcomes are currently used since the wider adoption of learning outcomes in HE, as part of an utilitarian ethos that tends to simplify the complexity of the learning process reducing it to auditable, measurable outcomes, without considering, for instance, that the results of learning might be delayed, that unpredicted outcomes might emerge, or that it is not straightforward that certain teaching methods will lead to an easily measurable and homogeneous change in students' abilities (Bennett & Brady, 2012; Furedi, 2012; Hussey & Smith, 2003; Maher, 2004; Scott, 2011; Strathern, 2000). The pre-specification of learning outcomes, some argue, if used rigidly, can stifle creativity and promote a focus on instrumental reasoning (Biggs, 1999; Eccleston, 1999; Maher, 2004).

Also, other aspects matter in teaching and learning, which make it difficult to guarantee that specific teaching and learning activities result in specified outcomes. Some aspects or approaches that some scholars and teachers take into account in trying to support a good learning experience, but are not explicit in the LD system are: writing in the disciplines (Wennerstrom, 2003), motivation(s) (Haggis, 2004;

Hussey & Smith, 2003; Mattern, 2005), difference and differentiation[41] (Haggis, 2004; Tomlinson, 2001), class management (Meyers et al., 2006), communication skills, etc. In the next section of the analysis I will discuss how different informants also refered to aspects they reflect on when planning their teaching, that are not captured in the LD. Furthermore, some researchers have criticised that theories of learning tend to focus on cognitive aspects, while the learner's socioeconomic and cultural context tends to be dismissed (Case, 2007; Haggis, 2003; Malcolm & Zukas, 2001; Mora & Escardíbul, 2007; Webb, 1997b). What these researchers suggest is a shift towards a view of learners and HE as socially and historically located. The point these researchers make is not that those theories are not valid, but as Case (2007, p.330) puts it, that "a wide range of aspects of student life all have a crucial bearing on the quality of learning that they are able to experience."

All this discussion takes even more relevance when we consider another development of the LDSE project: the Pedagogical Pattern Collector (PPC). As I have mentioned, the LDSE is based on the idea of collaborative learning. However, most of the efforts of the project went into embedding pedagogical knowledge in the system and research a suitable representation and formalization to capture learning designs. Therefore, collaboration is designed as sharing explicit formalized knowledge, with the view that teachers can upload their learning designs, and that these can be browsed and even reused or adapted by others. A space for peers to discuss the rationale behind their learning design, receive comments, or share ideas in less structured ways was not developed. Nor was fully addressed during the time frame of the project how teachers would filter, from a shared repository of learning designs, relevant[42] and quality resources or designs that they could adapt to their context. This is something that future research in the area might need to tackle, considering the complexities and consequences of

[41] As Malcolm and Zukas (2001) point out, in contrast to adult education literature, much of the focus in HE on the individual learner and personalisation tends to frame the learner as an anonymous, decontextualized, degendered being. This notion of differentiation is more common in further/adult education.

[42] In terms of relevance, the LD was designed as a "personalisation engine" that could provide personalised support. In this sense the intelligent system could help the teachers search for relevant resources. However, the LD prototype has not yet been tested as a collaborative tool; in addition, aspects like quality, authorship, etc. were not considered.

organizing, ordering, valuing, retrieving, and reusing information in social media and peer production platforms (Introna & Nissenbaum, 2000; Scott & Orlikowski, 2012). To analyse some aspects of collaboration and reuse, a web-based tool, the Pedagogical Pattern Collector (PPC), was developed, so that the user could "browse, adopt, adapt and generalise their learning designs" [End of award report, p. 4]. A pedagogical pattern is defined as a "teaching-learning activity sequence that is designed to lead to a specific learning outcome" (Laurillard & Ljubojevic, 2010, p.89). This tool is based on the idea of "identifying **patterns in effective practice**" [Case for support, p. 6], by designing a "computational model for **evaluating** pedagogy in learning design". That is, the idea is that by collecting enough learning designs in this theoretically informed system, and then generalizing them, patterns of effective practice can be found. This perspective concurs with Malcolm and Zukas' (2001), Webb's (1997a), and Haggis' (2004, p.337) appraisal of dominant approaches to learning in HE research as predominantly positivist in orientation and foregrounding "the importance of empirically generated evidence aimed at facilitating prediction." It is especially this effort of trying to find general, acontextual patterns of effective practice with the PPC that can be questioned by considering the complexity of assessing if and how a learning outcome is achieved[43] and by whom, by taking into account the multiple and complex dimensions of education, and by situating teaching practice and education in its historical, social and institutional context.

An informant of the project, explained that the learning design approach "has echoes for me of going back to kind of instructional design, I mean it has echoes of that. It sounds to me like one is trying to set up a sequence of activities to bring about particular learning goals. And I think that's not always what one's doing in education. I mean, I think a lot in… particularly in education about education, I think a fair chunk of what people are doing is about values and changing people's values." [D1-6 Digest] The learning patterns approach has even more resemblances

[43] As Hussey and Smith (2008, p.111) point out "all of these learning outcomes can be achieved to different degrees and depths and, as before, the limits of what is to be learnt—what is to be included and what excluded—is always somewhat arbitrary." If we also consider the difficulty of ensuring that a specific activity will result in specific outcomes, trying to find a causal relation between a series of activities and outcomes seems far-fetched.

to the instructional design perspective in trying to find the sequences of activities that bring about particular learning outcomes.

To sum up, in this section I have analysed the underpinnings of the LDSE in terms of how it aims to achieve innovation in teaching practices. I have shown that the lack of uptake of TEL in HE is framed, from a rational choice perspective, in terms of "academics need to learn", but learn from each other; that is, the LDSE proposes an alternative to managerial and governmental top-down strategies. I have analysed the specific pedagogical logic embedded in the LD, and how collaboration is conceived from a cognitive perspective, in individualistic interactional terms, based on formalizing and sharing learning designs. Therefore, the adoption of the CoP approach seems to respond to the institutionalisation of a buzzword stripped of its practice-based theoretical underpinnings. Finally, I have critically assessed the PPC as epitomising a positivist evidence-based approach to learning in HE research that tries to categorise, predict and improve teaching practice, by discovering some general laws (or patterns in this case). I have suggested the need to situate teaching practice and learning, and also the adoption of TEL, in its historical, social and institutional context. This last issue will be further discussed in section 6.4.

6.3 Orders and their others

Sub-Q 2. How does the LDSE frame the problem of education and how is this framing constituted?

In the literature review chapter I have mentioned that much of the debate regarding the use of technology to share knowledge, for instance in the area of knowledge management, takes for granted the role of technology as a tool to support the transmission of knowledge. Criticisms of this view tend to be framed around the dichotomy between explicit and tacit knowledge, and suggest that tacit knowledge cannot be formalised (Collins, 2010; Dreyfus et al., 1986; Dreyfus, 1992). However, both perspectives, that of advocates and critics, share a representationalist view of knowledge, which presumes that technology is an external tool able (or not able) to map reality, able (or not able) to support a community of practice, supposedly pre-existing.

Conversely, performative approaches challenge the assumption that objects and subjects of knowledge are independent from that knowledge, and are interested in studying how realities are being made, and what orders are sustained through knowledge and technology construction. Following this perspective, and drawing on the conceptual framework presented in Chapter 3, my analysis tries to show the intertwining of the LDSE project with the ongoing becoming of the world. But where does the LDSE begin? In the previous section I tried to show how the LDSE is of the world, and it is entangled with discourses and logics that extend beyond the local setting. I have also started to show how this is related to specific technological solutions in the design of the LD, which frame reality in one way and not another. This is the focus of this section. I will further analyse how the LD, and the discourses that sustain it, frame "the problem of education" and teaching practices in a very specific way, even if the LDSE project members refer to learning design as being "pedagogically neutral".

The Learning Design approach can be seen as an effort to rationalise teaching practice. The vision of LDSE is that "teaching could become more like a science of learning design" [Case for support, p. 1]. This "science of teaching" is configured and framed in specific ways: while pressures on education are acknowledged (mass education, knowledge economy), the problem and solution of education is framed within teaching practice, and also as a problem of communication between research (or theory) and practice. Teaching practice, it is claimed, lacks a common language, which reduces the possibility of comparing and learning from what works or does not work. This commensurability, from the LDSE point of view, can be achieved through the standardization of terminology, the definition of a meta-language and by following a Learning Design approach. In this way, teaching experience can be shared and compared through a process of peer review, general "learning patterns" of effective teaching can be found and, in this way, teaching and, thus, education can be improved. This approach, therefore, also reconfigures the user, that is, the academic, as a "teaching scientist".

This approach has many parallels with decision-support techniques implemented in medical practice,[44] which follow an evidence-based practice approach. Indeed, in the Case for support, we find the following statement: "Our first research focus is to clarify the process of learning design as it is currently practised, and as it would be practised if teachers were using an evidence-based, or research-based approach" (p. 6). While decisions based on evidence-based approaches are frequently presented as neutral, almost apolitical, because of their "factual" and "scientific" bases, as argued by Clegg (2005), what counts as evidence is debatable and political, and who is asking the questions and in what ways needs to be considered.

The Larnaca declaration on Learning Design (Dalziel, 2012),[45] which puts together ideas arising from a meeting of Learning Design experts, describes "how the new field of Learning Design contributes to the central challenge of improving teaching and learning" (p. 1). In this document they dedicate a section specifically to a defence of the idea of "pedagogical neutrality", or more accurately, they argue, an aspiration towards pedagogical neutrality, in the sense that learning design is a meta-model (p. 13), which they compare to notational music: a language to describe, not to judge learning experiences: "There is no "should" in Learning Design as a descriptive framework—merely a description of what activities happened in the classroom or online" (p. 13). The point I want to make explicitly is that a description is never merely a description.[46] Any category has its exclusions (Bowker & Star, 1999), any order has their others (Berg & Timmermans, 2000), and performative approaches try to shed light on this, and the effects this has on the construction or reproduction of some realities and not others.

[44] It is fascinating to see the similarities between the LDSE approach and some of those described by Berg (1997) in his analysis of decision-support tools in medical practice.

[45] Two of the LDSE project members, Diana Laurillard and Liz Masterman, appear in the acknowledgements as having contributed to the discussion in other meetings.

[46] They add: "we prefer phrasing such as "Learning Design frameworks can describe a broad range of teaching and learning activities" so as to avoid unnecessary consternation among colleagues who experience visceral reactions to "pedagogical neutrality"" (p. 13-14). In what follows I will try to explain where some of the "consternation" might come from.

The Larnaca declaration, like the LDSE project, frames "the problem of education" in the context of the "**knowledge economy** and the **need** for different kinds of graduates", with institutions facing many changes, with the expectation that educators will adopt **innovative** teaching approaches, and "the **impact of technology**—especially the internet via open sharing of educational resources and massive open online courses (MOOCs)." (Dalziel, 2012, p.1). In this context, "**effective** teaching and learning in the classroom (and beyond) remains central" (p. 1). As we can see there is a shared discourse in Learning Design approaches, that frames education in the context of a knowledge economy and its demands, which include the "need to use new technologies". I have previously discussed how, as a result, the LD has inscribed in the software support to encourage teachers to use TEL, and a specific concept of productivity attached to it, with a restricted view of the costs involved in the move towards TEL. I have also shown how the "learning experience" is evaluated in a particular way, considering some aspects but not others.

In this regard, it is worth questioning what is taken for granted in these approaches, the commonplaces in the Aristotelian sense; that is, the notions or theses *with* which one argues but *over* which there is no argument (Bourdieu & Wacquant, 2001): innovation, knowledge economy, and the need to use and promote TEL. Regarding the discourse of the knowledge economy, as mentioned in the case study narrative, functional and utilitarian conceptions of education have become increasingly dominant since the 1980s, and justified with a neoliberal discourse of the knowledge economy (Clegg et al., 2003; Clegg, 2009; Garnham, 2000), which is presented as inevitable, following the imperatives of the market (Bourdieu & Wacquant, 2001). In addition, in the LD discourse, the term innovation in teaching is used without much justification on why innovation is needed, or clarification of what is meant by innovation, beyond the perceived need to adopt TEL, which is associated with notions of efficiency and productivity. Following Sen's (1987; 2002) insights, efficiency, effectiveness, productivity or (technological) impacts, so much present in neoliberal discourses, do not tell us anything about the broader view of what is good. We need to question efficiency for what? Productivity for what? Impact for what?

The Learning Design approach—like much of the literature on teaching and learning in HE—draws on psychologically informed versions of the process of learning that try to establish or describe *how* we learn. It is grounded on an instrumental and procedural rationality, which focuses on the processes and techniques of formal learning at the micro level; that is, at the level of teacher-student interaction in the classroom (or online), and without questioning the aims of learning, the *what* we learn, and indeed the *who* and *why*. In this regard, one of the tenets of the Learning Design perspective is that disciplinary differences, the content and the values of education, are not relevant for the purposes of defining a pedagogical meta-language; they are, therefore, sidelined. This is also the case of the PPC, which offers generic representation of pedagogical patterns, with the idea that then, the teacher just needs to substitute the generic version with content-specific words. However, many informants [D4-5 workshop] found that such generic patterns did not make much sense without considering the disciplinary context or the content that they wanted to teach.[47]

I do not try here to convey that researching the psychological processes of how we learn, and the techniques that can help students' learning is not relevant; what I want to stress is that this is just one way of framing the much more complex phenomenon of education. The problem with notions like "general patterns" and "neutrality" used in the Learning Design literature is that they seem to convey an all-encompassing framework, produced "from nowhere" (Haraway, 1991), casting into the shadows other important questions that are not tackled and which might challenge some of the means-to-ends approach proposed. As I will discuss further in the next chapter, several scholars have been critical of the dominant discourse of learning in our society, which leaves indeterminate the content and aims of what

[47] An informant said: "I was trying to make it specific [to languages]. It's really hard when you try to make it generic. (...) The act of generalizing can compromise the creativity and part of the learning objective by 'dumbing down' the activity in order to make it accessible to anyone." And another informant: "When teaching to students you can't work from a generic pattern because you can't just drop in the appropriate words for that particular topic because a whole point of doing the material is the way you engage with the students. (...) If I choose another topic outside of physics, then the whole thing [learning pattern] falls apart." These informants also discussed that despite some transferable skills, different disciplines are taught in different ways, which mitigates against the possibility of sharing and re-use of learning designs.

is learned and nevertheless is unproblematically assumed to be a good thing (Contu et al., 2003; Fenwick, 1998).

If, following Latour's (2004; 2005) suggestion, instead of focusing on matters of fact (what is true or false, or in this context what is effective), we shift our gaze towards matters of concern (what we care about, what we value as good/bad), we realize that "good (or bad), knowledges, and realities, all are being enacted together" (Law, 2009, p.154). The aim of this section has been to show how the LDSE frames the "problem of education" and in so doing defines what matters in specific ways. This mattering—as I am arguing in this analysis chapter—results from assembling education researchers, TLRP, education institutions, policy discourses and mandates, the LD, the PPC, etc. Reality, and the assemblages that constitute it, are in constant construction, and we cannot be certain if and how an actor-network will temporarily stabilize, and which interests or concerns will finally dominate in the constant processes of negotiations and translations among different actors. In this regard, talking about the performative effect of the actor-network of which LD is part does not imply that the LD will be implemented and used as wished by the LDSE team. It will depend on the actors that become enrolled in the actor-network over time.

