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PhD revisited: The teacher as interface

Teachers of EFL in ICT-rich environments: Beliefs, practices, appropriation[1]

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ABSTRACT This chapter summarizes a doctoral study (Lund, 2003) that investigated teachers of English in Norwegian Senior High schools and their use of Information and Communication Technologies (ICT). The aim was to examine how teachers perceive the impact of ICT on their school subject, how they practiced in technology-rich environments, and how they appropriated ICTs to transform and expand their practices. The conceptual framework and theoretical perspective guiding the analysis were drawn from sociocultural perspectives and especially Cultural-Historical Activity Theory. The chapter discusses current and future issues related to teaching English in technology-rich and networked environments.

KEYWORDS English teaching | information and communication technologies | Cultural-Historical Activity Theory | transformation

1. The chapter presents the overall results of a doctoral study (Lund, 2003) from the University of Oslo, focusing specifically on practical implications for teaching English in digital and networked contexts. The doctoral thesis in its entirety – with theoretical, methodological and empirical details – can be found here: https://www.duo.uio.no/handle/10852/32284

INTRODUCTION

Teachers' encounters with ICT and how they integrate ICTs in their work constitute a complex phenomenon. In the present study, two main research approaches were chosen. The study aimed in part to capture teachers' socially and culturally constructed beliefs about and attitudes to ICT. How they experienced an ambitious course linking the teaching of English and ICT was researched through a survey. In addition, the study aimed to capture aspects of teachers' educational practices in ICT-rich environments, and *how* they practiced was researched using an ethnographic approach.

The rationale for the study was that education should prepare learners for life and work in the immediate and more distant future, not just serve a curriculum. Digital technologies as introduced and used productively by teachers will play a crucial role in such an endeavor; consequently, there is a need to develop insights as to how the interplay between teachers, learners, and technologies affects life in the classroom. The doctoral study presented here argued that teachers' encounters with and integration of technologies, their *appropriation* of them, had been an under-researched phenomenon. Appropriation involves making something that originally existed in other people's contexts your own and on your own terms, instilling it with your own intentions – in this case as a teacher (Bakhtin, 1979/2000; Wertsch, 1998). Thus, appropriation also involves change – *transformation* – in humans as well as in contextual factors, and these transformations are found at individual, collective and institutional levels.

In the doctoral study, teachers' appropriation processes were observed where three strands intersected: the school subject (EFL[2]), digital technologies (ICT), and didactics. These composite and mutually constitutive fields had not yet become an established academic domain. However, as ICT continued to make an impact on diverse school subjects it was assumed that the intersection of school subject, technologies and didactics would become an interesting area for research. It was where the three fields converged – not primarily to the separate fields – that this study intended to make a contribution.

The issues outlined above raised some challenging research questions about the instrumental use and the far more demanding appropriation of digital artifacts. Consequently, the overarching research question was formulated as follows:

In what ways are ICTs appropriated in the EFL classroom?

2. Since the publication of this thesis, EFL has become an obsolete term, but is kept throughout the chapter in order to stay true to the original text and with the original connotations of the term.

The aim was to see teachers' encounters in an interactive perspective where teachers, learners, technological artifacts, and environments constituted an *information ecology*, "a system of people, practices, values, and technologies in a particular environment. In information ecologies, the spotlight is not on technology, but on human activities that are served by technologies" (Nardi & O'Day, 1999:49). Consequently, three supporting questions were posed:

1. What are some of the beliefs and attitudes of teachers of English who encounter ICTs in their profession?
2. What kind of educational practices emerge when teachers of English integrate ICTs in their classes?
3. Under what conditions do we see innovative practices emerge?

The immediate purpose of this study was to increase our insight in and understanding of what it means to teach English as a Foreign Language in technology-rich environments; i.e. there was a marked didactic dimension to the purpose.

REVIEW: A MULTIFARIOUS FIELD

What is a field? Traditionally, English as a Foreign Language (EFL), Information and Communication Technologies (ICTs), and didactics had constituted three separate research fields. However, at the risk of simplification and superficiality, the doctoral study adopted an approach that looked at the synergy and complexity that emerged when these strands converged. There had been studies that defined the field of technologies and teacher education through a subject matter focus (Willis, 1993), but the present study aimed to analyze the *interplay* between technologies, subject matter and issues of teaching and learning in an organic, ecological sense. A research field is often approached from its "state of the art", the highest level of development at a particular time. However, the research field of the present study was a composite that drew on (at least) three separate domains (EFL, ICTs, didactics). Where these converged was an under-researched phenomenon and, consequently, not well documented in research literature.

