CYPRUS UNIVERSITY OF TECHNOLOGY

FACULTY OF FINE AND APPLIED ARTS

PhD Dissertation

THE DEVELOPMENT OF A CONSTRUCTIONIST LEARNING MODEL FOR SOCIAL TECHNOLOGIES

Antigoni Parmaxi

Limassol, 2015

CYPRUS UNIVERSITY OF TECHNOLOGY
FACULTY OF FINE AND APPLIED ARTS
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APPROVAL PAGE

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The development of a constructionist learning model for social technologies

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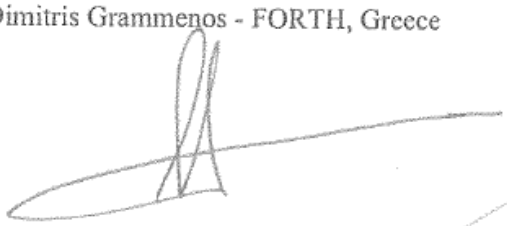

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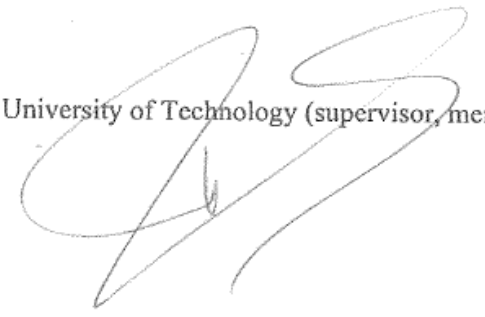

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ABSTRACT

The rapid popularity of social technologies has led to a wide spread of research studies conducted in formal and informal contexts demonstrating a wide range of their benefits in teaching and learning. Yet, the burst of studies exploring these technologies confronts with two threads with regard to their theoretical and pedagogical alignment. Firstly, a substantial number of studies is not aligned to a theoretical framework; whereas the implementation of Web 2.0 technologies in classroom settings calls for better task-technology alignment. The conundrum raised is that, whilst students increasingly engage with these tools in their everyday lives, there is still lack of Web 2.0 practices that draw on the specific features of these tools and align them with educational goals under well-designed activities.

With this in mind, this dissertation brought forward a three-year intervention, employing constructionism as an overarching theoretical framework, and unpacking the potential of social technologies as instructional tools that support social construction of artifacts by groups of language learners. The leading research question of this dissertation is "*How can constructionism ground and expand the use of social technologies as social constructionist tools in learning?*". Constructionism is a theory of learning, teaching, and design, which can be summarized in the conviction that learning occurs more effectively when learners understand the world around them by creating meaningful artifacts that can be probed and shared. In an attempt to infuse elements of constructionism in the use of social technologies, group of learners were assigned a task for social construction of an artifact using social technologies in three different Computer-Assisted Language Learning settings To understand the use of social technologies through the lens of constructionism, the process that students adopted and the way technology and context fostered this process were analyzed. The implementation of the intervention made feasible the identification of (i) core dimensions of social technologies as social constructionist tools; (ii) actions that capitalize the manifestation of constructionism within social technologies (iii) teacher's and students' role within social constructionist tools; and (iv) features of different social technologies as social constructionist tools. The main component of this dissertation is the constructionist model that demonstrates the core dimensions of social technologies as social constructionist tools, with actions held for the social construction of an artifact; and a set of instructional design elements that encloses the theoretical understanding of the

classroom whilst groups of learners use social technologies for constructing an artifact. The Social Constructionist Classroom (SCC) yields an environment rich in objects-to-share-with, following an artifact oriented task design and fostered through synergetic alliance of multiple social technologies, whilst moving beyond classroom walls.

As a result, the findings of this dissertation provide an in-depth understanding of how social technologies can be used for facilitating groups of learners to socially construct a shared artifact. Moreover, through the analysis of different types of social technologies, a new arena for using social technologies is deployed, offering insights for multimedia designers, interface architects, instructional designers, and practitioners towards a new culture of educational tools.

Keywords: social media, social computing, computer-assisted language learning, technology-enhanced learning, language learning, artifact, object-to-share-with, microworlds, social microworlds

ΠΕΡΙΛΗΨΗ

Η ραγδαία ανάπτυξη των κοινωνικών τεχνολογιών έχει οδηγήσει στην εκπόνηση σημαντικού αριθμού ερευνητικών μελετών σχετικές με τα τυπικά και μη τυπικά περιβάλλοντα μάθησης. Οι μελέτες αυτές αναδεικνύουν το εύρος των δυνατοτήτων των τεχνολογιών αυτών στη διδασκαλία και τη μάθηση, ενώ προβάλλουν δύο προκλήσεις που αφορούν τη θεωρητική και παιδαγωγική τους πλαισίωση. Σημαντικός αριθμός μελετών παρουσιάζει αδυναμίες στο να πλαισιώσει θεωρητικά τη χρήση των κοινωνικών τεχνολογιών, ενώ ταυτόχρονα τίθεται η ανάγκη για καλύτερη ευθυγράμμιση των εκπαιδευτικών δραστηριοτήτων με τις δυνατότητες των τεχνολογιών αυτών. Το παράδοξο που ανακύπτει έγκειται στην αυξανόμενη αφενός χρήση των τεχνολογιών αυτών από τους εκπαιδευόμενους, και αφετέρου στην έλλειψη πρακτικών που να πλαισιώνουν παιδαγωγικά τη χρήση τους.

Σε αυτό το πλαίσιο, η παρούσα διδακτορική διατριβή υλοποίησε ένα τριετές ερευνητικό έργο, υιοθετώντας τον κονστρουκτιονισμό (constructionism) ως γενικό θεωρητικό πλαίσιο. Η παρούσα διατριβή ανέδειξε τη δυνατότητα των κοινωνικών τεχνολογιών να δράσουν ως εκπαιδευτικά εργαλεία που υποστηρίζουν την κοινωνική κατασκευή τεχνουργημάτων (artifacts) από ομάδες εκπαιδευομένων. Το ερευνητικό ερώτημα που καθοδήγησε την παρούσα διατριβή ήταν: «Πώς μπορεί η θεωρία του κονστρουκτιονισμού να πλαισιώσει και να επεκτείνει τη χρήση των κοινωνικών τεχνολογιών ως εργαλείων ανάπτυξης κοινωνικών τεχνουργημάτων στη μάθηση;». Η θεωρία του κονστρουκτιονισμού μπορεί να συνοψιστεί στο εξής: η μάθηση λαμβάνει χώρα πιο αποτελεσματικά όταν οι εκπαιδευόμενοι κατανοούν τον κόσμο γύρω τους με τη δημιουργία τεχνουργημάτων που μπορούν να εκτεθούν και να προβληθούν δημόσια. Η θεωρία του κονστρουκτιονισμού στη χρήση των κοινωνικών τεχνολογιών τέθηκε σε εφαρμογή σε ομάδες εκπαιδευομένων σε τρία διαφορετικά περιβάλλοντα εκμάθησης γλωσσών. Αυτή η προσπάθεια είχε ως στόχο την κοινωνική κατασκευή ενός τεχνουργήματος με τη χρήση των κοινωνικών τεχνολογιών. Η διαδικασία που υιοθέτησαν οι εκπαιδευόμενοι και ο τρόπος με τον οποίο χρησιμοποιήθηκαν οι κοινωνικές τεχνολογίες, κατέστησε δυνατό τον εντοπισμό (i) των βασικών διαστάσεων των κοινωνικών τεχνολογιών ως εργαλείων κοινωνικού κονστρουκτιονισμού, (ii) τις ενέργειες που σηματοδοτούν τον κοινωνικό κονστρουκτιονισμό μέσα από τη χρήση των κοινωνικών τεχνολογιών (iii) το ρόλο του εκπαιδευτικού και το ρόλο των εκπαιδευομένων στο περιβάλλον του κοινωνικού

κονστρουκτιονισμού και (iv) τα χαρακτηριστικά των διαφόρων κοινωνικών τεχνολογιών ως εργαλείων κοινωνικού κονστρουκτιονισμού. Βασική συνιστώσα της παρούσας διδακτορικής διατριβής αποτελεί η ανάπτυξη του μοντέλου του κοινωνικού κονστρουκτιονισμού. Το μοντέλο αυτό προβάλλει τις βασικές διαστάσεις των κοινωνικών τεχνολογιών ως εργαλείων κοινωνικού κονστρουκτιονισμού, τις ενέργειες που σηματοδοτούν τον κοινωνικό κονστρουκτιονισμό και τα στοιχεία εκπαιδευτικού σχεδιασμού που περικλείουν τη θεωρητική κατανόηση του συγκεκριμένου μοντέλου. Το εκπαιδευτικό περιβάλλον του κοινωνικού κονστρουκτιονισμού είναι πλούσιο σε τεχνουργήματα, προσανατολισμένο στο σχεδιασμό εκπαιδευτικών δραστηριοτήτων με επίκεντρο το τεχνούργημα, ενώ ταυτόχρονα προωθεί τη συνέργεια πολλαπλών κοινωνικών τεχνολογιών.

Ως εκ τούτου, τα ευρήματα της παρούσας διατριβής συμβάλλουν στην εις βάθος κατανόηση του τρόπου με τον οποίο οι κοινωνικές τεχνολογίες μπορούν να διευκολύνουν ομάδες εκπαιδευομένων στην κατασκευή ενός κοινού τεχνουργήματος. Επιπλέον, μέσα από την ανάλυση των διαφόρων τύπων των κοινωνικών τεχνολογιών, διανοίγεται ένα καινούριο πεδίο όσον αφορά τη χρήση των κοινωνικών τεχνολογιών από σχεδιαστές πολυμέσων, εκπαιδευτικούς και ερευνητές.

Λέξεις κλειδιά: μέσα κοινωνικής δικτύωσης, κοινωνική πληροφορική, τεχνολογικά υποβοηθούμενη γλωσσική εκμάθηση, τεχνολογικά υποβοηθούμενη εκμάθηση, εκμάθηση ξένων γλωσσών, τεχνούργημα, μικρόκοσμοι, κοινωνικοί μικρόκοσμοι

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ABBREVIATIONS

ACMC	Asynchronous Computer-Mediated Communication
CAI	Computer Assisted Instruction
CALL	Computer-Assisted Language Learning
CALT	Computer-Assisted Language Testing
CCT	Centre for Children and Technology
CMC:	Computer-Mediated Communication
DBR	Design-Based Research
DSIL	Darunsikkhalai School for Innovative Learning
EFL:	English as a Foreign Language
ERIC:	Educational Resources Information Centre
HCI:	Human-Computer Interaction
IBL	Inquiry Based Learning
ICALL:	Intelligent CALL
LLK	Lifelong Learning Kindergarten
NLP	Natural Language Processing
SC	Social Constructionism
SCC	Social Constructionist Classroom
SCMC	Synchronous Computer-Mediated Communication
SLA:	Second Language Acquisition
SNS:	Social Networking Sites
L1:	First/native language

L2:	Second language
MIT	Massachusetts Institute of Technology
TEL:	Technology Enhanced Learning
VLE:	Virtual Learning Environment

1 Introduction

This chapter presents and discusses the backdrop, motivation, and scope of this dissertation. Relevant research that led to the specific research questions is discussed along with the research approach, and tasks undertaken for addressing the specific research questions. The chapter concludes with the structure and the outline of the dissertation.

1.1 Introduction to the topic

The term *social technologies* or *Web 2.0 technologies* refers to technologies and internet applications that allow users to generate content collaboratively. The concepts of social creation and sharing provide the philosophy behind social technologies, which include social networking sites (SNS), social software, and digital artifacts sharing platforms.

In recent years, social technologies receive substantial consideration from, Instructional Design, Technology-Enhanced Learning (TEL), Human-Computer Interaction (HCI) and Computer-Assisted Language Learning (CALL) researchers and practitioners. Each stakeholder explores these technologies from different angles aiming at describing and explicating how they are used, by whom, and for what purpose. Instructors employ these technologies in their everyday practice; whereas programmers, designers, researchers and professionals in the field of TEL, Instructional Design, and HCI, put great effort to improve them in order to enhance the learning experience within the framework of Computer-Assisted Instruction (CAI).

The inference is that social technologies are one of the mostly researched educational technologies; however, their use is not clearly theoretically grounded (Wang & Vasquez, 2012). As noted by Tess (2013, p. A62), employing social technologies requires the instructor to observe not only the "practical integration of the tool into course goals, but also (and more importantly) the theoretical framework for implementing the technology as a learning resource". This statement brings to light the need for more scholarship into the theoretical alignment of social technologies in learning.

This evidence triggered the implementation of this research. Drawing from Papert's (1980; 1993; Papert & Harel, 1991) constructionism, this dissertation sets off to ground the use of social technologies under a comprehensive theoretical model. This research is expected to supply designers, instructors, researchers, and practitioners with a better understanding of the features of social technologies, leading to a new perspective of their use, towards the arena of social constructionism. The outcome of the current dissertation is a set of theoretical and methodological elements that inform the use of social technologies towards social constructionism and foster learners to engage in the development of a shared artifact using social technologies.

1.2 Backdrop of the Dissertation

Technology-Enhanced Learning (TEL) is a synonym for any sort of educational environment that involves technology for facilitating learning and enriching learning resources. Researchers in the field of TEL have been frequently confronted with multitude challenges of digital media including their smooth integration into the classroom practice and their impact in enhancing learning and supporting creativity, collaboration, autonomy, and reflection. The employment of multiple types of digital and virtual media in various contexts has brought to the forefront key opportunities in unpacking new prospects for learning and classroom innovation. At the same time, the exponential advancement of TEL together with the progressive development of technology brings about new prospects as well as challenges.

In line with these wider prospects and challenges in the field of TEL, practitioners and researchers in the field of Computer-Assisted Language Learning (CALL) started raising issues of coherence in CALL research and practice. Gamper and Knapp (2002, p. 329) define CALL as a "research field which explores the use of computational methods and techniques as well as new media for language learning and teaching". The breadth of topics undertaken in the field of CALL has already been recognized, yet research studies set off to explore the scope and directions of CALL research. Levy (2000) explores articles published in books and journals in 1999, illustrating that it is possible to detect clear patterns in the goals and directions of CALL research and practice. A decade after Levy's study, a research study was undertaken in order to chart recent development in CALL, by building a map of existing research work in the field (see Parmaxi, Zaphiris, Papadima-Sophocleous & Ioannou, 2013b). The CALL map revealed emerging areas in the field of CALL, such as blogs, wikis, virtual learning environments, and mobile devices. Current research held in these areas unfolds their potential in bringing authentic settings in the language classroom, thus enabling instructors to provide learners with opportunities to use the foreign language in real-life situations. CALL provides the context of this dissertation, whereas this study served as a stepping-stone in order to narrow down its scope in one of the trends in CALL research agenda; that is in the category of Web 2.0 technologies. The importance of the specific category derives from its popularity as an emerging technology in CALL research agenda. As a follow up to this study, the potentials and capabilities of social technologies in CALL were investigated by exploring the literature in four major CALL journals, from 2009 to 2013. This review demonstrated an increasing body of

literature in CALL conceiving social technologies as social writing and communication platforms that can afford information-sharing, enhancement of plurilingual and intercultural competence, self-directed learning, reflective and collaborative learning (Melo-Pfeifer, 2013; Lee, 2011; Sun & Chang, 2012; Vurdien, 2013).

Yet, the employment of these technologies in the learning process is not always positive. Li and Zhu (2013) explored computer-mediated collaboration manifested in small writing groups within wikis showing that not all students had positive learning experiences. This study highlighted the importance of the kind of interaction in an online collaborative environment for improving learning opportunities. Moreover, recent reviews delineate that the use of these technologies is not clearly framed in theory, with features of these technologies remaining unused (Wang & Vasquez, 2012). Ultimately, the burst of studies exploring the use of social technologies in teaching and learning confronts with two threads with regard to their theoretical and pedagogical alignment. Firstly, a substantial number of studies do not provide a theory to ground their research (Wang & Vasquez, 2012; Merchant, 2012). As noted by Tess (2013, p. A62), employing social technologies requires both practical and theoretical integration on behalf of the instructor, bringing to light the need for more scholarship into the theoretical alignment of social technologies in learning. On a similar note, the implementation of Web 2.0 technologies in learning and teaching calls for better task-technology alignment (Bennett, Bishop, Dalgarno, Waycott & Kennedy, 2012). As noted by Naismith, Lee, and Pilkington (2011), integration of Web 2.0 technology in the classroom requires teacher's creative involvement for supporting students to understand the value of the tools and the learning outcomes that the teacher wants them to acquire.

These studies sketch a picture of social technologies as a widely researched area, while their potential as instructional tools for implementing theoretically and pedagogically aligned tasks is still unlocked (Wang &Vasquez, 2012; Bennett et al., 2012; Tess, 2013; Chwo, 2015). The conundrum raised through the research is that, whilst students increasingly engage with these tools in their everyday lives, there is still lack of Web 2.0 practices that draw on the specific features of these tools and align them with educational goals (Crook, 2008; Bennett et al., 2012; Wang &Vasquez, 2012; Chwo, 2015). For real progress to be made in the use of social technologies in learning, more studies need to take place that will align the characteristics of these tools with theory for the design of learning tasks that promote new educational practices.

With this in mind, a long term intervention is brought forward, employing constructionism (Papert, 1980; 1993; Papert & Harel, 1991) as an overarching theoretical framework and unpacking the potential of social technologies as tools that support social construction of an artifact by a group of learners. Papert (1980) coined the term constructionism advancing a theory of learning, teaching and design, which can be summarized in the conviction that learning occurs more effectively when learners understand the world around them by creating meaningful artifacts that can be probed and shared. For constructionists, emphasis is placed on individual learners' interactions with their artifacts that are mostly built through the assistance of digital media and computer based technologies (Kafai & Resnick, 1991). The Logo programming language (developed at the MIT Media Lab by Seymour Papert and a team of researchers) adheres to the constructionist philosophy by allowing children to engage in software design by controlling a cybernetic animal with a computer.

The following paragraphs summarize the overall objective and research questions of this dissertation (section 1.3), the importance of this research (section 1.4), and research design adopted (section 1.5). Finally, the chapter concludes with the structure of the dissertation (section 1.6).

1.3 The research questions and studies

The purpose of this research was to develop a framework that will ground and expand the use of social technologies towards the direction of constructionism. The main components of this dissertation are a methodological framework that demonstrates the core dimensions of social technologies as social constructionist platforms, with actions held for social construction of an artifact; and an instructional design model that demonstrates the instructional design elements that operate in the Social Constructionist Classroom. The overarching research question for this dissertation is:

RQ: How can constructionism ground and expand the use of social technologies as social constructionist tools in learning?

A set of subsidiary questions (SQ) is formulated (see Figure 1). The research was designed to be conducted in three interrelated parts.

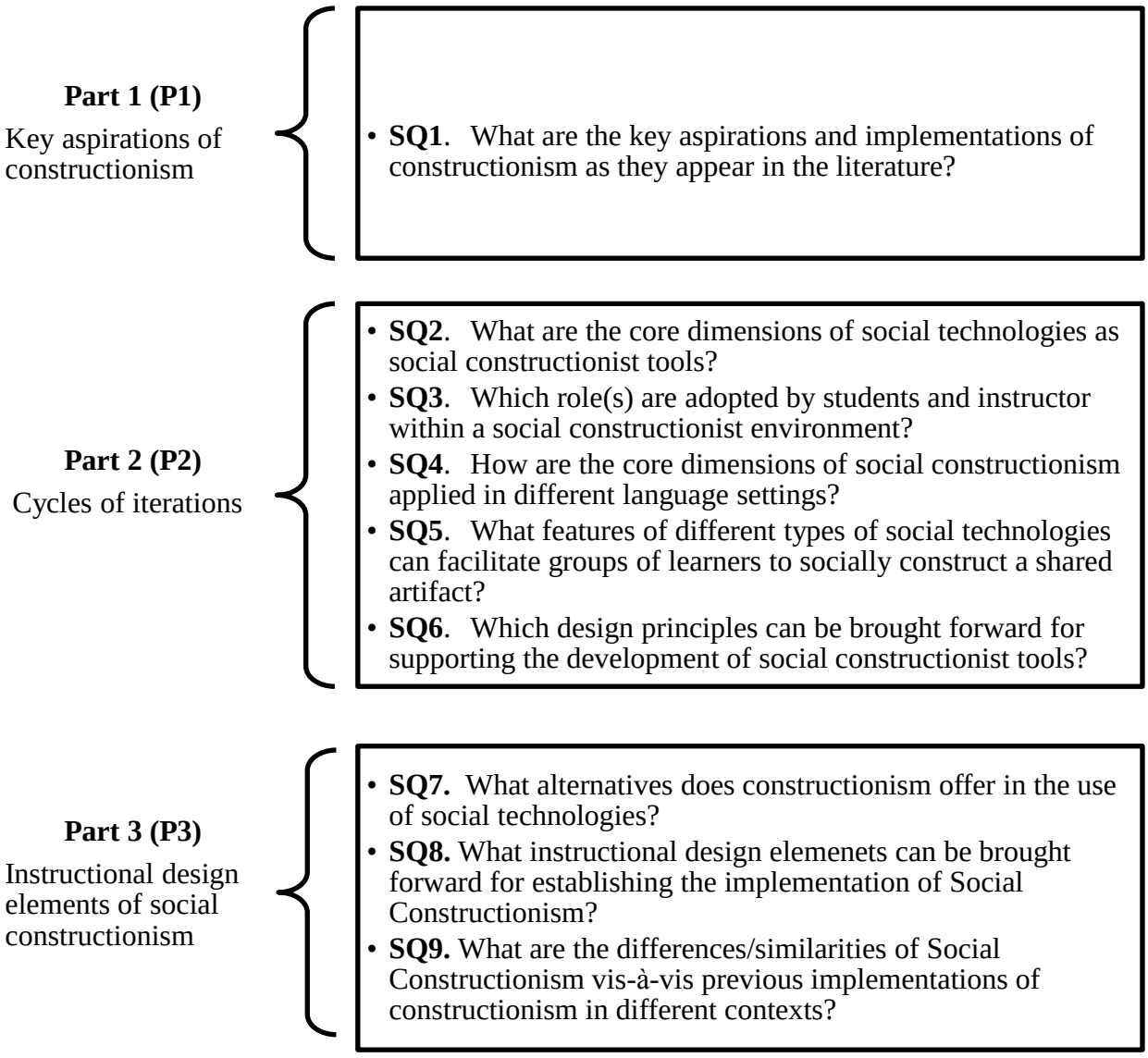


Figure 1. Subsidiary questions set in this dissertation.

The subsidiary questions are broken down in three parts and portray the path adopted for the implementation of the research. The plan of tasks undertaken is visualized in Figure 2. Initially, in Part 1 I explored the state-of-the-art in constructionism, CALL and social technologies in CALL. The aim of the tasks undertaken in Part 1 was three-fold: (i) understand the field of CALL which provides the specific context for this dissertation, (ii) understand and analyze the way social technologies are currently used, and (iii) inform the design of the intervention through constructionist aspirations. The implementation of the intervention (Part 2) made feasible the identification of (i) core dimensions of social technologies as social constructionist tools; (ii) actions that capitalize the manifestation of constructionism within social technologies (iii) teacher's and students' role within social constructionist tools; and (iv) features of different social technologies as social constructionist tools. Finally, building on all previous phases, instructional design elements of social constructionism are brought to light (Part 3).

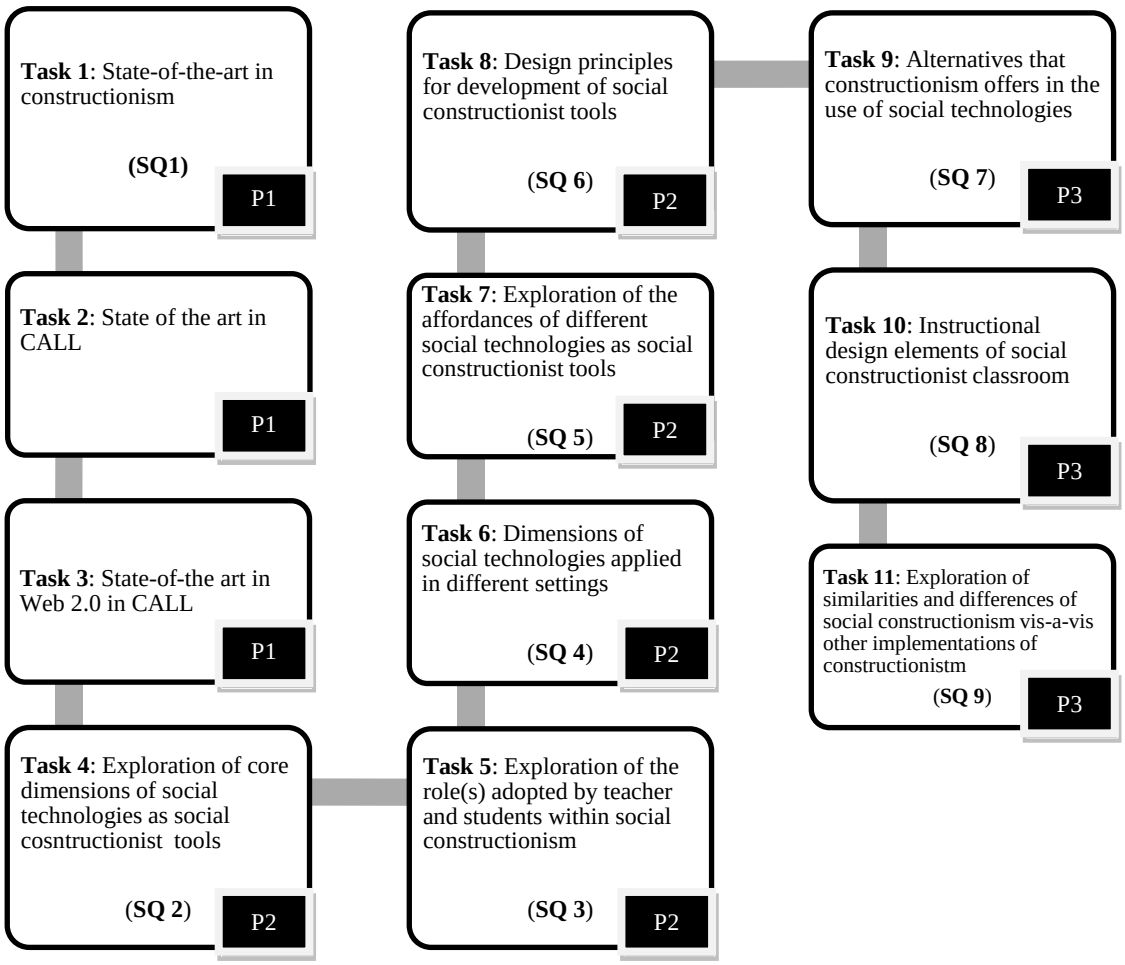


Figure 2. Workflow diagram of interlinked tasks and studies.

***Part 1**: Understanding the aspirations of constructionism*

Task 1: State-of-the-art in constructionism (SQ 1)

A literature review was held in order to gain an overview of the different aspects of constructionism. The aim of this task is primarily to understand the notions and aspirations of constructionism and inform the intervention, and secondly to place the research of this dissertation into the wider research conducted on constructionism (see also SQ9). Findings of this study answer SQ 1 (see Chapter 2 for a detailed description of this task's findings); and are published in HCI International Conference 2014 (see Parmaxi & Zaphiris, 2014b).

Task 2: State- of-the-art in CALL

CALL provided the context for this dissertation, as I needed to narrow the focus of the intervention in one discipline. An extensive literature review was conducted for exploring research development in CALL. Based on a corpus of 163 manuscripts, published between January 2009 and September 2010 in four major journals devoted to CALL, a holistic view of the field was illustrated through a CALL map. This study revealed areas that maintain their popularity for more than a decade; that is CMC, teacher education, and CALL materials; whereas CALL research development sees a tendency towards new emerging technologies that can be used in and out of class. Emerging technologies that gain ground in the research agenda of CALL are Web 2.0 technologies, VLEs, and mobile devices. This study provided a stepping-stone for this dissertation, in order to narrow down its research focus in Web 2.0 technologies in CALL (see Chapter 3 for a detailed description of this task's findings). Findings of this study are published in *Interactive Technologies and Smart Education Journal* (see Parmaxi, Zaphiris, Papadima-Sophocleous & Ioannou, 2013b).