6.4 The institutional context of expected use

Sub-Q 3. How is the LD "received" by academics and why?

In the previous sections I have analysed how different discourses, institutional logics, technologies, researchers, and other actors were associated in the construction of the LD. I have also discussed how through different technologies (discourses, LD) and associations the LDSE project helps to sustain a specific order; it performs a specific reality by defining specific divisions in the world, and by inscribing in the LD certain values, and scripts of behaviours. In a sense, what I would like to analyse in this section is how the LD travels outside the laboratory. However, it has not properly done so, as it is still a "proof-of-concept prototype" [End of award report, p. 5], and therefore it remains to be seen if a fully operational LD and PPC would enrol sufficient actors to become a working technology-in-

practice.[48] Thus, my aim is not to make any predictions in terms of possible adoption and use; what I will analyse is how the LD interacts with other practices and institutional logics in the expected context of use; how the technology intersects with and makes visible current changes and tensions in institutional logics in higher education, which affect the role of academics. It will also allow us to understand the reactions of some of the academics that the LD would like to enrol, and some of the challenges in trying to achieve innovation and change by design.

As discussed in the literature review, in contrast to natural sciences, which tend to assume a detached attitude towards the phenomena they study, what Simon (1996) labelled the "sciences of the artificial" explicitly aim to transform the phenomena they study, to construct, shape, design (cities, organizations, societies, etc.); they are concerned with the contingent, not with how things are but "with how things ought to be in order to attain goals and to function" (Simon, 1996, p.4). This is so in the case of the LDSE, which developed the LD and the PPC with the aim of achieving innovation in teaching practices. While sciences of the artificial have a tendency to adopt a technical rationality in their aim to achieve change by design (Cross, 2001; Margolin, 2002; Suchman, 1987), much literature in the social studies of IS and ANT has revealed that it is not possible to guarantee a deterministic outcome from a technology.[49] Technologies might be adopted or not, they might be used in different ways from what one expects, and they might cause unintended consequences. Performative approaches (as discussed in the conceptual framework) suggest a relational ontology that acknowledges that whatever the entities involved in a practice are able to do inevitably depends on adjacent entities they may do something with. Thus, such ontology sensitizes us, on the one hand, to the fact that technologies do matter, that they are not just carriers of information or knowledge but are part of the phenomena or the practices we study; but on the

[48] I'm using Orlikowski's (2000) notion of technology-in-practice to highlight that technology is redefined in the context of use.

[49] Since *MISQ* published the Hevner et al. (2004) article 'Design Science in Information Systems Research', there has been a resurgence of design research in IS. This research tends to focus on technical aspects only, despite the tradition of system theory and sociotechnical theories in IS, which have emphasised the entanglement of the technology with the social.

other, that what technologies afford does not result from any essential or material properties of technologies by themselves. Following the theoretical underpinnings presented in the conceptual framework, I suggest the need to account for the network of institutions in which actors and technologies are embedded. In such an approach, learners (in this case, academics) are seen not as guided mainly by rational choice, nor as completely autonomous, but as social actors situated in a network of institutional forces.

6.4.1 Teaching practices in context

As mentioned in the case narrative (chapter 5), in the transformation in the 1980s from an elite to a mass higher education system, academic activity has been exposed to substantial changes and challenges. A drastic increase in student numbers, the modularization and benchmarking of education, the major rise in students' fees, the marketization of education with the adoption of students as consumers or customers, the introduction of new technologies for learning, the 'teaching quality assessment', with students' surveys and course validation mechanisms, and new contractual conditions, with some "new" universities asking staff to have 500 hours "contact time" a year (Fanghanel & Trowler, 2008) has indeed impacted teaching activity (Kyvik, 2013; Parker, 2002). In this regard, a tool aimed at supporting academics in their teaching practice could be expected to be well received. However, informants expressed a wide range of views towards the LD and the PPC.

Several participants expressed in evaluation workshops that the LD and the PPC had helped them reflect about their teaching, and they saw value in using it. For instance, they found the pie chart of the module and session analysis helpful, as it made them reflect about their learning designs and teaching practice:

"I think the representation at the end, the feedback, this bit was very, very helpful [i.e. pie charts]" [D4-3 V2 Evaluation]; or "The pie chart is great! It helps you seeing how long your students will be discussing, etc." [D4-9 PPC R-workshop]; or " I rarely consider how the students' time is apportioned … it's good to be made to think about this" [D4-9 PPC R-workshop].

An informant also suggested that the list of TLAs could inspire innovation in teaching: “I like the idea of being able to see the different activities because I think it’s easy to revert to tried and tested ways of doing things” [D4-3 V2 Evaluation]

An interesting finding is that a frequent reaction when informants were asked if they would use the LD was *this might be useful for new teachers—not me*. Even young academics studying for the PGCertHE made comments like this (e.g. [D4-6 L Evaluation]). “Um…I mean from the perspective of designing the software, I would think that for, you almost, for new teachers having recommendations and, and new ideas and building up a repertoire of tasks is, is very helpful. Um…er, for more experienced teachers, you know, it’s probably still helpful, but I’m, I’m not sure if they’d want to use it as much.” [D4.2 SCO Spring], or “I don’t normally go down to this detailed level (...). I think this is very useful for new staff,” [D4-3 V2 Evaluation]. Another answer given was *I don’t have the time*: “The only problem I would see [in using the PPC tool] would be one of time” [D4-5 PPC-workshop]; or “So my answer really is: maybe I would use LD, given that I had time, some extra time” [D4-6 L-evaluation]; or “I think it is a little bit of a luxury for many colleagues, [...] because they have a lot of teaching” [D4-3 V2 Evaluation]; or “One could say that a system like this adds to your workload.” [D4-5 PPC-workshop].

In addition, some said that they would consider using the LD for designing new courses but not for those that they were already teaching—as that would take too much time and they did not see added value ([Interv1-B], [D4-3 V2 Evaluation])—, or those that had already been taught by somebody else and therefore some material, course description, etc., was already available [TransIP3]. Some even said that they could use it as an organising tool—not so much as a designing, and learning tool—to keep the information from one year to the other ([D4-6 L-evaluation], [TransIP3]) or to share information among colleagues teaching the same course and coordinate their work ([D4-4 R-evaluation], [D4-7 Module-Level]).

Finally, several informants did not find much value in the system for their teaching practice. They expressed that they did not find the LD (particularly) helpful in terms of adding extra value to their thinking about their teaching because they

reflect about teaching in different ways, and/or because they don't do such detailed learning designs, as they are sufficiently experienced. Some did not find any value at all and disagreed with the inferences of the LD.[50]

At the end one of the evaluation workshops 14 participants answered a survey, in which 76% said "I can see benefits to planning my teaching using LD", but only 43% replied positively to the statement "From working with the LD, I have learned new ideas and had insights that could change my teaching practice" [D4-4 R-Evaluation]. Admittedly, the time they had to understand and appreciate the systems was limited, but it is interesting to consider why even among those that found the LD useful, several did not think that this would lead to a change in their practices.

The different expressions of *this system is not for me* or *it adds to my workload* reflect that any new rationalisation or use of a new technology brings some costs and, as literature has pointed out, users need to have some motivation or incentive (positive or coercive) to use such systems and engage in collaboration (Brown & Duguid, 2001; Grudin, 1994; Wasko & Faraj, 2005). In a sense, paradoxically, tools that intend to simplify or rationalize practice add a further logic and thus an extra layer of complexity (Berg, 1997; Law & Mol, 2002). This is not an argument against such tools, because we do use all sorts of technologies in our everyday lives and working practices, which allow us to extend in one way or another our agency; the point, as Berg (1997) and Mol (2002) argue, is that we cannot fantasize complexity away. For instance, as informants have pointed out, they feel that using the LD or the PPC might be useful (or not) but for many it is seen as adding extra work, or they say that they are used to planning their teaching in different ways than those supported by the system. Also, as I will discuss in the next subsection, it might bring unintended (or added) consequences beyond the aim of encouraging learning and "innovation" in teaching. In addition, this *I don't have the time* response needs to be understood in a context where research continues to be what brings most of the status and rewards at an institutional and professional level in

[50] E.g. can be found in several interviews and evaluation workshops: [Inter2], [Inter4], [Inter5], [TransIP1], [TransIP3], several informants in [D4-8 G-evaluation].

academia, but also in a context of intensification of academic work[51] (Houston et al., 2006), with persistent pressures to do more with less resources (Welch, 2005), with associated increase in stress levels (Kinman & Jones, 2004), and invisibility of much academic labour, which is inadequately accounted for by managerialist approaches in place (Fanghanel & Trowler, 2008). One of my informants, when asked if she discusses issues regarding teaching with colleagues, replied: "Life here is so hectic, that we don't have the time [to discuss aspects of teaching]. To be honest, I would love to do it. But I don't have the time, because I'm teaching too much." [Inter2]

In this regard, while most initiatives directed at enhancing and inducing change in teaching practices are based on theories of teaching and learning that focus on acontextual teacher-student interactions, or on conceptions of universities as "learning organisations" that tend to assume a fairly straightforward relationship between strategies of change and its diffusion based on rationalist approaches of action,[52] it is important, as some researchers have recently emphasised, to consider teaching and learning practice in its sociocultural context to better understand the challenges in trying to achieve change by design (Fanghanel & Trowler, 2008; Trowler et al., 2005).

While the LDSE approach is based on the idea of achieving change in teaching practices through collaboration and learning, in fact academics do not design their teaching simply by following individual, rational action. In terms of the level of freedom that academics have to design for learning and teaching, several

[51] In a recent study, drawing on surveys since 1945, Tight (2010) suggests that despite the perception that contemporary academic workloads are increasing, the total number of working hours has not increased. His interpretation is that: "it is not that workloads as such are increasing, (...) It is, rather, that the balance of the average academic's workload has changed in an undesirable way. This then puts pressure on personal research, the aspect of the job that most academics appear to like most, and also makes it more difficult to pay as much attention to **teaching** as most academics would like to do." (pp. 214–215). Other researchers, however, as I have mentioned, talk about intensification of work and increased stress levels.

[52] As Trowler et al. (2005, p.434) point out, "some understandings of the 'learning organization' simply see it as a well-managed collection of reflective practitioners (Pedler et al., 1990; Edmondson & Moingeon, 1998), or one in which individuals' mental models are improved (e.g. Senge, 1990; Argyris, 1993). So, despite an apparently macro perspective, such notions of the 'learning organization' involve theories of change (in this case teaching and learning enhancement) at the micro level."

informants referred to how their teaching practice is to an important extent defined by their institution and by the course convenors, and they even reflected on how the expectations of how to teach differed in different HE institutions and in different countries.[53] For instance, [Inter2] explained: "If it was at my hand to design the course I would have put some mid-term exams. (...) I don't have much freedom [to teach what/how I want]. I have to cover certain material. In class, I have to discuss a certain number of questions."

Some informants from a Russell Group university referred to the established division between lectures and seminars, and it is possible to assert that the number of students assigned per course, the sort of examination procedures, etc. are also to a large extent institutionally established: "When you're dealing with a huge number [of students] you realise the best way is to actually give a lecture. You know perhaps, as much as I do, that the lectures are not just the best..." [D1-6 Digest].

In addition, new courses need to be devised according to quality frameworks and module development procedures to be approved by validation processes. One informant referred to it: "within the constraints of the validation process [we can] still be innovative and creative" [D1-6 Digest] Also, another informant [TransIP3] referred to the fact that if a person takes over a course, so many things are already set up (Moodle, guidelines on week to week, reading list, etc.) and this is done "at a course proposal stage, when it goes through the committees. Um, and a rationale for that must be made that is in line with school regulations and also just practicable and sensible and conventional"; so the LD would not be useful unless a new course needed to be designed from scratch.

All this shapes teaching practices in complex ways, which escape academics' control at least in a straightforward way. An informant explained how she tries to overcome some of such constraints: "… well if I actually have to lecture because sometimes resources… say you must do a lecture, what I'll do is I'll divide all the students into groups and the students will lecture, they'll prepare the lecture" [D4.2 SCO Spring].

[53] Examples can be found in several interviews: [TransIP3], [Inter2], [Inter4], [Inter5].

Other informants felt with a certain level of frustration that such limitations affect negatively the quality of students' learning, beyond their control, e.g.: "And you realise that the time set, for example, in terms of... for a lecture would be about 30-40 minutes, is not enough for you to deliver the package that you need to deliver for teaching and at the same time have a question-and-answer session […] … you know, for all the students, 200 of them really have questions […] And […] you realise that it's possible within that big community [for] some of them to switch off and you'll not know that they have switched off. " [D1-6 Digest].

An informant also referred to the fact that an "average teacher", who is not the course convenor does not or cannot adopt a huge variety of teaching methods and TEL, unless paid to do so: "Few enough people have a whole lots of things that they do. […] the resource-based learning, lab practical, field work…collaborative project, collaborative project online, adaptive digital resource, online discussion group, resource, I mean…how many of that does your average teacher, whose not the course convenor, squeeze into their life? Er…really very little…um…unless they're paid to, to, to work on the [VLE] or, um, you know, it's their turn." [TransIP3]. This raises the question about the implication of contractual conditions and power relations in teaching practices. Indeed, this informant explicitly referred to the various political decisions, and negotiations among several people, but also regulations and guidelines implicated in course design: "and just working with lots of people when they're redesigning their courses, um…there are so many, er, political decisions that, that are important. For instance lots and lots of courses here have three or four people who do the lectures, (...) so the availability, going forward, of an expert, for one chunk of the course actually has, has quite a big say on how that course goes forward and, or at least is, is done from year to year. Um, and I think…once you get to that level of course planning, you know, being a convenor, um, it isn't an individual process that you're planning. You're planning, er, based on a number of people. The school regulations, the, the department guidelines, and, and realities, the preferences, politics, um…yeah" [TransIP3]

Also another informant referred to the complex interplay of agendas and code of practices in a given institutional and socioeconomic context, which need to be negotiated: "…we've got these different sort of dimensions and it's to do with, it's

very much to do with employability ‘cause that’s a really big thing for us. So, you know, the things that employers are saying in terms of, or the OECD are saying about the communication, using tools interactively, um those sorts of things, we’re just trying to make sense of that and then build those in as outcome statements. So things like, you know, we’ve chosen dimensions like cross-cultural for example […] what we’re actually trying to do, is turn out students who are very effective in a cross, in cross-cultural situations. […] some of this stuff, I suppose you would need to think ‘Well if I’m, if I’ve got to build those, those outline statements somehow into my teaching’. […] plus the professional body statements, sort of where do I, where do those things come in to play as well? So there’s, kind of, an institutional context, there’s a professional body context, there’s a, there’s a code of practice, the QA [Quality Assurance] code of practice saying, ‘These are the things that you’ve got to put in’ and it’s trying to put in all those things in order to, to simplify all that, that whole, sort of complexity of things.” [D1-6 Digest].