CALL

At the time of the study, when questions of teachers, learners and technologies had been raised, the school subject had often been left unspecified (Lankshear, Snyder, & Green, 2000). Also, technologies had rarely been conceptualized beyond instru-

mental features (Orlikowski & Iacono, 2001). When a defined school subject or a knowledge domain constituted the point of departure, literature had often taken on prescriptive approaches ranging from collections of ideas and recipes (Hardisty & Windeatt, 1989) to more methodologically reflective examples of good practice (Warschauer, 1995). Regardless of type, such practices had been subsumed under the umbrella term Computer Assisted Language Learning (CALL), which went back to the 1980s. But over the years, any notion of a particular "CALL method" had been refuted and the need to link CALL to Second Language Acquisition (SLA) research had been acknowledged (Chapelle, 2000). Several scholars had tracked the history of CALL and noted the same patterns (Kern & Warschauer, 2000; Levy, 1997; Murphy, 2000).

Studies on the use of ICT in teaching and learning English had often focused on technological features (e.g. style checkers, speech technology), addressed generic learning processes (e.g. concept formation, types of interaction) and less often what happened when a particular school subject was introduced. However, this seemed to change with the growth of scientific literature.

Thus, the reviewed literature showed that there was a need to focus on how technologies impact on language learning and how they were embedded in larger social and cultural practices. With the impact from sociocultural studies of language learning on the one hand, and the trend towards collaborative uses of ICT on the other, adding the rapidly developing technologies on top, questions of how teachers and learners could cope had become acute, especially with a focus on teachers' pedagogical and technological expertise (Lankshear et al., 2000).

TEACHERS' DIGITAL EXPERTISE

One of the assertions that emerged from the review of the field was that teachers' *expertise* is a crucial – perhaps *the* most important factor in a sustainable and future-oriented education ecology. For example, a study by the British Educational Communications and Technology Agency (BECTA) found that "When teachers disengage from the use of technology and leave pupils to use it and teach each other how to use it, the potential for enhancing learning drops away steeply" (Dawes, 2001:64–65). Teachers' ability to work as the more knowledgeable peer in technology-rich settings had become an integral part of their professionalism. However, what counted as expertise may not have been obvious.

Further, the review of teachers' expertise showed that teacher knowledge is constantly evolving in practices and is not a compilation of subject knowledge and managerial skills to be applied to a classroom situation. Rather, teacher knowl-

edge is a multifaceted, evolving understanding of how three dimensions interact; *subject knowledge, school knowledge (i.e. institutional dimensions)*, and *pedagogic knowledge (including learner knowledge and curriculum knowledge)* (Lankshear et al., 2000; Dawes, 2001). Together, these dimensions add up to teachers' professional knowledge. A model of how these dimensions interrelate was devised by Banks et al. (1999) and was also used by McCormick and Scrimshaw (2001) where they applied it to analyze change in practices as a result of ICT implementation. Similarly, Becker (1994) found significant correlations between teachers' constructivist pedagogies and realizing the potential of ICT in education.

VARIATION IN ENGLISH

Moving from teacher expertise to the subject in question, EFL, the review also revealed intriguing trends when the language goes online. Like Global English (Graddol, 2001), Online English exhibits variants determined by situational factors – the plural form *Englishes* was frequently used (Crystal, 2001a; Kachru & Nelson, 2001). In his book on language and the Internet, David Crystal (2001b:17) used the generic term *Netspeak* for online language use and reserved *Netlish* for the English language. This extended mode of expression opens up for experiments with online identities, a well known phenomenon from several studies (Kirkup, 2002; Turkle, 1995). In a study of Norwegian learners' first encounter with a virtual classroom, a particular form of hybrid Netlish was found to mediate the process of learners establishing a presence through written language only (Lund, 2001).

Out-of-school contexts are rich in non-standardized variants that may be regarded as innovative and functional outside the classroom, but may be seen as challenging or even harmful in a curricular perspective. This means that there exists a strong element of out-of-school language socialization (Roberts, 2001) that is not easily compatible with the traditional perspective on language learning within the educational system.

In many ways, David Crystal summarized what this multi-thematic (CALL, teacher expertise and English variants) review revealed:

> The language classroom will lose all credibility if it is defined as only a counter-culture to new trends developing. An inevitable consequence of this development is that the language will become open to the winds of linguistic change in totally unpredictable ways (Crystal, 1998:130–31).

When English goes online we have seen both gusts and breezes.

THEORY

This section sought to explain, justify, and elaborate key concepts in *a sociocultural perspective* on the study of teachers' encounters with and *appropriation* of ICTs. The rationale for choosing a sociocultural perspective was found in its explanatory power; it builds on a fundamental assumption that learning is a social and cultural phenomenon, i.e. it involves collaboration and the use of available resources and is not confined to the mind of the individual. This will be elaborated in the following.