Task 3: State-of-the-art in the use of Web 2.0 technologies in CALL

A literature review was held in order to gain an overview on the use of Web 2.0 technologies in the field of CALL. Following a systematic review of the research studies published in four major journals related to CALL (*CALICO Journal*, *CALL*, *Language Learning & Technology*, and *ReCALL*), the following aspects have been analyzed: (1) Web 2.0 tools that dominate second/foreign language classroom; (2) learning/SLA theories that guide their use; (3) skills that Web 2.0 technologies support; (4) reported advantages and

challenges in harnessing Web 2.0 tools; and, (5) task design considerations. Chapter 4 provides a thorough description of this task's findings.

***Part 3**: Infusing constructionism into the use of social technologies*

In this phase, the elements of constructionism that derived from Task 1 are infused in the use of social technologies in three different classroom settings: a) Greek as a second language (L2); b) Greek for academic purposes/dissertation writing; and c) English as a foreign language for specific academic purposes.

Study 1

In this study, the use of social technologies as social constructionist tools was explored in the context of an intensive 650-hour long Greek language course. Qualitative content analysis of instructor's field notes, students' and instructors' descriptive reflections, interviews with students and a focus group was employed aiming at identifying the use of social technologies as platforms for constructing an online artifact. To triangulate the findings, the study also collected data by observing students' activity within social technologies (see Chapter 6 for a detailed description of this study's findings).

Task 4: Exploration of the core dimensions of social technologies as social constructionist tools (SQ2)

A code scheme was developed which manifests the use of social technologies as social constructionist tools identifying its major dimensions: exploration of ideas, construction of online artifact and evaluation of the constructed artifact. Actions within each dimension that indicate the manifestation of social constructionism were also identified. This study revealed results in favor of the use of social technologies as social constructionist tools, suggesting a new methodological framework for their use (see Chapter 6 for a detailed description of this task's findings). Findings of this study answer SQ 2. Results of this study have been published at INTERACT conference; see Parmaxi, Zaphiris, Michailidou, Papadima-Sophocleous & Ioannou, 2013a).

Task 5: Exploration of the role(s) adopted by teacher and students within social constructionist tools (SQ 3)

The role(s) adopted by the teacher and instructor under the framework of social constructionism was also explored. Special attention was placed to the specific tasks that teacher and students undertook during the implementation of social constructionism. Findings of this study answer SQ 3 (see Chapter 6 for detailed description of this task's findings). Results of this study have been published at INTERACT conference; see Parmaxi et al., 2013a).

Study 2

The core dimensions of social constructionism (see Task 4) are infused in two different language settings: a) teaching Greek as a first language (L1) for academic purposes/dissertation writing and b) teaching English as an L2 for Specific Academic Purposes.

Task 6: Application of the core dimensions of social technologies in different language settings (SQ 4)

The results of this study provide deeper insights into the use of social technologies as social constructionist tools, eliciting the methodological framework of social constructionism. Findings of this study answer SQ 4 (see Chapter 7 for detailed results of this study). Results of this study are published in *Educational Media International Journal* (see Parmaxi & Zaphiris, 2015a).

Study 3: *Capabilities of social technologies as social constructionist tools*

In order to identify the capabilities of the different types of social technologies as social constructionist tools, a third study was conducted in which different types of social technologies were used. In this study, special attention was placed on the question of whether each technology facilitated or inhibited the construction of an online artifact by group of learners.

Task 7: Exploration of the capabilities of different social technologies as social constructionist tools (SQ 5)

The strengths and limitations of different types of social technologies are outlined, thus answering SQ 5 (see Chapter 8). Findings of this study feature in CHI conference as an extended abstract (see Parmaxi & Zaphiris, 2014a) and as a long paper in *Behavior and Information Technology Journal* (see Parmaxi & Zaphiris, 2015b).

Task 8: *Design principles for developing social constructionist tools (SQ6)*

Design principles to be adopted in the arena of social constructionism are brought forward, in order to meet the needs of groups of learners to construct a shared artifact. These principles derived from the identified potentials and limitations of the different types of social technologies in facilitating each phase of artifact construction by a group of learners (see Task 6). Currently, the development of social constructionist tools, the so-called microworlds, needs to integrate functions that are present in different tools and facilitate different action(s). Detailed description of design principles for developing social microworlds can be found in Chapter 8, thus answering SQ 6. Findings of this study feature in *Behavior and Information Technology Journal* (see Parmaxi & Zaphiris, 2015b).

Part 4: Set of instructional design elements

Task 9: Holistic description of Social Constructionist Classroom (SQ 7)

In order to identify the alternatives that Social Constructionism offers in the use of social technologies, a rich account of the intervention is provided. The account offers a detailed description of the progressive refinement of the design, which included three iterative cycles. This account brings to the fore how social technologies have been used in this research work and what alternative constructionism offers for their use. Findings of this study answer SQ7 (see Chapter 9 for a detailed account of the findings of this study).

Task 10: Instructional design elements that underpin the use of social technologies as social constructionist tools (SQ8)

In order to establish social constructionism, a set of instructional design elements is brought forward. These elements underpin the use of social technologies as social constructionist tools and establish the Social Constructionist Classroom. Findings of this study answer SQ8 (see Chapter 9 for the detailed account of findings of this Task).

Task 11: Comparison of the refined theoretical and methodological framework (SQ 9)

The account of social constructionism is set in the context of the wider literature on constructionism. The results from Tasks 1, 9 and 10 inform the completion of this Task and answer SQ9 (see Chapter 9 for a detailed account of the findings of this Task).

1.4 The importance of this research

The findings of this dissertation provide an in-depth understanding of the use of social technologies as social constructionist tools, allowing for richer environments for learners to engage in construction of shared and visible artifacts. The most important significance of this contribution is to move the discussion about the use of social technologies further in the direction of social constructionism. The emergence of this prospect is expected to supply designers, instructors, researchers, and practitioners with a better understanding of the capabilities of social technologies, leading to a new perspective of their use. Moreover, the development of the social constructionist model can serve as a set of guiding principles for curriculum design, materials development, and classroom practice. Although social constructionism is framed within the limits of CALL, the rich account of the use of social technologies and the findings reported in this dissertation can inform future efforts to support learning, collaboration, and problem solving in other fields too. Specifically, this dissertation offers three main contributions.

The first contribution is the CALL map, which provides a holistic view of the field of CALL along with the most and less researched topics in the field. Moreover, the CALL map provides the basic components of each area, with which CALL researchers are concerned with and its major findings. Ultimately, the contribution of the CALL map is twofold: (i) it provides a holistic view of the field of CALL guiding both junior CALL

researchers to place themselves in the field, and policy and decision makers who attempt to evaluate the current and future scholar activity in the field; and (ii) it caters for more experienced researchers to focus on certain under-investigated domains.

The second contribution of this research is a rich account of a social constructionist environment that allows to a group of learners to employ social technologies to build a shared and meaningful artifact. This account covers multiple aspects of the design, including: i) core dimensions of social constructionism; ii) roles adopted by learners and instructors in a social constructionist environment, iii) capabilities of different types of social technologies as social constructionist tools; iv) design principles for fostering the development of social constructionist tools, and v) instructional design elements of a social constructionist classroom. This dissertation goes beyond mere identification of technological affordances of social technologies, by providing a holistic understanding of how the strengths and challenges of these technologies come across theoretical aspirations, whilst learners engage in the construction of a shared artifact.

The outcome of this dissertation is of use for researchers in the area of HCI, TEL, and CALL as it contributes a novel way for understanding and framing the use of social technologies. This outcome benefits also practitioners who can draw a new use of social technologies in their classrooms, and designers/ interface architects by aligning users' needs and domain knowledge with computational potentials or challenges.

1.5 Research Design

In an attempt to implement theoretically designed learning environments in real-world classrooms, the current dissertation employed Design-Based Research (Brown, 1992; Collins, 1992; Cobb, 2001; Hoadley, 2002; Design-based Research Collective, 2003; Tabak, 2004; Barab, 2006; Reeves, 2006; Anderson & Shattuck, 2012) as an overarching framework of inquiry. Design-Based Research (DBR) deals with the complexity of real-life settings by systematically designing and changing the learning environment over time, gathering evidence of the various changes which recursively feed into future designs (Brown, 1992; Collins, 1992; Barab, 2006).

The subsidiary questions are broken down in four phases, and depict the path adopted for the implementation of the research (see Figure 3). In all stages, close collaboration

between practitioners and researchers was achieved by involving experts from the supervision committee and language instructors from the language Centre of the university. The stages included:

(1) review of the literature in CALL and current use of Web 2.0 technologies;

(2) review of constructionist aspirations and design of activities that promulgate the use of social technologies as social constructionist tools;

(3) apply constructionism in three different settings: a) teaching Greek as a second language (L2), b) teaching Greek as a first/native language (L1) for academic purposes/dissertation writing, and c) teaching English as a foreign language (EFL) for specific academic purposes.

(4) chronicle the intervention holistically, with an eye to claiming success through a set of instructional design elements that generate "heuristics for those interested in enacting innovations in their own local contexts" (Design-Based Research Collective, 2003, p. 6). The theoretical understanding is considered to be the final step of a DBR study, resulting in conceptual models or design principles that can facilitate successful implementation of a solution. These elements are by no means decontextualized theories of learning, but they rather offer a ground for making sense of the intervention and the context in which it took place (Reeves, 2000; Anderson & Shattuck, 2012).

Figure 3 demonstrates the stages of this DBR and communicates how each of the stages operates with one another, in order to inform theory and strengthen the design of the Social Constructionist Classroom (Barab, 2006; Reeves, 2006).

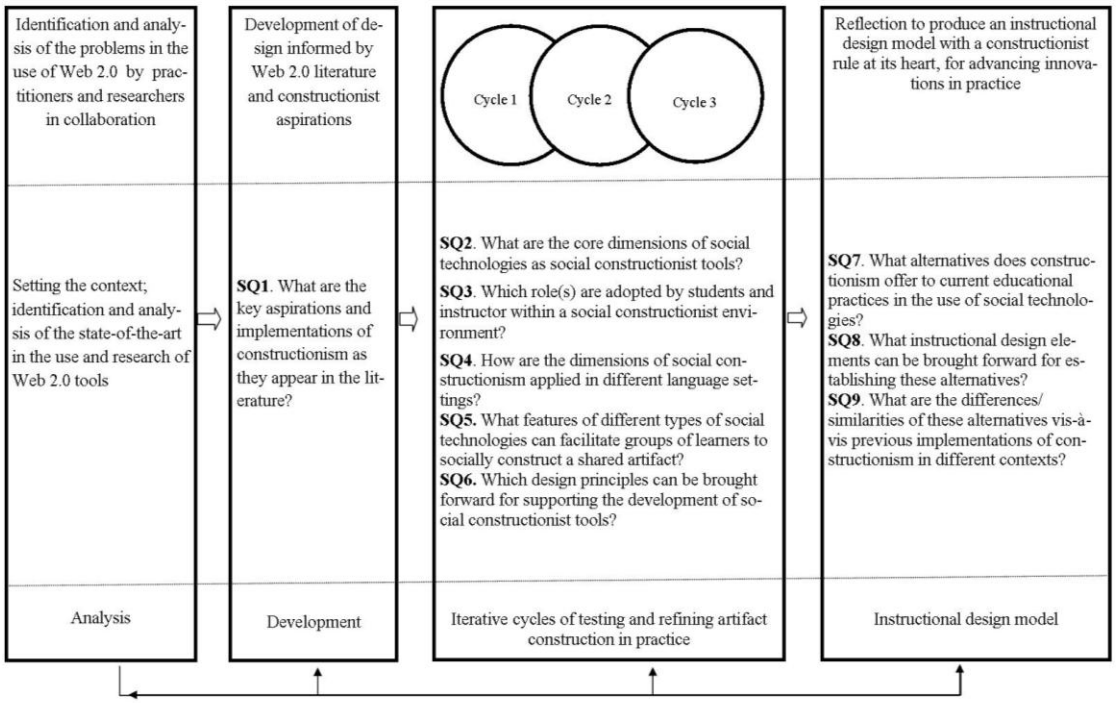


Figure 3. The core elements of Design-Based Research (adopted from Reeves, 2006).

The Design Based Research Collective (2003) proposes five characteristics of good DBR: (a) the essential goals of designing learning environments and developing theories of learning are closely connected; (b) development and research take place through consecutive cycles of design, enactment, analysis, and redesign; (c) research on designs must lead to sharable theories that help communicate relevant implications to practitioners and other educational designers; (d) research must report for how designs function in authentic settings. It must not only detail success or failure, but also emphasize on interactions that improve our understanding of the learning issues involved; and (e) the development of such reports depends on methods that can document and connect processes of enactment to outcomes of interest.

DBR is often defined as a series of approaches, rather than an approach, intending in producing new theories, artifacts and practices that can impact teaching and learning in naturalistic settings (Barab & Squire, 2004). One challenge in DBR is to report the complexity, disorganization, and solidity of the design and doing so in a way that is of value for others. DBR requires more than understanding the happenings in a particular context; a well-structure design narrative needs to show the relevance of the findings in one context of intervention to other contexts (Barab & Squire, 2004). Eventually, a DBR

narrative needs to support “petite generalizations” (Stake, 1995), that is, to report insights into the potentials and opportunities that emerge from their work, as well as strategies for navigating these effectively. From this perspective, the validation of a design framework is intended to advance theory in naturalistic contexts.

1.6 The structure of this dissertation

Throughout the dissertation, certain conventions and notes on basic terminology were followed which can be found in Appendix 1.

The current dissertation is structured into 9 chapters, in addition to this introduction:

- *Chapter 2*: State-of-the-art in constructionism (SQ1): This chapter provides a holistic view of constructionism from its inception towards its more recent implementations in several different contexts, informing the design of the intervention that took place in this dissertation.
- *Chapter 3*: State-of-the-art in CALL: This chapter provides a holistic view of the field of CALL. The aim is to explore research development in the field of CALL and identify current trends and future directions of research.
- *Chapter 4*: State-of-the-art in Web 2.0 tools in CALL: This chapter provides a holistic view of the use of social technologies delineating (i) Web 2.0 tools that dominate second/foreign language classroom; (ii) learning/SLA theories that guide their use; (iii) skills that Web 2.0 technologies support; (iv) reported advantages and challenges of Web 2.0 tools; and (v) task design considerations.
- *Chapter 5*: Design-Based Research: This chapter reports on DBR as an overarching inquiry for this dissertation. In this chapter, DBR is defined along with its characteristics and justification of its appropriation as an overarching inquiry for this dissertation.

- *Chapter 6*: Infusing constructionism into the use of social technologies in CALL (SQ 2-3): This chapter presents the use of social technologies in the context of an intensive 650-hour Greek language course. A code scheme was developed which manifests the use of social technologies as social constructionist tools identifying their core dimensions: exploration of ideas, construction of online artifact and evaluation of the constructed artifact (SQ 2). Moreover, the role(s) adopted by the teacher and instructor under the framework of social constructionism were explored (SQ 3).
- *Chapter 7*: Application of the core dimensions of social technologies in different language settings (SQ 4)*:* The core dimensions of social constructionism (see Chapter 6) are infused in two different language settings: a) teaching Greek as a first language (L1) for academic purposes/dissertation writing and b) teaching English as an L2 for Specific Academic Purposes. The results of this study provide deeper insights into the use of social technologies as social constructionist tools and inform the methodological framework of social constructionism.
- *Chapter 8*: Features of social technologies as social constructionist tools (SQ 5-6): This chapter presents the features of the different types of social technologies as social constructionist tools. Special attention was placed on the question of whether each technology facilitated or inhibited the construction of an online artifact by group of learners. Moreover, certain design principles are brought forward to be adopted in the arena of social constructionism for supporting designers and interface architects to develop social constructionist tools.
- *Chapter 9:* Set of instructional design elements that underpin the use of social technologies as social constructionist tools (SQ 7-9)*:* This chapter chronicles the research conducted in this dissertation, providing a rich account of using social technologies as social constructionist tools, resulting in a set of instructional design

elements with a constructionist rule at its heart. Moreover, the account of social constructionism is placed in the context of the wider literature on constructionism.

- Chapter 10: Discussion-Conclusion: This chapter brings together findings from all previous chapters, unpacking the agency of constructionism in the use of social technologies.

2 The evolvement of constructionism: an overview of the literature

This chapter reviews the theory of constructionism from its appearance in 1980s towards its more recent implementations. By reviewing recent research conducted under the framework of constructionism, this chapter frames key ideas of this theory, and their evolution over time. At the same time, obstacles, challenges, and critiques towards implementing constructionism in teaching and learning practices are also pinpointed. The chapter is organized around three sections: constructionism, distributed constructionism and social constructionism. The findings of this review reveal the dynamic progression of constructionism and answer SQ1 (“What are the key ideas of constructionism as they appear in the literature?”). Ultimately, the findings of this chapter inform the development of the intervention of this dissertation, that is, to engage groups of learners in making a shared artifact using social technologies.

2.1 Introduction

Whilst educators, practitioners and researchers express high interest in making available technological tools that enable their students to learn through experimentation rather than lecturing, designing and implementing such tools under the appropriate theoretical framework is hardly realized (Resnick, 1996b). Resnick (1996b) provides three threads of thought, which need to be taken into consideration whilst designing such tools: firstly, learners' experiences, needs and expectations; secondly understanding of domain knowledge and finally, understanding of computational ideas and paradigms. On the same line, Ruschoff and Ritter (2001, p. 220) raise the need of "a radical change in our approaches to teaching and learning in order to best prepare future generations for living and working in tomorrow's world". From this perspective, constructionism can offer "the guiding principles for curriculum design, materials development, and classroom practice" (Ruschoff & Ritter, 2001, p. 231).

The term constructionism originates from Papert (1980; 1987; 1993; 1996; Papert & Harel, 1991) and captures the concept of construction of knowledge by engaging in the making of concrete and public artifacts. Papert's theory can be summarized in his vision of a new educational environment in which learners build meaningful knowledge artifacts by taking advantage of the ubiquity of new technologies around them.

This chapter reviews the theoretical framework of constructionism from its early stages towards its more recent applications, and provides support for its privileged status for supporting the use of technological tools in learning.

2.2 Constructionism

2.2.1 Constructionism vis-à-vis constructivism, social constructivism and learning by doing

Constructionism builds and expands the Piagetian theory of constructivism (Piaget, 1954). For both constructivism and constructionism, knowledge is built by the learner; instead of being presented and imposed to students by an expert, such as the teacher (Ackermann, 2001). Yet constructionism adds to the constructivist perspective the idea of artifact construction:

> *Constructionism--the N word as opposed to the V word--shares constructivism's connotation of learning as 'building knowledge structures' irrespective of the circumstances of learning. It then adds the idea that this happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity* (Papert & Harel, 1991, p. 1).

Where constructivists view the learner as an active builder of knowledge, constructionism places a critical emphasis on having learners engage in constructing artifacts that are external and shared. Constructionism stresses the centrality of an artifact, a public entity with which the learner is engaged with. This artifact should be shared and visible to the world, either "*a sand castle on the beach or a theory of the universe"* (Papert & Harel, 1991, p. 1). In contrast to Piaget (1954), who focuses on cognitive processes of learning, Papert's constructionism focuses on learning through making and emphasizes individual learners' interactions with their artifacts that are mostly built through the assistance of digital media and computer based technologies:

> *[Constructionism] builds on the "constructivist" theories of Jean Piaget, asserting that knowledge is not simply transmitted from teacher to student, but actively constructed by the mind of the learner. Children don't get ideas, they make ideas. Moreover, constructionism suggests that learners are particularly likely to make new ideas when they are actively engaged in making some type of external artifact, … which they can reflect upon and share with others* (Resnick & Kafai, 1996, p. 1)

This definition decomposes constructionism into its major elements:

1. *Making* -students engage in the construction of their artifact through a variety of materials and media;
2. *Personal engagement with the artifact*- students engage with an artifact that is meaningful to them, building on the existing knowledge of individuals or groups;
3. *Sharing of artifact* – the process of sharing the artifact with a community, fostering the social environment for learning. The social context is important for allowing learners to share their artifact with groups or individuals as audience, collaborators, reviewers or tutors;
4. *Reflection* - students reflect upon their artifact allowing for ideas to be externally expressed and shared, extending abstract knowledge to an artifact that is shared in the real world.

Constructionists argue that learners' engagement with external artifact construction involves a creative and re-creative activity that represents a developmental cycle. Papert has seen the critical role of the cultural surrounding whilst building internal cognitive structures pointing out that surrounding culture can inform and facilitate constructive Piagetian learning (Papert, 1980). Papert views the difficulty in understanding certain concepts in the deficiency of education in materials that would make an idea or concept simple and concrete:

> *All builders need materials to build with. Where I am at variance with Piaget is in the role I attribute to the surrounding cultures as a source of these materials. In some cases the culture supplies them in abundance, thus facilitating constructive Piagetian learning. For example, the fact that so many important things (knives and forks, mothers and fathers, shoes and socks) come in pairs is a "material" for the construction of an intuitive sense of number. But in many cases where Piaget would explain the slower development of a particular concept by its greater complexity or formality, I see the critical factor as the relative poverty of the culture in those materials that would make the concept simple and concrete. In yet other cases the culture may provide materials but block their use* (Papert, 1980, p. 7).

Wilensky (1991) took this point further providing a new perspective into our understanding of concrete elucidating that "concreteness is not a property of an object but rather a property of a person's relationship to an object. Concepts that were hopelessly abstract at one time can become concrete for us if we get into the 'right relationship' with them" (Wilensky, 1991, p. 198). In light of this perspective, any idea, concept or piece of knowledge can become concrete provided that a person develops a set of representations, interactions and connections with the idea, concept or piece of knowledge. The constructionist paradigm offers a fertile ground for promoting concreteness since "when we construct objects in the world, we come into engaged relationship with them and the knowledge needed for their construction. It is especially likely then that we will make this knowledge concrete" (Wilensky, 1991, p. 202). Within this framework, social relations between people are important since "it is through people's own idiosyncratically personal ways of connecting to other people that meaningful relationships are established" (Wilensky, 1991, p. 202).

Thus, where Piaget (1954) emphasized learning process, Vygotsky (1980) emphasized spoken language as a crucial tool for development, whereas Papert (1980) focuses on the

centrality of an artifact that engages students in developing, sharing and conversing within a community. Still, both Papert and Vygotsky agree on the importance of social and contextual tools for knowledge development. For Papert the dynamic relation that is developed between the learner and the artifact facilitates active construction of knowledge and making of ideas that are externally expressed. In other words, the artifact facilitates the internal mental processes to be externally expressed and thereafter meaning is produced through this conversational relationship.

Papert is also in agreement with Dewey's principle "Learning by Doing" but stresses that Dewey (1916; 1933) lacked of an army that would take forward his theoretical arguments:

> *Just 100 years ago, John Dewey was saying things about educational change, not very different from what I believe in. He couldn't get very far. And the reason why he couldn't get very far is that he had only philosophical arguments. He didn't have an army. You must have an army, and it's an army primarily of children and the adults are a political force in this* (Papert, 1999).

In contrary to Dewey (1916; 1933; 1938), Papert (1999) explains the importance of the army for computers to be efficient "changers":

> *I think the technology serves as a Trojan horse all right, but in the real story of the Trojan horse, it wasn't the horse that was effective, it was the soldiers inside the horse. And the technology is only going to be effective in changing education if you put an army inside it which is determined to make that change once it gets through the barrier.*

2.2.2 Constructionist concepts

Constructionism is underpinned by three key ideas (Kafai, 2006): appropriation, knowledge construction, and learning cultures. Appropriation emphasizes the importance of having learners seize new knowledge and begin to identify with it (Kafai, 2006, p. 39). Knowledge construction is closely connected to learning through constructing one's own knowledge whilst engaging in creating meaningful artifacts. Finally, constructionism also values the importance of learning culture. A popular example of a learning community is the samba school, an informal social setting in which people come together for something that involves "social cohesion, a sense of belonging to a group, and a sense of common purpose" (Papert, 1980, p. 179). In a setting such as a school of samba, constructionists

focus on how the social context fortifies the building of connections to what is being learned. Papert (1980) has seen the critical role of the cultural surrounding whilst building internal cognitive structures, pointing out that surrounding cultures can inform and facilitate constructive Piagetian learning.

Finally, Papert (1993) brought forward the word *mathetics*, equivalent to the Greek word *heuristics*, for talking about the art of learning. A famous example used by Papert for explaining this notion goes back to the African proverb "If a man is hungry you can give him a fish, but it is better to give him a line and teach him to fish". This proverb codifies two important concepts: a) instead of feeding children with "fish" , it is better to help them find "fishing" by supporting them morally, psychologically, intellectually and materially; and b) fishing lines are as important as computers, for developing mathetically rich activities or microworlds. According to Papert (1980), a microworld is a simulation-based learning environment that facilitates certain kinds of thinking through active construction of an artifact; in Papert's words, it is 'an incubator'…a "growing place" for a specific series of powerful ideas or intellectual structures' (Papert 1980, p. 125). As such environments, computers have the power to support mental process and discover solutions to problems. Papert (1993; 1996) demonstrated that whilst working on an activity within a computer, you don't have to follow the computer demands, but you can experiment and if you mistake you are not punished or penalized. You get to work back and forth until you get it right. Papert (1993; 1996) used the French word "bricolage" for describing this process or its English equivalent "tinkering" for describing improvisation and negotiation of work in progress. It is worth noting here, that constructionism does not question the value of instruction, yet it endorses the view of Piaget that "every act of teaching deprives the child of an opportunity for discovery" (Papert, 1993, p. 139) as a reminder to be kept firmly in mind.

2.2.3 Potentials and challenges of artifact construction

Digital media and computer based technologies provide a rich teaching instrument, in Papert's words an "object-to-think-with" that can be shared in the world, probed and admired (Papert, 1980, p. 11). Constructionism is closely connected to the Logo programming language, which is seen by researchers as "a testing bed for engaging students in problems solving and learning to learn" (Kafai, 2006, p. 36). Logo is a

programming language developed at the Massachusetts Institute of Technology (MIT) in the late 1960s and is renowned for its turtle graphics. In its early years, the most popular use of Logo involved a "floor turtle" (robot) and with the burst of personal computers in the late 1970s the Logo turtle shifted to its screen version. Both the floor (robot) and screen turtle were controlled through a computer keyboard. The initial commands that were used with Logo to make the turtle move draw whatever the user wanted were: forward, back, left, right, pen up, pen down.

For constructionists, Logo provides a vehicle and a language for thinking about thinking, an activity that promotes the development of higher levels of thinking and problem-solving performance (Battista & Clements, 1986; Clements, 1986). Moreover, learners' engagement with the use of computer "offers children the opportunity to become more like adults, indeed like professionals, in their relationship to their intellectual products and themselves" (Papert, 1980, p. 31). Advocates of constructionism claim that Logo is a developer of creativity, divergent thinking, metacognitive ability, ability to describe direction well (Clemens & Gullo, 1984; Clemens, 1985; Clemens, 1987), and an enhancement of students' mathematical understanding (Feurzeig, 1986; Clements & Batista, 1990). Moreover, research also indicated that Logo can enhance the development of social and emotional development (Kull, 1986; Fletcher, 1985) and promote spontaneous social interaction (Hoyles & Sutherland, 1992).

On the other hand, Logo has received criticism mainly because what it provokes outstrips its actual performance. A growing body of research at the Education's Centre for Children and Technology (CCT) at the Bank Street College failed to identify Logo effects. Pea (1987) conducted a longitudinal pre-post study with children who worked with Logo language over a school year. The results showed no cognitive benefits for the children who worked with Logo language. Moreover, two other quantitative studies conducted at the CCT showed that the knowledge acquired within Logo has limited or no potential in transferring easily to any other kind of learning (Pea & Kurland, 1984; Kurland & Pea, 1985). As an attempt to elucidate these negative results, CCT researchers explored what happens whilst students explore Logo (Kurland, Pea, Clement & Mawby, 1986). The study showed that programming experience (as opposed to expertise) does not transfer to other domains which share analogous formal properties. Finally, advocates against Logo also demonstrate that Logo is a limited instructional tool that inhibits other kinds of thinking (Broughton, 1985; Davy, 1984).