Furthermore, the collaborative dimension of the LD needs to be considered within the socioeconomic context of expected use. I mentioned in 6.2.2 how a certain economic logic was embedded in the system, more specifically with the notion or sub-logic of “productivity”. However, another sub-logic in the economic logic might hinder the ideal of collaboration among institutions, which is the increased competition among HE institutions as a result of the marketisation of education. An informant from a post-1992 university explained that while inter-institutional collaboration has been part of academic life, we are now in “a different business model”, with private providers and increased competition, and so she expected that her institution would not allow her to share her teaching resources or designs with other institutions: “it’d be nice to share content, I’d love to do that but it won’t be allowed (...) Universities have always collaborated on things with shared content projects with JISC and all those things, which are very good but universities might want to increase their income so maybe the tool [LD] could be seen as something that if you develop a reasonably good structure that can be adapted in other universities you can get some money from it. (...) We may find a different landscape in the UK. And of course you see you’ve got in the UK, you have all the private universities that are going to be cropping up here and everywhere; we are

definitely in a different business model than the typical 140-year old institutes of HE, so we have to be mindful of sharing information with them. You know? Who are we sharing it with? Are we willing to share it with private providers? I suspect not." [Interv1-B]

6.4.2 Professional, managerial and pedagogical logics

I have mentioned that while some informants felt that LD made them reflect about their teaching, others did not find it especially useful for a range of reasons. Some disagreed with the assumptions of the software, such as the learning experience that the LD associated with each TLA and overall session (e.g. [TransIP1], [Inter4]) and therefore with the feedback that the LD gave. Some found it problematic that the LD established specific learning experiences for each TLA, because things do not always go to plan [D1-6 Digest], and also because the same sort of TLA, depending on how it is delivered or on the group of students, might result in different learning experiences. For instance [Inter4] argued that the same session, aimed at encouraging discussion, might result in more or less participation of the students, and thus different learning experiences, especially in terms of discussion and acquisition (recall that the pie chart of the learning experience offers a quantification of the amount of discussion, acquisition, etc. for each session). Similarly, [TransIP1] found it problematic to define the specific learning experience of a TLA, because each category is actualized differently in practice[54]:

> "it's [the pie chart] taking an automatic reading... a lecture is something or other, and, I think, you know, that depends on, on the lecture and, and the classification ought to depend more upon what the tutor's doing than it ought to be on, kind of, a definition of what a lecture is."

Furthermore, several informants explicitly stated that they did not understand the implications and meaning of the feedback provided by the system or the terminology used in the LD. This was the case even though the system has a wiki

[54] As we explained to informants in workshops, when they had similar concerns, the LD allows the user to change the values. However, this brings complexity to the question: 1) would the aimed commensurability proposed by LDSE, especially with the PPC, be possible if users are all adapting the "meaning" of categories? Are the users knowledgeable enough to do this, and if so, do they need a system to support them? This is a question that for instance [Inter4] raised.

with advice and guidance, where users could expand this information. In this regard, in one of the evaluation workshops [D4-4 R-evaluation], participants had to map learning activities phrased in natural language to the LD TLA types, and there were major discrepancies, showing that the terminology of the system was not clear or that there were many varied interpretations. Also in another evaluation workshop [D4-3 V2 Evaluation] some participants misinterpreted certain aspects of the LD analysis page. And several informants said that unless you had knowledge of theories of learning the LD would not be accessible, because of the specialised terminology (e.g. [D4-6 L Evaluation]). In addition, some informants felt uncomfortable with the fact that the system made inferences that were not transparent: “I’m sceptical at the moment, I have to say, I don’t find them useful... but, hmm, yeah, I don’t. I think what comes across to me is a nature of something hidden, which I don’t feel quite in control of” [D4-3 V2 Evaluation].

Beyond the validity or invalidity of the assumptions and inferences of the LD, some informants found that the sort of advice given by the LD did not add to what they already knew. For example an informant was not critical about the LD, but considered that she already knew what the system was trying to make her aware of, so she did not need it: “The pie chart is not really useful, because I already know acquisition is not the best way of learning.” But she thought it could be useful for “those teachers who like to talk a lot”. She added, however, that she would find it really useful if the LD “could help me finding resources that could help me on a specific thing, providing ideas about how to help student do their essay planning... I want ideas for content.” [Inter1]

Others did not find the LD particularly helpful because they reflect on other aspects not considered by the LD when preparing their teaching (e.g. [TransIP3], [Inter5]). An informant, for instance, explained to me how she thought about how to group students in a seminar, to make the most of the discussion (the LD only has the level of detail “group discussion”, so such aspects are not accounted for): “So the idea is that each pair would then work in these small groups, they got a **safe space** to think about the issues **without being intimidated** or scared in front of the big group of everyone, so they’d feel more **free to think** about what they wanted”, then, she explains, each pair presented their arguments in front of the class while the others

debated with them, and "that sort of **organically** led to sort of a general class discussion" [L-PGCertHE-Notes]. Another informant explained that he plans his teaching thinking about **attention spans**, to keep students **motivated**, because they come **tired** [TransIP3]. Another mentioned that one of the most important things when teaching is trying to develop **empathy** with students, so that you can offer them what they need [Inter4]. For further details, see the user scenario in the appendix)[55].

Others considered that the LD did not help because they do not think in terms of theories of learning. For instance, a mathematics class teacher in UnivL (Russell Group), explained to me:

> "I don't usually write down what my learning outcomes are; the intellectual outcomes is that or the other, I have all my exercises, etc., and that's all. (...) But, all this... learning outcomes, this sort of skills, that sort of skills,... just give me a break, please! [laughs] (...) No, **I'm not thinking in these terms**. (...) If I'm thinking about that, it's like thinking how am I going to walk? So... I do make an effort to use the inductive method in mathematics, and not the deductive. But... that's the only thing I try to do consciously; other than that, no, I don't think about learning theories. (...) If **I have to justify** it [my teaching], I know how to do it [using theories of learning]." [Inter2]

This informant refers to the fact that she does not need to make explicit the theoretical underpinnings of her teaching to deliver good teaching, and she uses the metaphor of walking to convey this: we do not need to know or formulate the rules of walking to be able to do so. Some research has suggested that experts—in

[55] As part of the process of eliciting user requirements, team members of the LDSE wrote several user scenarios drawing on real-life situations from users they had interviewed and issues arising from the literature [D1-4 User Scenarios]. I wrote one of the user scenarios drawing on my own teaching experience of having taught several disciplines (language, literature, literacy, information systems) in several institutions (further education, higher education, open university), which gives me a sense of different ways of thinking about teaching and learning, and practicing it in different contexts and disciplines. In this user scenario, I focus on language teaching in further education. I am attaching in the appendix a revised version of it, as the LD changed over time, and some concerns were not valid anymore. I show how the LD does not offer support for many of my concerns when planning my teaching.

contrast to novices—perform their practices without having to make explicit (or think explicitly about) their actions (Dreyfus et al., 1986), so we could explain this informant's explanation by saying that because she is an expert she does not need to spell out the theories behind her teaching. However, this cognitive perspective overlooks that what comes to be regarded as expertise is not given but socially negotiated; and this is an important aspect to consider in this context. The Communities of Practice (Lave & Wenger, 1991) approach to learning points out that what comes to be perceived as knowledge in a community is socially constructed and a contested matter; and also that the knowledge that remains implicit or that is made explicit depends on the community of practice. In this regard, the difference we see between the way "knowledge about teaching" is perceived by some practitioners (academics), and education researchers could be understood in terms of belonging to different communities of practice: what is considered legitimate (or relevant) knowledge in one community does not correspond to the other. In this sense, we could say that there might be a tension between the idea of the LD of "fostering a community of practice" and the pedagogical knowledge and vocabulary embedded, which seems to make explicit knowledge that many academics are not used to making explicit to guide their teaching practice.[56]

But there is an extra layer of analysis that we can add by considering the broader sociomaterial context from an institutional logics perspective. Let us consider this comment of a staff developer in UnivL (Russell Group), which points at the aforementioned lack of legitimacy or acceptance in UnivL of the vocabulary or explicit knowledge embedded in the LD:

> "I can't believe that anybody would actually do this [he is playing around with the LD], but, I suppose the idea is, might be that people would then go back and check that their outcomes are aligned with their activities and so on. So you'd want it to be there. But, um…I think, I think it would take a **QAA inspector** standing over your shoulder to cause people to do that

[56] Foucault had made this point already: "authoritative knowledge, or truth, is not a fundamental or scientific statement about the way things are. Rather, it is knowledge that has been legitimated and accepted as true by a particular community." (Avgerou & McGrath, 2007, p.298)

> [laughs]. Um…I mean just, I'm sure that there are, er…You know, from experience of different institutions **learning outcomes do and don't get used**... more and less. UnivL is, is a late adopter shall we say and, er…it's language that would make some people just outright **hostile**. Um, and even people who can see the point, you know, can see the point but, you know, are **busy**…" [TransIP3]

Not only do academics in UnivL not think in terms of learning outcomes, etc., says [TransIP3]; they also have a hostile attitude towards this language[57] and there is reference to the QAA (Quality Assurance Agency) inspector. Also [Inter2] referred to the idea that she only uses theories of learning if she **has to justify** her teaching. Of course all these are references to the auditing and validation systems in place in HE, which introduced this vocabulary of "learning outcomes" (Hussey & Smith, 2003; Scott, 2011). As I will further discuss, the LD and reactions of this kind make explicit a tension between the professional logic of academics and a managerial logics with its auditing systems; and the complex interaction of these logics with a pedagogical logic.

New institutionalists regard professions as institutions and also researchers from an institutional logics perspective refer to professional logic. In the literature review I have briefly outlined that the source of legitimacy of traditional professions was their expertise, and that this gave them autonomy, and control over their jurisdiction. Professionals were accountable to their peers, through internal mechanisms of accountability such as code of practice, professional associations, and the community of practice. I have also mentioned the important transformation of professions in the context of the knowledge economy. In the case narrative chapter I have outlined how these changes have also affected the academic profession.

Traditionally, academics hold most of the power and control in universities, and they used to enjoy an important level of autonomy and self-governance. However, the professional autonomy and accountability of academics has been reconfigured

[57] This "hostile" attitude was somehow present in [Inter4]—also from UnivL—but also in several participants in a workshop in UnivG (post-1992) [D4-8 G-evaluation].

under pressure from the managerial logic of audit accountability. As Parker (2002) points out, teaching and administration are asked to make explicit their aims and objectives at all levels: from lectures to courses, from departments to whole colleges, they are asked to define what they are trying to achieve, in a way that its results can be measured and assessed; thus, the introduction of the learning outcomes language in HE.

In this context, we could interpret the LD's effort to engage the "community of practice" of academics as an alternative to top-down initiatives, as an attempt to re-negotiate the position of pedagogy in HE, in line, it must be acknowledged, with many staff developers in HE who do not necessarily align themselves with managerial interventions of quality assurance (Clegg, 2009). However, while the LD was built with the idea of fostering a community of practice, it is viewed by several informants with suspicion[58]:

> "My only worry is that it [the LD] turns into an institutional requisite rather than an option. It becomes a measurement tool, rather than a useful organisational tool that allows some critical self-reflection on practice. I know that the goal is the latter, but software, once out there, can become so seductive to gather information for departments, policy makers, etc, and the information that is produced is probably only useful for individual teachers, not education ministers, etc." [D4-5 Evaluation]

> "I worry about how this tool can be used by policymakers and senior department officials who may decide that 'good' teaching necessitates 50% tutor supported learning; 10% student individual—i.e. forcing lecturers to stop being creative and instead of working to a model which is about how you teach." [D4-5 Evaluation]

Other informants, however, saw this possible alignment of the LD with the managerial accountability logic in a pragmatic way. That is, they envisaged that the LD could help them in the process of course validation:

[58] Also three participants in [D4-8 G-evaluation] and another in [D4-5 Evaluation] expressed this concern.

> "and I think that from your tool's perspective—it'd be nice to share content, I'd love to do that but it won't be allowed—but managing this nation wide level you could produce nice templates, that if you are teaching core computer science this is a nice little template that works, that has been validated previously in that institution, it's supported by QAA and it's supported by the HE Academy... That might be helpful as a guide." [Interv1-B]

And several informants of the LDSE project suggested that it would be useful if the LD could produce as an output a document ready for validation. In an interview conducted by LDSE project members, one of the informants said that he perceives the learning outcomes as a bureaucratic imposition (referring to the learning outcomes box of the LD). However, when asked, he said that he would find it useful if the LD could produce a document ready for validation [IOE, 24 January 2011]. Thus, the LDSE decided to include this as a user requirement for future versions of the LD (see [D1-3 User requirements summary]):

> "the LD should be able to produce forms. We need to be able to find out what the common subset of elements in validation forms are, so that the LD can offer this." [LDSE Notes 10 Feb 2011]

To sum up, in this section I have suggested the need to consider teaching and learning practice, as well as the introduction of new technologies to support learning (i.e. the LD), in its sociocultural context to better understand the challenges of initiatives directed at inducing innovation and change in teaching practices. I have shown how taking into account the social and institutional context of the actors (academics) that the LD tries to enrol, helps us understand some of their reactions. We have also seen how the LD is embedded in a network where different institutional logics interact and clash, and how it might help sustain not only a pedagogical logic but also a managerial logic and the associated implementation of accountability measures, in a context where the professional logic of academics has been challenged by it.

6.5 Conclusions

The aim of the introduction has been to offer an overview of the actor-network of which the LD is part and to defend the view that the analysis could gain from adopting the conceptual framework defended in the third chapter. Firstly, following a traditional ANT approach I have offered a brief outline of how the LDSE project was constituted by enrolling different actors, such as TLRP, researchers, the LD, etc., and how it continuously tried to keep enrolling actors to sustain the actor-network even after the 3-year project (HE institutions, academics, Moodle, policy discourse, funding bodies, etc.) had been completed. In accordance with an ANT relational ontology, I have shown how the LDSE is constantly being redefined and constituted through processes of association and translation. Secondly, in line with what I argued in the conceptual framework, I have suggested that adopting insights from new institutional theory could enrich this ANT analysis, as taking into account the sociotechnical context and institutional logics that can help explain the actions of the actors in the actor-network. I have proposed considering the LD and LDSE as relationally resulting from and supporting a complex interplay of institutional logics, in a network of institutions, organizations, humans and non-humans, each of them forming parts of other complex networks.

In section 6.2 I focused on the sociotechnical context of design of the LD. I examined how the sociotechnical context constituted of institutional logics, discourses, and technologies is implicated in the LD design, and I have analysed how certain logics and values are inscribed in the technology in specific ways. I have shown how a technological logic is present in TLRP and the LDSE with a discourse about the need to exploit the use of TEL, and it is inscribed in the LD by prompting prospect users to include TEL activities in their learning designs. I have discussed how this technological logic and a specific economic logic about productivity reinforce each other as TEL is seen as a cost effective solution to the "problems of education". I have analysed how this economic logic is also part of the LDSE and the TLRP discourse and it is inscribed in the LD with the time modeller, which, as I have argued, offers a restricted view of costs. I have also shown that the LD conveys, with the time modeller and learning experience, that productivity cannot be considered independently of the pedagogical benefits. I

have shown that the lack of uptake of TEL in HE is framed, from an acontextual, rational choice perspective, in terms of "academics need to learn", more precisely learn from each other, with the pedagogical support of the LD. I have analysed the specific pedagogical logic embedded in the LD, and how collaboration is conceived from a cognitive perspective, in individualistic interactional terms, based on formalising and sharing learning designs. Finally, I have critically assessed the PPC as epitomising a positivist evidence-based approach to learning in HE research that tries to categorise, predict and improve teaching practice, by discovering some general patterns. Critical of this view, I have suggested the need to situate teaching practice and learning, and also the adoption of TEL, in its historical, social and institutional context.