VYGOTSKY'S LEGACY

Essential to a sociocultural perspective is the Vygotskian tradition in psychology and education. Lev S. Vygotsky (1896–1934) refined the theories of the human being as a tool-using social agent and how language affords and constrains thinking (Vygotsky, 1978, 1986). This is referred to as the principle of mediation and mediated thinking and represents a cornerstone in sociocultural perspectives. In addition, Vygotsky was interested in studying development and future-oriented activities, and found this to be intimately linked to social and cultural rather than individual and cognitive dimensions. Thus, his seminal concept of the *zone of proximal development* (ZPD) rests on socially situated activity in which:

> [i]t is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more intelligent peers (Vygotsky, 1978, p. 86).

In sum, mediated thinking and action by cultural tools and mental development as a social and cultural phenomenon, not merely a cognitive and individual one, form the essence of Vygotsky's approach. This doctoral study argued for the explanatory power found in such approaches to the use of digital artifacts and teacher-led guidance and instruction. However, Vygotsky conceptualized but never operationalized the ZPD. It remained for his colleagues and students to pursue such endeavors.

CULTURAL-HISTORICAL ACTIVITY THEORY (CHAT)

Cultural-Historical Activity Theory (CHAT) takes Vygotsky's focus on the interplay between humans and tools (especially language) and takes a larger and more

systemic approach where a collective motive, the object of activity (for example, collaborative authoring in a wiki), is the driver for learning as expansion and going beyond current knowledge practices (see e.g. Engeström, 1987; Engeström, Miettinen, & Punamäki, 1999; Leont'ev, 1978). In Figure 7.1 (below) an activity system is illustrated.

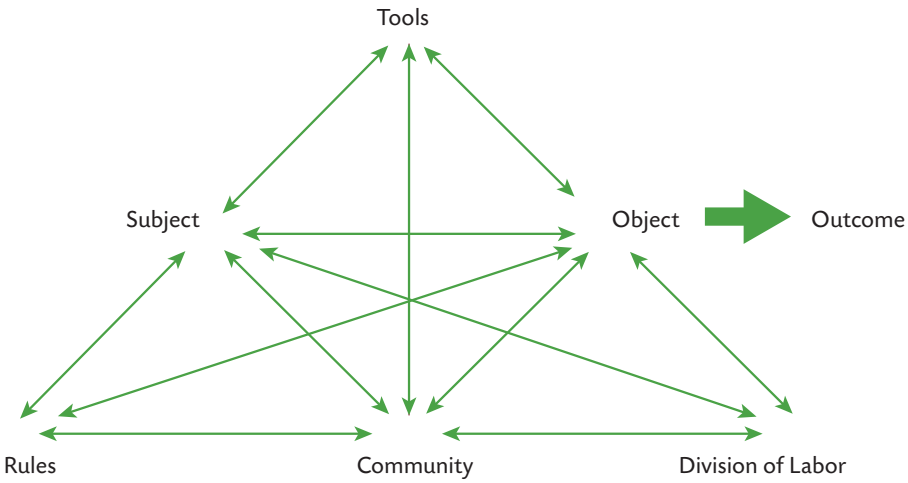

FIGURE 7.1. A model of an activity system (Engeström, 1999).

The top triangle is an approximation of Vygotsky's mediated action. In the expanded model of activity theory, this action rests on a foundation of rules, a community of practice (for example teachers), and a division of labor (for example between teachers and students). One component may be in tension with or mediate the transformation of another component. For instance, networked ICTs (cultural tools) may be in tension with a traditional teacher/learner division of labor (delivery/consumption) but also mediate the transformation of such division into a more interactive, collaborative, and empowered situation for learners. Furthermore, actors shape – as well as are shaped by – contexts and relations. An example is found in the way languages and language use are transformed when mediated by ICTs; we see an emerging vocabulary (blog, wiki, webinar), experimental syntax and register (emails), use of emoticons, multimodality etc. (Crystal, 2001a, 2001b; Wark, 1997; Warschauer, 2002). Engaging in such literacy practices also changes the person as a communicator and language user, for example when at the speed of a few key strokes s/he engages with diverse interlocutors in very different communicative cultural contexts, genres, and registers.

Taken together, the theoretical approaches and assumptions referred to above take us from language acquisition to language participation and increased student agency, although under expert guidance. But such expertise among teachers requires that they have appropriated the mediational means involved, made them their own, and instilled them with their own intentions as well as those of society. This is much more demanding than mere "mastery" of a tool (Bakhtin, 1979/2000; Wertsch, 1998) as it involves fusing subject-specific and didactic expertise with pedagogy; that, together with the affordances of technology, makes it possible to transform and improve teaching practices.

METHODOLOGY

The present study applied a mixed methodology and multilevel analysis. Methods included descriptive statistics, ethnographic research on classrooms, as well as virtual communities, elements of discourse analysis, and some informal talks and semi-structured interviews.