Papert entails this criticism as a “poor way to talk about Logo” (Papert, 1987, p. 23) grounding his argument on his view of technocentrism, a word inspired from Piaget's use of the word egocentrism:

> *Egocentrism for Piaget does not, of course, mean "selfishness"--it means that the child has difficulty understanding anything independently of the self. Technocentrism refers to the tendency to give a similar centrality to a technical object-for example computers or Logo.*

Papert (1987) points that this technocentric thinking which emphasizes the centrality of the computer as agent that acts directly on thinking and learning, underestimates other significant elements of the learning practice, people and culture:

> *Does wood produce good houses? If I built a house out of wood and it fell down, would this show that wood does not produce good houses? Do hammers and saws produce good furniture? These betray themselves as technocentric questions by ignoring people and the elements only people can introduce: skill, design, aesthetics* (Papert, 1987, p. 24).

For Papert this tendency has led to questions like "What is THE effect of THE computer on cognitive development?" which place computer or Logo as the most important component of educational situations, whereas people and cultures gain a less important, facilitating role. For Papert, human development is situated within its culture and people:

> *In the presence of computers, cultures might change and with them people's ways of learning and thinking. But if you want to understand (or influence) the change, you have to center your attention on the culture-- not on the computer* (Papert, 1987, p 23).

2.2.4 Other constructionist environments

In the years that followed, several new versions of Logo were developed, amongst which MultiLogo, StarLogo, StarLogo 2.0 and the most common commercial version of Logo called Microworlds Logo developed by Logo Computer Systems Inc. MultiLogo is a parallel version of Logo, supporting simultaneous creation and execution of multiple processes with a new programming construct: the “agent” (Resnick, 1990). Each agent can control a computational process, thus by using multiple agents the user can control multiple process at the same time. A new version of Logo, called StarLogo, extends the

Logo programming language, used by students to model the behavior of decentralized systems (Resnick, 1996b). StarLogo extends Logo in three ways: first it has thousands of turtles who can move at the same time, in parallel; secondly, StarLogo turtles expand the senses of the Logo turtle that could only draw geometrical shapes, and thirdly, concretize the turtles' world.

Few years later, Resnick (1993) discusses an advanced construction environment developed at the MIT Media Lab known as LEGO/Logo. LEGO/Logo links the LEGO construction kit with the Logo programming language. Whilst using LEGO/Logo children start by making machines out of Lego pieces, with additional pieces such as gears, motors and sensors. Then children can connect their machine on a computer and through a modified version of Logo to control their machine.

Another construction kit developed at the MIT Media Lab is known as Programmable Brick. Programmable Brick is a large LEGO brick, specially designed for interacting with the world. The Brick can control four motors of light at a time and it can receive inputs from eight sensors (Resnick, 1993; Sargent, Resnick, Martin & Silverman, 1996). To work and play with the Programmable Brick, children need to write programs on their personal computer and then connect the Programmable Brick with their computer through a cable. Then children can disconnect the cable and take the Brick with them, having the program stored in the Brick.

2.2.5 Distributed Constructionism

The theoretical underpinning of distributed constructionism was introduced at the MIT Media Laboratory and draws on research on constructionism and distributed cognition (Resnick, 1996a). Distributed constructionism focuses on situations in which learning occurs when a person is interacting with its surrounding environment for designing and sharing meaningful artifacts; thus distributed constructionism develops the constructionist theory towards the direction of distributed construction activities. Resnick (1996a) focuses on three main categories of activities: discussing constructions, sharing constructions, and collaborating on constructions. Table 1 demonstrates how computer networks can be used in order to support the aforementioned distributed construction activities.

Stemming from Resnick's (1996a) concept of Distributed Constructionism, Zaphiris, Zacharia and Rajasekaran (2003) explored the implementation of Distributed

Constructionism through a Participatory Design methodology for an Online Learning Community. Throughout this study, learners collaborated in developing the content of an online Modern Greek language course, peer reviewed and published content contributions, and were involved in participatory design teams. In this study, the Participatory Design was implemented as a four-step process, namely: (a) build bridges with the intended users; (b) define user needs and recommendations to the system; (c) develop a prototype and (d) incorporate feedback and carry on the iteration. Additionally, Distributed Constructionism was employed to enhance the learning experience and community development. The findings revealed that Distributed Constructionism enhanced the learning experience of both the passive users and the Participatory Design team, whose contributions included replying to other students' language enquiries, helping out students to cope with technical problems and helping them explore resources to enhance their learning of the Greek language.

Table 1. Distributed construction activities through computer networks (Resnick, 1996a)

Category of Distributed Construction Activity	Clarification	Examples
Discussing constructions	Students use computer networks for discussing, exchanging ideas for their construction	Discussion through email, newsgroups, bulletin boards
Sharing constructions	Students use computer networks for sharing/distributing constructions (text, images, videos) amongst people in the community and make it part of shared knowledge	Create page on the web that displays artifacts
Collaborating on constructions	Students use computer networks to collaborate with fellow-students in real time for the design and development of their construction	Use of Multi User Domains -text-based virtual worlds where participants can work together

2.2.6 Social Constructionism

Shaw (1996) first launched the term social constructionism emphasizing the importance of the social setting, whilst engaging in constructing external and shared outcomes and artifacts. Shaw (1996) views social constructionism as a strong tie between Vygotskian sociocultural theory (Vygotsky, 1978) and constructivist learning processes informed by Piaget (1954), since socially constructive activities may provide developmental activity of the individual for constructing an artifact in a social setting. Shaw (1996) in his study reports on MUSIC (Multi-User Sessions In Community), a community computer networking system that was designed for enduring constructionist social environments. MUSIC is a neighborhood based community that facilitates sharing of information and organizing programs run by neighborhood residents. The aim of this system is to encourage members in an urban social setting to invest in their relationships in order to make use of each other's services. MUSIC has been successful in organizing and managing neighborhood programs. In total, the network facilitated the organization of eleven projects such as, a group trip to Jamaica, a poetry collection, a summer jobs program for neighborhood teenagers, crime watch information updates and others.

2.2.7 Deploying the constructionist movement

Papert's students and colleagues followed this maker movement and created technologies that can enable children and adults to engage in constructionist activities. Amongst the examples of the maker movement are, 1) *Scratch* (http://scratch.mit.edu/)-a programming language that is inspired by Logo, yet being more meaningful in the sense that it supports diversity of projects in a more social environment. It is popular for its graphical drag and drop interface (Resnick et al., 2009). 2) *Snap!* (http://www.makeymakey.com/)- an extended reimplementation of Scratch that allows drag-and-drop programming. It also features first class lists, first class procedures, and continuations that make it appropriate for introduction to computer science for high school or college students (Harvey, Garcia, Paley, & Segars, 2012). 3) *Makey Makey* - a platform that improvises tangible user interfaces allowing users to create nature-based interfaces (Collective & Shaw, 2012). 4) *Alice* (http://www.alice.org/index.php) - a 3-D interactive animation tool (Pausch et al., 1995). 5) *Lilypad* (http://arduino.cc/en/Main/arduinoBoardLilyPad)- a microcontroller board designed for wearables and e-textiles (Buechley & Hill, 2010). 6) *Lego robotics*

(http://www.lego.com/en-us) - a series of kits containing software and hardware to create programmable robots. 7) *Dresscode* -a youth oriented design tool that aims to facilitate the production of designs that are linked with craft (Jacobs, Resnick & Buechley, 2014). 8) *c-book* (c=creativity) - a constructionist book that aspires to re-invent reading as a more active and engaging process, by having its readers to engage in creating the elements of the book (Kynigos, 2014); 9) pocket code: a scratch-like integrated development environment for phones (Slany, 2014).

In the following section, several studies are presented that employed the constructionist aspirations, as well as how the constructionist movement has affected the educational reform of Thailand, the first country that approached constructionism for restructuring its educational system.

2.2.8 Contemporary approaches towards constructionism

Constructionism receives major attention in Thailand as a philosophy that can open up new opportunities in education, communities, and industry. Currently, Paron Israsena, a former CEO in one of Thailand's largest industrial corporation, dedicated his retirement years in reforming Thailand's educational system based on constructionism, whereas the idea of constructionist learning was used for human resource development and productivity improvement in the industry of Thailand (Israsena et al., 2014). In late 90s, Thailand approached constructionism from a more practical perspective. Placed within a larger endeavor for exploring educational reform throughout Thailand, Seymour Papert directed the Lighthouse project (1997-2000) aiming at using new technologies to re-think what education should look like in isolated areas with high connectivity, via satellite internet link. The project builds on constructionist philosophy, which was considered as a cornerstone to this educational reform (Bers & Best, 1999). Most of the activities held within the Lighthouse project focused on Non-Formal Education centers that would offer some of the most flexible environments to engage constructionist activities. By the end of the Lighthouse project, it was noted that working in the school environment and implementing constructionism was not easy, that is why the constructionist movement decided to establish its own school (Darunsikkhalai School for Innovative Learning-DSIL), which was specifically created to explore how a constructionist school can be created, with as little restriction as possible. The DSIL learning model can be summarized in the triptych Designing-Making and Reflecting (Israsena et al., 2014). Recently DSIL has brought

FabLab@School from Stanford University Department of Transformative Learning Technologies Lab, which is a digital fabrication laboratory equipped with wide range of computerized tools (e.g. 3D printer, 3D scanner etc.). The aim of the visit was to empower students as makers and inventors to create things and realize their projects (Walter-Herrmann & Büching, 2014).

Inspired by the principles of constructionism, and more specifically by the idea that learners need to engage in meaningful artifact construction in collaboration with peers, the MIT Lifelong Learning Kindergarten (LLK) research group developed an approach for facilitating the development of creative thinking. The approach consists of four elements (the four Ps): projects, peers, passion, and play (Resnick, 2014). These elements contributed in the development of the Scratch programming language and of an online community, which facilitates meaningful project development in collaboration with a community of peers. Scratch is a programming language, inspired by Logo, yet being more meaningful in the sense that it supports diversity of projects in a more social environment. LLK research group supports that the existing practice of learning coding through coding puzzles does not lead to coding fluency, as language fluency cannot be achieved by solving crossword puzzles, but by providing students with opportunities to use the language for expressing themselves in meaningful situations. Currently Scratch hosts more than 5 million projects, with the community growing more and more every day -10,000 new projects are created and shared every single day. Relevant studies with Scratch extend to its use by both teachers and students.

Brennan (2014) explored technocentrism –"the centrality of technology as a carrier of change" (Papert, 1987, p. 23)- and outlined how teachers can be supported to think beyond a technocentric view, whilst working with ScratchEd project. More specifically, she explored how teachers can shift their focus from the functionalities or the effects of a specific tool to learning with or through the tool. Her study demonstrated three means of support: face-to-face meet-ups, online community, and an online workshop. In another study, Fields, Kafai, Strommer, Wolf, and Seiner (2014) examined students' creative expressions as part of online activities within Scratch community. More specifically, this study focused on how students' participation in online social networking communities fostered their creativity. Students were engaged in developing collaborative interactive stories and received constructive comments from the Scratch team-both positive comments and limitations. Examination of students draft and final projects demonstrated the potential

of social networking communities to allow students develop more complex stories and steer modifications and improvements in students' stories.

In another context, Boytchev (2014) explored how constructionism has been applied in university level course and a secondary school project for Inquiry Based Learning (IBL). The project demonstrated that utilizing constructionism might not be a straightforward process. For Boytchev (2014) learning through construction can be broken down into two phases: deconstruction (i.e. decomposing something into smaller but meaningful entities) and construction (i.e. building blocks to construct personal knowledge). Following a similar path, Sendova (2014) described her experiences in involving scientific research at school age. Following an IBL approach, Sendova (2014) stressed the following principles: i) foster situations in which the teacher is involved as an authentic co-learner; and ii) promote scientific research at school age. Working on research projects with secondary school students, activities need to follow the following phases: a) preparation; b) research; c) presentation; d) passing on the torch.

Another implementation of constructionism is a c-book (c=creativity), that is an e-book that aspires to engage readers in creating the elements of the book. Kynigos (2002) argues that there is need for bringing together stakeholders from diverse backgrounds and expertise to develop multi-organizational culture for designing microworlds. Within this school of thought, Kynigos (2014) introduced elements of constructionism in a wide scale traditional schooling tool; that is an e-book. Kynigos (2014) delineates a European project (Mathematical Creativity Squared) which aims to introduce a c-book (c=creativity) that will facilitate social creativity and constructionist engagement. The c-book aspires to re-invent the reading as a more active and engaging process, by having its readers to engage in creating the elements of the book. The first feature developed in this project supports collective design of c-book units through four options: alternative (with regard to expression of opinions, statements, arguments), contributory (with regard to modifying an existing alternative), objecting (with regard to rejecting an existing idea and proposing another alternative), off task (with regard to activities not connected with the activity), management (with regard to managing the progression of the task).

Cognitive processes within a constructionist environment are also explored. Kynigos, Moustaki, Smyrnaiou, and Xenos (2014) explored the use of constructionist media for fostering creative mathematical thinking- focusing on the elements of problem solving and problem posing. In their study, students worked together for debugging a 3d mathematical

artifact by planning their actions, discussing in groups and exploring ideas to address the problem. Students employed problem solving and problem posing strategies such as: breaking down the problems to smaller pieces, understanding the problem by using available material, reshaping the problem and sharing the outcomes of several attempts, and generating ideas on how the problem can be solved. In another study, Petrou, Nicolaou, Karnaou, and Constantinou (2014) explored cognitive processes enacted by learners during collaborative construction of scientific models. Students groups working in a science class were analyzed indicating that students followed a somewhat similar path for constructing their model, which included the following steps: inductive reasoning, explanation, evaluation, analysis, and quantification.

The constructionist movement focused mainly on science, engineering technology, and mathematics education (cf. Noss et al., 2012; Noss & Hoyles, 1996; Kynigos, 2014; Petrou, Nicolaou, Karnaou & Constantinou, 2014). Yet, constructionism gains attention in other fields including language learning, art, physics, music, social and environmental education. Peppler and Davis-Soylu (2014) illustrated how learning in arts is guided by an ecological and socio-cultural constructionist framework, demonstrating that the artifact initiates a reciprocal conversation between the learner, the artifact, and the context. For Peppler and Davis-Soylu (2014), learning in art can provide researchers with additional information and tools to explore learning and education. In another study, Hjorth and Wilensky (2014) argue that the tenet of constructionism is understudied in the field of social policy. Thus, they conducted a study on harnessing agent-based models for fostering urban planning and social policy. The study used the agent as an object-to-think-with and intuitively reasoned how to better design their city. Constructionism has also been employed in Environmental Education. Daskolia, Makri, and Kynigos (2014) explored how a digital story can foster collaborative creativity in the design of tangible artifacts for urban sustainability. In this study, digital storytelling was treated as "improvable boundary object", which is a rich environment that allows learners to engage in a synergetic relationship with their artifact and allows them to express their ideas in the outside world. The results demonstrated that the construction of digital stories related to urban sustainability has proven a demanding yet rewarding venture, since it allowed students to collaborate and struggle for collaborative creativity in the construction of the artifact. The constructionist theory has been also applied for fostering students' motivation by employing a multidisciplinary approach between Music and Physics. Again, following the

constructionist aspirations, Dietmeire, Russell, Wielgus, and Berland (2014) developed a simulation app that enables students to explore the interrelated relationship between music and physics. The concept of microworlds has been investigated in the field of language learning and more specifically in intelligent CALL. Hamburger (1995) commissioned an attempt for implementing the microworld idea in a simulation called Foreign Language Understanding Engendered by Naturalistic Techniques (FLUENT) in which learners are required to provide words, phrases and sentences to achieve simple goals. The system responds immediately and allows the learner to proceed to the next stage. Similar implementations of microworlds are realized within virtual worlds, where learners are involved in understanding a simulated world (Schwienhorst, 1998).

Figure 4 demonstrates the evolvement of constructionism towards distributed and social constructionism, as well as its more recent implementations. The dynamic progression of constructionism is prevalent not only by its continuous development but also from the various technological tools that evolve as social constructionist tools -for example Scratch, Snap!, Lego robotics, Makey Makey, Dresscode.

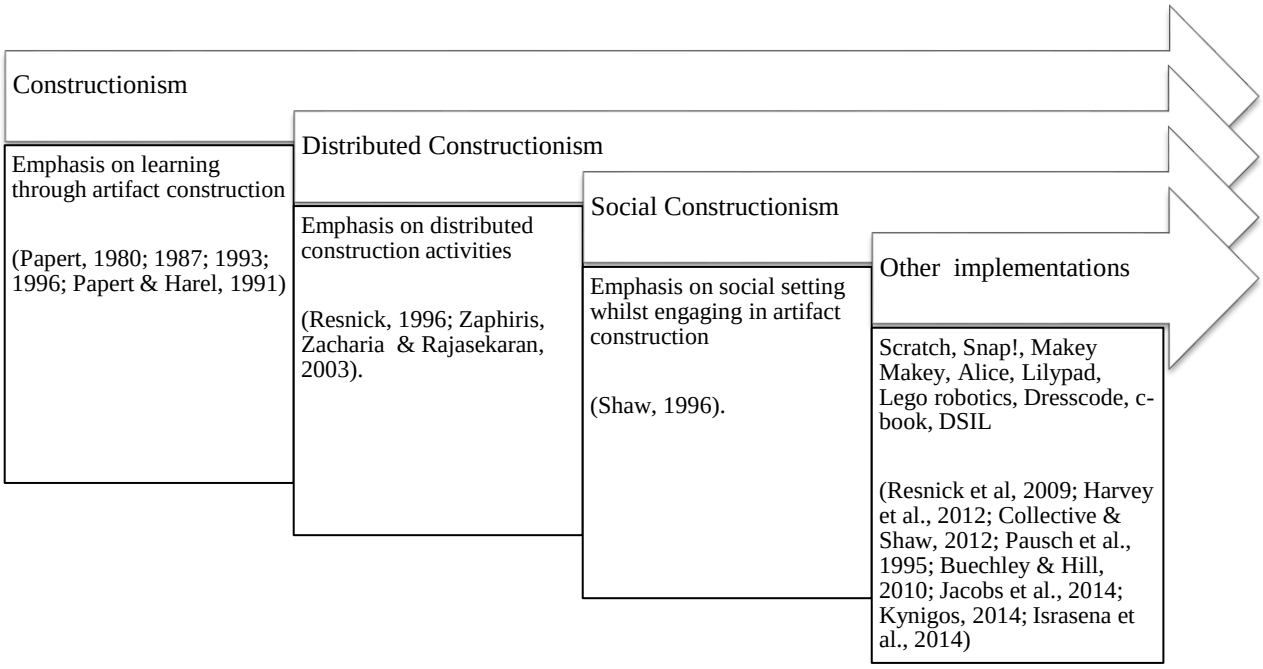


Figure 4. The evolvement of constructionism.

2.3 Discussion

This chapter reviewed the theoretical framework of constructionism from its early stages towards its more recent applications and provided key notions and ideas that evolved, thus answering SQ1 ("What are the key aspirations and implementations of constructionism as they appear in the literature?"). The dynamic progression of constructionism leans towards distributed and social constructionism, whereas recent applications of constructionist aspirations include Scratch, Snap!, Dresscode, c-book,Makey Makey and DSIL school in Thailand.

For constructionists, the development of an artifact that is visible to the world enhances the engagement with the knowledge needed for the construction of the artifact, whereas the social environment and culture enhance the creation of a close relationship, both with the artifact and the knowledge needed for its construction. A sound mathetic advice in constructionism is "*Look for connections*" which leads to the suggestion of establishing connections between abstract and concrete knowledge by engaging in the making of objects in the world (Papert, 1996). Through improving the connectivity, learners come into engaged relationship both with the artifact and with the knowledge needed for its construction.

2.4 Summary

This chapter has demonstrated the evolvement of constructionism towards distributed and social constructionism, and provided a detailed account of its more recent implementations, thus answering SQ 1 ("What are the key aspirations and implementations of constructionism as they appear in the literature?"). Amongst the constructionist concepts that evolved from this chapter are, appropriation, knowledge construction, learning cultures, *mathetics*, microworlds, object-to-think-with and bricolage. This chapter provides a springboard for understanding its notions, and infusing such a concept in real-life settings. In this endeavor, Computer-Assisted Language Learning (CALL) was selected as the context in which the intervention could take place.

2.5 Contribution

Understanding the notions and aspirations of constructionism provided a leaping stone for the development of the design and its implementation in real-classroom settings. An initial assumption of the design of researchers and instructors was “give them the tools and they will build”. Social Constructionism (SC) design was set forward, that is, tasking students to socially construct an artifact using social technologies. In this dissertation, certain tasks were planned, that allowed students to use social technologies for constructing an artifact, such as a shared dictionary. DBR was used throughout the experimental part of this dissertation. Throughout the cycles of DBR new issues came up, informing both the local design and the evolvement of usable knowledge in the field.

3 Mapping the landscape of Computer-Assisted Language Learning

This chapter explores the development in the field of Computer-Assisted Language Learning (CALL), by building a map of existing research work in the field. Based on a corpus of 163 manuscripts, published between January 2009 and September 2010 in four major journals devoted to CALL, it sets out to describe the range of topics covered under the umbrella of CALL and provides a holistic view of the field. CALL provides the context for this dissertation, where the designed intervention took place.

3.1 Introduction

Gamper and Knapp (2002) define Computer-Assisted Language Learning (CALL) as "a research field which explores the use of computational methods and techniques as well as new media for language learning and teaching" (p. 329). A range of different areas are shaping the field, whilst Information and Communication Technologies (ICT) are rapidly expanding, and language learning applications continue to grow (Zhang, 2012; Thomas, Reinders and Warschauer, 2013). In recent years, several studies have been conducted exploring CALL effectiveness (see Zhao, 2003; Grgurovic, Chapelle, & Shelley, 2013) showing that foreign language instruction supported by technology is at least as effective as instruction without technology; whereas in cases of rigorous research designs CALL groups perform better than non-CALL groups (Grgurovic, Chapelle, & Shelley, 2013). On the other hand, in another meta-analysis, Blok et al. (2001) reported no significant effect for four of the five studies that evaluated word learning programs for elementary students.

CALL is interdisciplinary in nature, drawing on emerging practices from other fields, such as Instructional Technology, Human Computer Interaction (HCI), Second Language Acquisition (SLA), Teaching, Pedagogy and Psychology. Being in close relationship with these fields, Levy (2000) sets out to clarify the goals and limitations of CALL research from within. More specifically, Levy (2000) considers the issue of coherence and direction in CALL by exploring articles published in books and journals in 1999. Based on a corpus of 177 CALL research articles published in books and journals in 1999, Levy (2000) puts forward a bottom-up approach, for identifying the scope and goals in CALL research and practice. In order to describe the corpus, the introduction to the Educational Resources Information Centre (ERIC) *Thesaurus of Descriptors* was used, since it provided a comprehensive reference list of words that could describe education-related literature. This study illustrated that it is possible to detect clear patterns in the goals and directions of CALL research and practice, revealing six themes in CALL research: CMC-based CALL, CALL artifacts, CALL hybrids, CALL environment, teacher education, technological effect on reading and writing and other. Furthermore, Levy (2000, p. 174) claimed that "sophisticated methods of content analysis" are needed in order to provide a definitive description of the CALL articles published during a specific period. Following Levy's retrospective, in this chapter a bottom-up approach was adopted in order to classify the topics that researchers undertake in the field of CALL. Within this framework, this chapter aims at mapping goals and directions of CALL research and practice, by a) building a map

of existing research topics in the field of CALL; and b) synthesizing objectives of researches included in each category of the map. The emergence of the map aspires to provide a holistic view of the field and shed light in the current and future directions of research. Moreover, the map offers a springboard for this research by delineating research trends in the categories of the CALL map, as well as possible future directions in the field.

3.2 Methodology

As mentioned above, the purpose of this chapter is to map the current research goals and directions in CALL through a systematic six-stage approach (see Figure 5). Similar methodologies to the ones used in this study have been used in the past in the field of Human-Computer Interaction (cf. Zaphiris et al., 2006). All data in the corpus were classified in the map following an expert-centered approach (using a focus group and the card sorting techniques). In the sections below, a detailed description of the adopted methodology is presented.

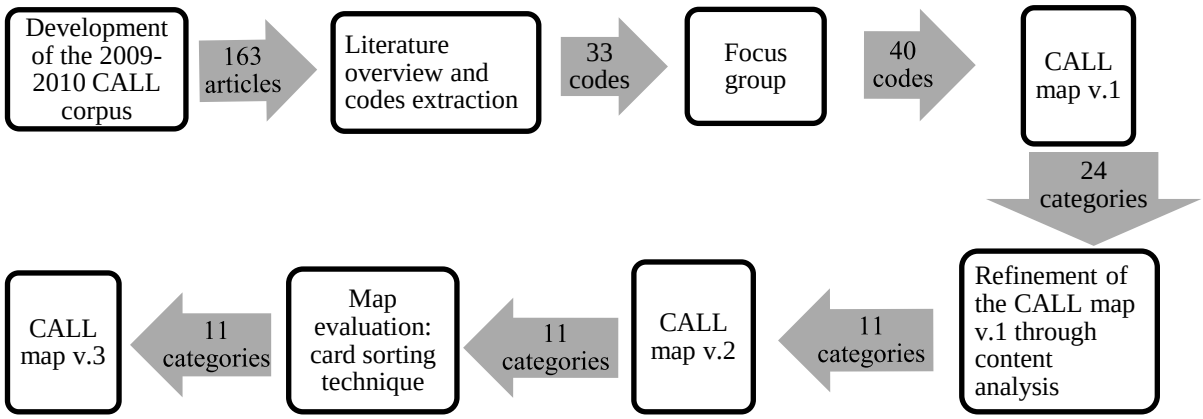


Figure 5. Six-stage process adopted for the elaboration of the CALL map.

3.2.1 The corpus

The framework of this study was set by developing the CALL corpus, which included 163 manuscripts published between January 2009 and September 2010 in four major journals devoted to CALL. The selection of journals was guided by Smith and Lafford (2009) who evaluated scholarly activity in CALL aiming at ranking CALL-specific and applied

linguistics journals according to the quality of their articles and their contribution to the field. The top four ranked journals were selected for inclusion: *Language Learning and Technology*, *CALICO Journal*, *Computer Assisted Language Learning* and *ReCALL*. The distribution of manuscripts in the various publications is given in Table 2. The corpus does not include product reviews in the *CALICO Journal*, introductions to special issues, editorials and the commentary sections in the *Language Learning and Technology* journal. Although these journals do not represent all possible publications in the field of CALL, their ranking by Smith and Lafford (2009) suggests that they are likely to represent a substantial body of relevant studies.

Table 2. Allocation of manuscripts in the journals included in the 2009-2010 CALL corpus.

Journal title	Number of manuscripts
CALICO	62
Computer Assisted Language Learning	42
Language Learning & Technology	19
ReCALL	40
Total number of manuscripts	163

3.2.2 Literature overview and initial coding scheme development

In order to familiarize with the 2009-2010 CALL corpus, an initial overview of the manuscripts was held, aiming to elicit their basic themes. To this aim, keywords were extracted from the title, abstract, and keywords of each manuscript. The output of this stage was a collection of 33 keywords that described the basic themes of the corpus. The collected keywords were then used to develop an initial coding scheme with 33 code categories. Although the collected keywords captured the author's understanding of their work, yet abstract and keywords did not capsulate in depth the essence of each manuscript. Thus, initial code scheme was refined following an expert centered approach.

3.2.3 Focus group

A focus group was then hosted as a means to refine the initial coding scheme. Focus group is a valuable tool for generating data, orienting and exploring new research areas from the participants' own standpoint (Morgan, 1997; Cohen, Manion & Morrison, 2007). The focus group was conducted with five CALL practitioners –all were language instructors teaching English as an L2 at tertiary education level in Cyprus and use CALL as an integral component of their language teaching. The goal was for the professionals to verify, expand or limit the initial coding scheme.

The focus group selected randomly fourteen manuscripts (8.5%) from the indexed corpus and coded them either by using existing code categories or by generating new ones. Throughout this session, eight new code categories were generated and two existing code categories were merged into one, thus expanding the initial 33 code categories to 40.

3.2.4 CALL map Version 1.0

The code categories were then organized into a map with an eye to meeting two criteria: internal homogeneity within the generated categories and external heterogeneity among categories (Patton, 2002). During the construction of the map, some categories were divided into subcategories, when the data imposed so. The subcategories were kept when differences among other subcategories were bold and clear. The output of this stage was the CALL map Version 1.0 which included 24 categories and 11 subcategories.