In section 6.3 I discussed in more detail how the LD, and the discourses that sustain it, frame "the problem of education" and teaching practices in a very specific way. I have argued that the LDSE project as part of a broader actor-network helps to sustain a specific order; it performs a certain reality by defining specific divisions in the world, and by inscribing in the LD certain values, and scripts of behaviours, some of which I have already presented in the previous section. I have critically assessed how the LDSE actor-network helps sustain some commonplaces such as the inevitability of the imperatives of the knowledge economy, the need to adopt TEL, and the association of innovation with technical innovation. I have indicated that the LD and the PPC, following an evidence-based approach, can be seen as an attempt to rationalize teaching practices by developing a meta-language that allows for easier communication and comparability of teaching practices among teachers and researchers. Thus, "the problem of education" is presented within teaching practice, in teacher-student interaction; more specifically it is presented as a matter of discovering more efficient ways of supporting learning. That is, as in much of the literature in HE research, and quality assurance interventions, the phenomena of education is reduced to an instrumental and procedural rationality, which focuses on the processes and techniques of formal learning at the micro level, at the expense of a consideration of socioinstitutional, cultural and political aspects of education and its values and aims.

Finally, in section 6.4 I have analysed how the LD interacts with other practices and institutional logics in the expected context of use. I have shown how the technology intersects with and makes visible current changes and tensions in institutional logics in higher education, which affect the role of academics. Considering the sociotechnical context and logics has allowed me to elucidate the reactions of some of the academics that the LD would like to enrol, and some of the challenges in trying to achieve innovation and change by design. I have revealed that the LD is embedded in a network where different institutional logics interact and clash, and I have argued that it might help to sustain not only a pedagogical logic but also a managerial logic and the associated implementation of accountability measures, in a context where the professional logic of academics has been challenged by it.

In conclusion, with this analysis I have shown how institutional logics, discourses, technology, academics, etc. are all part of an actor-network and how the LDSE and the LD is relationally constituted by and constituting such sociotechnical network. In this regard I have not presented institutional logics and the sociotechnical context as pre-given, structural forces, but as relationally constituted in this network; thus, the performative character of the LDSE. Therefore, the division of this chapter into different sections needs to be seen as an analytical division, which does not imply an ontological separation between the contexts of design and use, and the technology. For this reason I have chosen to present this analysis in one long chapter.

7 Discussion

7.1 Introduction

This thesis draws on a case study of a UK-based research project, the LDSE, while developing and evaluating the Learning Designer. This technology was intended to foster a community of practice among academics who would share good practice in teaching and learning. The aim was to achieve innovation in teaching practices in HE in the UK.

In the literature review chapter I have indicated that some research interested in the study of knowledge sharing and knowledge management takes for granted the role of technology as a tool to support the transmission of knowledge. This is based on a technology-neutral and acontextual view of communication. Other authors, however, have suggested that (some) knowledge is socially embedded and embodied, and they have argued that expertise and practical knowledge have an important tacit dimension and are context-bound. Thus, for this authors, the problem of transmitting knowledge with technology derives from the impossibility to formalise the tacit part of such knowledge (Collins, 2010; Dreyfus et al., 1986; Dreyfus, 1992).

Both perspectives, that of advocates and critics, are based on a representationalist view of knowledge that assumes that technologies can (or cannot) map reality or connect individuals so that they can share knowledge. However, performative approaches suggest instead focusing on how realities are being done, and which orders are sustained through knowledge and technology construction. Following this perspective, I have analysed how the LD, and the discourses and material arrangements that sustain it, frame "the problem of education" and teaching practices in a very specific way, even if they refer to learning design as being "pedagogically neutral".

Literature on learning design, and more generally literature on virtual communities of practice and ICT-mediated collaborative learning, tends to present technology as a tool to connect individuals to facilitate that they learn from each other, and as means to achieve innovation in practices. However, understanding technology as

just a tool to support collaboration and knowledge sharing dismisses the complex participation of technologies and discourses of innovation in the (re)production and change of practices, in the constitution of subjects and objects of knowledge.

Drawing on a theoretical framework that combines insights from ANT and institutional logics, in the analysis I have adopted a performative approach, based on a relational ontology, which assumes that design takes place in the world and it helps constituting the world in specific ways. Thus, I understand 'technologies' as materializations of more or less contested sociotechnical configurations. From this perspective, I developed the following research question, which has guided my analysis:

How is the LD implicated in the configuration and negotiation of educational practices in Higher Education in the United Kingdom?

In what follows I present the research findings of this thesis by relating the empirical analysis to the theoretical discussion. I have organised the presentation of the research findings in terms of the three sub-questions that structured the analysis. However, it will become apparent that in putting forward my argument elements of the three sections become intertwined. The chapter finishes with conclusions.

7.2 Research findings

Sub-Q 1: How are institutional logics bound up with the development of the Learning Designer?

In the introduction and first part of the analysis chapter I have examined how the LDSE project is entangled with other actors and institutional logics. In this way I have put forward a view that decentres designers (Law, 2002) as the originators of technology design and learning interventions, moving away both from accounts that implicitly portray design as neutral and external to the world being shaped, and at the same time those perspectives that in trying to show that designers are not neutral grant too much power to individual designers and their views. Drawing on the theoretical perspective presented in the corresponding chapter, I tried to show

in the analysis how the LDSE project is part of a larger configuration of the world, in constant process of negotiation.

In the introduction I traced some actors that helped sustain the project and the LD and its vision. Most significantly, the LDSE project was part of a network of research projects, TLRP, financed with the aim of exploring how to "achieve radical change through TEL". Within this network the LDSE project was expected to lead the research focus on teaching productivity. Therefore, a specific framing or problematisation of teaching and education was sustained, which can be traced to a broader actor-network including governmental policies, HE institutions, education researchers, etc.

In the first part of the analysis I traced how the LDSE was bounded up with several institutional logics. This entanglement needs to be seen as a mutually reinforcing. That is, I do not see institutional logics as external forces in an external context exerting an influence on technological design, but in an actor-network view of the world I see institutional logics as being maintained and reshaped by actors and actions in the ongoing becoming of the world. In this sense, we can see how the LDSE project helps reinforce certain logics. I focused on three dominant logics and their interaction: pedagogical, technological and economic. In the next part of the analysis I showed how this had implications or can be seen in technological decisions in the design of the LD, and in the last part I explore how it interacts with the institutional logics with which expected users are entangled.

Sub-Q 2: How does the LDSE frame the problem of education and how is this framing constituted?

Adopting a performative perspective, my aim has been to reveal how technology designed to foster a CoP of reflective practitioners and to support knowledge exchange is not mapping an external knowledge and making connections among a pre-existing community of subjects of knowledge. Different technologies help produce different worlds (Berg & Timmermans, 2000) and may embody different notions of what it implies to practice teaching in HE and be an expert practitioner. Rationalisation strategies such as the LD may claim to improve teaching practice, but the standards by which good and bad and thus improvement are assessed do

not precede them (Berg, 1997; Mol, 2002). Sociomaterial arrangements such as the LD also contribute to different distributions of accountability (Suchman, 2002). Thus, the LDSE can be seen as participating in the ongoing ordering and configuring the world, more specifically of HE in the UK.

A certain technological determinism can be perceived in the LDSE at 2 levels: in the overall aim of fostering a CoP to achieve innovation, and in the need to promote TEL in HE. Some research has revealed that the institutionalisation of ICT in our technological society goes hand-in-hand with discourses of modernisation (Avgerou, 2002) and innovation (Barry, 2001; Suchman & Bishop, 2000). The influence of such dominant discourse can indeed be found in the LDSE (and TLRP) discourse about TEL. The LDSE project proposes the development of the LD as means to achieve innovation in teaching in HE. However, the term "innovation in teaching" is used without much justification on why innovation is needed, or clarification of what is meant by innovation, beyond the perceived need to adopt TEL, which is associated with notions of efficiency and productivity. This is in line with Barry's (2001) assessment that, in our technological society, innovation is frequently figured as technological innovation, and it is seen as providing solutions for many societal issues (education, economy, democracy, etc.).

In this framing of change as technological innovation, Suchman and Bishop (2000, p.332) argue, the term 'change' or innovation is frequently a "useful tool for an agenda concerned with ensuring that, under changing conditions, distributions of symbolic and material reward remain the same." In line with this, critical perspectives in education have argued that in the discourse of the knowledge economy ICT are presented as both cause and a consequent driver for change within HE (Clegg et al., 2003, p.41), and "apparently neutral forms of educational technology have actually served to align educational provision and practices with neo-liberal values, thereby eroding the nature of education as a public good" (Selwyn, Forthcoming, p.Cover). My research has provided a different angle than that of critical perspectives in education, which explain the technological push in education as the result of powerful discourses or power structures. Acknowledging that it is through specific *material-discursive* practices that reality is coproduced (Barad, 2007), I have shown instead how the technological push in HE is

sociomaterially sustained and enacted, for instance in practices of knowledge production and technology design such as the LDSE and the LD. I have shown in my analysis how the LD is designed to encourage users to adopt TEL in their teaching practices.

In relation to this, despite the assumption of the potential benefits of ICT in education, the questions "who benefits" from the introduction of these technologies and how scarce resources are allocated in education have rarely been explored in the research area of education and technology (Selwyn & Facer, 2013). Following Sen's (1987; 2002) insights, efficiency, effectiveness, productivity or (technological) impacts, so much present in neoliberal discourses, do not tell us anything about the broader view of good. Indeed we have shown how in the LDSE the use of TEL is seen both from a pedagogical perspective as enhancing teaching but also from a productivity perspective. Therefore, the LD can be seen as embodying the rationale that TEL is the solution to limited resources in education. I have questioned, however, in the analysis the accuracy of cost-benefits calculations in the LD.

Furthermore, in the LDSE's approach there seems to be an implicit assumption that the adoption of TEL can be explained through a pedagogical rational choice. That is, the rationale seems to be that if, through collaboration with LD, academics learn—with the support of the system and interacting with others—"innovative uses of TEL" they will adopt them. However, some research has revealed that the adoption of TEL is subject to technical, institutional, economic and other social constraints, and that important social and institutional factors affect e-learning innovation, and that "for innovations to gain widespread support and acceptance it is likely to be necessary for them to support or be adaptable to the diverse goals of multiple actors in different games" (Dutton et al., 2004, p.147).

In this line, in the area of education, some authors have emphasised the need to broaden the scope of inquiry into TEL beyond the usual focus on instructional or learning design to understand the uptake (or not) of TEL. These authors have suggested to analyse the "ecosystem" or "ecology" in which TEL is embedded (Dillenbourg et al., 2011; Dutton et al., 2004), the complexity of "orchestration" of

TEL when considering issues of power in the existing cultural and political dynamics of TEL environments, and the ongoing negotiations of teachers' day-to-day work, who are subjected to varying conflicting demands and expectations (Perrotta & Evans, 2012; Selwyn, 2011c). As Perrotta and Evans (2012, p.5) put it: "the notion of orchestration represents a valuable opportunity for the TEL community to examine how technology-related agency in schools may be shaped by problematic motives and factors, which often relate to dynamics of power rather than issues of design and usability." While the adoption of TEL in HE has not been the focus of research in this thesis, what I share with this authors is the view that teaching and learning cannot be analysed only at the individual and very localised interaction student-teacher in the classroom, but at the meso-level.

One of the underlying assumptions of the LDSE with implications for the design of the LD is the idea that the innovation of teaching practices should follow an evidence-based approach. Sharing teaching knowledge with the LD, and particularly with the PPC, which aims to collect and encourage the reuse of patterns of good teaching, is seen as supporting such an approach. Evidence-based approaches are very well established in areas such as health care, and they are based on the idea of defining what works, what is an effective practice, based on the "weight of evidence, produced by other members of the community or by the researcher community" (Clegg, 2005, p.417). This is done by analysing the correlation between inputs and outputs and, in the view of its proponents, leads to progressive, systematic improvement of such practices (e.g. Salvin, 2002). In the area of education, an important precursor of evidence-based policy and practice was research in the 80s on school effectiveness, which tried to identify the variables that made schools more effective. While at the beginning this research paid attention mainly at organisational aspects, later work focused on the dynamics of teaching and learning, and adopted a more narrow view of relevant outcomes and outputs, which is connected with the implementation of measurable outcomes in education, and the introduction of audit and inspection (Biesta, 2009). While policy decisions based on evidence-based approaches are frequently presented as neutral, almost apolitical, because of their "factual" and "scientific" bases, as Clegg (2005) argues, what counts as evidence is debatable and political, and who is asking the

questions and in which ways needs to be considered. In addition, Biesta (2009) suggests, in the area of education the technical validity of measurements is not sufficient, because good education, with all its social, ethical and political dimensions, is more than effective teaching or effective education.

In relation to this, I have discussed in the analysis how the LD frames teaching practice from a learning science perspective. I have also substantiated that the specific issues that the LDSE and the LD considered relevant in reflecting about teaching are not the only ones that are seen as important to consider by practitioners and other educational researchers. I have challenged in this way the claimed neutrality of the learning design approach defended by researchers in the area. All orders, all technologies, are boundary making. The language of learning, dominant in learning sciences and inscribed in the LD, focuses on the process of learning; it is seen as a meta-language that supposedly can be indistinctibly applied to even different disciplines. It is so much the case that the PPC aims to be able to gather generalised patterns of effective learning. Such framing invisibilises the purpose and content of what is to be learned and also the fact that what counts as worth learning (student's learning, but also academics' learning through the LD) is not given in the order of things, nor universally shared.

I share the concern of a reduced number of researchers who have been critical towards the instrumental rationality of the "new language of learning" (Biesta, 2005) that frames much of the scholarship in education. In contrast to the instructional paradigm, based on the idea of transmission of knowledge, the learning paradigm, draws from constructivist approaches, and focuses on how teachers can *facilitate* student's learning (Biesta, 2013). This learning paradigm is mutually reinforced with the rhetoric of ICTs as providing flexible, personal, and thus, individual learning (Haugsbakk & Nordkvelle, 2007). As Biesta (2013, p.36) convincingly argues: "the point of education is never that children or students learn, but that they learn *something*, that they learn this for particular *purposes*, and that they learn this from *someone*. The problem with the language of learning and with the wider 'learnification' of educational discourse is that it makes it far more difficult, if not impossible, to ask the crucial educational questions about *content*, *purpose* and *relationships*." Learning denotes a process without content, and tends

to focus on the individual, whereas education is a sociomaterial and political issue. As Biesta points out, it is problematic to discuss the processes and techniques of learning in abstract terms, because the teaching approaches and methods used depend on the aims of education. It is important not to close the debate on the aims of education particularly in a moment in which, as researchers have suggested, learning and HE is increasingly seen as having to serve the needs of the knowledge economy (Clegg et al., 2003; Contu et al., 2003; Couldry, 2011; Weymans, 2010), and important changes have taken place in the way HE is financed, managed and made accountable, and teaching quality is assessed.

Sociomaterial arrangements distribute different ontological positions with different attributions of identity for those involved, and involve specific distributions of accountability (Barad, 2007; Law, 2002; Mol, 2002; Suchman, 2011). In terms of accountability the LDSE and the LD places academics and their knowledge of learning science as the sole agents of how teaching is performed in HE. It assumes that teaching innovation will result from academics learning from each other effective patterns of teaching. Then, following a learning science rationality, they will be able to design the best courses of action so that students can enjoy good learning experiences. Adopting the dominant humanist view of learning as an individual achievement, the LDSE and the LD help reinforce a humanist preoccupation with the cogitant learner or the reflective practitioner, as an individual actor living in a world separate of things. Drawing on empirical evidence, in the last section of the analysis I show how teaching practice in HE does not only result from reflecting in learning sciences terms. Thus, I suggest the need to study teaching at a meso-level, and in so doing, consider the material assamblages in which it takes place. We need to decenter the human being in conceptions of learning (Fenwick et al., 2012).