RESEARCH DESIGN

The Mixed Methodology Design (Tashakkori & Teddlie, 1998) was intended to bridge research questions, the composite field to be studied, and theory on the one hand, and unit of analysis, types of data, types of description, and conclusions on the other. The multilevel approach also involved a perspective that embraced individual, collective and institutional planes.

Below is a visualization of the research design.

If we break down Figure 7.2 into stages, we can analytically get an overview of how the research design progressed over a two-year period (September 2000–September 2002). Note that it appears as more linear than in the actual research, which involved overlaps and cycles. The first stage involved developing the design to examine teachers' attitudes to and beliefs about ICT through a questionnaire, and also by observing online interactions among EFL teachers who took part in an extensive and ambitious in-service course on the use of ICT in EFL (*The Tower*). The second stage consisted of data collection in accordance with stage one. The third stage involved analysis of this data, predominantly in the form of descriptive statistics; however, qualitative approaches were also needed when encountering open-ended questions and the online interaction data. Stage four represented a shift into designing for examining what practices emerged in two classrooms. Stage five involved data collection through ethnographic classroom studies of

teacher and learner interactions, in addition to interviews. Finally, stage six represented a phase in which the previous stages converged in a more holistic analysis involving mostly qualitative analysis, but also some frequency counts.

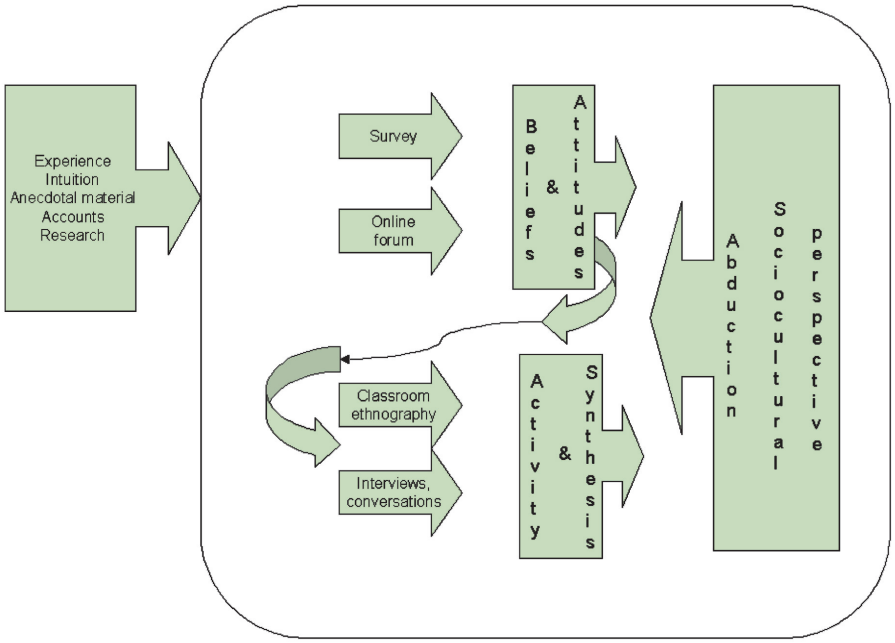

FIGURE 7.2. Research design. The model reflects a dynamic and evolving process in accordance with an abductive approach (Alvesson & Sköldberg, 1994), i.e. identifying patterns and relating them to the conceptual framework in order to analyze examples in depth. The link from the survey and online forum (Phase One) to the classroom ethnography and interviews (Phase Two) is not causal, only suggesting a connection.

SAMPLE

The above research design yielded several types of data; survey data in the form of responses to closed as well as open questions, data from a vast number of postings from teachers participating in the many discussion groups offered by *The Tower*, audiotaped interactions and field notes from classroom practices, data from senior high school students' work online and in virtual classrooms, and data from semi-structured interviews and informal talks with both students and teachers.

The data for this study was collected and processed over a period from September 2000 until September 2002. During this period, two primary sources were tapped; participants in the in-service course *The Tower* ("Språktårnet"), and teach-

ers and learners in two classrooms. A survey with pre-designed (*N*=208) as well as open-ended (*N*=92) questions was conducted with teachers of English who took part in the extensive in-service course. This quantitative approach sought to elicit the participating teachers' beliefs about, attitudes to, and experiences with ICT; i.e. their appropriation of ICT. The survey served as a backdrop for the qualitative, longitudinal study of three teachers (*Tower* participants) and their students. Thus, the second part of the study aimed to capture aspects of teachers' *practices* in ICT-rich environments. Both *The Tower* data and data from the two classrooms amount to purpose sampling in the sense that they were regarded as decisive in explaining the phenomenon under examination.