3.2.5 Refinement of the CALL map Version 1.0

The categories of the CALL map Version 1.0 were refined in a cyclical manner working back and forth between the data and the map to "verify the meaningfulness and accuracy of the categories and the placement of data in categories" (Patton, 2002, p. 466). Each manuscript was assigned to one of the categories, giving careful consideration to the wording of the title, abstract and keywords, as well as to the content of the introduction, conclusion and future implications/considerations (if any). Each manuscript was included in only one category, based on the focus of interest, since a clear-cut taxonomy was seized - following the process adopted by Zaphiris et al. (2006). Saturation was reached when all manuscripts of the corpus could be classified into the existing categories, without any

incongruity. The output of this stage was a revised map with 11 categories and 27 subcategories (CALL map Version 2.0).

3.2.6 Card sorting in predefined categories

The CALL map Version 2.0 was further refined and the categories were cross-checked independently using the card sorting technique. Card sorting is a useful technique in resolving disagreements on categorization by identifying trends and insights in the way people group and label content (Morville & Rosenfeld, 2007).

Twenty articles (12,2%) were chosen randomly from the 2009-2010 CALL corpus and categorized for a second time by five new independent researchers. Researchers agreed on the categorization in 80% of the cases. Disagreements in the categorization of three manuscripts were resolved by discussing the classification differences, identifying the purpose and the contribution of those manuscripts until full agreement in the classification was reached.

The same researchers also randomly selected twelve additional studies from a list of 106 studies published in *JALT* and *System* journals between March 2009 and December 2010. The two journals were selected randomly from Smith and Lafford's (2009) ranking. The researchers categorized the selected studies in order to evaluate the proposed map and verify the inclusiveness of the categories. The studies from *JALT* and *System* journals fitted well in the predefined categories, thus validating the inclusiveness of the map categories. By the end of this stage, the CALL map Version 3.0 was established, which included 11 categories and 25 subcategories, that is 11 major topics and 25 subtopics.

3.3 The map of Computer-Assisted Language Learning

Once the data have been categorized, the researcher could count the number of studies included in each category; i.e. the most and least researched topics in the field. Figure 6 depicts the CALL map Version 3.0 with the 11 topics and 25 subtopics. In Table 3 the detailed distribution of articles in the elaborated categories is presented, along with the number of studies included in each category. The categories cover a wide range of topics related to CALL. Not surprisingly, the use of technology in language learning has been studied by many different researchers in many different contexts. Table 4 presents the

derived themes in CALL research from Levy's study (2000) vis-à-vis the elaborated categories of the CALL map. Three noteworthy topics arising from the 2009-2010 CALL corpus relate to "second-language instructional material" (20/163 articles), "CALL applications in support of language skills and other competences" (35/163 articles) and "Computer Mediated Communication" (26/163). This is in line with Levy's (2000) study in which there were 61/177 items focusing on CALL artifacts, namely the combination of the categories "second-language instructional material" and "CALL applications in support of language skills and other competences" of this study. In Levy's study the number of items focusing on Computer-Mediated Communication (CMC) was higher than in this study (47/177). Topics that maintain their popularity for more than a decade are CMC, CALL materials and language teachers' training; whereas new promising categories which evolved in this study include "Attitudinal Studies", "Web 2.0 technologies in language learning", "Intelligent CALL" and "Innovative technologies in language learning".

Table 3. Distribution of studies in the elaborated categories of the map.

Categories	Total number of research studies included in each category
1. CALL applications in support of language skills and other competences	35
2. Computer Mediated Communication (CMC)	26
3. Attitudinal studies	20
4. Second-language instructional material	20
5. Intelligent CALL (ICALL)	16
6. Web 2.0 technologies in language learning	12
7. Innovative technologies in language learning	11
8. Language learners' variability	9
9. Language teachers' training	8
10. Computer Assisted Language Testing (CALT)	3
11. CALL hybrid research	3
Total	163

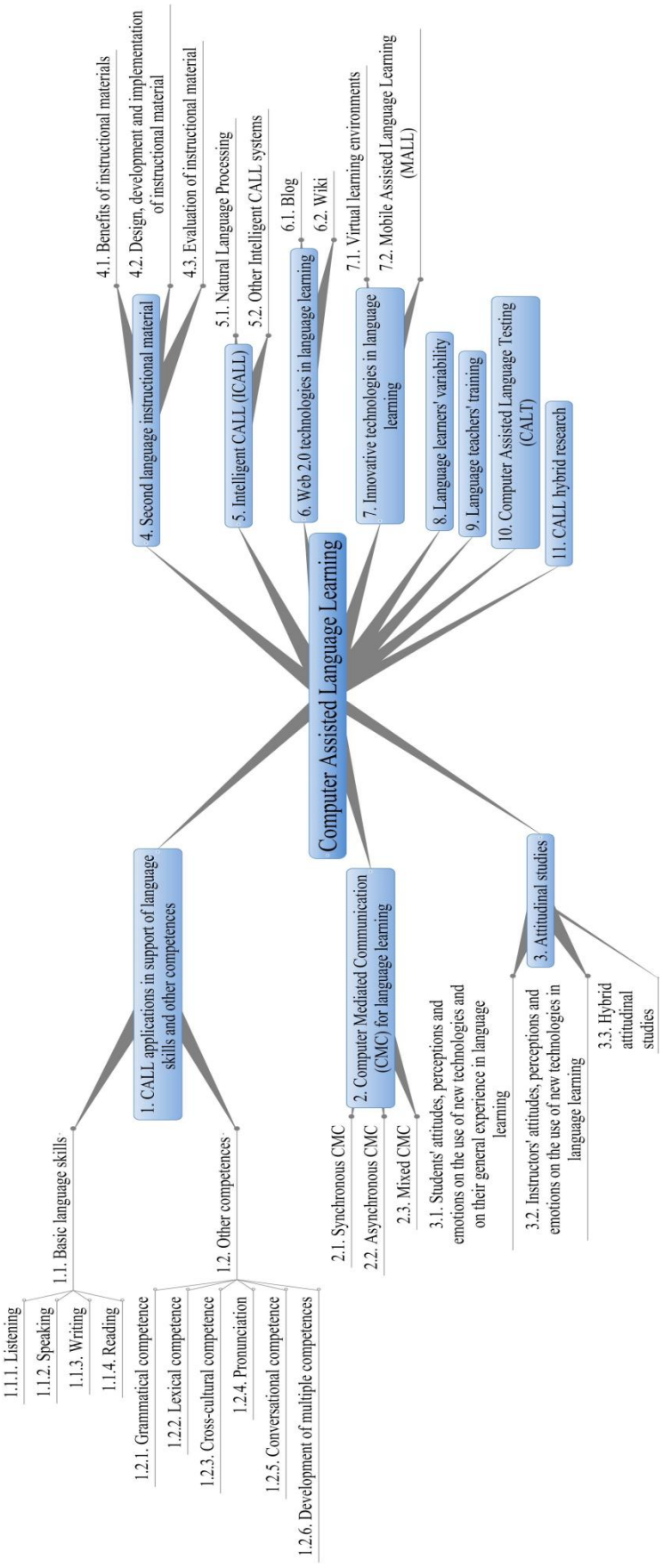


Figure 6. The CALL map version 3.0.

Table 4. Derived themes from Levy's study (2000) and elaborated categories of the CALL map.

Derived themes in CALL research (Levy, 2000, p. 177)	Elaborated categories of the CALL map
Research focus	Categories
1. CMC 2. Artifact 3. (Hybrid) 4. Environment/comparative evaluation 5. Teacher education 6. Hypertext/reading 7. Other	1. CALL applications in support of language skills and other competences 2. Computer Mediated Communication 3. Attitudinal studies 4. Second-language instructional material 5. Intelligent CALL (ICALL) 6. Web 2.0 technologies in language learning 7. Innovative technologies in language learning 8. Language learners' variability 9. Language teachers' training 10. Computer Assisted Language Testing (CALT) 11. CALL hybrid research

3.4 Synthesis of the findings of the CALL map

As discussed earlier, the CALL map includes 11 topics related to CALL. Accordingly, the synthesis is organized using the concepts that evolved in the CALL map. Below the 11 topics of the CALL map are presented, together with the summary of each category of the map.

3.4.1 CALL applications in support of language skills and other competences

CALL applications signify specially designed multimedia/web based software – commercial or designed ad hoc– for supporting language competence. The research goal of manuscripts in this group is to make use of these information technologies to investigate their affordances in supporting the four basic language skills and in enhancing communication and other generic skills or competences, namely grammatical and lexical competence, pronunciation, conversational competence, cross-cultural competence or in developing multiple competences. The use of technology is supportive and emphasis is

placed on the development of language skills and other competences. Among the technologies that have been explored by researchers are videos (Sydorenko, 2010), Virtual Learning Environments (VLEs) and Computer-Mediated Communication (Pérez Cañado, 2010); video games (deHaan, Reed & Kuwada, 2010); captions during video-based listening activities (Winke, Gass & Sydorenko, 2010), a slow-down tool during video-based listening activities (Meinardi, 2009); e-mail interactions with native speakers (Sasaki & Takeuchi, 2010), multimedia glosses (Erçetin, 2010) and concordances (Chang & Sun, 2009). All of these studies showed positive effects of information technologies on enhancing vocabulary acquisition, listening, proofreading performance and overall comprehension of a foreign language. Slightly different results are presented by Fidaoui, Rima and Nahla (2010) who explored the use of CALL in the writing classroom, demonstrating that students produced written work of moderate quality; although both students and teachers shared a positive attitude towards CALL.

Additionally, research studies that fall into this category often have a comparative aspect, in the sense that they investigate the efficacy of digital and multimedia technologies vis-à-vis other instructional means –computerized or traditional– determining the impact the environment may have on learners' language literacy (Kessler, 2010; Taylor, 2009). Finally, researchers in this category often chronicle their educational experience in using CALL for enhancing language competence (see for example, Moreno Jaén & Pérez Basanta, 2010).

3.4.2 Computer-Mediated Communication

Computer-Mediated Communication (CMC) is defined as "the process by which people create, exchange, and perceive information using networked telecommunications systems (or non-networked computers) that facilitate encoding, transmitting, and decoding messages" (December, 1997, p. 1). Hubbard (2009) has foreseen the increasing development of CMC by noticing that CMC "has become perhaps the most researched area in the field of CALL" (p. 10). Hubbard (2009, p. 10) provides two possible reasons for this:

> One is practical: when doing text-based CMC studies much or all of the data of interest is collected automatically, saving the hours of transcription associated with research on spoken language. … The second reason is that there is a more natural

> connection between the human-human interaction through CMC and the findings from studies of face-to-face interaction in [Second Language Acquisition] SLA.

CMC draws an interesting division along two main dimensions: time –synchronous, asynchronous and mixed– and modality –text, audio, video and mixed. The manuscripts included in this category explore the usage of these three modalities and their affordances in the language classroom. A rapidly increasing body of research investigates synchronous CMC (SCMC) with an eye to give a deep insight into second language development (see for example, Smith & Sauro, 2009) and put emphasis to the investigation of the possibilities of learner-learner interaction through SCMC (Yilmaz & Granena, 2010). Research in the group of SCMC also focused on the effects that SCMC has on learners' cognitive and affective development in L2 (see for example, Smith, 2009; Liaw & Bunn-Le Master, 2010). Additionally, researchers in SCMC sought to identify, describe and evaluate the impact of different CMC modes in language learning (see for example, Sauro, 2009). In addition, researchers in SCMC often compare the effectiveness of communication in SCMC in comparison to face-to-face discussion (see for example, Oskoz, 2009; Vandergriff & Fuchs, 2009). Researchers in asynchronous CMC (ACMC) seek to identify and evaluate the affordances of various ACMC modes in L2 development. ACMC modes and features explored include many-to-many bulletin boards (Basharina, 2009), computer-mediated elaborative feedback (Murphy, 2010) and journal asynchronous writing (Andrew, 2009). Researchers in ACMC also explored how learners make use of the various modes of ACMC and the effects of the usage of these modes (Kosunen, 2009). Finally, research in mixed CMC has a comparative aspect in the sense that it sets the affordances of SCMC vis-à-vis the affordances of ACMC and face-to-face interaction (see for example, Hirotani, 2009).

3.4.3 Attitudinal studies

In this category, researchers' focus is on students' and instructors' attitudes, perceptions and emotions on the use of new technologies or on their general experience in language learning (see for example, Ranalli, 2009; Varley, 2009). Research studies in this category also have a comparative aspect in the sense that they explore students' vis-à-vis instructors' attitudes, perceptions and actual use of CALL (see for example, Hee Hong &

Samimy, 2010). Finally, this category includes studies that aim to develop instruments for measuring the attitude towards CALL (see for example, Vandewaetere & Desmet, 2009).

3.4.4 Second language instructional material

This category includes studies which aim to (1) discuss the benefits, affordances and constraints of second language materials, namely online programs, software, textbooks and generic application (see for example, Wu, Franken, & Witten, 2010; Geraghty & Marcus Quinn, 2009); (2) outline design issues, namely enumerate the phases involved in designing, developing and implementing valuable and effective language materials (see for example Mac Lochlainn, 2010; Bush, 2010); and finally (3) evaluate this material with respect to its linguistic and interactional features or with respect to its effectiveness in improving learning outcomes (see for example, Kissau, McCullough, & Pyke, 2010; Madyarov, 2009). Studies included in this category emphasize the development of instructional material with the use of technology rather than on the development of a specific language competence.

3.4.5 Intelligent CALL (ICALL)

Intelligent CALL (ICALL) is conceptualized as "an approach to CALL that makes use of sophisticated programming techniques that mimic human intelligence" (Davies & Riley, 2012, entry ICALL). The main programming technique, which underlies the development of ICALL, is Natural Language Processing (NLP); whilst the use of other programming techniques are also present. The research goal of the manuscripts included in this group is to provide examples of such systems and discuss their affordances in language learning (see for example, Heift, 2010; Vlugter, Knott, McDonald, & Hall, 2009; Napolitano & Stent, 2009; Sha, 2009).

3.4.6 Web 2.0 technologies in language learning

This category deals with two dominant Web 2.0 technologies, blogs and wikis. The researchers in this group aim to explore the effectiveness of Web 2.0 tools in supporting language learning, often in comparison with traditional instruction (see for example, Arslan & Şahin–Kızıl, 2010). The pedagogical strengths and added value of Web 2.0 tools

are also explored by researchers in this category (see for example, Rivens Mompean, 2010), along with the features of Web 2.0 tools that could improve traditional teaching (see for example, Miceli, Murray, & Kennedy, 2010; Kárpáti, 2009). Finally, learners' interaction in a Web 2.0 environment is also under the microscope of research (see for example, Bradley, Lindström, & Rystedt, 2010; Kessler & Bikowski, 2010), along with usability issues (Stevenson & Liu, 2010).

3.4.7 Innovative technologies in language learning

Manuscripts in this category report usage examples or explore the efficacy of virtual learning environments and mobile devices in language learning. Several studies in this category operate on a pilot basis aiming to demonstrate the affordances of such innovative tools in language learning (see for example, Stickler & Hampel, 2010; Peterson, 2010). Moreover, comparative studies are also present in this category, in the sense that they investigate the efficacy of innovative environment vis-à-vis other instructional means – computerised or traditional (see for example, O'Brien, Levy, & Orich, 2009). Researchers are also concerned with the need to establish the value of such technologies as cost and time effective instructional tools (see for example, Abdous, Camarena, & Facer, 2009; Stockwell, 2010).

3.4.8 Language learners' variability

The scope of this category is twofold; it focuses on learners' individual variation in Second Language Acquisition (SLA), as well as on learner training, namely training on technology itself or training to specific CALL and non-CALL applications. More specifically, this category includes studies pertaining to the effects of learners' individual differences, namely motivation, intelligence, receptiveness, environment and gender, on their learning performance (see for example, Li, 2009; Chang & Ho, 2009; Chang, 2010), as well as the role of learner training in language learning (Boulton, 2009).

3.4.9 Language teachers' training

This category is concerned with the shortage of resources in the area of preparation of language teachers for online language teaching and the need for language teachers to

develop new competences in the era of new technologies (see for example, Guichon, 2009; Hong, 2010). Moreover, researchers develop and/or evaluate the effectiveness of teacher training programmes (Dooly, 2009). Finally, teacher trainees' experiences are also under the microscope of research, in order to explore the experiences of pre- and in- service language teachers in studying and incorporating technology in language learning classrooms (Ebsworth, Kim, & Klein, 2010).

3.4.10 Computer-Assisted Language Testing (CALT)

The employment of computer as a tool for assessing students' progress is the main focus of the manuscripts in this category. Major importance is attached to the development of online tests (see for example, Larson & Hendricks, 2009); whereas the scoring validity of such tests is also explored (see for example, Coniam, 2009).

3.4.11 CALL hybrid research

The last category combines two or more topics from the map categories. Research in this category has a reflective scope, in the sense that researchers aim to document and share their CALL experience, give further implications for research and highlight key issues for consideration (see for example, Kennedy & Levy, 2009).

3.5 Discussion

This chapter has adopted a six-stage process for the development of the CALL map with current goals and directions of CALL research and practice. The CALL map provided a roadmap of the field, including both topics that attract long-term interest as well as new directions, along with information that goes beyond quantitative data provided in a classic literature search that is, most and least researched topics. Moreover, the map brought to the fore an overview of CALL research, published in four major journals in the field between January 2009 and September 2010. This chapter looked only at manuscripts that were published in a short period of time in four major journals, focusing on the categories or the themes that researchers are concerned with. The results are limited to this particular corpus; however, the categories are likely to reflect both present and future trends in the

field of CALL. It is worth noting here that these journals are representative for CALL and are highly ranked amongst researchers in the field (Smith & Lafford, 2009).

This chapter revealed themes that maintain their popularity for more than a decade, namely CMC, teacher training and CALL materials which maintain their popularity since Levy's study (2000), when teachers had access only to computers, generic software and CALL applications that often accompanied paper-based material. Today, blogs, wikis, virtual learning environments, and mobile devices are prevalent in the language classroom. Current research held in these areas unfolds their potential in bringing authentic settings in the language classroom, thus enabling instructors to provide learners ample opportunities to use the foreign language in real-life situations. The studies included in the categories "Web 2.0 technologies in language learning", "Intelligent CALL" and "Innovative technologies in language learning" seem to carve new paths in the field, unpacking new ways in approaching language learning. Yet, the viability of these technologies depends on their long-term impact; in other words, CALL practitioners and learners are expected to inform their further use.

3.6 Summary

The findings of this chapter indicate a multifaceted structure for the field of CALL, informing current goals and directions in research and practice. Current goals and directions uncovered in the map lay in Web 2.0 technologies, VLEs, and mobile devices; whereas categories that seem to lose ground are CALT and CALL hybrid research. The affordances of the aforementioned technologies manifest their potential to improve traditional teaching by enhancing students' motivation, collaboration and language performance and bringing in class authentic paradigms of language use. This chapter provided a terminus a quo for this dissertation for narrowing down on one of the trends in the field, that is, Web 2.0 technologies, which I explore in-depth in the following chapter.

4 Towards an understanding of Web 2.0 in CALL

Following the results of the previous study, this chapter focuses on one of the major categories of the CALL map, exploring the research development pertaining to Web 2.0 in the field of CALL. Following a systematic review of the research studies in four major journals related to CALL (CALICO Journal, CALL, Language Learning & Technology, and ReCALL) between January 2009 and December 2013, the following aspects have been determined: (1) Web 2.0 tools that dominate second/foreign language classroom; (2) learning/SLA theories that guide their use; (3) skills that Web 2.0 technologies support; (4) reported advantages and challenges in harnessing Web 2.0 tools; and (5) task design considerations. This chapter argues that social technologies are valuable tools in the language classrooms, but entail challenges regarding their theoretical and pedagogical alignment.

4.1 Introduction

Social/Web 2.0 technologies, the so-called interactive media, are amongst the technologies that are increasingly changing the classroom environment. The question of how best to integrate such tools in the language classroom has become a key issue in a number of research papers in research journals and conferences (cf. special Issue of *CALICO* 2014: Web 2.0 and Language Learning: Rhetoric and Reality). Some studies have been guided by the wish to understand effective practices for training teachers in the use of Web 2.0 technologies for CMC-based language learning activities (cf., for example, Dooly & Sadler, 2013) and some by the wish to identify usability issues and better interfaces design (cf., for example, Stevenson & Liu, 2010). Other studies have sought to understand the benefits of Web 2.0 technologies in second/foreign language teaching and learning (cf., for example, Lee 2010a). Yet, despite their popularity, it is still not clear to what extent they are used in language learning contexts and how effective they are as instructional tools. In an attempt to understand the various foci of research conducted in the use of Web 2.0 tools in CALL, relevant literature has been explored in the past five years. Thus, this chapter provides the state-of-the-art on the use of Web 2.0 technologies in CALL and delineates: (1) Web 2.0 tools that dominate second/foreign language classroom; (2) learning/SLA theories that guide their use; (3) skills that Web 2.0 technologies support; (4) reported advantages and challenges of Web 2.0 tools; and (5) task design considerations.

4.2 Methodology

In order to synthesize the findings of research pertaining to Web 2.0 in the field of CALL, this chapter followed a three-step approach (see Figure 7) which includes:

(a) development of Web 2.0 corpus from January 2009 to December 2013. The manuscripts of the Web 2.0 corpus were selected from the top four ranked journals in CALL-specific and applied linguistics journals (Smith & Lafford, 2009) via manual keyword search. The initial corpus consisted of 48 manuscripts;

(b) corpus refinement. This stage excluded seven manuscripts as reporting on non-empirical studies, thus resulting in 41 manuscripts; and

(c) synthesis of the research corpus under the five aspects of this review (see section 4.1

above). Table 5 provides the distribution of manuscripts in the four journals.

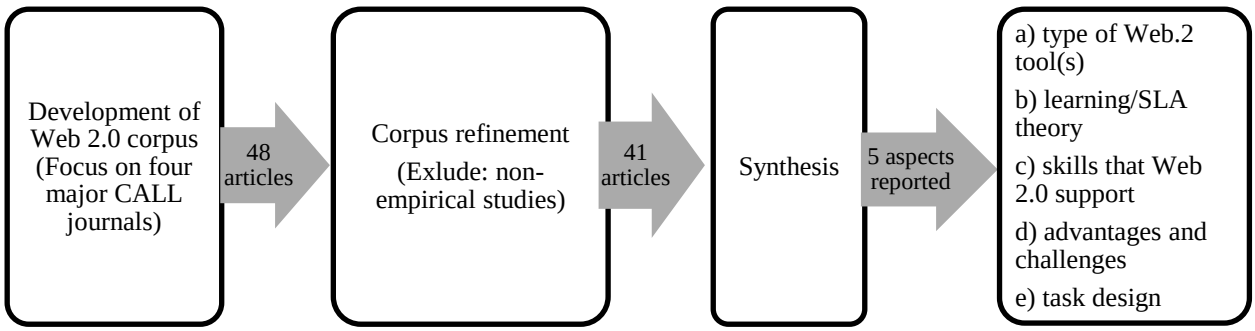


Figure 7. Flow diagram of the methodology adopted for exploring the state-of-the-art in Web 2.0 technologies in CALL.

Table 5. Allocation of manuscripts in the journals included in the 2009-2013 Web 2.0 corpus.

Journal title	Number of manuscripts
CALICO	13
Computer Assisted Language Learning	9
Language Learning & Technology	13
ReCALL	6
Total number of manuscripts	41

4.3 Findings

The following sections provide a detailed review of the research in the use of Web 2.0 tools in CALL in the past five years.

4.3.1 Web 2.0 technologies researched

Figure 8 demonstrates the types of Web 2.0 technologies researched between 2009 and 2013 as they derive from the Web 2.0 corpus. Weblog or blog receives high popularity as a means of social media, and this might justify its prominent status in the research

community. Wikis and Social Networking Sites (SNS) such as Facebook, its Chinese (Mixi) and Russian (VKontakte) counterparts, and MySpace have increasingly gained popularity amongst researchers. Digital artifact sharing platforms such as Google Docs are recently added to the CALL research agenda. Researchers also combine one or more Web 2.0 technologies such as wikis and Google Documents (see for example Hafner & Miller, 2011; Diez-Bedmar & Perez-Paredes, 2012; Bustamante & Moeler, 2013).

Bearing in mind that the term Web 2.0 was launched in 2004 (O' Reilly, 2005) the interest on the use of the aforementioned Web 2.0 tools rises, whereas researchers overlook other types of technologies, such as Twitter, Google+, Dropbox, Evernote, and del.icio.us. Research needs to focus towards other less researched Web 2.0 tools such as media-sharing services, collaborative editing tools, and social bookmarking sites. This is in line with Wang and Vasquez (2012) who delineated that future research in the use of Web 2.0 technologies in CALL should investigate the use of the less-researched Web 2.0 technologies such as Facebook and Twitter, as well as other less widely used Web 2.0 tools such as social bookmarking tools. Ultimately, for unpacking the benefits of social technologies as instructional tools, more detailed studies are needed, that will explore the impact of specific features of these tools under specific tasks. In addition, in order for these tools to expand the toolbox of practitioners, further studies are needed in real-classroom settings under well-designed and theoretically framed activities.

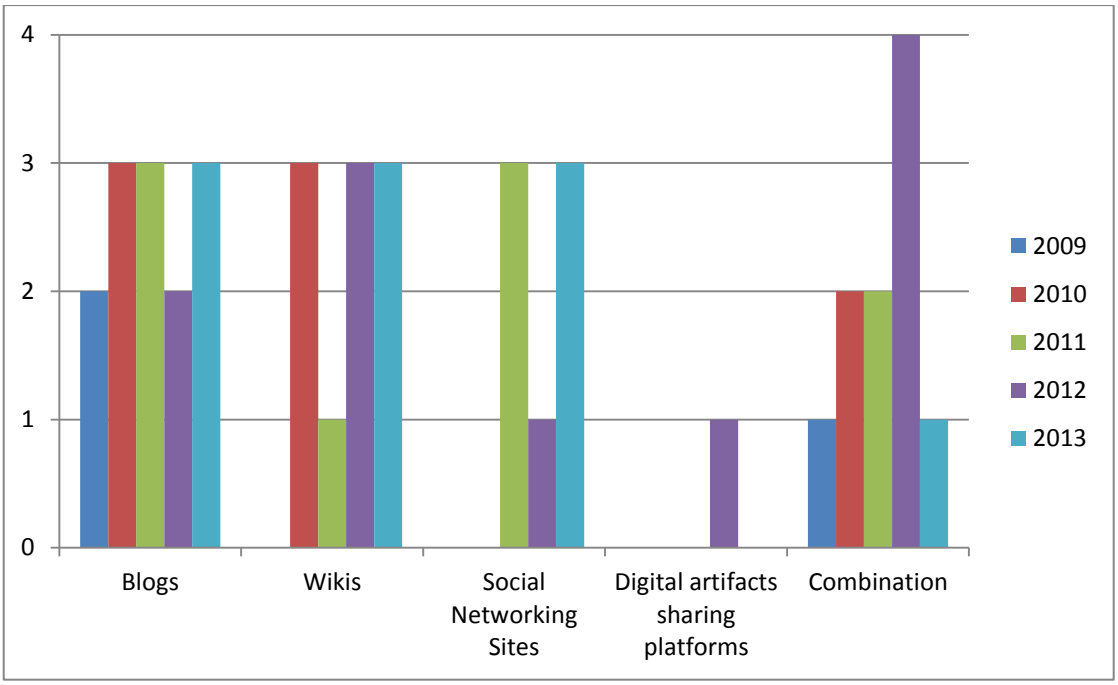


Figure 8. Types of Web 2.0 technologies investigated in the past five years from the Web 2.0 corpus.