In terms of the attributions of identity and expertise, the LD, and the broader actor-network of which it is part, participates in the ongoing transformation of the academic identity and expectations in terms of their expertise; from somebody with a specialist knowledge to transmit, into a facilitator of learning with specialist knowledge but also procedural knowledge about learning. It also positions

academics as workers in constant need to learn and update their knowledge about teaching.

If, following Latour's (2004; 2005) suggestion, instead of focusing on matters of fact (what is true or false, or in this context what is effective teaching), we shift our gaze towards matters of concern (what we care about, what we value as good/bad), we realize that "goods (or bads), knowledges, and realities, all are being enacted together" (Law, 2009, p.154). The aim of this section has been to show how the LDSE frames the "problem of education" and in so doing allocates responsibilities and defines what matters in specific ways. This mattering results from assembling together education researchers, TLRP, education institutions, policy discourses and mandates, the LD, the PPC, etc. Reality, and the assemblages that constitute it, are in constant construction, and we cannot be certain if and how an actor-network will temporarily stabilize, and which interests or concerns will finally dominate in the constant processes of negotiations and translations among different actors. In this regard, talking about the performative effect of the actor-network of which LD is part does not imply that the LD will be implemented and used as wished by the LDSE team. It will depend on the actors that become enrolled in the actor-network over time. In the next section of the analysis I focused on the reception of this technology by expected users and I considered some of the institutional logics with which they are bounded up. Relevant actors such as those involved in taking decisions about teaching quality assurance in HE have not been interviewed for this research.

Sub-Q 3: How is the LD "received" by academics and why?

As previously mentioned, the orderings performed by technologies do not only configure the objects of knowledge, but also the subjects of knowledge. In this case the teacher or academic. The LD aimed to foster a community of practice of reflective practitioners. Such approach tends to reify the concept of practice and naturalises what is to be learned: the community learns from each other what they do in practice. However, as I discussed in the previous section, the LD frames in specific ways the aspects of practice that need to be "learned", what aspects of the seamless ongoing action of the academic work is worth paying attention to. Not

only this, in fact the LD aims to induce change in practice, and to do so the system is inscribed with knowledge of learning science and uses of TEL, and it is able to offer analyses of the learning designs and suggestions for change. As humans we always learn, but what comes to be considered learning is part of the sociomaterial arrangements of which we are part. In this regard, the LD participates in an ongoing change in the value given to the "knowledge about teaching" and non-didactic approaches to teaching in HE, as well as to the quality of teaching, defined in very specific ways.

Through workshops and interviews to practitioners (mainly academics but also learning technologists and staff developers) it became apparent that currently academics do not (only) follow a learning science rationality when planning their teaching. While some academics found value in the LD and the way it made them reflect about their teaching, other informants suggested that they do not understand or use the same vocabulary and "way of thinking" as the LD. Others also mentioned that when planning their teaching their concerns were of a different sort. This shows how the engineering of a community of practice comes with the difficulty of framing what matters in ways that might not correspond to the way practitioners act, think while practicing and learn from each other.

In contrast to a humanist-centric view of teaching and learning the analysis revealed that teaching and academic practices do not respond to a pedagogic reasoning (only). On the one hand, academic work, and thus, teaching is not the result of individual rational decisions, but responds to legitimate ways of doing things. We could see from the responses of informants that some, but not all, practitioners saw learning science knowledge as legitimate. Furthermore, the answers of practitioners revealed something that needs further exploration in the academic literature, which is the way teaching practice is performed as part of sociomaterial arrangements. Academics referred to how teaching is shaped by the number of students, the way HE institutions assume is the normal way to organise teaching (in terms of hours, seminar vs lectures, etc.), resources, sharing courses with other colleagues with different decision power, etc. Thus, the planning of teaching does not (only) result from a rational, individual, decision of what is the best way to teach.

In this third part of the analysis I also took into consideration some institutional logics that could help explain the reaction of academics in the way they perceived the LD. It also helped explain the way in which the LD might help sustain certain institutional logics not considered in the first part of the analysis. I explained how the pedagogical logics and managerial logics might help reinforce each other, and how some academics feared that the LD could be used as a tool in the hands of management to shape and assure the quality of teaching. Others, however, saw positively that the LD could help in the process of validation of courses. All this, I suggested, needs to be understood in a context in which academics have lost the power and autonomy that the professional logics used to grant.

7.3 Conclusions

Design thinking tends to focus on solving a problem at hand, frequently searching for efficiency and technical solutions, as in the case of the LDSE. The underlying assumption is that there is a world out there that we can shape. Conversely, a performative sociomaterial approach suggests looking at design in terms of the assemblages it tries to put in place, the realities it helps reinforce, while already being part of the world.

The theoretical framework developed in this thesis, which combines insights from ANT and institutional logics, is critical towards universalists views of design, but it also allowed me to move beyond the analysis of localised practices of design present in some ethnomethodological (and early ANT) approaches which, as Gad & Jensen (2014) point out, privilege practitioners' modes of thinking, naturalising "descriptions" of embodied action and local practice. Rather than granting them and their "individual" interests too much power I have tried to show how their design choices need to be understood as entangled with sociomaterial arrangements and actors beyond the local setting, in a world in becoming. Descentering the designers, I don't assume individual designers as "the origin" and only actors of design.

As argued in the conceptual framework I suggest to conceive of ICTs as resulting from and supporting a complex interplay of institutional logics, in a network of institutions, organizations, humans and non-humans, each of them forming part of

other complex networks. Institutional logics are implicated (together with other actants in the network) in the production of technology, and at the same time technology might help reinforce some institutional logics: the actor-network is relational, and results from ongoing processes of negotiation.

More specifically I have discussed how technologies like the LD aimed at supporting a CoP of reflective practitioners need to be understood as more than a tool allowing the connection of practitioners who, as members of a CoP, will learn from each other. While literature on CoP tends to portray communities and learning as non-controversial, what needs to be learned is not given in the order of things but negotiated. Furthermore, CoP should not be reified as a pre-existing group of individuals that just need the tools to facilitate the communication of knowledge about an objective reality.

In the literature review I have justified the need to go beyond overly localized analyses of learning dominant in practice perspectives, particularly in its reception/interpretation in OMS and learning sciences. In the conceptual framework chapter I have also justified the value of combining ANT and institutional logics to be able to study how ICT-mediated learning interventions participate in the ongoing negotiations of the world in becoming. In the analysis chapter I have studied the modes of ordering inscribed in the LD, and I have analysed how such mode of ordering, and the framing of what needs to be learned, by whom, and in what way is entangled with broader sociomaterial arrangements. I have also shown how the LD does not fall into an empty new world; “users” are institutional actors with different logics and interests.

8 Conclusions

In this chapter I offer an overview of the thesis, I present the key implications and main contributions, and I acknowledge the limitations of my research. The chapter is structured in three sections. In the first section I offer an overview of the thesis. I re-estate the research question and I present the key findings of the case study and key implications. In the second section I highlight the main contributions of this thesis. Finally, in the last section I discuss the limitations of this research and I suggest possible avenues for further research.

8.1 Overview of the thesis and findings

This thesis began with a critical assessment of the theoretical assumptions underlying ICT-mediated learning research, and it seeks to address some of the limitations of received views of learning and technology, which underlie substantial investments in developing technologies to support learning.

A critical review of the relevant literature in the areas of educational technology, organization studies, management, and information systems revealed a dominance of instrumental approaches, which assume a modernist view of knowledge, learning, and technology. That is, an important body of research adopts psychology-inspired views of knowledge and learning, and a positivist stance, according to which technoscientific knowledge is able to map and control an external, independent reality. Thus, the assumption is that the functionality of a technology is a good predictor of its impacts and effects. From this perspective, technologies are devised to support learning and knowledge sharing, frequently with the view of achieving innovation; and literature stubbornly discusses the potentials of technologies, largely unconcerned with the social nature of knowledge, learning, and technology. In this thesis I share the view of scholars who argue for the need to offer analyses that move beyond a technical rationality (quite common in applied academic fields of study), and try to contribute to a better understanding of the complex sociopolitical phenomena of which technological and learning interventions are part. In the field of learning design research, this is still an unexplored perspective.

Social constructivist approaches to the study of learning, knowledge, and technology have laid bare some of the shortcomings of this dominant body of literature, and have revealed the social and political nature of knowledge, learning, and technology. Social constructivist perspectives in the study of technology have challenged the assumption that technical solutions are neutral and universal, and that they unambiguously lead to expected outcomes. This research has revealed the social shaping of technology, that is, the sociopolitical and historical dimensions of technological design; the politics of technology, and the values and rationalities it embeds; the reconfiguration of technology in use; and that the development, adoption and appropriation of technology results from ongoing negotiations, and that it is affected by the infrastructures, policies, institutional actors, and social relations within a sociopolitical context.

Similarly, social constructivist theories of learning are critical of individualist accounts of learning and human behaviour, and recognize that knowledge is dynamic, provisional, socially constructed, and situated. This literature mostly situates knowing and learning in practice, and emphasizes its mutual constitution. In addition, approaches such as communities of practice (Lave & Wenger, 1991) have revealed the political character of knowledge and learning, and the embeddedness of learning practices in power relations. These theories have been quite influential in education and organization science research and have been used to devise technology-mediated learning interventions that promote collaborative learning, and that try to foster communities of practice, which are seen as good sites of innovation. Under closer inspection, we realise that the adoption of these analytical and critical theories as tools for intervention results in a loss of critical power of the practice concept. Especially in education technology research, “collaborative learning” and even “communities of practice” are frequently invoked while in fact adopting individualist and monistic views of learners, and a positivist view of the world as the object of learning. In addition, in much of this literature, the role of technology is taken for granted.

This thesis is motivated by three main broad concerns: 1) There is an important body of literature in OMS and education fields concerned with ICT-mediated learning which adopts individualist and human-centric notions of learning; 2)

Concepts like CoP and learning are frequently unproblematically taken positively and presented as aconflictual; 3) Technology is frequently taken as a mere conduit of knowledge; 4) An adequate consideration of the entanglement of ICT-mediated learning interventions with broader sociomaterial arrangements is needed to overcome overly situated accounts of technology design and learning interventions, and the tendency to offer individualist and monistic views of actors.

To address these issues I proposed a conceptual framework that integrates insights from ANT and institutional logics, for the following reasons: ANT challenges modernist conceptions of technoscientific knowledge and therefore it is well suited to overcome instrumentalist views of technology and learning. In addition, ANT brings to the fore the role of technologies (and other actors) in the constitution of reality. Thus, technologies are not seen as mere conduits but as actors. We can, therefore, move beyond the exploration of the best procedures and technologies to support learning, and we can ask questions that refer to how knowledge is sociomaterially constructed and sustained in practice, or which sort of realities knowledge and technology help reinforce. Furthermore, the concept of performativity is related to the notion of ontological politics (Mol, 2013), which suggests a critical stance: technologies and discourses enact realities; thus, ANT offers a lens to study how realities are enacted and sensitise us to the fact that it could have been otherwise; in addition, it reminds the researcher of the performative effects of their own research.

In turn, institutional logics theory offers an effective complement to individualistic and monistic perspectives. From this perspective, actors and processes of technology innovation are influenced by the sociopolitical context in which they are situated. In this approach actors are seen not as mainly guided by rational choice, nor as completely autonomous, but as social actors situated in a network of institutional forces. The results of IS innovation are difficult to predict due to the presence of multiple institutional logics, which vary in different contexts. This suggests the need to attend to the possible tensions between the values and logics inscribed in a technology and the institutional logics in the context of implementation.

Integrating these two approaches I suggested in the conceptual framework to understand technology not as a set of material products functioning according to the technical rules embedded in their physical components, but as products and producers of a sociotechnical network embedded in sociotechnical institutions.

This research drew on an empirical case study of the process of design of the LD, and has addressed the following question and sub-questions:

RQ: How is technology implicated in the configuration and negotiation of educational practices in Higher Education in the United Kingdom?

> **Sub-Q 1:** How are institutional logics bound up with the development of the Learning Designer?
>
> **Sub-Q 2:** How does the LDSE frame the problem of education and how is this framing constituted?
>
> **Sub-Q 3:** How is the LD "received" by academics and why?

Sub-Q1: In contrast to positivistic accounts of science and technology that assume that technical solutions are the result of a detached technical rationality and offer universal solutions, I argued that design is from somewhere: it is embedded in a sociotechnical context where certain logics have become taken for granted, and it is the result of negotiations with other actors. First, I considered the network of relations within which the design of the LD was situated and I tried to understand some design decisions in the sociotechnical context of design. Through an iterative process of analysis of the documents and decisions of the project, the materialization of such decisions in the LD, and secondary literature to understand the sociotechnical context, I traced the discourses, institutional logics and previous technological interventions entangled with the development of the Learning Designer. I found three dominant logics bound up with the development of the Learning Designer, I traced the entanglement of such logics with other actors and how they interacted with each other, and I analysed how these rationalities were inscribed in the technology.

I found that a technical rationality, a pedagogical rationality and an economic logic (specifically the concept of productivity) were inscribed in the system, reinforcing each other. The reinforcement of a technical rationality and the notion of productivity can be found in policy discourses in Europe and the UK, which present TEL as the solution to tackle the need to serve a growing number of students in the context of the knowledge economy. This was also translated in TLRP documents. The reinforcement of the technological rationality and the concept of productivity was also translated in the LD with the time modeller, which offers a positive association between the adoption of TEL and productivity.

While a pedagogical rationality and an economic logic were presented in some occasions as conflicting logics, they became integrated through their mutual interaction with the technical rationality. That is, the suitability of using TEL is presented in the learning experience of the LD as consisting of its pedagogical desirability and productivity.

Sub-Q2: Technologies (LD) and discourses (LDSE research) are more than just tools for the transmission of knowledge. They frame and are implicated in the configuration of educational practices in specific ways. I have shown how the problem of education is framed in terms of the need to exploit the potential of TEL, as this is the most "productive" and "efficient" way to tackle the massification of higher education, in the context of the knowledge economy. Thus, the LD and LDSE helps reinforce this discourse of a technical fix, which is present in policy directives, despite the limited benefits that much investment in ICTs for education has brought. The LDSE discourse takes for granted, and it presents as unavoidable the imperatives of the knowledge economy and the massification of education. In addition, the LDSE and the LD sustain an instrumental "learning discourse" which frames the problem of education in terms of efficiency (economic and "pedagogical") without considering the aims of education, nor the contents. In addition, the problem and solution of education is framed within teaching practice (at an individual level and not at a political or organizational level), and also as a problem of communication between research (or theory) and practice. Teaching practice, it is claimed, lacks a common language, which hampers the possibility of

comparing and learning from what works or does not work; therefore the LD can be seen as an effort to rationalize teaching practices.