In order to rise above inductive accumulation while at the same time trying to grasp patterns in digitalized communication as they emerged in the data corpus, an abductive approach was chosen (Alvesson & Sköldberg, 1994). An abductive approach combines deductive and inductive approaches as it seeks to identify patterns in the data corpus, juxtapose patterns with theoretical concepts, and use the explanatory power of such juxtaposition to analyze examples in depth. Thus, empirical examples go beyond a status of being mere illustrations to become empirical carriers of principles and determinants pertaining to the phenomenon under study.

FINDINGS

This section is divided into two parts. First, three main findings emerging from the collected data corpus are listed. Next, these findings are extrapolated onto a meta level where the emerging educational activity system, as identified through the analyses, is juxtaposed with a schematized version of the activity system that functioned as its point of departure.

PATTERNS IN THE DATA

Pattern 1: The social spaces (both in terms of time and place) for EFL practices became extended. As EFL practices and content increasingly became "externalized" in distributed networks and other digital artifacts, new communicative spaces emerged. Teachers could exploit such new spaces by making designs for learning at the interface of offline and online environments. By populating and colonizing new social spaces, teachers and learners brought their lifeworlds, their cultures-of-use into them and, consequently, a potential for a shared or "third space" emerged, not least because of a series of innovative tasks designed by the

teachers. For example, in one such design, the class was divided into motorists on their way to an important event and demonstrating environmentalists blocking the highway. The setting was L.A. The participants were to articulate and enact their arguments and perceptions of the situation, using the school's intranet. This also resulted in subsequently videotaped role-play.

Pattern 2: The school subject of EFL learning was partially transformed. With networked ICTs, new participatory genres emerged as socially constructed conventions. These were developing and did not become well-established communicative forms on par with e.g. the business letter or the scientific essay. Nevertheless, the ICT-rich environment afforded opportunities for innovative and diverse practices. Thus, the distance between school and out-of-school practices was reduced. Moreover, such practices pointed to EFL as situated and contextual, both in human and technological terms. However, teachers sometimes found it difficult to assess such practices by conventional or standard criteria.

Pattern 3: Teachers needed to teach in ways they were not taught to do. In ICT-rich environments we saw the outline of communicative practices that ideally should prepare learners for the future. For teachers, this meant being committed to continuous professional development, e.g. by engaging in collaborative teamwork with colleagues, by fostering collaborative cognition in the classroom, and by developing a capacity for risk-taking and transformation. These processes involved learning and teaching as two aspects of an activity; the two could not always be separated, but emerged as two dimensions of partaking in the development of educational activities and discourse.

FINDINGS ON AN AGGREGATED LEVEL

On an aggregated level, the above findings point to tensions between an activity system of emerging practices and an activity system that carries a long institutional-organizational heritage. However, for the emerging activity system to be sustainable and not merely a stunt, constraints in the traditional system will have to be overcome. As schools are socially and culturally constructed institutions, the way they arrange conditions for teaching and learning are manifestations of how they think about (or ignore) urgent educational issues. Based on the findings gleaned from the data corpus, the present study revealed that the teachers found themselves at the interface of a historical and an emerging activity system (Table 7.1).

TABLE 7.1. Teachers at the Interface. Aspects of cultural reproduction and renewal.

Issues	Interfaces	
	Traditional	**Emerging**
Ontology	Dualist (mind ≠ world), static	Non-dualist, relational interdependence of mind and world
Epistemology	Knowledge can be possessed through transfer and (individual) mental processes	Knowledge is situated, procedural, relational, collective, distributed over humans and artifacts
Literacy	A series of discrete functional skills to be taught (encoding and decoding)	Increasingly informed engagement in complex, diverse multimodal social practices;
Technology	Enhancement of learning and teaching	Transformation, potential new spaces for learning and teaching
EFL school subject	Defined by curriculum, standardized	Beyond the curriculum, diverse and not (yet) approved variants
Didactics	Priority to knowledge acquisition, loose connection with a theory of learning	Priority to knowledge production, closer connections with theories of learning
Curriculum	Standardized, administered and controlled in the form of individual tests and exams	Negotiated with a view to "real world" practices and controlled as capacity for mature, collaborative participation
ICT Policies	Promote skills (technical and pedagogic) that produce efficacy in learning and teaching	[At the time of writing, this was not clear. Recent years have shown ICT policies also embracing innovation, creativity, transformation and epistemologies]

In sum, findings from data analysis and findings on an aggregated level amounted to what was argued as the most important discovery in the doctoral thesis; that the underlying activity system for EFL teaching was changing, and that teachers who engaged in ICT-rich practices found themselves caught up in, challenged, and also invigorated by this process.