4.3.2 Learning theories framing Web 2.0 use

Research conducted in the area of Web 2.0 technologies in CALL is grounded either in generic learning theories or in Second Language Acquisition (SLA) theories. In line with other studies (Levy & Stockwell, 2006; Hubbard, 2008; Wang & Vasquez, 2012), this review demonstrates a wide range of theoretical viewpoints that underpin research conducted in the use of Web 2.0 tools in CALL. Table 6 demonstrates eighteen different theories that frame research in Web 2.0. The top counted theory was Social Constructivism (6/41 studies) followed by Sociocultural theory (5/41 studies) and Constructivism (2/41 studies). It is worth noting that 12/41 studies do not provide a theory to direct their research and base their design upon. Such a finding revokes Stephen Krashen's conclusion that theory is "rejected by most language teachers" (Krashen, 1983, p. 255), delineating that despite the existence of a wide range of theories in the language classroom, their application is limited. A possible explanation for this is the weakness of teachers to identify a learning theory and use it to guide their teaching. Moreover, the complexity of the real world of teaching often raises difficulties to apply theoretically designed lesson plans. This is felicitously summarized by Freeman and Johnson (1998, p. 411) who stated that "research knowledge per se does not articulate easily and cogently into classroom practice, much current knowledge in SLA may be of limited use and applicability to

practicing teachers". Similarly, Papert (1980; 1993) recognized that learning theories that build educational change remain disparate, due to their strong philosophical argument and the lack of key stakeholders, learners and instructors, who would apply those arguments in real-educational settings. This brings to the fore the need to bridge theoretical arguments with real-life educational environments. Whilst theoretical aspirations provide deep understanding of learning, they still fall short in directing and organizing instructional decisions. As noted by Tess (2013, p. A62), employing social technologies requires the instructor to observe not only the "practical integration of the tool into course goals, but also (and more importantly) the theoretical framework for implementing the technology as a learning resource". Hence, as these new tools increasingly overwhelm educational settings, there is a need for detailed studies that will ground theoretical arguments in real-life classrooms and account guided organization of instructional processes. Such studies can bring innovation in real life settings, whilst optimizing the use of specific tools and functionalities under well-designed activities.

Web 2.0 technologies are relevantly new in the toolbox of L2 teachers. As such, they open-up new perspectives in teaching and learning, and their abundant functionalities can foster multiple uses and instructional designs, which remain unexploited until they are embodied and sustained in real-life contexts. Thus, involving both learners and practitioners in an active synergy has the potential to unfold the strengths and weaknesses of these technologies, under different tasks. For making real progress in the investigation of Web 2.0 in CALL, more studies need to take place that will explore their impact on specific tasks, harnessing specific web functionalities (cf. Wang & Vasquez, 2012). Fundamentally, for real progress to be made in the use of these technologies, more studies need to take place and foster a rate of change in the leaning place towards new educational practices, on a hitherto unprecedented scale towards new ways of thinking and working.

Table 6. Learning theories in the Web 2.0 corpus.

Learning theory	Manuscript	No of studies
Social Constructivism	Lee (2010a); Kost (2011); Pellet (2012); Vurdien (2013); Rivens Mompean (2010); Lee (2011)	6
Constructivism	Arnold, Ducate & Kost (2012); Sun & Chang (2012); Hafner & Miller (2011);	3
Collective learning processes	Castaneda & Cho (2012)	1
Dynamic systems theory	Sockett (2013)	1
Sociocultural literacy framework	Reinhardt & Zander (2011)	1
Expressivist and soci-cognitivist approach	Lee (2010b)	1
Framework for developing autonomy	Kessler & Bikowski (2010)	1
Motivational theory	Chen & Brown (2012)	1
Project-based learning theory	Lee & Wang (2013)	1
Situated learning theory	Mills (2011)	1
Social realist theory	Pasfield-Neofitou (2011)	1
Social approaches in SLA theory	Klimanova & Dembovaskaya (2013)	1
Sociocultural theory	Gebhard, Shin & Seger (2011); Lee (2009); Li & Zhu (2013); Bradley, Lindstrom & Rystedt (2010); Jalkanen & Vaarala (2013)	5
Sociopragmatic and multiliteracy skills	Blattner & Fiori (2011)	1
Poststructuralist approach	Chen (2013)	1
Structuralist and poststructuralist approach	Yang (2011)	1
Experiential learning theory, sociocultural theories of development and mediated practice of technology	Dehaan, Johnson, Yoshimura & Kondo (2012)	1
Technological Pedagogical Content Knowledge Model (TPACK)	Bustamante & Moeller (2013)	1
Not defined	Mitchell (2012); Prichard (2013); Arslan & Sahin-Kizil (2010); Miceli, Murray & Kennedy (2010); Kennedy & Miceli (2013); Dippold (2009); Sun (2009); Elola & Oskoz (2010); Diez-Bedmar & Perez-Paredes (2012); Kessler, Bikowski & Boggs (2012); Fuchs, Hauck, Muller-Hartmann (2012); Sun (2012)	12
Total		41

4.3.3 Language skills supported

A number of scholars noted that the promise of new technologies is to improve a wide range of skills and competences (cf. Cummins, Brown & Sayers, 2007; Godwin-Jones, 2013). Research conducted harnessing Web 2.0 tools supports a wide range of skills (see Table 7): writing receives major attention (15/41 studies), group engagement (5/41 studies, speaking (3/41 studies), intercultural awareness/identity construction (4/41 studies), and autonomous learning (3/41 studies). This wide range of skills depicts the significant shift from the four basic language skills towards a body of skills that would enable learners to succeed in today's workplace. Acknowledging the shift towards the technological era, learners do not only need to communicate effectively verbally and in writing, but also to develop new ways of thinking and living as well as new skills for working, the so called twenty-first century skills (see Binkley et al., 2012).

Educational researchers explore emerging technologies as new tools that can potentially enhance teaching and learning and support a wide range of skills and competences, leveraging social technologies as an efficient tool in the language classroom. The following section provides a detailed report of specific use of different types of social technologies in order to sketch a more holistic picture of their current use.

Table 7. Skills supported by Web 2.0 technologies.

		Technology				
		Blog	Wiki	SNS	Digital artifact sharing platform	Combination of Web 2.0 and other technologies
Skill	Writing [15]*	Arslan & Şahin-Kızıl (2010); Vurdien (2013); Rivens Mompean (2010); Sun & Chang (2012); Gebhard, Shin & Seger (2011)	Lee (2010a) Li & Zhu (2013) Arnold, Ducate & Kost (2012) Kessler & Bikowski (2010) Kost (2011)	Chen (2013)	Kessler, Bikowski & Boggs (2012)	Chen & Brown (2012); Elola & Oskoz (2010); Lee (2010b)
	Intercultural awareness/ Identity construction [4]			Mitchell (2012); Klimanova & Dembovskaya (2013)		Lee (2009); Pasfield-Neofitou (2011)
	Participation/ Sense of community/ Group interaction/ Joint engagement [5]	Miceli, Murray & Kennedy (2010); Yang (2011)	Kennedy & Miceli (2013); Bradley, Lindstrom & Rystedt (2010)	Mills (2011)		
	Speaking [3]	Sun (2012); Sun (2009)				Dehaan, Johnson, Yoshimura & Kondo (2012)
	Autonomous learning [3]	Lee (2011)				Hafner & Miller (2011); Fuchs, Hauck & Müller-Hartmann (2012)
	Peer feedback [2]	Dippold (2009)				Diez-Bedmar & Perez-Paredes (2012)
	Collaborative learning [2]		Pellet (2012);			

			Lee & Wang (2013)			
	Language learning – generic [2]			Reinhardt & Zander (2011)		
	Technological skills [2]			Prichard (2013)		Bustamante & Moeller (2013)
	Reading comprehension [1]	Jalkanen & Vaarala (2013)				
	Online informal learning [1]	Sockett (2013)				
	Grammar [1]		Castañeda & Cho (2012)			
	Sociopragmatic and multiliteracy skills [1]			Blattner & Fiori (2011)		

Note: *Number of studies exploring the specific skill

4.3.4 Potentials and challenges of Web 2.0 technologies in language learning

The studies included in the Web 2.0 corpus circumscribe the wide potential of Web 2.0 technologies in supporting second/foreign language learning and teaching. The following section summarizes all studies included in the corpus, highlighting the affordances and limitations of each technology.

4.3.4.1 Blogs in CALL

A wide range of studies in the Web 2.0 corpus employed blogs, demonstrating a large variation of strengths and weaknesses. Various researchers explored their potential in specific areas of writing such as content and organization (Arslan & Şahin–Kızıl, 2010) and in supporting students' writing for a wider audience (Gebhard, Shin, & Seger, 2011). Miceli, Murray, and Kennedy (2010) showed that blogs are an effective tool for practicing both reading and writing skills, but can also promote authentic interaction and raise a sense

of class community by stimulating students' reflection on their personal experiences and by encouraging them to share them with the rest of the class.

With regard to feedback provision, Dippold (2009) demonstrated that blogs can be a valuable tool for peer feedback; however issues of students' and tutors' training are also raised. Moreover, this study showed that students' interest was increased due to the innovative blogging experience. In addition, peer feedback on the content incites further discussion, whereas feedback from the instructor on linguistic elements promotes focus on form for language accuracy (Dippold, 2009; Vurdien, 2013).

Other benefits reported from the body of research refer to the potential of blogs to support self-directed learning (Lee, 2011); increase students' participation and development of meaningful interactions (Rivens Mompean, 2010); support reconstruction of academic writing knowledge, and sense of authorship (Sun & Chang, 2012); enhance reading comprehension skills (Jalkanen & Vaarala, 2013); drive informal learning through the intention to interact with others in a blog (Sockett, 2013), and finally increase commonality within a blogging project (Yang, 2011).

Voice blog is another type of blog that attracts researchers' attention. Sun (2009) explored students' learning processes, strategies, and perceptions of voice blogging experience. The results showed that a series of blogging stages were adopted by learners (conceptualizing, brainstorming, articulation, monitoring and evaluation), as well as a series of strategies to deal with difficulties related to blogging. In another study, Sun (2012) illustrated that students generally perceived gains in their speaking proficiency in voice blogs. However, there was no significant improvement in their pronunciation, language complexity, fluency, or accuracy.

Although blogs yield great potential in providing students more opportunities to practice the target language, yet many challenges arise with regard to technology integration into curriculum design and course objectives. Dippold (2009) focused on issues of students' and tutors' training as well as the aptness of tool against other learning technologies that needs to be taken into consideration. Additionally, Rivens Mompean (2010) pinpointed the challenge of perceiving a blog not as a "real life" one but a pedagogical one. Finally, Yang (2011) reports that blog interactions are constrained when the element of commonality is absent. Table 8 provides an overview of the potentials and challenges of blogs as they derived from the Web 2.0 corpus.

Table 8. Potentials and challenges of blogs as they derived from the Web 2.0 corpus.

Potentials	*Challenges*	*Study*
Afford writing for a wider audience		Gebhard, Shin & Seger (2011)
Provide an avenue for speaking practice outside classroom and make students comfortable in speaking in the target language	No significant improvement in pronunciation, language complexity, fluency, or accuracy Considerations on goal and purpose of blogging project	Sun (2012)
Improve writing fluency and organization		Arslan & Şahin–Kızıl (2010)
Practice reading and writing skills Promote authentic interaction Raise a sense of class community		Miceli, Murray & Kennedy (2010)
Improve linguistic performance through free expression of peers' blog entries		Vurdien (2013)
Allow peer feedback	Issues of students' and tutors' training as well as the aptness of tool against other learning technologies	Dippold (2009)
Increase participation and development of meaningful interactions	Blog is not perceived as a "real life" one but a pedagogical one	Rivens Mompean (2010)
Drive informal learning through intention to interact with others		Sockett (2013)
Allow the adoption of a series of strategies to deal with difficulties related to blogging Perceived not only as a learning platform, but also as a means of self-presentation, information exchange and social networking		(Sun 2009)

Increase commonality within a blogging project	Constrain blog interactions when commonality is absent	Yang (2011)
Support self-directed learning		Lee (2011)
Enhance advance language learners to reconstruct academic writing knowledge		Sun & Chang (2012)
Enhance students' reading comprehension skills		Jalkanen & Vaarala (2013)

4.3.4.2 Wikis in CALL

Wiki is another technology that is examined widely by researchers in the field of CALL. Its potential lies on improving students' writing through collaborative engagement and on fostering attention to form for the improvement of language accuracy (Lee, 2010a); enhancing students' collaboration and sharing of ideas (Kost, 2011); increasing students' engagement, active participation and development of a sense of community (Pellet, 2012). Moreover, the research yields other benefits such as development of autonomy in flexible learning environments (Kessler & Bikowski, 2010) and improvement in grammatical knowledge (Castañeda & Cho, 2012).

Different ways of interaction within wiki are also explored, identifying different strategies employed by learners. Bradley, Lindström, and Rystedt (2010) explored what interaction is developed in the wiki and how written interaction promotes language learning. Their results showed that there are different types of posted interaction among group members on the wiki. Students co-operate, namely they post individually on a common theme, but they also collaborate, they produce joint texts and then make alterations and additions. In another study, Li and Zhu (2013) explored patterns of interaction in a wiki-mediated collaborative writing project. This study demonstrated "three distinctive patterns, namely, the collectively contributing/mutually supportive, authoritative/responsive, and the dominant/withdrawn" (Li & Zhu, 2013, p. 78). Following a somewhat similar path, Arnold, Ducate and Kost (2012) explored how second language learners worked together on a wiki in order to provide their classmates with cultural background information on a novel read in class. The study demonstrated that students cooperated and collaborated on the wiki, but focused mainly in their own writing. Moreover, this study demonstrated that

wikis have great potential in enhancing collaborative and autonomous work. On the same line, Kennedy and Miceli (2013) explored the potential of integrating wikis into a beginner's language course. Results showed students' interest on the wiki pages, and also that students who placed emphasis on group interaction appreciated more the wiki experience.

Although wikis yielded great potential in various aspects of L2 learning, yet many challenges arise. Arnold, Ducate, and Kost (2012) stressed the importance of learner training and teacher guidance for unlocking wikis potential. Moreover, Kennedy and Miceli (2013) identified students' technical difficulties in the wiki and little interest in participating in an online group. Finally, Lee and Wang (2013) explored the factors that facilitated peer collaboration in a collaborative wiki project, which include students' evenly sharing of workload, appreciation of different opinions, continuous communication and participation among peers, and good wiki management skills (Lee & Wang, 2013, p. 245). Table 9 demonstrates a synopsis of the potentials that wikis offer in the language classroom, along with the challenges raised by researchers employing this type of technology.

Table 9. Potentials and challenges of wikis as they derived from the Web 2.0 corpus.

Potentials	*Challenges*	*Study*
Impact positively on students' writing fluency		Lee (2010a)
Foster collaboration and sharing of ideas		Kost (2011)
Enhance engagement, active participation and sense of community	Efficacy of collaborative learning projects depends highly on instructors' feedback based on students' output and participation in the learning process	Pellet (2012)
Enrich collaboration, cooperation and autonomous work	Need for learner training, teacher guidance for unlocking wikis potential	Arnold, Ducate & Kost (2012)
Raise autonomy in flexible learning environments		Kessler & Bikowski (2010)
Cultivate distinctive patterns in small writing groups: collectively contributing/mutually supportive, authoritative/responsive, dominant/withdrawn		Li & Zhu (2013)
Improve grammatical knowledge		Castañeda & Cho (2012)
Appreciate wiki experience after placing placed emphasis on group interaction	Technical difficulties with little interest in participating in an online group	Kennedy & Miceli (2013)
Foster different types of posted interaction among group members on the wiki -cooperation and collaboration		Bradley, Lindström & Rystedt (2010)
	Factors contributing to students' active wiki collaboration: students evenly sharing the workloads, appreciation of different opinions, constant communication and participation among peers, and good wiki management skills	Lee & Wang (2013)

4.3.4.3 Social Networking Sites (SNS) in CALL

Social networking sites (for example, MySpace and Facebook) are online communication and network sites. The affordances of SNS in the field of CALL include enhancement of language learning, communication, and cultural awareness (Mills, 2011; Mitchell, 2012; Klimanova & Dembovskaya, 2013); rapport building with the instructor (Blattner & Fiori, 2011); promotion of learner-learner interaction, and development of transcultural, plurilingual identities (Reinhardt & Zander, 2011); and development of multiple, often competing identities of writers through various activities and social interactions (Chen, 2013).

Besides their affordances, the research studies undertaken in the area of SNS revealed some pitfalls that both researchers and practitioners should be aware of. One of them is the need for students to enhance their digital literacy and employ certain strategies to overcome any difficulties (Mitchell, 2012). Addressing the aforementioned challenge, Prichard (2013) explored how training second language learners to use Facebook appropriately and following ethic norms can enable them to reach the goals of TESOL Technology Standards Task Force. This study demonstrated that the training was useful in assisting learners reach the goals of TESOL Technology Standards Task Force. Table 10 demonstrates a synopsis of potentials and challenges in the use of SNS are they raised from the Web 2.0 corpus.

Table 10. Potentials and challenges of SNS as they derived from the Web 2.0 corpus.

Potential	*Challenges*	*Study*
Promote authentic language use Foster exploration of the target culture Build rapport with their instructor	Need to further establish the effectiveness of SNS in language classrooms	Blattner & Fiori (2011)
Promote learner-learner interaction Develop transcultural, plurilingual identities		Reinhardt & Zander (2011)
Develop language learning and cultural awareness		Mills (2011)
Improve language and cultural competency Keep in contact with old friends	Need for computer literacy and language strategies to overcome any difficulties	Mitchell (2012)
	Learning training in SNS can assist learners reach the goals of TESOL Technology Standards Task Force	Prichard (2013)
Enhance learner autonomy		Fuchs, Hauck & Müller-Hartman (2013)
Foster use of target language for communication with NS peers		Klimanova & Dembovskaya (2013)
Develop multiple, often competing identities through various activities and social interactions	Teachers need to embrace students'' multiple voices and engage real life in real life practices and purposes	Chen (2013)

4.3.4.4 Digital artifacts sharing platforms

The only digital artifact sharing platform being explored was Google Documents, a shared Web-based word processing tool, demonstrating both potentials and challenges. Kessler, Bikowski, and Boggs (2012) explored collaborative writing processes within Google

Documents, demonstrating that students who were engaged in collaborative writing tasks focused on meaning than form as they wrote their texts, whereas grammatical changes were overall more accurate. Moreover, various aspects of Google Documents were valued for enhancing collaboration and autonomous language learning. Amongst the challenges highlighted in this study is the need to consider students' abilities in using this kind of tools, as well as the related pedagogy for grounding the teaching and learning practices. Most importantly, the evolvement in the use of these technologies should set students' and teachers' active involvement as a priority. Table 11 provides an overview of the potentials and challenges of this types of tools, as they emerged from the Web 2.0 corpus.

Table 11. Potentials and challenges of digital artifacts sharing platforms as they derived from the Web 2.0 corpus.

Potential	*Challenges*	*Study*
Foster focus on meaning than form Enhance collaboration and autonomous language learning.	Need to consider students' abilities in using this kind of tools. Need to consider pedagogy for grounding the teaching and learning practices. Students' and teachers' active involvement for better understanding the use of these technologies	Kessler, Bikowski & Boggs (2012)

4.3.4.5 Combination of Web 2.0 and other technologies

By combining Web 2.0 tools and/or other types of technologies, researchers attempt to optimize the potential of these tools and shift the way students learn. This might be achieved by combining voice and text technologies or by involving a wider audience in the learning process through social networking sites. Amongst the benefits that were reported from the corpus are the development of students' confidence, creativity and critical thinking with the use of wiki and digital video (Dehaan, Johnson, Yoshimura & Kondo,

2012); promotion of creativity, information sharing, powerful socialization and active involvement in the learning environment (Bustamante & Moeller, 2013); unique opportunities to explore the target language and culture using blogs and podcasts (Lee, 2009); students' positive attitude towards task-based writing which may derive from the audience authenticity in wikispaces and weebly (Chen & Brown, 2012); autonomous language learning through a range of new technologies and Web 2.0 platforms, including YouTube and Edublogs (Hafner & Miller, 2011); peer feedback within forum and wiki (Diez-Bedmar & Perez-Paredes, 2012); and development of learner autonomy and e-literacy, when working in tools such as forums wikis and social bookmarking sites for language learning and teaching purposes (Fuchs, Hauck & Müller-Hartman, 2012). Moreover, combining multiple technologies opens up new trajectories for learners and instructors. For example, Elola and Oskoz (2010) demonstrated that the use of wikis and chats allowed students to build a learning community and use the target language for meaningful interactions. This type of community creates a space beyond the more traditional classroom setting, that can be used judiciously to facilitate learners' writing processes and interactions. Moreover, Dooly and Sadler (2013) demonstrated that the use of multiple tools (e.g. Moodle, Skype, emails, wikis, Second Life, podcasting) in a teacher training program promoted understanding of new technologies and developed competences for the effective use of such tools. On the same line, Lee (2010b) indicated two essential elements for the implementation of blog projects in L2 instruction, namely learners' critical thinking and technological skills.

Telecollaborative projects also make use of multitude technologies. Pasfield-Neofitou (2011) explored informal use of blogs, emails, and SNS (Facebook, MySpace and Mixi) between Australian and Japanese students. This study demonstrated the benefits of participation in Japanese SNS for Japanese learners, which include greater exposure to the target language, access to the target culture and authentic materials. Moreover, the authenticity of the audience in a SNS encourages and motivates learners to use the target language.

With regard to challenges, researchers express their concern with regard to activities designed with learners' needs and interest in mind (Dehaan, Johnson, Yoshimura & Kondo, 2012; Chen & Brown, 2012); methodological approaches that best support language learners in diverse instructional contexts (Elola & Oskoz, 2010); caution with

technology overuse (Dehaan, Johnson, Yoshimura & Kondo, 2012), and training provision to students in order to become acquainted with new tools introduced (Lee, 2009). Table 12 provides an overview of the potentials and challenges of combining Web 2.0 tools as they derived from the Web 2.0 corpus.

Table 12. Potentials and challenges of combined Web 2.0 and other technologies as they derived from the Web 2.0 corpus.

Potential	*Challenge*	*Study*
Develop confidence, creativity and critical thinking	Concerns with regard to a) link between the approach and second language acquisition; b) potential overuse of technology in the course. Activities must be tailored to students' needs and expectations in mind.	Dehaan, Johnson, Yoshimura & Kondo (2012)
Promote creativity, information sharing, powerful socialization and active involvement in the learning environment Empower participants to integrate technology in language classroom	Concerns with regard to the use of Facebook for privacy issues	Bustamante & Moeller (2013)
Afford unique opportunities to explore the target language and culture	Training provision to students in order to become aquainted with new tools.	Lee (2009)
Develop students' positive attitude towards task-based writing which may derive from the audience authenticity	Factors to be taken into consideration by instructors whilst for enhancing motivation: (1) task design, (2) audience identity, and (3) student goals	Chen & Brown (2012)
Promote understanding of new technologies and develop competences for the effective use of such tools		Dooly & Sadler (2013)
Build a learning community Use the target language for meaningful interactions	Consider methodological approaches that best support language learners in diverse instructional contexts and can	Elola & Oskoz (2010)

	lessen stress or frustration when learners are introduced to new genres	
Foster greater exposure to the target language- access to the target culture and authentic materials Motivates learners to use the target language due to authenticity of the audience	Negative effects regarding language acquisition: students' feeling of always being a second-language speaker	Pasfield-Neofitou (2011)
Enhance autonomous language learning		Hafner & Miller (2011)
Provision and incorporation of morphosyntactic and lexical feedback, yet Spanish peers in this experience accept it when they perceived it as correct without further follow-up or discussion	Communication channels affect the type and effect of the feedback provided	Diez-Bedmar & Perez-Paredes (2012)
Impact positively on learners' writing fluency Increase motivation for writing for a broad audience Incite peer discussion through peer feedback on the content Promote focus on form for language accuracy through instructor's feedback from the instructor on linguistic elements	Essential elements for the implementation of blog projects in L2 instruction: learners' critical thinking and technological skills	Lee (2010b)

4.3.5 Types of tasks undertaken in Web 2.0 technologies

The cutting edge of the CALL field is the perspective that technology should be part of instructional design, based on instructional goals (see O'Dowd & Waire, 2009). Effective CALL design is not merely a case of exploring a Web 2.0 technology to understand its affordances and might not use it again in subsequent semesters; it is an endeavor to stress

task design considerations, and commend the integration of different functionalities of a specific tool in real-classroom conditions.

Table 13 demonstrates how Web 2.0 published papers included in the Web 2.0 corpus are divided in this regard (affordances versus instructional design), together with indicative examples of types of tasks that practitioners and researchers employ in Web 2.0 corpus. The corpus showed a somewhat balanced task design, having on the one, manuscripts that focused on exploring the affordances of a Web 2.0 tool, and on the other, studies that determine the structure of their tasks based on learning outcome. Potential drawbacks of the first case are similar to the ones referred by O'Dowd and Waire (2009), namely the exploration of the affordances of a specific technology requires students' and teachers' ICT literacy and high level of engagement. Lack of one of the above may jeopardize the activity or even the course.

The task design includes communication in an authentic audience, social writing and speaking, yet new educational practices need to accompany the design of tasks, making the use of these tools coherent with educational goals (see also Mitchell, 2012). Ultimately, implementation of Web 2.0 technologies in learning and teaching calls for task design, instructional goals, and educational practices to align with technological affordances. As noted by Rivens Mompean (2010), learners need to implement projects that give learners opportunities to interact in real-life situations. The conundrum raised here is that whilst students increasingly engage with Web 2.0 tools in their everyday lives, there is still lack of Web 2.0 practices that draw on the specific features of these tools and align them with educational goals under well-designed activities (see also, Crook, 2008; Bennett, Bishop, Dalgarno, Waycott & Kennedy, 2012; Wang & Vasquez, 2012; Chwo, 2015). For real progress to be made in the use of social technologies in learning, more research needs to take place that will align the affordances of these tools with theory for the design of learning tasks that promote new educational practices. Fundamentally, the affordances of the technology and their use in real-life situations can inform further learning tasks and activities.

Table 13. Task design in Web 2.0 corpus.

	Examples of tasks	*Study*	*Number of studies*
Affordances	– Collaborative writing on a wiki for exploring its effectiveness – Develop Facebook profiles for exploring student participation in SNS – Information exchange between Native Speakers and non-Native Speakers for exploring the practicality of Web 2.0 tools	Lee (2010a); Gebhard, Shin & Seger (2011); Reinhardt & Zander (2011); Mills (2011); Kost (2011); Dehaan, Johnson, Yoshimura & Kondo (2012); Arnold, Ducate & Kost (2012); Mitchell (2012); Prichard (2013); Kessler & Bikowski (2010); Arslan & Sahin-Kizil (2010); Li & Zhu (2013); Dippold (2009); Rivens Mompean (2010); Sockett (2013); Yang (2011); Pasfield-Neofitou (2011); Kessler, Bikowski & Boggs (2012); Klimanova & Dembrovskaya (2013); Chen (2013)	20
Instructional design	– Exposing and exchanging stories for topics related to the target foreign language and culture – Speaking practice using voice blogs for supplementing limited speaking practice in class	Blattner & Fiori (2011); Pellet (2012); Sun (2012); Bustamante & Moeller (2013); Miceli, Murray & Kennedy (2010); Chen & Brown (2012); Vurdien (2013); Castaneda & Cho (2012); Kennedy & Miceli (2013); Lee (2010b); Bradley, Lindstrom & Rystedt (2010); Lee & Wang (2013); Sun (2009); Elola & Oskoz (2010); Hafner & Miller (2011); Lee (2011); Sun & Chang (2012); Diez-Bedmar & Perez-Paredes (2012); Fuchs, Hauck & Muller-Hartmann (2012); Jalkanen & Vaaraka (2013); Lee (2009)	21

4.4 Discussion

In the evolvement of ubiquitous computing, social technologies represent a tool and a concept with great potential. This chapter provided an overview of the use of Web 2.0 in CALL technologies and raised interesting questions about the way forward in the use of

these technologies, specifically for their theoretical alignment in language learning and teaching. This chapter offered a springboard for the need to unpack the potential of social technologies as instructional tools under a theoretical framework in well-designed tasks aligned with educational goals.

The most commonly researched Web 2.0 technologies are blogs and wikis, whereas other technologies that could enrich the toolbox of second/foreign language researchers and practitioners include digital artifacts sharing platforms (for example, Google Documents) and SNS (for example, Facebook and Mixi). Current research unfolds the potential of Web 2.0 technologies in bringing authentic settings in the language classroom, thus enabling instructors to provide learners with opportunities to use the foreign language in real-life situations. Yet, for this to happen there is a strong need for pedagogy to frame their use, with learners' needs and expectations firmly in mind in the instructional design process.