Sub-Q 3: While I argue that discourses and technologies are implicated in the reconfiguration of education, they participate in ongoing negotiations with many actors in a given sociotechnical context. Therefore, in contrast with received versions of collaborative learning that tend to assume the spontaneous appropriation of technologies, I claim that we cannot guarantee if and how the LD will manage to change practices. ANT suggests that a "working tool" is the result of negotiations of different actors, but, following insights from institutional logics theorists, I add that the consideration of actors as institutional actors can help us understand their reactions.

I found that the reactions of academics towards the LD were various, but a common reaction was "this is not for me" or "I don't have the time". I argued that a consideration of the institutional context of work, can help us understand some of these reactions; a context where research continues to be what brings most of the reputation and rewards at an institutional and professional level in academia, but also in a context of intensification of academic work. In addition, the LDSE approach is based on the idea of achieving change in teaching practices through collaboration and learning, but in fact, as informants explained, academics do not design their teaching merely by following individual, rational action. They talked about several aspects that limited their freedom in planning their teaching: not being the course convenors, the negotiations in setting up courses, the number of students assigned to the course, the different expectations in different institutions, etc. In addition, the concept of peer collaboration that the LDSE embraces might be challenged, an informant argued, by the increasing competition among HE institutions.

I also discussed how some informants did not seem comfortable with the vocabulary of the LD and its way of rationalizing teaching. The difference between the way "knowledge about teaching" is perceived by some practitioners (academics), and education researchers could be understood in terms of belonging to different communities of practice: what is considered legitimate (or relevant)

knowledge in one community does not correspond to the other. In this sense, we could say that there might be a tension between the idea of the LD of "fostering a community of practice" and the pedagogical knowledge and vocabulary embedded, which seems to make explicit knowledge that many academics are not used to making explicit to guide their teaching practice.

I also discussed how some informants perceived the LD with suspicion as they thought it could be used as a managerial and accountability tool. This reaction needs to be understood in a context in which professional autonomy has been challenged by the systems of accountability introduced by new public management forms of organizing. Other informants, however, saw this possible alignment positively, and expressed that the LD would be helpful if it could provide as an output a document ready for validation. Thus, the LDSE decided to include this as a user requirement for future versions of the LD. Thus, we see how the LD might help sustain not only a pedagogical rationality but also a managerial logic and the associated implementation of accountability measures, in a context where the professional logic of academics has been challenged by it.

RQ: The answers of the previous research questions also answer the main research question of this thesis. I have argued that technologies and knowledge (and what is considered worth learning) are imbricated in an ongoing "scene of struggle" where different interests, institutional logics, and realities are negotiated. That is, we have seen that the LD is one among other actors (TLRP, policy discourses, academics, HE institutions, etc.) that participates in the configuration and negotiation of educational practices in HE in the UK, and how several institutional logics were also implicated. I have discussed how the design of the LD was the result of negotiations and translations with several actors and institutional logics. I have discussed how the LD and LDSE discourses configured the problem of education and teaching practices in a specific way, helping reinforce a certain reality. However, I have also shown how their aim of transforming teaching into a learning design science is still in the process of negotiation, and we have seen how the clash between certain institutional logics (for instance professionalism and accountability) might create a certain resistance.

In this regard, I suggest that ICTs may also be conceived as resulting from and supporting a complex interplay of institutional logics, in a network of institutions, organizations, humans and non-humans, each of them forming part of other complex networks.

8.2 Core contributions

Despite the important gap between the expected transformational capacity of technologies for education and reality, important investments continue to be directed towards ICTs for educational purposes. In addition, academic literature in the education technology research field is dominated by instrumental approaches, concerned with exploring how to best harness the potential of technologies to support or even enhance learning. This thesis contributes to recent calls to look beyond pedagogical issues, and critically approach the study of educational technology (Selwyn, 2010a; Selwyn & Facer, 2013). In addressing my research question, I have approached not only the study of the LD as a learning technology, but also its underlying rationale to promote technology-enhanced learning in higher education, and the discourse on productivity.

IS research has been predominantly concerned with the analysis of IS in business organizations. With rare exceptions (Darking, 2004), research in IS has not studied ICTs in education. This research has shown that concerns arise in educational organizational settings that are distinct from those in business organizations, for instance the tension in the former between accountability and professional autonomy, and how a technology like the LD makes visible the tensions and reinforcement of certain logics, or how issues regarding the aims of education become relevant. At the same time, it is also interesting to point out the commonalities: the “discourse on learning”, and collaborative learning to achieve innovation, for instance, seem to be pervasive in both business and education organizations.

Therefore, one of the contributions and challenges of this thesis has been to bring together literature from these different fields of research. Framing this research in a way that could dialogue with both disciplinary traditions has been particularly complex. I have contributed to the areas of educational technology, organization

sciences and IS in terms of offering research that moves beyond received theorizations of ICT-mediated learning. In line with recent interest in sociomaterial approaches in the study of IS and learning, I have explored the entanglement of technology in the constitution of reality, moving away from representationalist and rationalist approaches in the study of ICT-mediated learning. I have also taken adequate consideration of the broader sociomaterial arrangements within which technology design and learning is situated, overcoming a tendency in practice-based approaches to provide overly localised accounts.

I have contributed to theory by developing a conceptual framework that draws on ANT and institutional logics to tackle the aforementioned limitations in received theorisations and research on ICT-mediated learning. This is in line with recent calls among proponents of the institutional logics (Thornton & Ocasio 2008; Lounsbury 2008), who have suggested that incorporating the insights of ANT can be fruitful for understanding how actors are implicated in the transformation and maintenance of institutions. This theoretical approach has allowed me to provide a performative sociomaterial approach to the study of ICT-mediated learning that considers the entanglement of technological and learning beyond the localised setting of design and intervention. Thus, this theoretical approach has allowed me to attend to a different sort of question. Instead of analysing how technology can foster a CoP and support knowledge exchange, in my research I have tried to reveal how the LD is bound up with other actors and institutional logics in the ongoing and conflictual configuration of reality. I have argued that LDSE participates in the ongoing negotiation of the object and subject of teaching, of the practice and its practitioners.

This thesis has revealed some of the limitations of the learning design approach, which is an area of study that has recently gained relevance in the education field. I have provided a critique towards the claimed neutrality of the approach, and a discussion about the difficulty of achieving change in teaching practices by design. In this regard, a gap found in the literature in HE is that most literature discusses teaching at the micro-level, as an interaction teacher-student, and adopting a human-centric perspective of learning. Similarly LDSE seems to assume that the pedagogical rationality guides decisions in teaching practices. I have argued that

this is not the case, and that several institutional logics and also institutionalized ways of doing things do play an important role in teaching practice.

In addition, received practice perspectives on learning tend to reify practices and therefore assume that there is an intrinsic knowledge or knowing of these practices that can be shared in communities of practices. However in trying to make explicit the knowledge of practitioners it becomes apparent that what constitutes "knowledge", what is worth learning is not given in the order of things, and it is conflictual. This research has contributed to critical voices towards the dominant discourse of learning in our society, which leaves indeterminate the content of what is learned (Fenwick, 1998) and nevertheless is unproblematically assumed to be a good thing (Contu et al., 2003).

While this thesis is explicitly not instrumental and its purpose therefore is not to provide principles of good practice or guidance for effective courses of action, I believe that this research provides important practical implications. This research cautions against investments in technology that do not adequately consider the complexity of achieving change by design, and more specifically the difficulty of engineering CoP. This research intends to sensitize to the fact that technology adoption or teaching practice do not easily follow rationalities established from the outside. An important effort of enrolling other actors needs to be made. I have shown that what becomes to be accepted as expertise, knowledge and learning is the result of ongoing negotiations and sociomaterial arrangements.

Furthermore performative perspectives provide important implications regarding the role of technology design and learning interventions. Performative approaches sensitise us to the fact that technology and research participate in the configuration of reality; therefore, ethical consequences derive in terms of the world that we help constitute. In addition, as I assume a conflictual view of the world, a further consequence is the suggestion that we need to avoid closing controversies too early.

8.3 Limitations and future research

I have tried to convince the reader of the virtues of the theoretical approach developed. However, it also has some limitations. In the chapter where I develop

the conceptual framework I have already mentioned some of the limitations of ANT and institutional logics, and some of the criticisms they have received. I presented the combination of ANT and institutional logics as a way to overcome what I see as the main limitations of each of the approaches. On the one ANT, by focusing on the situated practices as they emerge, has no straightforward way to acknowledge that actors do not act in a *tabula rasa*. On the other institutional logics can be seen as imposing certain sociological categories in their analyses. I see the combination of these two theories as sensitising the researcher to the limitations of each of the theories through the lenses of the other. I believe that the conceptual framework presented can be further refined and fruitfully used for analysis in other contexts in future research.

The theoretical perspective adopted has also methodological implications. ANT convincingly argues that we should not only consider humans as social actors, and posits a relational ontology that challenges essentialist perspectives. This poses the methodological difficulty of setting boundaries of the network and phenomena to be studied, as we could trace an infinite material-semiotic regression of relations. Thus, as a researcher I had to decide which actors to follow and which not. A similar challenge affects the tracing and definition of institutional logics. In an ANT way of thinking, I accept that the research cuts could have been otherwise, and another researcher might have been interested in tracing other actors or logics. The actors, logics and discourses that I discussed were the result of an iterative process of analysis of discourses, documents, and decisions of the LDSE project, secondary literature defining certain concerns, and theoretical preoccupations. In that sense, this research does not claim to offer the only possible answer to the question, but it offers a plausible one.

Also in relation to the focus of analysis, choices need to be made in the research design, in which disciplinary traditions and practical factors play a role. I hold a studentship linked to the LDSE project, and as a PhD student in IS it made sense to focus my analysis on the development of the LD and its evaluation. As any study needs to limit its scope, I did not engage in an in-depth study of “teaching in practice”. This much needed research would provide a very interesting complement to this thesis, by considering the materiality of teaching and how “good teaching”

is sociomaterially enacted. Standards, space, norms, regulations, policies, technologies, traditions, all play a role on how teaching is done. Such research would help substantiate one of the arguments defended in this thesis that is that teaching and learning tends to be framed as a cognitive and very localised matter, and in doing so firstly teaching tends to be reduced to a rational activity that should draw on learning science, and secondly teachers-as-learners are configured as fully accountable for teaching practices, despite the fact that academics have become over the years less autonomous.

More generally, there is further research to be done which considers the meso-level of analysis in the study of teaching practices, and particularly in relation to the uses of TEL. That is, research that frames the study of TEL not in pedagogical terms, but considering the institutional context and its entanglement with current practices. Another interesting aspect that I did not investigate is whether academics from research universities perceived the LD differently than those from post-1992 institutions, which tend to be more focused on teaching, Future research could study this.

My access to and participation in the LDSE project came both with opportunities and limitations in terms of data collection. I gained full access to the workings of the project and the documents and technologies they produced, which constitute an important part of the data analysed. In addition, as part of the project I participated in the collection of data in workshops and interviews to practitioners, and I also had access to the evaluation reports produced by members of the project. This was as part of a collaborative effort within a funded project, which means that I gained data that I could have not obtained as a single PhD researcher. However, this also means that part of the data I rely on was collected for the purposes of the LDSE project research, and not for my own research. For this reason I decided to conduct some follow up interviews.

Another limitation is that the project came to an end and the LD was not a tool ready to be implemented but only a prototype. This poses challenges to the informants, who are left to build their views partly based on the “vision” of the technology and not on real use in the workplace. In addition, informants were

exposed for only a limited amount of time to the technology, and therefore could not explore it and reflect about it as much as a habitual user would do. In addition, aspects like the notion of collaboration, which was one of my focuses of interest when I started my research, could not be analysed “in practice”.

After the project ended and by the time I finished this thesis, the publications of the project in peer-reviewed journals have gained significant attention and have been cited by other authors. In addition, proposals have been made to introduce further quality assurance mechanisms regarding teaching in higher education in the UK. All together seems to suggest that learning designs and other tools to rationalize teaching practices might deserve the attention of future research. I believe that despite the challenge of conducting research that draws on and tries to contribute to more than one discipline (IS and education), much can be gained in terms of insights and other ways of looking at phenomena, otherwise neglected.

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Appendix 1: Follow-up interview questions

INTRODUCTORY QUESTIONS

1) What do you teach? (course, level, number of students)

2) What is your teaching experience? / How long have you been teaching?

3) What are the main differences in the way you taught these different courses?

TEACHING PRACTICE

4) What makes good teaching for you?

5) How do you achieve it? You can exemplify it with a good class you did.

6) How do you usually go about planning your teaching? (thinking process, when do you do it...)

7) Which aspects do you take into consideration to plan a good class / course? (learning theories, motivation - students' experience, content, skills development...)

8) To what extent do learning theories inform your teaching? (which ones? in which way?)

9) Which 'tools' do you use to plan your teaching? (i.e. do you record your planning in any way?, which technology do you use -just pen & paper or computer...?)

10) In which ways do you feel that teaching at LSE shape the way you teach? Which are the specific teaching conditions / expectations? What freedom do you have? (are you the course organiser, are you expected to teach in a certain way, for instance doing debates, etc?)

COLLABORATION / CHANGE

11) Do you feel that you have introduced changes in the way you teach since you started teaching? What have you changed? What prompted you to change?

12) From where did you get (or do you usually try to find) inspiration?

13) Do you share ideas about teaching practice with other colleagues? Are they from the same discipline and institution, or not? When / How?

14) Have you shared or reused any sort of teaching materials?

15) Have you (re)used teaching plans from other people? From whom? Have you shared yours? With whom? Why / Why not? Which sort of specification did they have (only in terms of content, or also activities were specified)? Was it for the same course you were teaching or have you shared with teachers of other courses / disciplines?

16) Do you use materials that you find online for your teaching (images, videos, etc.)? Examples?

17) Have you ever looked in the Internet for teaching plans or for examples that you could introduce in your teaching?

LDSE AS A TOOL FOR PLANNING

18) How was your experience using the LDSE? What did you think about it?

19) Did you find it easy / difficult to 'rewrite' your plan for the class in the teaching?

20) Did you find that it captured / represented well your plan? How well did it capture your practice?

21) What do you think about the terminology used in the programme? Was it straightforward? Is this a terminology you would usually think about?

22) Did you find the learning experience pie chart useful or telling? In which sense?

23) Did it make you reflect further on your teaching? In which sense? Would you introduce changes as a result?

24) Were there any aspects of your teaching, or the way you think about your teaching, that were left unrepresented in the LDSE?

25) Do you see any value in using the LDSE?

26) Would you find it a useful ‘learning’ tool? (to improve your teaching)

27) Would you find it a useful way to share practices? Would you find it useful to know what others are doing in other institutions?

28) Do you think that you could find inspiration from LDSE learning designs to improve your teaching? Or would you find it more useful to get inspiration in other ways? Why?

29) As it is now, do you see yourself using the LDSE? Why / Why not?

29b) If not, would you use a similar tool if it were different? (would you find it useful to use some sort of learning design?)

Appendix 2: User scenario: Redesign at the unit and session level

Author

Roser Pujadas

Structure and some concepts based on user scenarios by Liz Masterman (D1-4)

Marie is a fictional teacher, built based on my own experience of teaching language for many years in HE and FE, and considering specially what is institutionally expected of teachers in a FE institution, and what is taught and stressed in staff development courses.

Rationale

This scenario is intended to explore the ways in which LDSE could support a language teacher in FE in designing at the unit and session level. It assumes "Building on the work of others" as a cornerstone design principle of the LDSE and includes repurposing learning designs/activity sequences from online learning environments. It also assumes another cornerstone principle of the LDSE, which is fostering innovation.