DISCUSSION: CONTRIBUTIONS TO THE ENGLISH DIDACTICS FIELD

In the following, empirical, methodological, and theoretical contributions are listed before turning to implications for teaching English in technology-rich environments and suggestions for further research into this field.

EMPIRICAL CONTRIBUTIONS

Firstly, by juxtaposing data from *The Tower* survey with ethnographic and discourse data, this study could report from what teachers *perceived* and what teachers *did*. Thus, the empirical foundations for understanding what English didactics in technology-rich learning environments entails became more analytic and robust than in the rather descriptive accounts that often have been published.

Secondly, the field of ICT in EFL had at the time of the study not produced much data in the form of recorded interactions elicited from teachers' practices in ICT-rich environments. The micro-level properties of these data made it possible to track and analyze certain crucial decisions, "teachable moments", and serendipitous incidents up close. Important spaces for participation and realignment of teacher and learner positions could be seen in such data, including practices where learners exercised more agency and drew on language practices acquired and cultivated out of school, not least in online activities. Also non-standard utterances and linguistic features (spelling, emoticons, register) emerged in the course of the activities.

Cultures and technologies influence what counts as functional and valid English in the 21st century. Instead of locating the discipline within a linguistic system to be acquired, it is located in practices that are constantly being shaped and reshaped through an increasing number of people who engage in global and online Englishes. This situation has consequences for what we consider "acceptable" or "functional" practices and how we assess such practices. Novel communicative conventions are currently emerging in online communicative spaces, and while some might interpret such novel conventions as innovative experimentation, others might see regular errors and miscalculated context or interlocutor response. Such ambiguity could complicate assessment practices that take standardized language as their point of departure. Still, teachers need to take part in and point to productive and relevant use of such conventions in order to serve as informed and convincing users. If not, they risk becoming marginalized and abdicating their position.

This amounts to a novel image of the teacher: the new generation of teachers will find themselves at the interface of cultural reproduction and renewal. They will not only be entrepreneurs and executors of approved policies but also activists and agents of change, i.e. people who persistently inquire into and research educational practices. In this capacity, teachers will themselves constitute an interface between tradition and innovation, cf. the title of the present study.

METHODOLOGICAL CONTRIBUTIONS

Firstly, *The Teacher as Interface* was a study that was broad in its scope; it sought to capture appropriation processes as they emerged in collective as well as individual contexts. The mixed methodology approach used in the present study was in itself not new, although not common within a sociocultural perspective. However, the way quantitative and qualitative methods were sought to complement one another may represent a suitable methodological approach when the researched phenomenon is complex.

Secondly, the study aimed at capturing a multi-dimensional view of appropriation processes. The survey presented a "snapshot", an accumulation of beliefs and attitudes aggregated in teachers over the time they participated in *The Tower* course but captured at the end of the course. Although descriptive statistical techniques have been used, the responses have also been analyzed qualitatively as a polyphony of voices, captured in a particular scientific genre. Thus, the survey made it possible to examine teachers' appropriation of ICTs on a collective level after having participated in a particular discourse community.

Thirdly, the classroom observations captured the more longitudinal aspects of appropriation emerging in and through teachers' practices. In addition, the longitudinal design captured levels of activity: horizontally in the form of consecutive sessions that added up a course or a term, vertically in the form of episodes and sequences, how these were enacted, and where we see different configurations of learners, teachers, and artifacts.

Finally, there was a contribution regarding recurrent phenomena and patterns and how they related to the theoretical perspective. Avoiding a strictly inductive or deductive approach, the present study made use of abduction. This approach examined instantiations of phenomena in light of theoretical assumptions and concepts; i.e. there is interplay between empirical data and conceptual framework. Abduction afforded an intimate relationship between the two and served as a valuable research strategy and methodology when analyzing phenomena through a particular theoretical perspective.

THEORETICAL CONTRIBUTIONS

This researcher will argue that the current PhD study has made an important theoretical contribution to understanding how change and innovation affect education at the interface of offline and online settings and, consequently, the work of teachers.

Firstly, a sociocultural perspective was used to link the separate fields of EFL, ICTs, and didactics and to view their convergence in terms of the interface metaphor. Sociocultural approaches come with a set of constructs that make it possible to examine the transformation of the classroom under the impact of ICT. By transcending dichotomies of the individual and the social, mind and activity, actors and contexts, a sociocultural perspective provides analytical tools for studying how learners, teachers and artifacts realign themselves when encountering digital and networked technologies. Thus it was possible to make visible the relational expertise teachers in the 21st century will need (Edwards, Gilroy, & Hartley, 2002). The study has brought about a reconsideration of literacy and what it means to be literate today and in the near future. This is particularly important when the subject in question, English, is a global language on the rise in online settings.