This chapter demonstrated an increasing body of literature in CALL conceiving social technologies as social writing and communication platforms that can afford communication, information sharing, enhancement of plurilingual and intercultural competence, self-directed learning, reflective and collaborative learning (Melo-Pfeifer, 2013; Lee, 2011; Sun & Chang, 2012; Vurdien, 2013). Moreover, similarly with other reviews (cf. Wang & Vasquez, 2012; Tess, 2013), this chapter delineates that the use of these technologies is not clearly framed in theory. Research conducted in the area of Web 2.0 technologies in CALL is grounded either in generic learning theories or in SLA theories. The top counted theory was Social Constructivism whereas, a substantial number of studies do not explicitly provide a theory to ground their research. A possible explanation for this is the complexity of the real world of teaching which often raises difficulties in implementing theoretically designed lesson plans. Learning theories that build educational change remain unused due to their strong philosophical argument and the lack of an "army" of learners and instructors, who would transform those arguments to practical patterns in real-educational settings. This brings to the fore the need to bridge theoretical arguments in real-life classrooms and account guided organization of instructional processes that make use of Web 2.0 technologies. By building research designs based on a certain theory, a fruitful basis is set forth for guiding both implementation and evaluation of instructional designs. Such studies can bring innovation in real-life settings, whilst optimizing the use of Web 2.0 tools and their different

functionalities, by elucidating on their decisions on the types of activities, tasks and materials as well as in-class practices and behaviors.

For making real progress in the investigation of Web 2.0 in CALL more studies need to take place that will explore their impact on specific tasks, harnessing specific web functionalities (Wang & Vasquez, 2012). In each case, the full potential of these technologies can be unpacked by grounding their use under a theoretical framework, whilst accumulating both the affordances of the tools along with the activities that they can support, with an eye to foster learning in-context and achieve specific educational goals.

4.5 Summary

This chapter has portrayed the state-of-the-art on the use of these technologies in CALL. Overall, this chapter sketched a picture of social technologies as a widely researched area, where their potential is still unlocked and not clearly theoretically grounded, thus raising the need to theoretically frame their use and unpack their full potential as instructional tools. With this in mind, researchers (cf. Ruschoff & Ritter, 2001) set constructivism into question as the appropriate paradigm for language learning and put forward constructionism as "the guiding principles for curriculum design, materials development, and classroom practice" (Ruschoff & Ritter, 2001, p. 231). To this aim, constructionism was selected as a theory of learning, teaching, and design that aligns well with the demands and expectations of computational culture, and emphasizes building, creating and making of shared and meaningful artifacts as a means for gaining knowledge (Papert, 1980; 1993). In this dissertation, certain tasks were planned, that allowed students to use social technologies for constructing an artifact, such as a shared dictionary. DBR was used throughout the experimental part of this dissertation. Throughout the cycles of DBR new issues came up, informing both the local design and the evolvement of usable knowledge in the field. In the following chapter, the DBR inquiry is described, followed by the iterations of DBR.

5 Developing a framework for the use of social technologies in teaching and learning via Design-Based Research

This chapter reports on the employment of Design-Based Research (DBR) as an overarching inquiry for implementing theoretically designed interventions in real-classroom settings. To investigate how constructionism can frame social technologies in language learning, I needed a systematic methodology and decided to move with DBR as it values the design of interventions as an enactment for producing novel learning and teaching environments. Moreover, DBR fosters understanding on how theoretically designed principles can be transformed into usable knowledge about designs and theories. In this chapter, I define DBR and justify its appropriation as an overarching inquiry for this dissertation, and proceed in articulating how this inquiry framed this research.

5.1 Introduction

To investigate how constructionism can frame social technologies in language learning Design-Based Research (DBR) was employed as an overarching paradigm for educational inquiry. In this dissertation, three cycles of design, enactment, analysis, and redesign were employed.

DBR acknowledges the real-life environment (as opposed to controlled laboratory experiments) and its complexity and values the design of interventions as an enactment for producing novel learning and teaching environments. DBR fosters our understanding on how theoretically designed principles can be transformed to designs and theories that are contextually based and provide rich accounts of implications for practitioners and educational designers (The Design Based Research Collective, 2003). It should be noted here that the terms "design-research" and "development research" have been also employed for describing this methodology (Oha & Reeves, 2010); however, this dissertation deliberately encompasses the more popular term, Design-Based Research.

This chapter is organized into two parts. In the first part, I delineate the principles of DBR and its appropriation for this dissertation vis-à-vis other paradigms, as well as the challenges and strengths of DBR as an educational inquiry; whereas in the second part I expand in the context and data collection in the three classroom settings:

1) teaching Greek as a second language (L2);

2) teaching Greek as a first/native language (L1) for academic purposes/dissertation writing; and

3) teaching English as a Foreign Language (EFL) for specific academic purposes.

5.2 Design-Based Research

DBR is a methodology designed by and for educators that endeavours to increase the impact of education research into practice (Brown, 1992; The Design-Based Research Collective, 2003; Cobb, Confrey, diSessa, Lehrer & Schauble, 2003; Anderson & Shattuck, 2012). DBR is an emerging educational paradigm that studies learning in authentic settings where an intervention takes place and ends up in creating usable knowledge and progressing theories of learning and teaching. It follows an iterative cycle

of design, enactment, analysis and redesign, where relationships between interventions and social interactions are refined, supporting teaching and learning and rendering solutions in complex educational problems (Collins, 1992; Cobb, 2001; Design-Based Research Collective, 2003; Tabak, 2004; Reeves, 2006). In this process, a flexible design process is adopted where "subjects" are considered as co-participants in the design and even in the analysis process (Barab & Squire, 2004).

Wang and Hannafin (2005, p. 6) define DBR as: "systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually sensitive design principles and theories". Barab and Squire (2004) define DBR as a series of approaches, rather than an approach, intending in producing new theories, artifacts and practices that can impact teaching and learning in naturalistic settings. Researchers came to engage in DBR for bringing educational innovation to scale in everyday educational contexts and develop new theoretical insights about the nature of learning. Bell (2004) identifies the following three criteria in DBR enterprises: 1) intentional design combined with 2) empirical research and 3) theorizing on what takes place in educational settings where designed intervention takes place. Moreover, Bell (2004) views DBR in education as a high-level methodological orientation that can be used across many theoretical perspectives and link research and design for progressing our understanding of learning-related phenomena. These criteria were considered sufficient and covered the needs of this research, that is, to ground the use of social technologies under constructionism by infusing constructionist elements in three different classroom settings -thus meeting criteria (1) and (3). For the second criterion (2-empirical research), this research was implemented in three classroom environments, whilst systematic data collection was taking place. Data collected included, instructor's and students' reflections, interviews, focus group and exploration of the use of social technologies in the groups of learners, whilst the intervention was taking place (see section 5.3.5 of this chapter for detailed account of data collection).

Other approaches were also explored (such as Action Research and multiple case studies), yet were considered inappropriate for addressing the overarching aim of this dissertation. Action research shares the element of improving a classroom context. Yet, there are three essential differences between DBR and action research, as demonstrated by Anderson and Shattuck (2012). Firstly, DBR aims to advance the agenda of both researchers and

practitioners by bringing to the forefront deep understanding between theory and practice. Secondly, DBR results in workable theories by providing detailed instructions that can guide educational practice. Finally, action research is conducted by the teacher for solving a problem, whereas DBR requires a synergy between practitioners and researchers. Multiple or collective case studies is another educational paradigm that could be used for framing this research. A multiple-case study allows the researcher to explore differences within and between cases, with an aim to replicate findings across cases (Yin, 2003). Yin (2003) recommends researchers that engage with multiple-case study to choose cases carefully, so that the researcher can draw predictions of results in similar cases (literal replication) or predict divergent result based on a theory (theoretical replication). One could argue that in this dissertation, the case could be considered a language classroom, thus if we want to study the use of social technologies for language learning in various language classrooms, then a multiple-case study would be indicated. Yet, this statement misses the element of advancing theory and practice that is useful to others. In this dissertation, different language settings are not explored for identifying and understanding similarities and differences between them or for replicating findings across cases, but for informing a framework for the use of social technologies as social constructionist tools in different learning contexts.

5.2.1 Visiting challenges and strengths of DBR

The Design Based Research Collective (2003), and a recent review article on DBR (Anderson & Shattuck, 2012), identify the following characteristics of DBR:

(1) *Link theory with practice*: the essential goals of designing learning environments and developing theories of learning are closely connected. A basic tenet in DBR is the development of contextualized theories of learning and teaching (The Design-Based Research Collective, 2003). Moreover, the focus of a DBR is to step on a certain design intervention for providing practical design principles/patterns, and/or grounded theorizing. Certainly, the intervention informs the context in which it operates, but it is likely to inform other contexts, provided that, researchers and practitioners will adjust the context and intervention for maximizing learning. According to The Design-Based Research Collective (2003, p. 5; my italics), "research on design must lead to *shareable theories* that help *communicate relevant implications* to practitioners and other educational designers".

On the same line, Cobb, Confrey, diSessa, Lehrer, and Schauble (2003, p. 10, my italics) identify a cross-cutting theme in DBR, "the theory must do *real work*. General philosophical orientations to educational matters –such as constructivism- are important to educational practice, but they often fail to provide *detailed guidance in organizing instruction*".

(2) *Real educational context*: DBR is situated in a real educational context thus providing an authentic environment where research can be effectively employed to assess and improve practice. Yet, research must report for how designs function in authentic settings. It must not only detail success or failure, but also emphasize on interactions that improve our understanding of the learning issues involved.

(3) *Design and testing of significant intervention through multiple iterations*: development and research take place through consecutive cycles of design, enactment, analysis, and redesign. The exploratory cycle begins with relevant literature, theory and practice from other contexts that come to inform local practice. Yet, these consecutive cycles make it difficult for the researcher to understand when (if ever) the research program is completed. For effective interventions to take place the following design characteristics need to exist: a) learning framework, b) potentials and limitations of the selected instructional tool(s), c) domain knowledge, and d) contextual limitations (Mingfong, Yam San & Ek Ming, 2010). One challenge in DBR is to report the complexity, disorganization and solidity of the design and doing so in a way that is of value for others. DBR requires more than understanding the happenings in a particular context. A well-structured design narrative needs to show the relevance of the findings in one context of intervention to other contexts (Barab & Squire, 2004).

(4) *Mixed methods*: DBR interventions typically involve mixed methods by employing a variety of tools according to the need(s) of each research design. The selection of tools should depend on methods that can document and connect processes of enactment to outcomes of interest.

(5) *Collaborative partnership between researcher(s) and practitioner(s)*: DBR interventions require the development of a partnership between the researcher and the teacher. This synergy will facilitate the literature review, acknowledge the affordances of the technology and design and assess the impact of an intervention.

DBR received criticism for being nothing more than another formative evaluation methodology –setting goals, operationalizing measures, examining phenomena, and understanding the consequences of their use. However, proponents of DBR make sense of the differences of DBR vis-à-vis formative evaluation: (1) DBR is closely connecting design interventions with existing theory; (2) DBR may conclude in theory generation -not only testing existing theory; and (3) the naturalistic context in which the DBR is taking place is the *minimal ontology* for which the variables are intersecting, that is to say that we cannot return to the laboratory for testing theoretical assumptions (Barab & Squire, 2004). The focus is on advancing theory in naturalistic settings, hereafter differentiating DBR from experiments or evaluation research (Barab & Squire, 2004). DBR employs a particular design with an eye to modeling the way people think, learn, and advance the theoretical grounding of the field. Moreover, a radical difference of DBR as a theory producing methodology is that it requires changes at the local level, as these contexts are evidence for the viability of a theory.

Another challenge encountered by design-based researchers is to report what counts as credible evidence. This brings us to the heart of the discussion with regard to meeting the criteria of trustworthiness, credibility, and usefulness, which are akin to reliability, validity, and generalizability/external validity. For design-based researchers, the significance of a study is determined from its ability to influence practice, while moving forward theory that will be suffice to others (The Design Based Research Collective, 2003; Barab & Squire, 2004; Bell, 2004).

With regard to validity, design-based researchers (DBRs) argue that the evidence for validity is the changes it produces in the context of application (Messick, 1992). The critique of DBR vis-à-vis validity refers to whether a researcher who is involved in conceptualization, design, evaluation, and re-design reports data with credibility (Barab & Squire, 2004). There is also the view that the biases, insights, and understanding of the researcher challenge the credibility of the findings. DBR adopts the notion of consequential validity (i.e. the ways in which research data are used do not exceed the capability of the research and the action-related consequences of the research, Cohen et al., 2007). Barab and Squire (2004) advise researchers who employ DBR to be clear in their arguments that surpass the local context and express awareness of their limitations. The Design Based Research Collective (2003, p. 7) argues that in DBR the issue of validity of findings is often addressed by the partnerships and the continuous cycles of design,

enactment, analysis and redesign, which end up in "increasing alignment of theory, design, practice, and measurement over time". Critics consider these interventions as "taint" in the research context. The response from DBR capitalizes the importance of these interventions, as they allow the refinement and testing of effective instructional models. As demonstrated by Barab and Squire (2004, p. 10), "each new application is an extension of the theory as its specific characteristics are situated in local dynamics". DBRs also articulate that it is the responsibility of the researcher to build on methodological practices of other qualitative methodologies and warrant on the trustworthiness and credibility of the findings (Barab & Squire, 2004). Finally, proponents of DBR have elaborated upon the process of conducting research for addressing issues of reliability and validity. As suggested by Anderson and Shattuck (2012, p. 18), DBR "requires comradeship, enthusiasm, and a willingness to actively support intervention. Thus, a certain wisdom is needed to walk this narrow line between objectivity and bias. The personal skill to hold all of these attitudes simultaneously is a challenge and a defining feature of quality DBR". The employment of multiple iterations exacerbates the temporal scope of DBR, encouraging researchers to develop large-scale projects -for example the RiverCity project (an interactive computer simulation for middle grades science students) undertaken by Chris Dede at Harvard university (Dede, Nelson, Ketelhut, Clarke, & Bowman, 2004).

An additional challenge encountered in this project is replicability. A DBR narrative needs to support "petite generalizations" (Stake, 1995), that is, report insights into the potentials and opportunities that emerge, as well as strategies for navigating these potentials and opportunities effectively. Hoadley (2002) noticed the difficulty in replicating others' findings since DBRs cannot (and may not want to) machinate cultural contexts. Thus, the aim of DBR is to bring to the surface and problematize the completed design and implementation in a way that brings insights into the dynamics of the local context. Narrative is one way of conveying and making sense of the context, describing the emergence of design features of intervention and their impact on participation and learning. However, DBR does not entail simple description of the design and its context, but should include theory work that advances theory generation. DBR work is by its nature iterative with the long-term commitment to result in production, refinement and validation of theory and design alternatives, and finally advancing a particular set of theoretical constructs (Barab & Squire, 2004). On a similar note, The Design Based Research Collective (2003) brings forward that research in this paradigm would be difficult to generalize in other

settings. Yet, if success means that a certain form of intervention could be effective in any setting, then the intervention should be investigated in a variety of settings. DBRs lay the completed design open offering a rich account of the local dynamics in an endeavour to advance theory that will be of use to others (Barab & Squire, 2004).

In this project, the effects of an intervention were explored across three different contexts, with an eye to claiming success by "generating heuristics for those interested in enacting innovations in their own local contexts" (The Design Based Research Collective, 2003, p. 6). This inquiry envisioned to draw connections to theoretical assertions that transcend the local context, but are by no means decontextualized principles or grand theories that function with equal effect in all contexts (Anderson & Shattuck, 2012; Barab & Squire, 2004). As a Design-Based Researcher, I followed a pragmatic philosophical background in which a theory is valued based in its ability to produce changes in the world. By setting in exploration the use of social technologies under a certain theoretical framework, I pose the intervention and its theoretical construct as its major outcomes, demonstrating how constructionist theory can be productive in this context.

In the second part of this chapter, I elaborate on the context and data collected in this research project.

5.3 Methodology

In this dissertation, the intervention was implemented in three different classroom settings, following a DBR inquiry: a) teaching Greek as a second language (L2), b) teaching Greek as a first/native language (L1) for academic purposes/dissertation writing, and c) teaching English as a Foreign Language (EFL) for specific academic purposes. Figure 9 demonstrates the core elements (design, theory, problem in a real-life environment) of DBR and communicates that each of these components were taken into consideration in all studies. Each of these elements operates with one another in order to inform theory and strengthen the design of our framework (Barab, 2006). From this perspective, DBR is both interventionist –in the sense of intentionally changing the learning environment- and generative –in the sense that is produces new knowledge based on the initial and subsequent iterations.

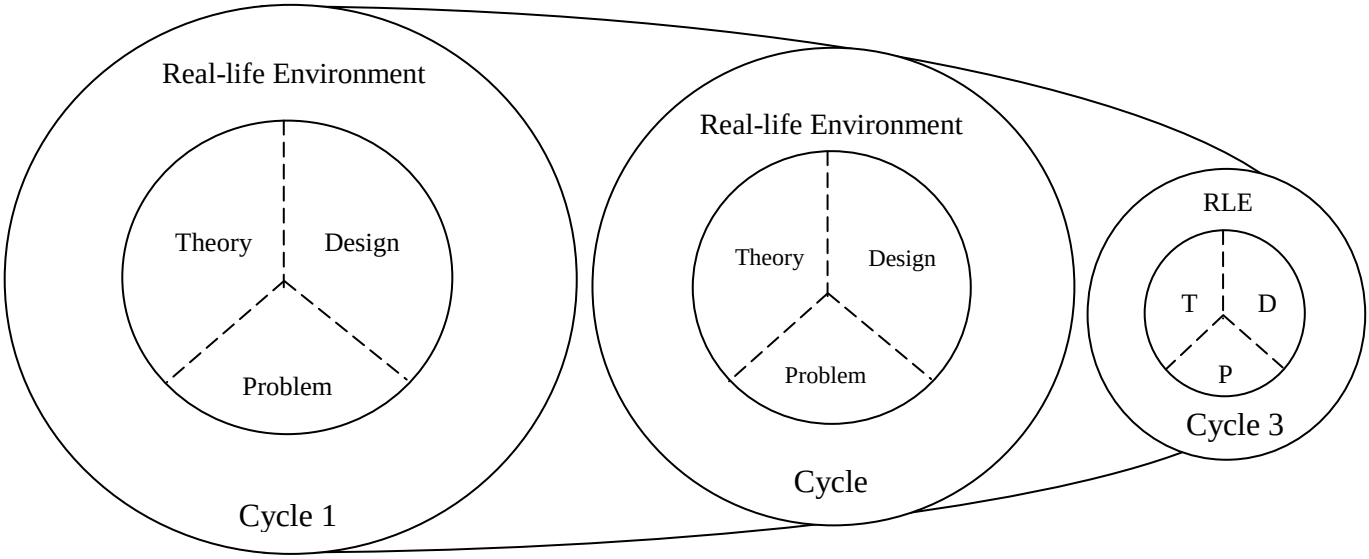


Figure 9: The core elements of Design-Based Research (adopted from Barab, 2006).

5.3.1 Description of the setting

All data related to the three studies were collected at a newly established public university in the Republic of Cyprus. The university accommodates approximately 2500 undergraduate and postgraduate students. The official language of the university is Greek. The same setting was used for the studies reported in Chapters 6, 7, 8 and 9). As a matter of consistency the three studies of the DBR conducted in this dissertation are named as Study 1 (Greek as an L2) for specific purposes (Nursing); Study 2 (Greek for academic purposes/dissertation writing); and Study 3 (English as a foreign language for specific academic purposes).

5.3.2 Participants

Table 14 shows the participants involved in the three studies.

Table 14. Participants involved in the three studies.

Study	Participants
Study 1: Greek as a second language (L2) for specific purposes (Nursing) (September 2011-May 2012)	Students: Four male students (age: 19-23 years) – No knowledge of Greek – Limited knowledge of social technologies Instructor: female with four years of experience in teaching Greek as an L2
Study 2: Greek for academic purposes/ dissertation writing (January 2013-May 2013)	Students: 17 female and 10 male students (age: 21-32 years) – Good command of social technologies – Greek as an L1 Instructors: (a) female with three years of experience in teaching Greek for academic purposes; (b) male with two years of experience in teaching Greek for academic purposes
Study 3: English for specific academic purposes (Agricultural studies) (January 2014-May 2014)	Students: 21 female and 22 male students (age: 18-29 years) – Good command of social technologies – Greek as an L1 Instructor: female with sixteen years of experience in teaching EFL for specific academic purposes

5.3.2.1 Participants in Study 1

In the first Study, participants comprised of four male students from Kenya and Uganda with limited knowledge of social technologies. Students' age ranged from 19-23 years. Students had no knowledge of Greek upon arrival in Cyprus. Their computer skills were in general at basic to intermediate level. Three of them were able to turn the computer on and off; all of them had difficulties in advanced functions such as sending emails and attachments; document processing and use of keyboard. Additionally, they had minimal knowledge of social technologies, two of them created a Facebook account upon arrival to Cyprus, and none of them had any previous knowledge of blogs, wikis, Google

Documents, or Dropbox. In Study 1, the instructor was a female, with four years of experience in teaching Greek as a second language. The instructor was both participant and observer of students' activities and her role provided access to a wide-range of data.

5.3.2.2 Participants in Study 2

The second Study consisted of 17 female and 10 male students with good command of social technologies. Twenty-four students were Cypriots; two were from Greece and one from Russia. All students had Greek as one of their mother tongues. Their computer skills were in general at intermediate to advanced level. Additionally, they had good command of social technologies.

This course was taught by a female instructor with three years of experience in teaching Greek for academic purposes and a male instructor with two years of experience in teaching Greek for academic purposes. The two instructors followed the same course outline and had a weekly meeting to coordinate the procedure adopted throughout the course. Again, the instructors were observers of students' activities and their role provided access to a wide-range of data.

5.3.2.3 Participants in Study 3

The third Study consisted of 21 female and 22 male students with good command of social technologies. Students' age ranged from 18-29 years. Forty students were Cypriots; one was from Poland, one from South Africa, and one from Greece. All students had Greek as one of their mother tongues. Their computer skills were in general at intermediate to advanced level. Additionally, they had good command of social technologies. The course was taught by a female instructor with sixteen years of experience in teaching EFL. Again, the instructor was observer of students' activities and her role provided access to a wide-range of data.

5.3.2.4 Research Team

Since the focus of this dissertation was not only to meet the needs of the specific courses, but to advance the agenda of the use of social technologies as social constructionist platforms (cf. Barab & Squire, 2004, p. 5), a research team was established that provided knowledgeable insights on the complexities of integrating elements of technology and theory together. For ensuring that orientations and modifications made would be in-line with research findings, a collaborative partnership was established that involved the instructors of the courses and three experienced researchers from the Cyprus Interaction Lab and the Language Centre of the University.

5.3.3 Procedure

In Study 1, class met face-to-face every day for five hours, for a total of 650 hours (two academic semesters). Activities were held face-to-face and online, whereas outdoor activities allowed students to practice the language in authentic, real-world situations. The course was particularly designed to meet the needs of university students who planned to study Nursing. In the first semester, the language and content were drawn from students' experiences and other key learning areas such as nursing. In the second semester, the language and content were drawn exclusively from nursing. The course and the materials were tailored to meet the academic and professional needs of the nursing students.

Study 2 took place in two classes, with the same course design. Classes met face-to-face twice weekly for two hours each time, a total of 52 hours. Activities were held both face-to-face and online. Study 2 took place for the academic semester throughout January 2013 till May 2013. The course was particularly designed to meet the needs of university students who were preparing their dissertation, and thus needed to produce language at an academic level.

Study 3 related to teaching English for specific academic purposes (Agricultural studies) and took place in January 2014 throughout May 2014. Intervention in this study lasted for three 90-minute courses. Activities were held both face-to-face and online.

5.3.4 Materials

Both students and teachers in all studies made use of social technologies. More specifically, in Studies 1 and 2 students used social technologies throughout the course (26 and 13 weeks respectively); whereas in Study 3 students made use of social technologies for three consecutive 90-minute lessons. The types of social technologies employed in the three studies are demonstrated in Table 15. Detailed description of the use of all technologies in the three studies is provided in the following sections.

Table 15. Types of social technologies used in the three studies.

Study	Social technologies used
Study 1	Dropbox
	Facebook
	Blog
	Wiki
	Google Documents
Study 2	Dropbox
	Facebook
	Blog
	Wiki
	Google Documents
Study 3	Facebook

5.3.4.1 Use of social technologies in Study 1

Participants utilized five social technologies throughout the course (26 weeks): wikis, blogs, Facebook, Google documents, and Dropbox.

The instructor set up two class wikis, Greek4Practice wiki and Lexicon wiki. Wikispaces was employed for creating the wikis because of its simple, user-friendly interface that allows page layout to be easily changed. It is free and password-protected, easy to create and update. It uses open editing functionality and lets users create unlimited internal wiki pages and links. Users can also add other multimedia features including images, audio and

video files to support the content. Wikispaces is currently available in many languages, including Greek, which enabled students to develop their site in the target language. Basic functions within the wiki include file or picture uploading, editing, creation of links and view of the history of pages. Wikispaces also allows its users to monitor the activity of the wiki and compare the differences between any two versions of the page.

The instructor created a Facebook group in which all participants were invited to join. Only members of the group were able to see the group information and content. Students were allowed to freely post anything of their interest on the Facebook group and make comments using the target language.

Following Bloch (2007), the instructor set up one blog for the course, as it is more likely for classmates to interact with each other in one space. The blog allowed students to post and comment, upload material and track the history of blog entries. For the instructor interface, the class blog tracked all posts and comments history.

Google Documents were developed for sharing material related to the course. The instructor created and shared a folder of Google Documents with students, who were allowed to view and edit. Google Documents allows users to share, open and edit the document simultaneously. The Google service also enables users to view the revision history, additions made to a document, with each author distinguished by color.

Finally, all participants shared a Dropbox folder, which included photos taken throughout the outdoor activities held. Dropbox enables all member of a shared folder to edit and re-post files. The version history is kept for 30 days.

5.3.4.2 Use of social technologies in Study 2

Participants in Study 2 were allowed to use any kind of social technology of their preference for constructing their artifact. Students were induced to academic writing through a research project that had the format of an academic research paper. Students had to identify a research problem close to their research interests, work in groups, and complete a research report. To build their project/artifact, students worked in groups on social technologies of their choice for 13 weeks. In total, six groups were formed. Each group selected to use more than one technology, as it is shown in Table 16.

Table 16. Types of social technology used by each group in Study 2.

Group Number	Number of students	Social Technology Used
Group 1	4	Wiki Facebook Group Google Document
Group 2	6	Facebook Group Blog
Group 3	7	Facebook Group Google Document
Group 4	4	Facebook Group Google Document
Group 5	2	Facebook Group Google Document
Group 6	4	Facebook Group Google Document

5.3.4.3 Use of social technologies in Study 3

Study 3 took place in an EFL for specific purposes course (English for Agriculture), centered on the thematic area of modern technology in Agriculture. Students used Facebook group for developing their artifact, related to the aforementioned topic.

5.3.5 Data collection

Data collected in the three studies included instructors' field notes, students' and instructors' reflections, focus groups and semi-structured interviews aiming at investigating how social technologies have been used for constructing an online artifact.

To triangulate the findings, data were also collected by observing students' activity within social technologies. Table 17 summarizes the types of data collected in the three studies of this project.

Table 17. Overview of the data collecting method used in the three studies of this dissertation.

Study	Data collecting method	Purpose
Study 1	Questionnaire	Insight into students' language and computer literacy
	Students' Reflections	Self-evaluation of their activities outcomes and process adopted
	Instructors' reflections	Reflection of activities outcomes
	Instructors' field notes	Overview of the process adopted and activities held
	Interviews	Reflection on activity process and outcomes
	Focus group with each group	Overview of process adopted by the group
	Students' activity on social technologies	Insight of the process adopted and activities held
Study 2	Questionnaire	Insight into students' language and computer literacy
	Students' Reflections	Self-evaluation of their activities outcomes and process adopted
	Instructors' field notes	Overview of the process adopted and activities held
	Instructors' reflections	Reflection of activities' outcomes
	Interviews	Reflection on activity process and outcomes
	Focus group with each group	Overview of process adopted by the group
	Students' activity on social technologies	Insight of the process adopted and activities held
Study 3	Questionnaire	Insight into students' language and computer literacy
	Students' Reflections	Self-evaluation of their activities outcomes and process adopted
	Instructors' reflections	Reflection of activities outcomes
	Researcher's field notes	Overview of the process adopted and activities held
	Focus group with each group	Overview of process adopted by the group
	Students' activity on social technologies	Insight of the process adopted and activities held

5.4 Summary

This chapter reported on the employment of DBR as an overarching inquiry for implementing theoretically designed interventions in real-classroom settings. DBR acknowledges the real-life environment and its complexity and values the design of interventions as an enactment for producing novel learning and teaching environments. DBR fosters our understanding on how theoretically designed principles can be transformed into designs and theories that are contextually based and provide rich accounts of implications for practitioners and educational designers.