For this purpose I will assume that the teacher is either not very experienced or has not much pedagogical training. I will also assume that the teacher is open to innovate with TEL but has not much previous experience.

I will assume that the teacher has changed institution and needs to adapt her teaching to a new sort of students and institutional practices. Hence, she needs to design a whole module and its sessions. As mentioned, though, in this scenario I will focus on the unit and session level.

Synopsis

Marie has recently started teaching French as a Second or Other Language in a centre for further education, where she runs classes for adult students with mixed abilities, most of which have work commitments and therefore cannot be expected to study much at home.

For the first time in her career she has an interactive board in the classroom. She has also access to other more traditional technologies such as TV with video and CD-player. Moreover, she thinks that the use of VLE and other resources in the Internet might be useful to set up homework and to offer extra activities for independent study to those students who need or want to practice more than the minimum required.

She has completed a scheme of work for the module, and she has decided that she will dedicate 3 sessions (i.e. classes) to the topic/unit "Shopping at the market", in which students will be able to understand and use vocabulary of fruits and vegetables, and different kinds of shops and stalls; they will also be able to understand and use expressions, questions and answers used when we go shopping; and they will be introduced in a contextualised way to some grammatical issues such as the use of direct object pronouns, and the singular forms of the present tense and conditional tense of the irregular verb *vouloir*. She is now about to design a session plan for the first face-to-face class of this topic and the homework associated to it. She will use LDSE to produce the session plan, because she thinks that the LDSE will support her designing the session and give her some tips and advice; she also expects to find inspiration from the work of others and find useful resources for teaching.

Detailed scenario

Step:	*Narrative:*	*Notes:*
1.	Marie logs into the LDSE. Before planning in detail the session she looks for inspiration. So she goes directly to the LDSEeker[59]. In the LDSEeker she expects to find: 1) Other unit/session plans about the topic "Shopping at the market". Ideally these would be learning designs elaborated by colleagues of the same discipline in a similar institution. 2) She is looking for resources such as images, flashcards, etc. that she can reuse	Marie is looking for specific examples of learning designs and resources that she can reuse. She is looking for learning designs and resources that are as close to her practice as possible (i.e. they have to be from her discipline, and ideally for students of the same or similar level, and from her institution or a 'similar' one) (This challenges LDSE's idea of sharing across disciplines)
2.	It took her a while to find resources at the right level and that fitted with what she needed to teach, but Marie has found some useful material. She now needs to elaborate her own session plan to adapt it to her group of students and length of the course. She goes to LDSE to see how it can support her planning. She goes to "Create a new session". She sees that she can choose a **session type,** but she cannot choose one as she is constantly changing the sort of interaction and group organisation (i.e. she constantly combines very brief presentations with group activities, pair exercises, listening exercises that elicit new vocabulary or grammar structures, etc.; and she considers assessment as an ongoing aspect, integrated in the activities).	The list of **session types** in the LDSE seems to assume long sessions with the same sort of interaction, which does not correspond with the very active and changing interactions of the language class, especially at lower levels. Also, it seems to assume that each session contains the same sort of TLAs? Or otherwise why defining sessions and not directly just TLAs?

[59] At the beginning of the LDSE project, substantial efforts were directed to build a system that could help finding and reusing resources and learning objects. The LDSEeker was the search engine that would look for resources in specific repositories. This aspect of the project was dropped, in favour of building the LD intelligent system to support learning design.

Step:	*Narrative:*	*Notes:*
3.	She then looks at the **learning outcomes** palette. None of them seems to really fit with what she wants her students to achieve, so she decides to define her own learning outcomes for the first session. When defining learning outcomes and learning activities Marie thinks in terms of the vocabulary, expressions and grammar that students need to learn; and also that different **skills** need to be developed in different areas: speaking, listening, writing and reading. She defines learning objectives such as: *Understand and use basic vocabulary of fruits and vegetables.* *Understand and produce phrases and expressions used in shopping interactions.* *Etc.* Even if stated in this way, some of the objectives include several sub-objectives, which she doesn't always explicitly articulate but that need to be taken into account when designing the learning activities; for instance, the *use of basic vocabulary* and new expressions means that students need to work also on pronunciation.	The palette of **learning outcomes** does not contain many (any?) learning outcomes that could be useful in language teaching. The "Argue the case for and/against" is something that is done in language class but the aim is not mainly "Evaluation", but a way to encourage debate and practice the language. How can the LDSE support on this? Wouldn't the system support Marie more easily if she could specify that she is teaching language? If Marie was not **balancing** correctly the learning outcomes and **skills** (e.g. if she is not working on the pronunciation, if she is not allowing students to practice their oral skills sufficiently) how could the LD help her to become aware of it and improve her teaching?
4.	Then, Marie goes to the timeline, where she needs to design a **sequence of teaching and learning activities [TLAs]**.	She is not very clear about the terminology in the TLAs palette. Should she choose "group practical activity" for her first activity in the lesson plan below? She has many activities and different group dynamics, and the terms seem very generic. Is the LD going to help?
5.	As mentioned, she needs to balance activities that allow her students to practice speaking, listening, writing and reading. She learned from staff development sessions, that she also needs to take into account other aspects when designing the activities:	How can the LD give support in all these aspects?: - Could Marie look for ideas of controlled speaking activities or of free practice activities in the LDSEeker, for instance?

Step:	*Narrative:*	*Notes:*
	- **Scaffolding**: Students need **controlled practice** activities to consolidate new structures and grammar, and later, semi-controlled activities and **free practice** activities, which will stretch students' productivity and potential. (i.e. the **order** of the activities matters) - When selecting the resources and designing activities she tries to introduce enough variety to cater for different **learning styles**[60] and to keep students **motivated** and engaged. (e.g. using visual stimuli, songs, etc.; designing activities that are more reflective, but others more dynamic or that involve negotiation) - In relation to the previous point, she defines different **group dynamics** for each activity (in terms of the size and kind of interaction expected, and also more or less static set ups) - When designing learning activities she needs to take into account **differentiation** aspects, above all as regards mixed abilities. To do so, she needs to think of designing activities that can be useful to different kind of students at the same time. In fact, she has such a variety of students that she finds this the most challenging aspect when designing her teaching. She has in class a 90-year old gentleman who finds it sometimes difficult to follow the class, and who would appreciate a more traditional approach to teaching. She has a very bright 26-year old PhD student who has learned 5 other languages, and who is very sharp. She has a middle aged very good but shy student, who finds it difficult to interact with other students in oral practice exercises, etc.	- How can she improve the **group dynamics**? Can she get support from the LD? - Can she find ideas for oral exercises? How can she encourage students to speak? Marie had a language teacher who knew many **fun activities** and she would like to be able to introduce some to keep students **motivated**. - Can she get support from LD to assess if her activities cater for different **learning styles**? - How can she get support from LD to tackle **differentiation** (which is a strong concern in FE institutions)? How can she improve her activities and sessions so that all her students can get something from the class and don't get bored considering the very different levels and aptitudes? - Marie was told in a staff development session that having an **initial assessment** would be good in terms of considering differentiation and redefining learning outcomes and teaching style. Would the LD be able to suggest this sort of ideas? - Marie's institution is very keen on having continuous assessment and different ways of **assessing and recording the progress** of students (as funding depends partly on this!). Can the LD help her thinking of new ways of assessing and recording the assessment of activities, using different media? - Can LD offer a visual representation of the connection between the methods, resources, group organization and the assessment of each

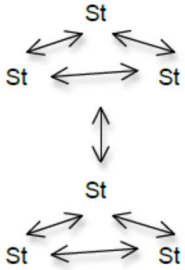
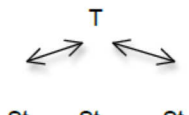
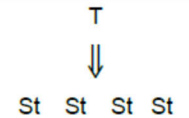
[60] The notion of learning styles has become very widespread—and enforced by staff development sessions and quality assessment in some institutions, e.g. Marie's one—, despite substantial doubts about its validity (Coffield et al., 2004).

Step:	*Narrative:*	*Notes:*
	- She also has a student who is a bit difficult in several respects and other students tend to avoid to practice with him. He has also made some offensive comments. She would appreciate ideas on how to **manage difficult students**, because this is affecting the learning environment. - When designing the activities she also thinks how each of them (or how each of the learning outcomes) is **(continuously) assessed**.	activity? (Following the advice of Marie's FE institution, see at the end an example of how a segment of the session plan would look like) - What if Marie is not aware of all these issues? Can the LD help her improve (improve? in her institutions' terms? in terms of students' feedback?) her teaching by somehow making her aware that she should consider these issues, or that for instance her teaching is not well balanced? Should LD be adaptable as to allow institutions to define best practices (i.e. which issues need to be considered when doing the learning design)—and would teachers be happy about it? - The sort of **analysis** offered by the system in the **pie chart** does not really tackle her (and her institutions') concerns. What sort of balance between acquisition, discussion, inquiry, practice and production would make a goo language teaching she wonders?
6.	When designing the activities, Marie would need support to know how she could use the **interactive board** she has in class in innovative ways. When planning the activities, Marie assesses if there are aspects of the learning outcomes that can be left to students for **self-study (i.e. homework)**. The homework she usually sets up is reading, writing or grammar exercises. She wonders if using Moodle would be of any use to support student's self-study and if she should use **Moodle or any other technology** to allow students to practice also listening at home.	How could the LD help on this? Not only Marie would need ideas on how to use the interactive board and VLE, but she would also like to assess when and to what extent the use of the interactive board and VLE would add value to her teaching. Different TEL activities are part of the TLAs palette in the LD but there is no support as to how to best use the resources the teacher has at hand, i.e. how to use specific technology (e.g. an interactive board) in innovative ways, and integrate it in class teaching.

Terminology:

- she uses the term session to refer to a face-to-face class plus the homework (i.e. 2 sessions in LD terms)
- she uses the terms topic and unit indistinctively (to refer to a module)
- she does not use the term learning design but scheme of work for the module level, and session plan for the session level
- In FE the Bloom's distinction between mastery tasks and developmental tasks is frequently used. In language teaching teachers tend to refer to controlled practice vs. free practice.

Example of Marie's session plan before using LD (segment)

Time	Objective	Methods/Activity	Resources	Group organisation	Assessment
6:00pm	Introduce new vocabulary: fruits and vegetables	T posts several pictures representing fruits or vegetables around the class. T gives 3 names of fruits or vegetables to each group of 3 students, which they have to stick below the appropriate picture. Groups can help each other	-Pictures A4 size -Names of fruits and vegetables printed in A4 size		T and peer observation
6:13pm	- Pronunciation and acquisition of the vocabulary introduced - Practice of structures and vocabulary learned in previous lessons (ici/là, ça/ceci/cela)	(Still standing around the class) T asks students: "- Where is the carrot?" Sts reply "here" or "there" Drill: T can you repeat after me?: "Carrot" T asks students: - What is an onion? Sts reply "this" or "that" (pointing at the right image) Drill of the new word, after each answer.	-Pictures A4 size -Names of fruits and vegetables printed in A4 size		T and peer observation
…					
6:40pm	- Understand how to use the different personal forms of the present tense of *vouloir*	T shows the present tense of the verb *vouloir* and explains that different subjects need different forms of the verb (and not only different endings, because it is an irregular verb)	Board		Next exercise
6:45pm	- Be able to use the appropriate form of the verb	St need to fill in the gaps of sentences with the adequate form of the verb, depending on the subject of the sentence.	Handout with exercises	St	Correction of the exercise in class
…					

Appendix 3: Screen captures of the last version of LD (v.3)

Figure 15. Module level properties.

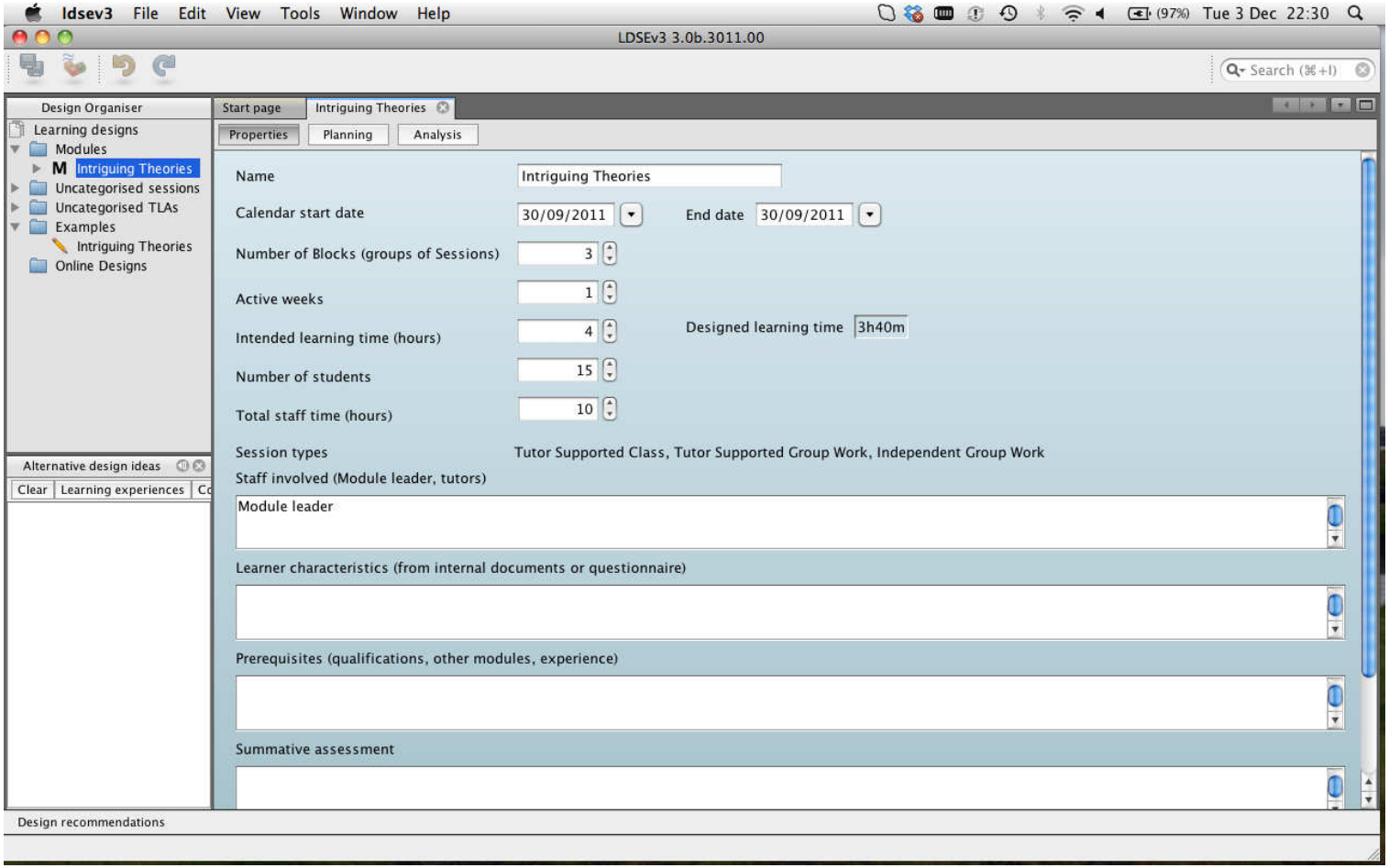


Figure 16. Module level planning.