Secondly, the present study instilled the field of didactics with certain assumptions of knowledge and learning to show that questions of ontology and epistemology become didactic concerns as information increasingly becomes digitized and distributed. Another aspect is that the distance between a subject matter as it appears in a formal schooling context and in the "real world" is reduced. Practices in the schools resembled authentic practices and in which the students' lifeworld experience became a real asset. The epistemological implication is that learners relate to a school subject in new ways as they participate in giving it shape and may, over time, contribute to forming an activity system that challenges the traditional system. Such future-oriented, exploratory, and creative efforts must, however, be balanced by the cultural heritage found in the discourse of a school subject. Teachers play a crucial role in making visible and sustaining this balance between tradition and innovation. Thus, it can be argued that the theoretical lenses employed in the study brought about valuable contributions to didactics.

Finally, the construct of *appropriation* has been developed in some detail. The construct appealed to the present researcher because of its explanatory potential when examining how and why some teachers integrate ICTs and some do not. In sociocultural literature, the construct is often brought up but seldom in great detail or applied to a specific research objective. Rather, the appropriation construct has been used in general terms to characterize the relationship between agents and mediational means (Wertsch, 1998). The present study used appropriation as a key

to understanding how teachers integrate technologies in the EFL classroom and has, thus, aimed to operationalize the construct within a particular domain. This involves not only demonstrating how teachers (and learners) merely enact digitalized communication, but also how they cope and at times struggle with making emerging genres and registers their own. With on-going change and development in language and learning/teaching approaches as well as digital technologies, the appropriation processes of teachers might be one of the major roads to explore in order to advance and improve our understanding of what goes on in the 21st century classroom and how to prepare teachers for practices in transformation.

IMPLICATIONS FOR TEACHING ENGLISH AND TEACHER EDUCATION

At the two schools, the three teachers that were observed made changes in the way they organized their teaching. This came about either by grouping sessions into larger units or by going beyond "normal" working hours, e.g. when conducting online sessions with students in the United States, ICT suspended many constraints regarding time and space. Therefore, there seems to be a need for greater flexibility with regard to the school subject and its allotted time that the current organization of schooling does not easily accommodate.

Another similar issue is how the three teachers managed to cope with the added complexity. Teachers at one school tried to take on challenges by building a collaborative approach that included teachers of English as well as technicians and ICT-savvy students at the school. This amounts to enhanced relational competence as part of teachers' professionalism. In the case of the other school, there was a quite different situation as the ICT-competent teacher ran a mostly solitary practice. This can be seen as a survival strategy: teachers with the kind of competence that this teacher displayed might be exploited and experience burnout if they are not allocated time to let their expertise benefit staff and administration. In both cases, the issue is one of sustained support and division of labor. The implications are that innovative practices cannot be separated from how contexts encourage, adapt to, or resist transformation at classroom level as well as on an institutional level.

A basic but relevant question that might follow any study would be *So what?* In slightly more sophisticated form, the above question might be rephrased, *What might be the practical relevance of the present study for educators?*

Responses from *The Tower* survey as well as the classroom practices observed showed how the EFL curriculum was innovatively enacted at classroom level. One could say that the teachers observed at the two schools in many ways taught

beyond the curriculum. When ICTs permeate practices and are not just add-ons to existing ones, we see fundamental transformation. The PhD project demonstrated that such transformation included a re-conception of literacy, realignment of positions, relations and agency, new spaces for participation, and proximity to diverse and authentic practices, in addition to students' practices involving e.g. experimental spelling and objectionable choice of (four-letter) words far from "accepted standards". Well thought-out designs of learning environments and activities and careful orchestration of them are needed.

In turn, the analyses and findings of the doctoral study have implications for teacher education and in-service training courses. ICT-intensive designs and enactment of them need to be integrated, and designs must pay attention to two dimensions of education; enculturation into an existing discourse that centers on a school discipline (e.g. EFL) as well as transformational potential that prepares for emerging discourses. ICTs offer opportunities for creating such designs but teachers will need support from institutional and academic quarters in order to make such opportunities materialize. For instance, ICT integration needs to be linked to theoretical frameworks in order to avoid being merely *ad hoc* and unprincipled efforts. It is the relations between humans, artifacts, and contextual factors that emerge as mutually constitutive of learning and teaching. Moreover, in order to sustain innovative practices and make them more robust, teachers need to become *designers of technology-rich environments and trajectories as well as researchers of their own practices*.

RECENT DEVELOPMENTS AND SUGGESTIONS FOR FURTHER RESEARCH

The present study was conducted at a time when there was very little similar literature, especially where a sociocultural approach was used. The study was also broad in scope, which left room for more in-depth research to be done in a number of areas. Some might appear as an extension of the implications presented above. In the following, two major themes with strong links to the present study are briefly pursued: a) Teachers' Professional Digital Competence (PDC), and b) Language Learning and Identity.