In this dissertation, three studies were employed following the notion of design, enactment, analysis, and redesign. In this section I articulated the context and data collected in the three classroom settings: i) Greek as a second language (L2); ii) Greek as a first/native language (L1) for academic purposes/dissertation writing; and iii) English as a Foreign Language (EFL) for specific academic purposes. The setting of the three studies detailed in this chapter was used for the studies reported in the following chapters (Chapter 6, 7, 8 and 9).

6 Introducing new perspectives in the use of social technologies in learning: Social Constructionism

This chapter reports on the first, exploratory phase of the three-cycle DBR inquiry. A qualitative study was carried out exploring the core dimensions of social technologies as social constructionist tools (SQ2- "What are the core dimensions of social technologies as social constructionists tools?") and the role(s) adopted by students and instructor within a social constructionist environment (SQ3- "Which role(s) are adopted by students and instructor within a social constructionist environment?"). Qualitative content analysis of instructors' field notes, students' and instructors' reflections, interviews and a focus group was employed. To triangulate the findings, data was also collected by observing students' activity within social technologies. A code scheme emerged which manifested the use of social technologies as social constructionist platforms. The core dimensions identified (exploration of ideas, construction of online artifact and evaluation of the constructed artifact) provided a rich account of the actions held for constructing an artifact (SQ2). Moreover, the role(s) adopted by students and instructor within a social constructionist environment is outlined, thus answering SQ3. This chapter reveals results in favor of the use of social technologies as social constructionist tools and provides a stepping-stone for suggesting a new perspective for their use.

6.1 Introduction

The emergence of social technologies transformed the way we communicate, learn and interact with others. Among other tools, social or Web 2.0 technologies received substantial consideration from instructional designers, researchers, and practitioners. Each stakeholder explores these technologies from different angles aiming at describing and explicating how these technologies are used, by whom, and for what purpose. Yet, as indicated in Chapter 4, the potential of these technologies as instructional tools has not yet been fully unpacked. Blogs and wikis appear increasingly as social writing platforms being valuable tools for a variety of campus needs, from student group learning to faculty department work to staff collaborations (Alexander, 2006, p. 38). However, the potentials of these technologies are not limited to this use. This chapter aspires to widen the applicability of social technologies drawing on the theoretical framework of constructionism (Papert 1980;1993; Papert & Harel, 1991) and explore the potential that social technologies offer in facilitating teams of learners to socially construct an online artifact.

6.2 Objectives

Social technologies have been widely researched (see Chapter 4.3.4), however their potential as social constructionist platforms has not been exploited. In this chapter, this possibility is explored by providing insights into the use of social technologies in a longitudinal Greek as a second language (L2) course. The aim of this chapter is broken down in the following objectives:

1. Develop a code scheme that captures the core dimensions of social technologies as social constructionist platforms (SQ2)

2. Explore the role(s) adopted by students and instructor within a social constructionist environment (SQ3)

6.3 Setting

This chapter reports on the first cycle of the three-phase DBR inquiry. It presents the results of a longitudinal inquiry of social technologies as social constructionist platforms, in learning and teaching Greek as an L2 for specific academic purposes (Nursing).

The setting of this chapter is described in Chapter 5.3.1 (see page 85). Despite the small sample, this first cycle's horizon is to go in detail and in depth, having participants work with social technologies in a long-term course, and collect data rich in detail about the use of social technologies.

6.4 Methodology

The linkage between constructionism, social technologies and CALL and thereafter the generation of theory will emerge from the data collected throughout the intensive course of Greek described earlier (see Chapter 5.3.1, page 85). Throughout the intensive Greek course, the students were involved with social construction of artifacts within social technologies, including wiki, Facebook, Blogger, Google Documents and Dropbox.

6.4.1 Data collection

The data was collected using a variety of methods: a questionnaire, in class observations and daily field notes kept throughout the course by the researcher-instructor, instructors' and learners' weekly reflective diary kept on the wiki. Interviews were also conducted which allowed to elicit qualitative data about the process that participants followed within social technologies. Sixteen (16) interviews (4 per student) were conducted aiming at capturing students' overall impression and challenges of their learning process. A protocol was followed to explore students' opinions on overall experiences throughout the course. Each interview lasted approximately 45 minutes to one hour. The interviews were tape recorded and transcribed verbatim. Finally, students participated in a focus group that lasted approximately 30 minutes, written notes were taken during the focus group. To triangulate the findings, data were also collected by observing students' activity within social technologies.

6.4.2 Development of Code Scheme

In order to become acquainted with the data, the data set was first read thoroughly. This enabled me to acquaint a holistic view of the course development during analysis and take its context into account. Also, reading the course outline and profiles of the participants helped us to gather peripheral information about the course. Throughout this process, insights and ideas emerging from the data were recorded as memos within the Qualitative Research Software Nvivo. The purpose of this stage of analysis is "to ensure that the theoretical ideas which have emerged in the first round of coding can be systematically evidenced in the data, thus addressing the validity of the research results" (Welsh, 2002, p. 7). Memos were also used for the evolvement of the theoretical understanding of social constructionism (see Chapter 9, page 146).

For the development of the code scheme, consecutive sentences that construct the same meaning are taken as one text unit and coded into a single code. This ensures that each coded segment captures the essence of described events in detail and it is still seen within its context (Pfeil & Zaphiris, 2007). The aim of this process is to classify and elucidate telling the story of the data (Patton, 2002). A shortcoming of this approach is that the decision of what constitutes a meaning can be very subjective. To address this issue, Pfeil and Zaphiris (2007) approach was followed, which developed a procedure as a guide for determining the unit of analysis. An inter-coder reliability test with a sample of the data set revealed that two independent coders agreed on the segmentation in 81% of the cases.

In the second step, the data was analyzed within the Qualitative Research Software Nvivo, extracting keywords and themes. When a set of themes and patterns that described the data was collected, the codes were sorted and grouped for the development of the code scheme. Data was coded based on the target of an activity, for example when participants mentioned that they collected material from real situations in order to build their artifact within social technologies, we coded the segment under social technologies.

In the third step, the code scheme was examined by sensitizing concepts from Papert's (1980;1993) theoretical framework (Patton, 2002). This procedure was repeated iteratively, until a final code scheme was developed. Saturation was reached, when no new codes could be found and the data set could be sorted into the existing codes without any discrepancies. To make the code scheme as objective as possible, a codebook was developed, which clarified the description of the codes further. This codebook includes

characteristics that distinguish the codes from each other and facilitates analysis process. To measure the inter-coder reliability, the codebook was given to another independent researcher who coded 10% of the data set. Cohen's KAPPA was calculated to be 0.72, which, according to Stemler (2001), is considered to be substantial.

6.5 Results

Over the two-semester course (26 weeks), the four participants and the instructor made a total of 1096 edits on the first wiki (Greek4Practice) and 2086 edits on the second wiki (Our Dictionary-Lexicon). On average, each participant made 219 edits on the first wiki and 417 on the second wiki. On the Facebook Group, the four participants and the instructor made 301 posts and 495 comments. On the blog, a total of 26 posts and 40 comments were made and 1158 files were uploaded by the four participants and the instructor in the shared Dropbox folder.

6.5.1 Core dimensions of social technologies as social constructionist platforms

In this section, the code scheme that manifests the use of social technologies as social constructionist platforms or as "objects-to-think with" is presented. The code scheme brings to the forefront the series of actions employed for facilitating the social construction of an artifact within social technologies. Overall, three categories emerged (see Table 18): exploration of ideas, construction of artifact and evaluation of constructed artifact.

In the following sections, the three dimensions that manifest social constructionism are described. The discussion revolves around the aforementioned dimensions, along with the actions occurring within each dimension that indicate the manifestation of constructionism within social technologies.

Table 18. Core dimensions of social technologies as social constructionist platforms.

Categories	Action	Description
Stage 1: Exploration of ideas	*Orientation*:	Text units which refer to setting up the goals of an activity, providing objectives for a specific task (often the instructor challenges the students to identify why a specific activity takes place and how it should be formed).
	Brainstorming:	Text units which refer to making a list of ideas or content that could be used in the constructed artifact. Text units also refer to sharing notes and ideas within social network channels.
	Material exploration:	Text units which refer to exploration and collection of material by taking photos from real situations that learners experienced and by searching the web. The issue of cultural information exchange is prominent here since students often conducted activities out of class in order to collect material.
Stage 2: Construction of artifact	*Outlining*:	Text units which refer to translating material from English to Greek, mapping the main and supporting ideas (before moving to putting the ideas down).
	Editing material:	Text units that refer to editing material, during the construction of the artifact. Editing material includes adding links and other multimedia material. Editing the material is rather a social than an individual task.
Stage 3: Evaluation of artifact	*Revising*:	Text units which refer to the process in which the participant corrects production-errors. Spell check and automatic correctors are used. Revising is rather an iterative than an instantaneous process.
	Peer reviewing:	Text units which refer to peer reviewing the artifact in terms of organization, content and language usage. Comments were also employed for providing feedback within social technologies as a method for monitoring and evaluating a certain activity.
	Instructor reviewing:	Text units which refer to the instructor reviewing the constructed artifact in terms of organization, content and language usage.
	Presenting/ Publishing:	Text units which refer to students presenting the constructed artifact to their classmates/community. Publication of the constructed artifact was done also via social communication channels (Facebook).

6.5.1.1 Exploration of Ideas

The first stage involved orientation towards the tool and the idea. At this stage, goals and objectives are set and the instructor challenges the students to take preliminary decisions for exploring their and other's ideas. In the case of Papert's constructionism within the LOGO environment, learners interact freely with the learning environment; however, in the case of applying constructionism within social technologies, the exploration of ideas facilitated by the instructor appears to be a vital step in the process. During this phase, the instructor introduces the tool to the learners through tutorials and step-by-step workshops. Students that participated in the course had difficulties in dealing with the tools; however, the use of computer enabled them to enhance their language literacy:

> S1 (4th interview)*: When we started to work on wikispace writing, logging in and all that stuff, I realized that it needs more practice because it is not so easy as such. We need to go after links inside the wikispace and the good thing that I like in wikispace is that I realize that it helps a lot, mostly when you write something in Greek.*

Students need to explore a great deal before gaining mastery of how technology works. However, the task is engaging and carries students through the learning process:

> S2 (reflections): *I really enjoyed this week. I learned how to put the Voki in the lexicon* [i.e. Dictionary students built within wiki], *and I also learned a lot of things by adding new verbs in the link related to Nursing.*

A major theme in constructionism is that the computer is seen as a "carrier of cultural 'germs' or 'seeds' whose intellectual products will not need technological support once they take root in an actively growing mind" (Papert, 1980, p. 90). Taking this a step forward, social constructionism assumes that learners can socially exchange "germs" or "seeds", throughout the brainstorming phase. In the framework of social constructionism, learners interact and exchange material throughout social communication channels. Facebook has been used as a tool for social brainstorming on a specific topic. As it is shown in Figure 10, an orientation task has been set by the instructor on Facebook, requesting from students to search for material related to a specific topic. Participants have been brainstorming by listing related material through their posts/comments on a specific topic.

Figure 10. Screenshot of social brainstorming in Facebook group.

The last action of this phase includes exploration of the material gathered. Students were involved in collecting and exploring material from real-life situations (taking photographs) or by searching the web. At this stage, students needed to gather information both online and offline in order to address the needs of their artifact. For example, for developing the page dedicated to the library, students would discuss with librarians how the library can support the research of the university, whilst also gathering information from the library website. Such real-life encounters allowed students to practice the language orally, whilst engaging in an activity that was both purposeful and meaningful.

6.5.1.2 Construction of Artifact

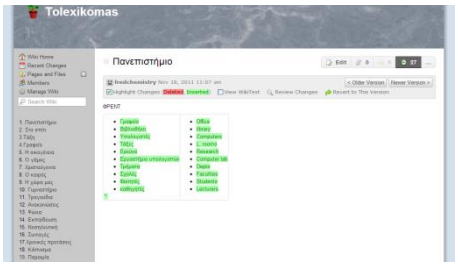
Learners begin their construction experience by translating material from English to Greek and mapping the main and supporting ideas:

> Instructor's reflections: *Students tried to read the material they found sentence by sentence and with the use of the translator to understand the basic information, before start working on their own material.*

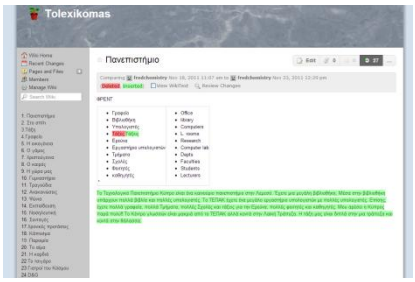
Having understood the material, students move to more advanced commands. Students worked together in building an online dictionary which "can be shown, discussed examined, probed and admired" (Papert, 1993, p. 142). To this aim, during the exploration

phase, students focused in finding the topics that would be included and moved on in the construction phase, first by simple text editing and then by executing more complex actions such as picture uploading, adding plug-ins, videos, or other multimedia material (see Figure 11). Throughout this phase, learners are challenged to go through the artifact and enrich their computational and linguistic competences. The examples vary, but in each case learners practice in the use of language in a rich "object-to-think" that is personally meaningful by being related to their environment they live and study, appearing as authors of a unique experience.

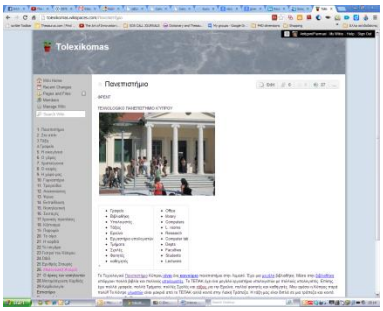
Screenshot 1: Lexicon page November 17, 2012



Screenshot 2: Lexicon page November 18, 2012



Screenshot 3: Lexicon page November 23, 2012



Screenshot 4: Lexicon page November 23, 2012

Figure 11. Screenshots of the process of constructing the online dictionary.

Participants viewed this process of constructing the artifact as highly iterative and powerful, since they had to involve systematically in problem solving and in explaining the constructed artifact to their potential audience:

> S4 (3rd interview): *This procedure helps me because when you stick on doing something maybe you learn more. I did not know how heart transplantation is called in Greek but I think I will not forget it, because when you look a certain*

word maybe once you can forget it easily but this one I will not forget it. I have just got it right now and many other words I have been working on.

6.5.1.3 Evaluation of Artifact

A central theme in constructionism is that "people seldom get anything exactly right on the first try" (Papert, 1980, p. xiii). Within this framework, the construction of an artifact is seen as an iterative process that includes several modifications and revisions. The actions that participants followed in this stage include presentation of the constructed artifact to their peers either face to face or by publishing an artifact into social network channels. Presenting the artifact face-to-face allowed students to describe and elaborate orally on the artifact and the process adopted for its construction, and answer to any questions addressed. During the presentation of their artifact, participants receive feedback from their peers:

> S4 (reflections): *In class, I tried to do my best in presenting my work on the wiki and from the mistakes that I made I have learned the correct.*

Additionally, peers' and instructor's comments enable them to identify and correct their mistakes:

> S3 (4th interview): *In the blog we were discussing and exchanging views, so through those discussions we could see the mistakes of one another, written mistakes by reading through one another's posts.*

Moreover, participants were monitoring the constructed artifact regularly, thus the evaluation of the artifact is seen as an iterative process. In the stage of revision, participants moved back and forth within the constructed artifact, making iterations in terms of organization of material, content, and language usage:

> S3 (interview): *When I go to the Wikispaces I may write something wrong but after two or three weeks I go back and read through and I realize that I made a mistake. Maybe I did not know about that thing before and then I get to know. As I am passing through that text, I see that I made a mistake and I correct it. And if I correct it, it is not very easy to forget it.*

Additionally, the instructor often challenged participants by highlighting their mistakes within the wiki or by providing comments on Facebook. As participants were reviewing

what they have written, they were challenged to think over their artifact until they find the correct answer:

> Instructor's field notes: *I tried to point out their mistakes on the wiki by highlighting incorrect sentences, and also by pointing out their mistakes orally.*

In social constructionism environment, students are not criticized for errors but are rather encouraged to proceed on, try several strategies, and build on their mistakes.

6.5.1.4 Summing up the construction of an artifact

At this point, I articulate how the aforementioned core dimensions were employed in action for the development of an artifact. Examples of artifacts built throughout this course included an online dictionary within wiki, an online calendar within Google Documents, storytelling within Blog, shared video-clip created within Movie Maker and Photostory3 and distributed through YouTube and Facebook.

In the following paragraphs, I demonstrate how the students constructed one of these artifacts, an online dictionary with words and expressions in both Greek and English within wiki. Students built their artifact within a wiki, however other social technologies were also used especially Facebook group -for sharing their artifact- and Facebook comment plug-in within wiki –for facilitating peer reviewing. The development of the artifact was achieved in the following actions:

Stage one: Exploration

1) Students set up the form of the dictionary and decide which items they would include in each entry (*Orientation*).
2) Students make a list of content that could be used in the constructed artifact (*Brainstorming*). During this stage, students kept notes on a page entitled "Notes" on the wiki, which would be used as a guide for the development of their dictionary.
3) Students develop the content by searching and collecting material either by taking photos from real-life situations they experienced and/or by searching the web (*Material Exploration*). Having completed actions 1-3, students would end up in several different ideas and make a decision on the form of their dictionary.

Stage two: Construction

1) Students move to the main construction of their artifact, which reveals the need to translate material from English to Greek and identify main and supporting ideas they wanted to include in each wiki entry (*Outlining*). At this stage, students would choose from various materials they had collected in step 3 (*Material Exploration*), and make an initial outline/draft of their entry.

2) Students modify their initial draft entry by adding links and other multimedia material. This was not done by only one student; an entry could be initiated by one student, modified, and completed by another (*Editing material*).

Stage three: Evaluation

1) Students revise their entries, focusing mainly on correcting production-errors. During this stage, spell check and automatic correctors were used (*Revising*).

2) Students receive comments from their peers in terms of organization, content and language usage. Comments were also employed for providing feedback within wiki or Facebook as a method for monitoring and evaluating their artifact (*Peer reviewing*).

3) Students also receive feedback from their instructor again in terms of organization, content, and language usage (*Instructor reviewing*).

4) Students present their constructed artifact either through social communication channels (Facebook) or orally in class (*Presenting/ Publishing*).

The development of the artifact was an iterative rather than an instantaneous process, which involved the aforementioned actions. However, the sequence of actions was not linear. For example, when students published their artifact on Facebook, they might receive feedback, from either their peers or their instructor, and they would move back to revise and then re-publish their artifact.

Students reacted positively on the activity, which involved building something of their own, and said that it helped them in being engaged in their language lesson. Yet, a number of barriers to social artifact construction were identified as well. Not all students were familiar with the technologies, thus the instructor needed to allow time for technology orientation. Moreover, students also reported limited wireless connectivity and difficulty typing in Greek.

6.5.2 Role(s) adopted by students and instructor

The instructor's role in the social constructionism framework can be marked as facilitator, supporter, and reviewer. The instructor facilitates the orientation phase and reviews the constructed artifact. However, the instructor acts more as a member of the construction team rather than an authoritarian evaluator. The instructor supports students emotionally by giving advice and encouragement related to their progress:

> Instructor's reflections: *Remember that in every fight the first step is to believe in yourselves. What you have done so far proves your potentials.*

Students act primarily as active constructors and reviewers of the artifact, as it is reflected in the actions that evolved in Table 18–orient, brainstorm, explore, outline, edit, revise, review. Typically, in a language class the aim is to memorize as much information as possible, however in a social constructionist environment, learners are encouraged to focus and understand their errors and involve in the process of correcting them.

6.6 Discussion

This chapter revealed results in favor of the use of social technologies as social constructionist tools, demonstrating a code scheme with its major dimensions: exploration of ideas, construction of online artifact and evaluation of the constructed artifact. The development of this code scheme demonstrated that, in order for social technologies to be used as social constructionist tools, nine actions take place, that is, Orientation, Brainstorming, Material exploration, Outlining, Editing material, Revising, Peer reviewing, Instructor reviewing, and Presenting/ Publishing. These actions provide a holistic view of how the construction of an online artifact manifests in practice and unpack the potential of social technologies to act in the arena of social constructionism. An example of an online artifact constructed is an online dictionary with words and expressions in both Greek and English. Students developed their artifact within several social technologies (e.g. using wiki, Facebook group, Facebook comment plug-in). Although social constructionism is framed within the limits of CALL, the emergent dimensions provide a rich account of the designed innovation and actions that can be applied to new settings, provided that they will tailor the activity to the needs and characteristics of a particular situation. These actions enrich the toolbox of designers, instructors, researchers, and practitioners with a better

understanding of the features of social technologies, leading to a new perspective of their use.

From the perspective of knowledge creation, the construction of an online artifact within social technologies allows learners to think and understand abstract scenarios by linking them to their artifact. From the perspective of design, this chapter views constructionism as a fertile ground for framing social technologies, and allowing students to experience the design of an online artifact as designers and researchers, rather than learners.

With regard to the role of the teacher and learners within a social constructionist environment, learners are an energetic part of the whole process starting from exploration throughout the evaluation of the artifact. The instructor acts as facilitator in orienting the ideas in the exploration phase; supporter for participants in the construction phase and reviewer in the evaluation phase. Peers are involved in co-forming decisions in the whole process. Social technologies constitute an integral part of the process; however the essence of social constructionism lays in the artifact itself that produces understanding through construction of an explicit representation.

6.7 Summary

This chapter explored social technologies from the perspective of constructionism. The three dimensions that emerged along with the respective actions that accompany each dimension reveal further dynamics of social technologies as social constructionist platforms, or in Papertian terms, "object-to-think-with". A social constructionism action model that takes into consideration the dynamics of social technologies could be represented in the triptych: *exploration of ideas*, *construction* and *evaluation of artifact*. This triptych captures the actions that take place throughout the social construction of an online artifact process and answers SQ2 ("What are the core dimensions of social technologies as social constructionist tools?"). Social constructionism is articulated in a series of actions, including orientation, brainstorming, material exploration, outlining, editing material, revising, instructor reviewing, peer reviewing, and presenting/publishing.

With regard to the role of the teacher and learners within a social constructionist environment (see SQ3-"Which role(s) are adopted by students and instructor within a social constructionist environment?"), learners and peers participate actively in the process

starting from exploration throughout the evaluation of the artifact. The instructor acts as facilitator; supporter for participants and reviewer of the artifact.

The success of the results presented in this chapter lays in revealing the core dimensions of social technologies as social constructionist platforms, capitalizing on the actions that manifest them. As advised by DBR, the elements of this study (i.e. the core elements of constructionism) were taken into consideration in two different settings (a. Greek for academic purposes/dissertation writing and b. English for specific academic purposes). Besides, the small scale of this phase needed to expand in order to be able to claim success of the intervention (The Design Based Research Collective, 2003). The following key findings emerged from the first cycle and guided our decision to refine the SC design:

1. Students' technology skills were not high, however once introduced to the tools they could deal with the artifact construction easily. Yet, there was a need to allow students with higher technology skills to adopt a social technology of their choice and work on the construction of their artifact.
2. Some technologies were complementary for the construction process. Therefore, there was a need to explore how different types of technologies facilitated or inhibited the construction of the artifact.

In the next chapter, the core dimensions of social constructionism are set into practice in two different settings, a) Greek for academic purposes/dissertation writing, and b) English for specific academic purposes, with an aim to develop a framework for their use.

7 Applying the dimensions of social constructionism in different CALL settings: the methodological framework of social constructionism

This chapter reports on two DBR cycles of inquiry for the development of the framework that grounds the use of social technologies in learning. The core dimensions of social constructionism that emerged from the first exploratory study (see Chapter 6) were put into practice in two different language settings: a) Greek for academic purposes/Dissertation Writing and b) English for Specific Academic Purposes. The two cycles of DBR inquiry provide insights into the use of social technologies as social constructionist tools and provide a methodological framework of social constructionism, consequently answering SQ4 ("How are the dimensions of social constructionism applied in different language learning settings?"). This chapter reports on the use of social technologies in two different language settings, and articulates the methodological framework for their use.

7.1 Introduction

This chapter sets off to explore how the core actions of social constructionism can be applied in two different classroom settings. Chapter 6 proved that Social Constructionism is applicable within a language learning classroom that uses a variety of social technologies. The core dimensions that evolved (see Table 18, page 99) facilitate groups of learners to socially construct a shared, meaningful artifact within social technologies following the constructionist theory. This chapter embarks to apply these dimensions in two different CALL settings: a) Greek for academic purposes/Dissertation Writing and b) English for Specific Academic Purposes.

Following two additional cycles of DBR inquiry, this chapter communicates the methodological framework that grounds the use of social technologies in learning. Moreover, this chapter provides a rich account of the use of social technologies in two different language settings, thus feeding into the advancement of a set of theoretical constructs for establishing and sustaining social constructionism.

As stated earlier, constructionism is a theory of learning which assumes that knowledge is better gained when students find this knowledge for themselves, when engaging in the making of concrete and public artifacts (Papert, 1980; 1993). In addition, constructionism supports that computers are needed, as an environment through which rich activities can be developed (see Chapter 2, page 19 for a thorough review on the theory of constructionism).

7.2 Design-Based Research

As described in Chapter 5 (see page 77), this dissertation adopted DBR as an overarching paradigm for educational inquiry. DBR fosters our understanding on how theoretically designed principles can enact and sustain innovative learning environments (The Design Based Research Collective, 2003). Following an iterative cycle of design, enactment, analysis and redesign, relationships between interventions and social interactions are refined, supporting teaching and learning and rendering solutions in complex educational problems (Collins, 1992; Cobb, 2001; Design Based Research Collective, 2003; Tabak, 2004; Reeves, 2006). The first exploratory cycle of DBR grounded the use of social technologies as social constructionist tools under three core dimensions, whereas the next two cycles build on these dimensions and further explore its implementation. Although

generalizing is difficult in this model, yet "if success means being able to claim that an intervention could be effective in any setting, we should study effects across a variety of settings" (Design-Based Research Collective, 2003, p. 5). Having this firmly in mind, the next two cycles of DBR were used in an attempt to view this intervention holistically and gain a richer account of the interaction between social technologies, learners and teachers, following constructionist's aspirations.

7.3 Methodology

The first exploratory study of the DBR inquiry revealed the core dimensions of social constructionism framework reflected in the triptych: *exploration of ideas*, *construction* and *evaluation of artifact* (see Table 18, page 99). This triptych captures the actions that manifest social constructionism within social technologies, compiling a guide for instructional organization (cf. Cobb, Confrey, diSessa, Lehrer, & Schouble, 2003, p. 10). Using these dimensions, the intervention was designed and implemented in the next two cycles. The core dimensions (and actions) have been set into practice in two different language settings: a) Greek as a first/native language (L1) for academic purposes/dissertation writing and b) English as a Foreign Language (EFL) for specific academic purposes. These studies provide insights into how the dimensions are applied in different settings, and answer SQ4 ("How are the dimensions of social constructionism applied in different learning settings?").

7.3.1 Setting

The cycles described in this chapter ran in three classes throughout 2012-2014. The setting followed is identical to the one described in Chapter 5.3.1 (see page 85, study 2 and study 3). Table 19 provides an overview of the setting in the two studies described in this chapter.

Table 19. Overview of the setting in the two studies.

	Participants	Scope of the course	Social technologies used
Study 2	17 female students 10 male students	Greek as a mother tongue for academic purposes/ dissertation writing – 52 hours	wikis, blogs, Facebook, Google Documents
Study 3	21 female students 22 male students	English as a Foreign Language for specific academic purposes (Agricultural studies) –three 90-minute lessons	Facebook

7.3.2 Data collection

In all studies, qualitative content analysis of instructors' field notes, students' and instructors' reflections, interviews and focus groups were carried out aiming at identifying how the dimensions have been applied for constructing an online artifact. To triangulate the findings, students' activity within social technologies was also observed.