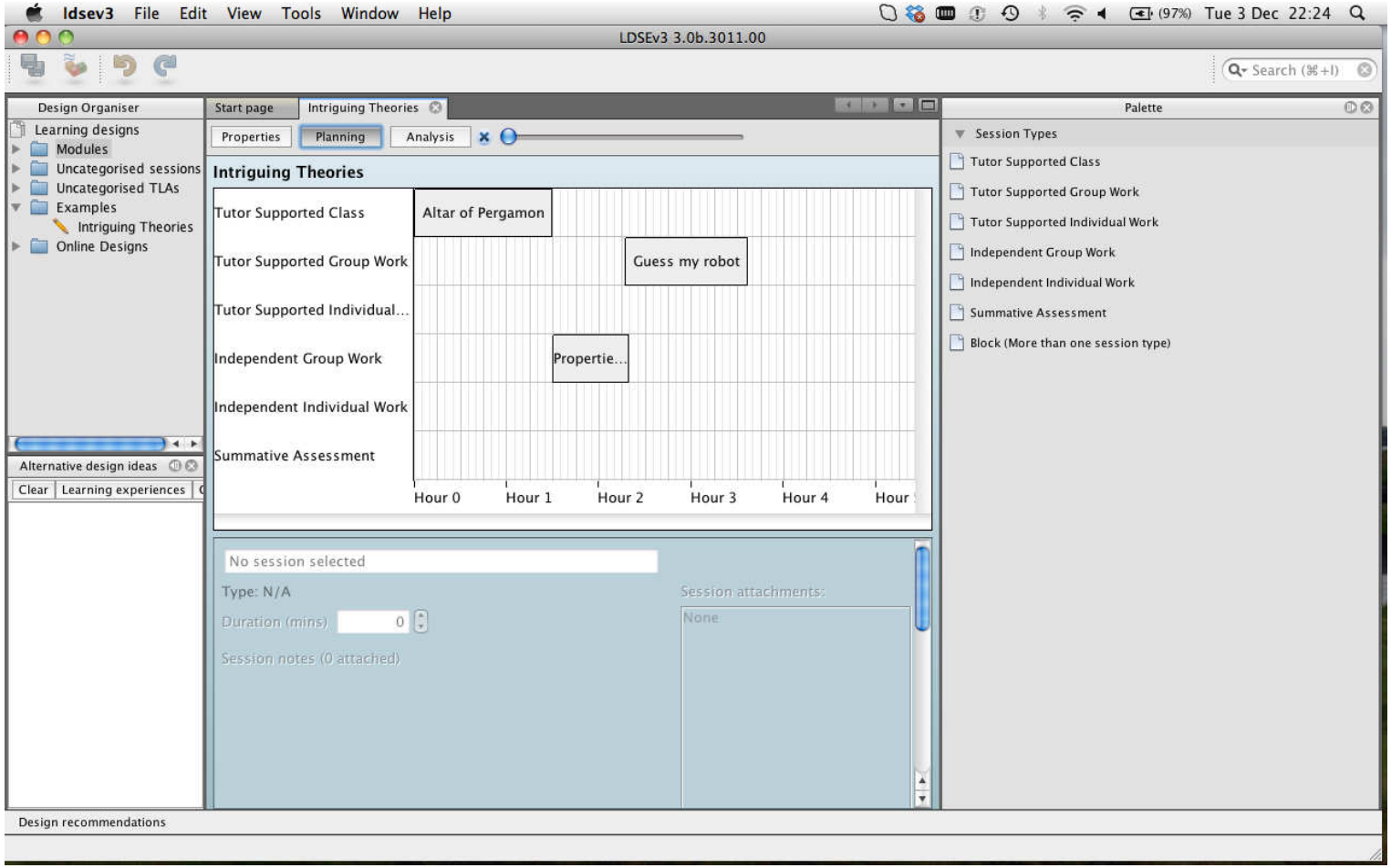


Figure 17. Module level analysis

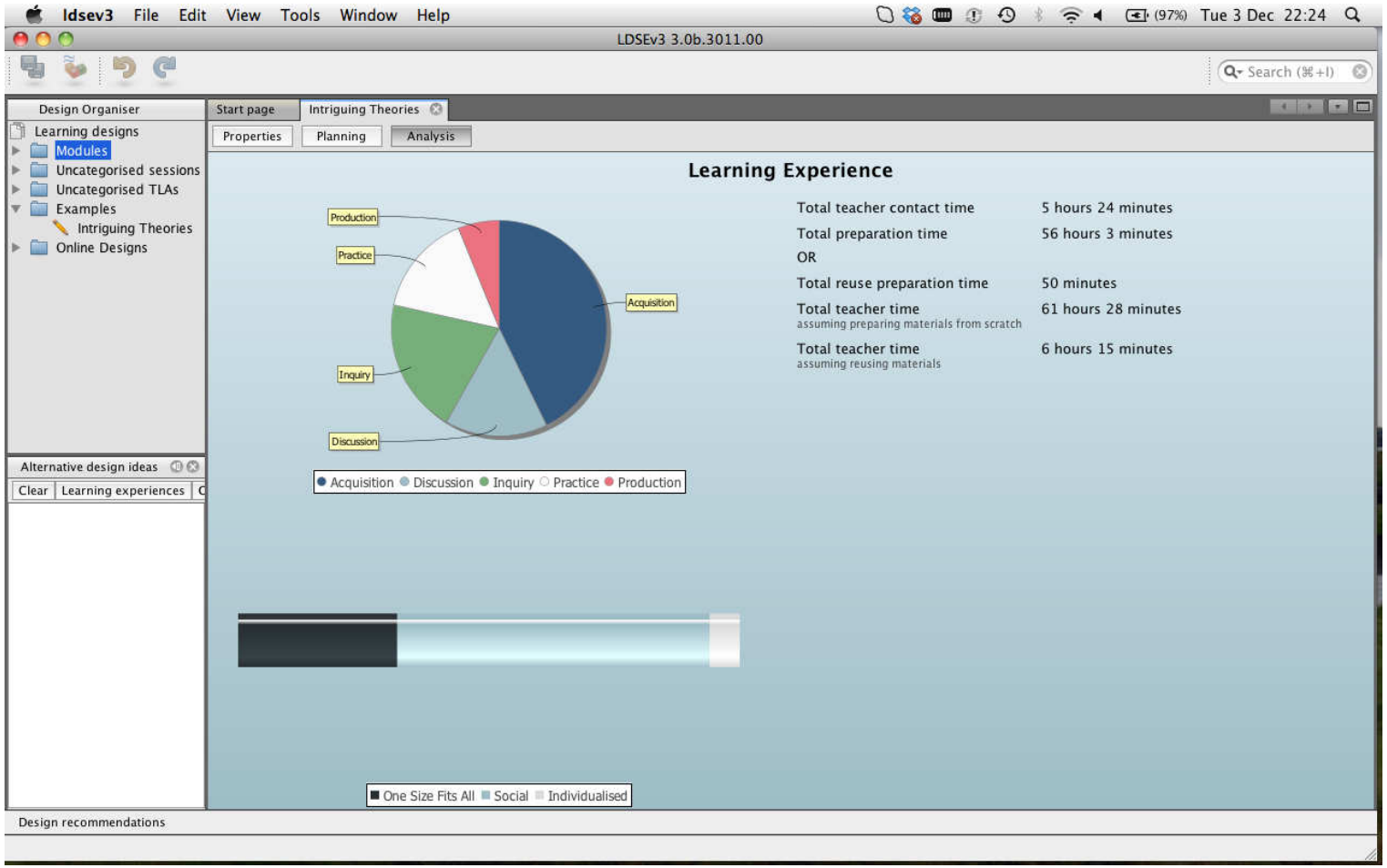


Figure 18. Session level properties.

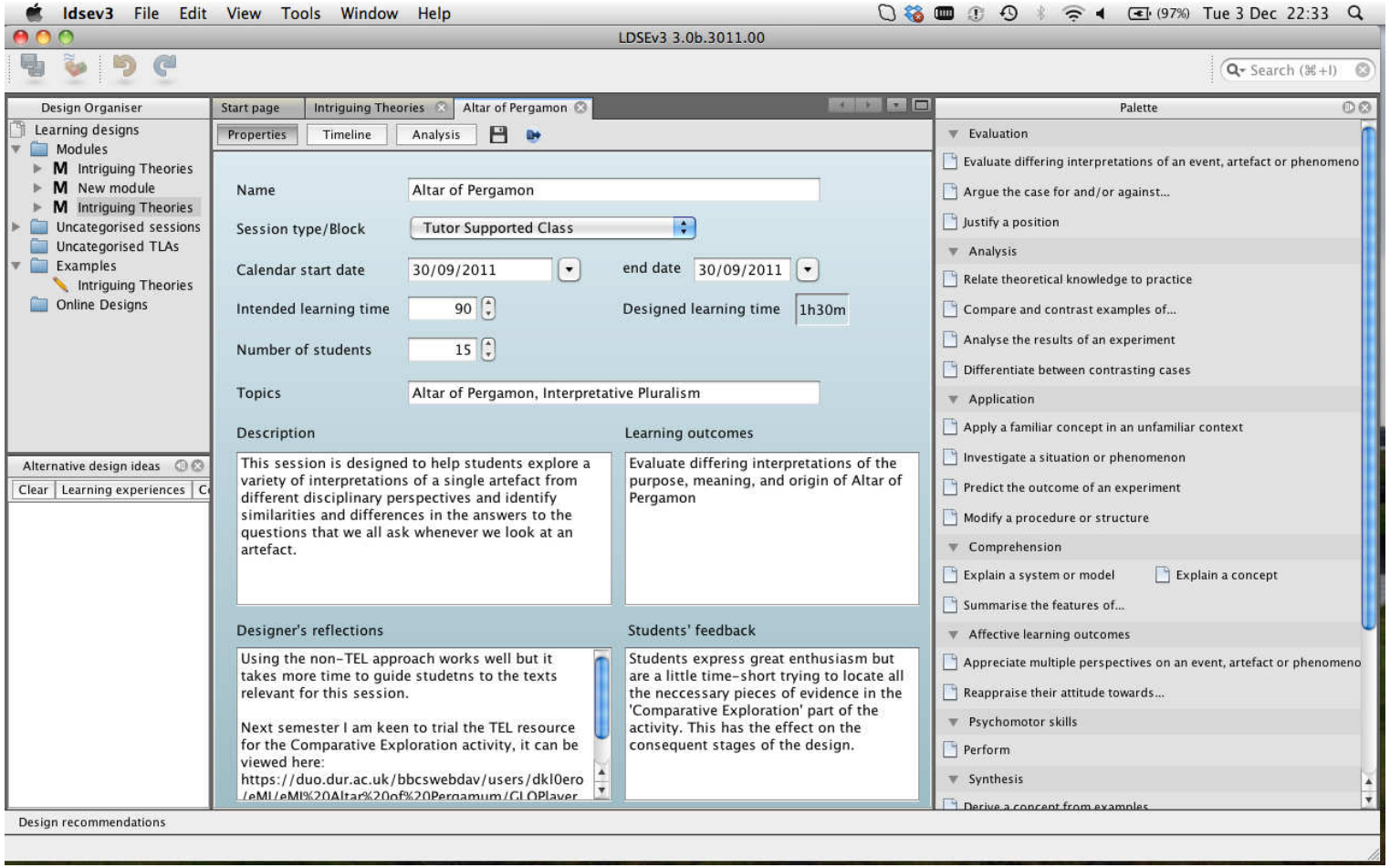


Figure 19. Session level timeline.

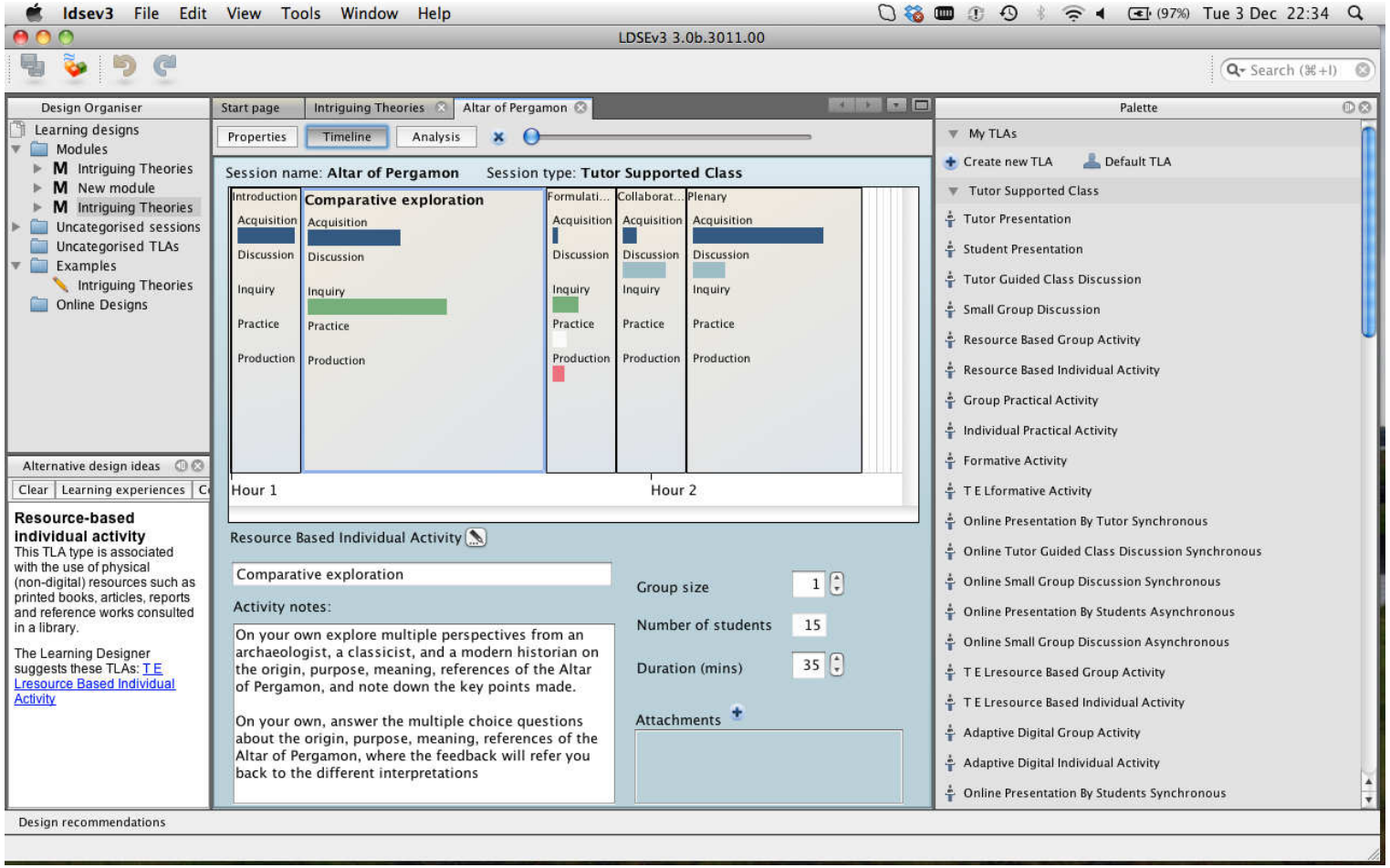


Figure 20. Session level analysis.