Professional Digital Competence (PDC)

In recent years, increased interest in teachers' professional digital competence has emerged. This corresponds with a teacher role where s/he is not merely an executor of the curriculum but a knowledge worker and designer of learning environ-

ments and learning trajectories (see e.g. Cviko, McKenney & Voogt, 2014; Lund, Furberg, Bakken & Engelien, 2014; Brevik, Gudmundsdottir, Lund & Strømme, in press). The *Nordic Journal of Digital Literacy* has frequently published articles on such issues.[3] From a sociocultural perspective, the focus has often been on the juxtaposition of technology and literacy as practices that have operational, cultural and critical dimensions to be appropriated by teachers. Furthermore, connecting school and out-of-school practices has emerged as a research topic that has raised a lot of scholarly interest in recent years (Lund, 2016). As for the transformative dimension touched upon in the empirical contributions (above), this is firmly linked to the role of the teacher as a designer of technology-mediated learning activities where humans and "non-humans" collaborate, but also to epistemological implications: how we come to knowledge and engage in knowledge practices and communicative endeavors when information is digitized, multimodal and infinitely accessible.

PDC is not an established concept or practice, and much research remains until we have a robust conceptualization of this competence. However, a vital element is how PDC connects deeply with the learning sciences and fundamental assumptions of learning; in our case sociocultural perspectives. Further, as an epistemic framework PDC links theory and practice in the sense that the two are not dichotomized, but rather represent two knowledge types and logics mutually constitutive of learning and development, in many ways the ultimate girder of the teaching profession. To further develop the understanding of PDC among teachers and student teachers, it is important to discuss the specific conditions that apply when teachers use ICT in their profession, and to discuss teacher education as one of the important realms where the operationalization of the concept takes place. Further research along these lines represents a multitude of exciting possibilities for enriching the educational professions.

Language Learning and Identity

A more subject-specific research direction that follows from the empirical contributions is how digitalization affords a whole new communicative ecology (social networks, hybrid spaces, virtual worlds, tele-collaboration, mass collaboration and communication, communication via avatars, etc.). With English as one of the primary languages used on the Internet, it commands special interest for anyone wanting to study language use and development in digital environments.

3. See e.g. https://www.idunn.no/dk/2014/04

As digitalization has become more sophisticated and pervasive, we see how digital environments not only offer opportunities for learning activities but also for developing, experimenting with and enacting identities by engaging in digitally mediated communicative practices (Thorne & May, 2017). Through virtual reality, augmented reality, imagined communities, online gaming, social networking sites, and blogs, language learners can experience an extension of their personal physical lives or adopt alternative identities, experimenting with and enacting personae.

The connection between identity formation and language learning has for decades been accepted as a powerful incentive for development of the first language (L1); how we construct our social identities through language, projecting for example class, gender, culture, nationality and/or community. Thus, *language as a social practice* has become one of the seminal constructs. Furthermore, research on identity formation has shown that identity is not an innate and static attribute of the individual, but that we may have multiple identities that are authored and enacted as we improvise and observe conventions depending on contexts and cultural worlds and spaces (Holland, Lachiotte, Skinner, & Cain, 1998). It would seem that at the juxtaposition of identity formation and new digital spaces, we encounter exciting opportunities for developing L2 proficiency and an expanded linguistic register, brought about by the possibilities of participating in diverse online language communities. For example, Brevik (2016) examined a phenomenon where male students in upper secondary school emerged as more proficient readers in English L2 than in Norwegian L1, and that online gaming seemed to play an important role. This is due to game instructions in English as well as communicating with other gamers in English.

Increasingly researchers and practitioners alike have started to investigate how virtual worlds (often with avatars) and online communicative spaces mediate diverse language use and, consequently, language learning (e.g., Norton & McKinney, 2011). The possibilities for cultural interaction, expanded literacy, and commuting between contexts, discourses, and registers open up for a plethora of context-specific and context-sensitive task types and activities. This opens up a whole new field of language research on poly-contextual use of English.

Many of the above suggestions require interventions and intervention research. In such studies, teachers could be involved since they can be identified as agents of change and since they increasingly have access to powerful digital artifacts. The primary reasons for interventions are found in the vagueness of the curriculum and syllabi when it comes to ICT, the mismatch between instrumental views of ICT (ICT as "mere tools") and the way digital technologies influence and trans-

form practices, and also how curricula as well as policy papers, programs for ICT integration and EFL teachers' professional development need to be informed by current research.

This doctoral study showed that EFL educators needed to appropriate technologies from a social and relational perspective. However, more research is needed on perspectives and practices that link human cognition and social practices in order to make sense of the transformational potential of digital technologies (Brevik et al., in press). The present doctoral study was written with an intention to contribute to this endeavor.

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