7.3.3 Use of social Technologies in Study 2 and Study 3

The use of social technologies in the two studies is detailed in Chapter 5.3.4.2 (page 90 for cycle 2) and chapter 5.3.4.3 (page 91 for cycle 3).

Participants in Study 2 were encouraged to use any kind of social technology of their choice for constructing their artifact. Students were induced to academic writing through a research project that had the format of an academic research paper.

In Study 3, students worked with Facebook, a technology that evolved as a popular cultural trend, with which students were familiar with and no further induction was deemed necessary (see Chapter 8, page 122 for a detailed account of the features of different types

of social technologies to act as social constructionist tools). Students worked in groups of 4-5 within Facebook group for three consecutive 90-minute sessions.

7.3.4 Analysis

Data were analyzed using the Qualitative Research Software Nvivo 10. The content of the utterances was read for meaning to define segment boundaries, thus, consecutive sentences that construct the same meaning are taken as one text unit and coded into a single code (Chi, 1997). This ensures that each coded segment captures the essence of described actions in detail and it is still seen within its context (Pfeil & Zaphiris, 2007). The coding focused on the actions that took place in order to facilitate a group of learners to develop a shareable artifact within social technologies.

As described earlier, DBR requires consecutive cycles of design, enactment, analysis, and redesign. This process is reflected in the analysis. The data of the second cycle was analyzed in order to feed into the redesign of the framework and the development of the third cycle. Thus, the results of Cycle 1 were considered important for designing Cycle 2 and consecutively Cycle 3, since they are essential components for revealing artifact construction by a group of learners within social technologies. These cycles followed these actions, communicating how social constructionism manifests in action.

7.4 Findings

7.4.1 Study 2

Students were induced to academic writing through a research project, which had the format of an academic research paper. Students had to identify a research problem relevant to their research interests, work in groups, and complete a research report. To build their project/artifact, students worked in groups on social technologies of their choice for 13 weeks.

During the implementation of this study, the results from the first Cycle were taken into consideration, thus students were encouraged to follow the nine actions in order to socially construct their artifact. Students were advised to use a technology they were familiar with and ended up with Facebook group (6 out of 6 groups), wiki (1 out of 6 groups) and Blog

(1 out of 6 groups). However, during the development of their project, the Facebook group could not accommodate all students' and instructors' needs (multiple Word Documents caused confusion, peer and instructor reviewing was limited to generic rather than specific comments). Thus, all groups turned to Google Documents, which facilitated synchronous editing and reviewing of the artifact (thorough investigation of the features of different types of social technologies to facilitate or inhibit social constructionism can be found in Chapter 8, page 122).

At this point, I present the actions followed for the development of the artifact in this study.

Stage one: *Exploration of ideas*

1) The instructor directs and sets the form and aim of the activity, which is to build an artifact that had the form of an academic research paper with an aim to submit it at the local students' competition of the Research Promotion Foundation in Cyprus (*Orientation*). Orientation by the instructor is also provided, when necessary, for each new section of the artifact. Students are triggered to form their groups, select the tool they would work in and allocate responsibilities and roles for the construction of the artifact.

2-3) Students make a list of content that could be used in the constructed artifact (*Brainstorming*) either on their own or by searching online databases using keywords relevant to the topic of their interest (*Material Exploration*). Having completed these actions, students would end up in a list of ideas and material and start thinking over the structure of their paper.

Stage two: *Construction of the artifact*

4) Students move to the construction of their artifact, which reveals the need to translate material from English to Greek -in the case of English academic manuscripts- and identify supporting ideas they would include in their artifact (*Outlining*). Students would work initially on the ideas needed for the Introduction of their artifact, drawing ideas and content from the material collected in *Brainstorming* and *Material Exploration*, for preparing a first draft of the artifact.

5) Students modify their first draft by adding references and supporting ideas with an eye to achieve cohesion and coherence of their research paper. This was not done by

only one student; a section could be initiated by one student, modified and completed by another (*Editing material*).

Stage three: *Evaluation of artifact*

6) Students revise their artifact, focusing mainly on correcting production-errors. During this stage, spell check and automatic correctors were used (*Revising*).
7) Students receive comments from their peers in terms of organization, content, language usage, cohesion, and coherence. Comments were employed for providing feedback as a means for monitoring and evaluating the artifact (*Peer reviewing*).
8) Feedback is also provided by the instructor again in terms of organization, content, and language usage (*Instructor reviewing*).
9) Students present their constructed artifact by either sharing their artifact (constructed in blog, wiki, Facebook group) within social communication channels (Facebook) or orally in class (*Presenting/ Publishing*).

Throughout this study, the actions of the framework were followed in multiple micro-cycles. The artifact was broken down in several sections (i.e. introduction, existing literature, methodology, etc.). For the completion of each section, students explored their artifact, moved into construction, and evaluated it before moving to the next section. These micro-cycles finalized one section of the artifact and marked the enactment of another. The duration and extent of this project/artifact deemed necessary both for the teacher and students to break down the assignment into micro-cycles for better monitoring the artifact. Still, all these micro-cycles are positioned under a macro-cycle of exploration-construction-evaluation, which leads to the construction of the whole artifact. This is in line with Papert's (1980) "structured programming" strategy, which imposes working with small parts, in order to confine problems and allow easily debugging. Hence, at the end a macro-cycle of exploration, construction and evaluation would bring all pieces together for the finalization of the artifact.

Overall, this iteration enacted the development of the methodological framework of social constructionism. In this study, *Orientation* was directed by the instructor who set up the activity rather than students, but still, students were triggered to allocate responsibilities and roles for the construction of the artifact. *Brainstorming* and *Material Exploration* were closely connected, in the sense that the material students collectively added in their group shaped a first skeleton of ideas for the artifact. Actions were not followed in linear order,

but it was noticed that *Evaluation of the artifact* was pervading all stages of artifact construction. Figure 12 demonstrates the redesigned framework, where *Evaluation* pervades both construction and exploration, since revising, peer/instructor reviewing and publishing are actions that appeared throughout the artifact construction. Finally, actions in *Exploration of ideas* reflect the iterations that evolved –*Orientation, Brainstorming,* and *Material Exploration*. As stated earlier, the development of the artifact followed multiple micro-cycles, thus for each section of the artifact the aforementioned actions were followed. For example, when students published their artifact on Facebook, they might receive feedback, from either their peers or their instructor, and they would move back to revise and then re-publish their artifact.

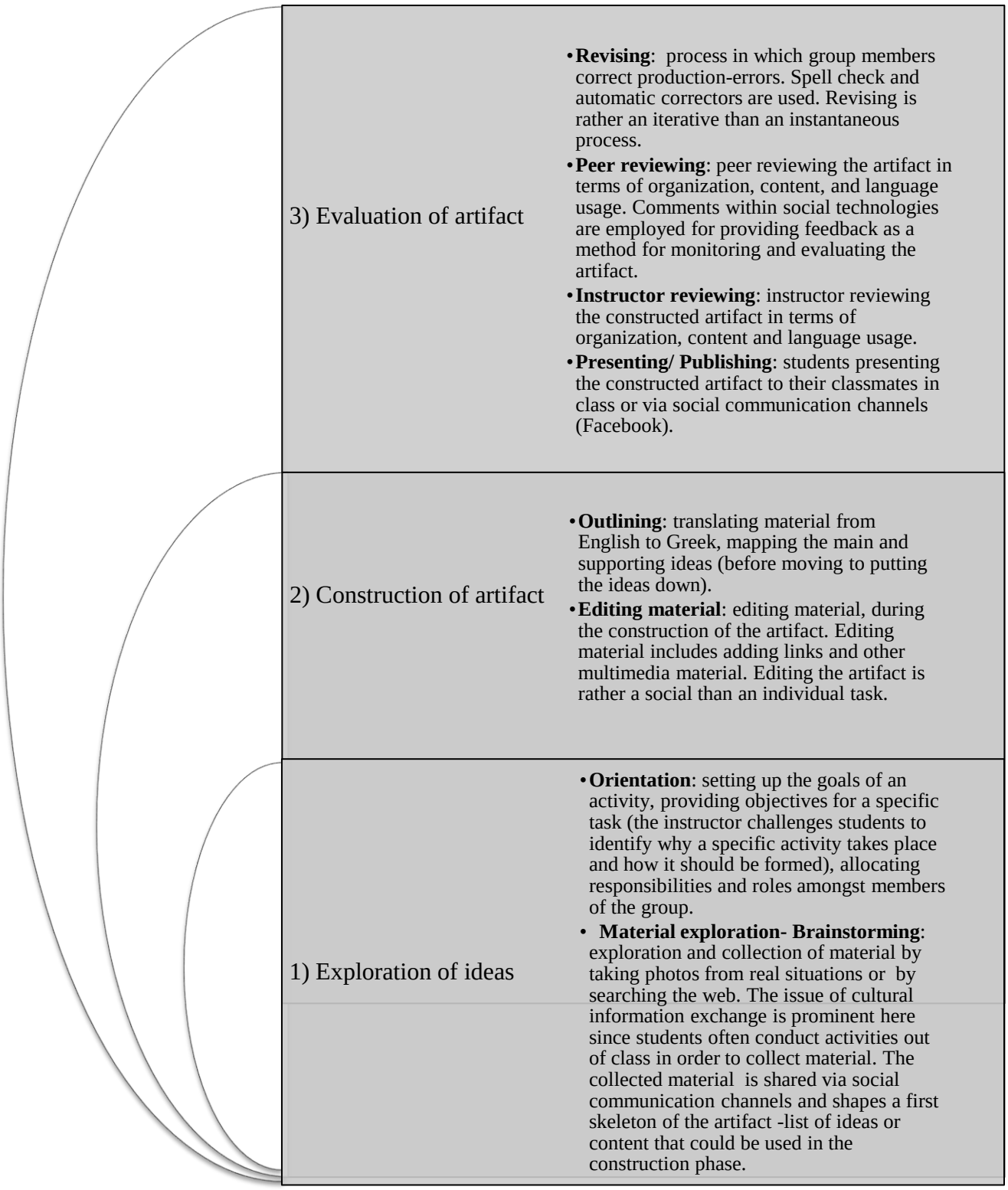


Figure 12. Methodological framework of social constructionism.

7.4.2 Study 3

Study 3 proceeded in applying the framework from Study 2 (see Figure 12). In this study, students were again given a structured task from their instructor (*Orientation*); that is to develop a report and presentation of advantages and disadvantages of Modern Agriculture. Students worked in groups of 4-5 within Facebook group for three consecutive 90-minute sessions. Facebook was chosen as a popular cultural trend with which students were familiar with and no further induction to it was deemed necessary (see Chapter 8, page 122 for a detailed account of the features of different types of social technologies to act as social constructionist tools). During this study, the instructor allowed students to work on their artifact in groups emphasizing the importance of continuous revising and evaluation of the artifact as informed by Study 2. This action boils down to Papert (1980, p. xiii) who stated that "people seldom get anything exactly right on the first try", thus the construction of an artifact is seen as an iterative process that includes several modifications and revisions.

The Facebook group allowed students to make modifications on the constructed artifact, facilitated discussion amongst the members (and the instructor) of the group on what needed to be changed or refined. Moreover, the Facebook group also allowed students to contribute on their artifact, which grew with all students' contributions. As one student stated, the Facebook group served as a "*common brain for the team*", that is a common place where all group members contributed their ideas and saw their artifact grow. Students were also able to meet face-to-face and build on their artifact, yet collocated settings and online interaction contributed to the development of the artifact. In a social environment, constructionism has the connotation of having a set of people working together for constructing something that is shared and visible to the world. Construction that takes place in the head of the team is supported by the construction of a visible artifact and complemented with concrete ideas from all team members within social technologies. Figure 13 demonstrates the evolvement of the activity in one of the groups, demonstrating actions of the social constructionism framework.

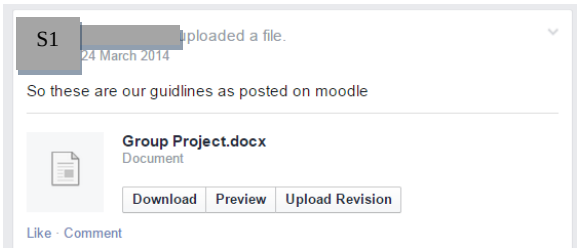
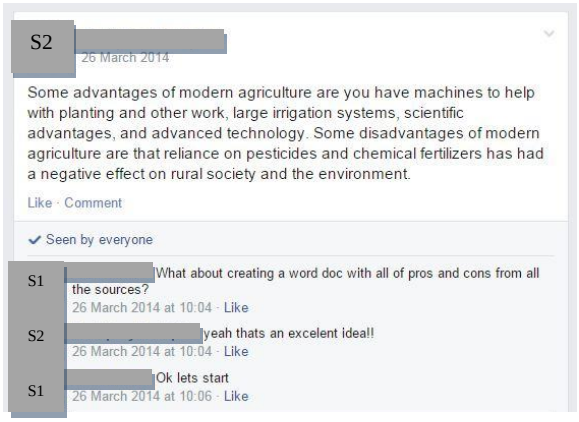
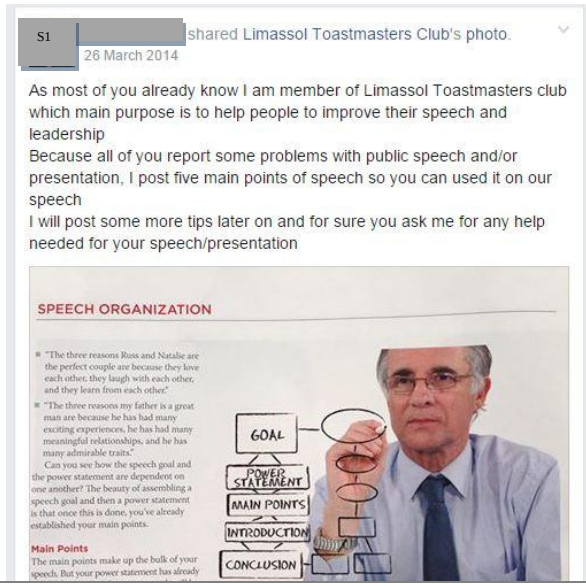
Stage 1. Exploration of ideas		**Orientation** – Having created the group, one of the members of the group uploads the instructions of the specific task, as set by the instructor
		**Material exploration- Brainstorming** - Students start exploring and sharing material related to their artifact. - The material comes either from databases, from YouTube or from students' personal archives.
Stage 2. Construction of artifact		**Outlining** - Students start classifying their ideas, creating a first draft of the artifact in progress - Suggestions are provided from other members of the team to move on to construction of the artifact.
Stage 3. Evaluation of artifact		**Peer reviewing** - Peer reviewing the artifact (in this case oral presentation) comes from one of the members of the group, providing assistance based on his experiences in terms of delivery of content of the artifact (public presentation skills)

Figure 13. Examples of actions undertaken for the construction of an artifact by a group of learners within Facebook.

This study allowed for the framework of Study 2 to be implemented and explored in a complete situation delineating that in three stages –*exploration of ideas*, *construction of artifact*, *evaluation of artifact*- students were able to develop their artifact within social technologies. The teacher facilitated all groups by monitoring their progress, providing feedback and challenging them to justify their choices. The activity was overall well-received by all groups and the instructor. Social construction of an artifact within social technologies evolves as a promising framework for incorporating the use of technology in context, fostering students to work together for constructing an artifact that is shareable and visible to the world.

7.5 Discussion

The two studies provided deep insights into the use of social technologies as social constructionist tools and informed the methodological framework that communicates how social constructionism operates in action. This inquiry provided three core dimensions that enabled learners to participate actively in artifact construction within social technologies; that is *exploration of ideas*, *construction,* and *evaluation* of the constructed artifact. The emergence of this framework opens up a novel pathway for the use of social technologies towards the direction of social constructionism and optimizes the advancement of a particular instructional design model of social constructionism.

In general, learners and instructors reported positively on the activity, and particularly on the development of an entity that belongs to the collective wisdom of their team. Students' engagement with the construction of an artifact that is visible to the world allowed them to construct an "object-to-share-with" that serves as a point of departure for engaging in abstract notions and concepts. Finally, this chapter enhances the process of understanding the relationship between theory, artifact construction, and social technologies, hence enhancing the advancement of a particular set of theoretical constructs.

7.6 Summary

This chapter unpacks the potential of social technologies towards the direction of social constructionism in two different classroom settings, a) Greek for academic

purposes/dissertation writing; and b) English for specific academic purposes (Agricultural studies). The application of social constructionism in the two classroom settings provided in-depth insights of the social constructionist environment, illustrating the prevalence of Evaluation for monitoring and polishing the artifact. Studying the effects of the intervention across a variety of settings enabled articulating the methodological framework of social constructionism, subsequently answering SQ4 ("How are the dimensions of social constructionism applied in different language learning settings?"). Yet, it should be kept firmly in mind that the framework is not a clear-cut map of actions, but it is rather a heuristical understanding of the intervention for those interested in enacting innovation in their own settings.

The social technologies that students employed varied, often facilitating or inhibiting the construction of an artifact. For example, Facebook has been used for exploring and sharing material from various sources (real-life and web) for artifact construction and later for monitoring the artifact through comments, whereas the Google Document allowed for the whole artifact to be in one place and then shared through other communication channels (e.g. Facebook). Thus, an important element for sketching a holistic understanding of the intervention and the relationship between theory, designed artifact and social technologies, lay in understanding the features of social technologies to act as social constructionist tools. To address this need, the various social technologies used in the first two studies have been explored with an aim to decipher how each type of technology facilitates or inhibits the construction of an artifact by a group of learners. Thus, in the following chapter the different types of social technologies are explored and articulate the features of each type of technology (SQ5), and design principles for developing such tools (SQ6).

8 Specifying the dynamics of social technologies as social constructionist tools

This chapter explores the capabilities of social technologies for supporting the construction of a shareable artifact by a group of learners. To this aim, special attention was placed on whether each technology facilitated or inhibited the construction of an artifact. This was achieved by capturing the use of five different types of social technologies (Facebook, blogs, wikis, Google Documents, Dropbox) in the two different classroom settings (Study 1 and Study 2), shedding light to the potential and challenges of these tools for supporting the core dimensions of social constructionism, that is material exploration, artifact construction and evaluation. Qualitative content analysis of instructors' field notes, students' and instructors' reflections, interviews and focus groups brings to the fore the potential of social technologies to transform the activity of learning across a new culture of computational tools. The features of social technologies are discussed thus answering SQ5 ("What features of different types of social technologies can facilitate groups of learners to socially construct an online artifact?"), and design principles that need to be followed in these new arenas, thus answering SQ6 ("Which design principles can be brought forward for supporting the development of social technologies as social constructionist tools?"). This chapter fosters deep understanding of the potentials and challenges of social technologies as social microworlds, that is, as environments that foster groups of learners to construct a shared artifact; thus enhancing the process of advancing a particular set of instructional design elements for social constructionism.

8.1 Introduction

The term “social technology” or “Web 2.0 technology” is generally used to refer to technologies and internet applications that allow users to generate content collaboratively. The concepts of user-generated content and sharing give in a nutshell the philosophy behind social technologies which include social network sites, social software, digital artifacts sharing platforms, and social bookmarking (O’reilly, 2005; Constantinides & Fountain, 2008; Wu & Zhang, 2014).

This chapter sets off to specify the dynamics of social technologies as social microworlds. Microworlds is an essential element of constructionism; social microworlds are learning environments that facilitate groups of learners to engage in the social construction of an online, shared artifact.

Constructionism is a theory of learning, teaching, and design advanced by Seymour Papert (1980), which can be summarized in the conviction that individual learning occurs more effectively when learners understand the world around them by creating connections between old and new knowledge, in interactions with others whilst creating meaningful artifacts (see Chapter 2, page 19 for a detailed review of constructionism).

8.1.1 Objectives

Abundant literature across many disciplines exists on the use of social technologies as useful tools for improving communication, collaboration, cultural awareness, and information sharing (see Chapter 4.3.4, page 61, for a detailed review of the affordances of Web 2.0 tools in CALL). Yet, there is a need for more solid evidence on the potentials, challenges as well as the theoretical grounding of these technologies (Lantz-Andersson, Vigmo & Bowen, 2013; Wang &Vasquez, 2012). Thus, by drawing on the potentials and challenges of social technologies as social microworlds, the process of advancing a particular set of theoretical constructs is enhanced.

In an attempt to fill this void, this chapter sets off to contribute in the arena of social technologies by specifying their dynamics as tools that support the construction of a shareable artifact by a group of learners. The following research questions guide this chapter:

***SQ5**: What features of different types of social technologies can facilitate groups of learners to socially construct an online artifact?*

***SQ6**: Which design principles can be brought forward for supporting the development of social constructionist tools?*

8.1.2 Contribution

Whilst educators, practitioners and researchers express high interest in making available technological tools that enable their students to learn through experimentation rather than lecturing, designing and implementing such tools under the appropriate framework is hardly realized (Resnick, 1996b). Resnick (1996b) provides three threads of thought, which need to be taken into consideration whilst designing such tools: firstly, learners' experiences, needs and expectations; secondly understanding of domain knowledge and finally, understanding of computational ideas and paradigms. Within this school of thought, this chapter sets off to find out how to nurture the use of existing social applications and software for supporting groups of learners to socially construct shared, meaningful artifacts. Focusing on learners' needs, and by understanding the computational potentials and limitations of social technologies, this chapter contributes to the use of these technologies across multiple domains and users, including HCI, CAI, TEL, and CALL. Moreover, this chapter adds into the research agenda for developing social microworlds that can support a synergy between the artifact, the pedagogy and the technology (Parmaxi & Zaphiris, 2014a). In other words, by learning how these technologies facilitate or inhibit a group of learners to socially construct meaningful, shared artifacts, we can also find out how to nurture and design social applications and software that support them. Seen in this light, this chapter bridges the gap between computer designers and interface architects with classroom practitioners by aligning users' needs and domain knowledge with computational potentials or challenges.

8.2 Setting

The study described in this chapter ran in three classes throughout 2011-2013 in order to have a wide spectrum of the use of social technologies in different settings. The setting in

which this study took place was identical to the one described in Chapter 5.3.1 (see page 85). Table 20 provides an overview of the participants and instructors in the two studies.

Table 20. Overview of participants and instructors in the two studies.

		Participants	Instructors
Study 1	Class 1: Greek as a second language Duration: 650 hours (September 2011- May 2012)	4 male Origin: Kenya (2), Uganda (2) Age: 19-23 - No knowledge of Greek - Basic to intermediate computer literacy - Minimal knowledge of social technologies	Female with four years of experience in teaching Greek as an L2
Study 2	Class 2: Greek as a mother tongue for academic purposes/ dissertation writing Duration: 52 hours (January 2013- May 2013)	12 female 8 male Origin: Cyprus (18), Greece (1), Russia (1) Age: 21-32 - Greek as a mother tongue - Intermediate to advanced computer literacy - Good command of social technologies	Female with three years of experience in teaching Greek for academic purposes
	Class 3: Greek as a mother tongue for academic purposes/ dissertation writing Duration: 52 hours (January 2013- May 2013)	5 female 2 male Origin: Cyprus (6), Greece (1) Age: 21-23 - Greek as a mother tongue - Intermediate to advanced computer literacy - Good command of social technologies	Male with two years of experience in teaching Greek for academic purposes

8.2.1 Use of social technologies in Study 1 and Study 2

The use of social technologies in the two studies is detailed in Chapter 5.3.4.1 (page 89 for Study 1) and Chapter 5.3.4.2 (page 90 for Study 2). A summary is also provided in the following paragraphs.

In Study 1, participants utilized five social technologies throughout the course: wikis, blogs, Facebook, Google Documents, and Dropbox. The instructor set up two class wikis - Greek4Practice wiki and Lexicon wiki- and created a Facebook group in which all participants were invited to join. Moreover, the instructor set up a class blog for the course in order to provide classmates a mutual space to interact with each other. The instructor created and shared a folder of Google Documents with students, who were allowed to view and edit. Finally, all participants shared a Dropbox folder, which included photos taken throughout the outdoor activities held.

Participants in Study 2 (Classes 2 and 3) were allowed to use any kind of social technology of their preference for constructing their artifact. Students were induced to academic writing through a research project that had the format of an academic research paper. Students had to identify a research problem close to their research interests, work in groups, and complete a research report. To build their project/artifact, students worked in groups on social technologies of their choice for 13 weeks as it is shown in Table 21.

Table 21. Type of social technology used by each group in Study 2.

Group Number	Number of students	Social Technology Used
Group 1	4	Wiki Facebook Group Google Document
Group 2	6	Facebook Group Blog
Group 3	7	Facebook Group Google Document
Group 4	4	Facebook Group Google Document
Group 5	2	Facebook Group Google Document
Group 6	4	Facebook Group Google Document

8.3 Methodology

This chapter aims at identifying the features of social technologies as social constructionist tools within the theory of constructionism.

8.3.1 Data collection

The data, as explained in previous chapters (see Chapter 5.3.5, page 91), was collected using a variety of methods: questionnaires, in class observations and field notes kept throughout the course by the researcher and learners' summative reflections. Focus groups and individual semi-structured interviews were conducted in order to elicit qualitative data about the process that participants followed within social technologies.

Table 22 briefly describes the types of data collected in the two studies. To triangulate the findings, data were also collected by observing utterances, texts, and artifact evolvement within social technologies. The small size of the groups allowed for the full range of social interactions to transpire and for researchers to find what is going on within each group (Stahl, Koschmann, & Suthers, 2006).

Table 22. Overview of data collected in the two studies.

Study 1	
Data	Purpose
Questionnaire	Insight into students language and computer literacy
Students' Reflections	Self-evaluation of their activities outcomes and process adopted
Instructors' reflections	Reflection of activities outcomes
Instructors' field notes	Overview of the process adopted and activities held
Semi-structured interviews	Reflection on activity process and outcomes
Focus group minutes	Overview of process adopted by the group

Study 2	
Data	Purpose
Questionnaire	Demographic data and insight into students computer literacy
Instructors' field notes	Overview of the process adopted and activities held
Learners' summative reflections	Self-evaluation of their activities outcomes and process adopted
Semi-structured interviews	Reflection on activity process and outcomes
Focus group	Overview of process adopted by the group

8.3.2 Data analysis

I adopted a deductive approach for identifying the features of the different types of social technologies as social microworlds. As a basis for the analysis, the established code scheme developed in Chapter 6 (see Table 18, page 99) was employed. The code scheme manifests the aspects of online artifact construction within social technologies and consists of nine codes that were sorted out in three high-level categories: exploration of ideas, construction of artifact, evaluation of artifact. These categories were considered important for this approach since they are important components for revealing artifact construction by a group of learners within social technologies. Taking them as a basis for my analysis allowed to explore how these aspects manifest within different social technologies, and identify how specific actions, and the overall artifact construction, are facilitated or inhibited by each type of social technology.

To get an initial idea of the data, the whole data set was read thoroughly. The data set consisted of all data collected in the three classes, that is, semi-structured interviews and focus group transcriptions, field notes and instructors' and students' reflections (see Table 22). Moreover, I also explored the interaction developed within social technologies by all groups of learners, focusing on the process adopted in each group from the beginning until the completion of their artifact. In addition, reading the course outline enabled to gather peripheral information about the courses. This helped me to come up with a comprehensive overview of the courses' development, and take their context into account.

The data set was analyzed using the Qualitative Research Software Nvivo. The content of the utterances was read for meaning or idea to define segment boundaries (Chi, 1997), thus, consecutive sentences that construct the same meaning are taken as one text unit and coded into a single code. This ensures that each coded segment captures the essence of described events in detail and it is still seen within its context (Pfeil & Zaphiris, 2007). A weakness of this approach is that the decision of what constitutes a meaning can be very subjective. To address this issue, Pfeil and Zaphiris (2007) approach was followed, developing a detailed guide for determining the unit of analysis. An inter-coder reliability test with a sample of the data set revealed that two independent coders agreed on the segmentation in 77% of the cases.

The coding was not exclusive and each segment was coded under a) one of the categories manifesting the action held for the construction of the artifact, and b) the specific social

technology in which the action was taking place. For example, when participants outlined the structure of their artifact within Google Document, the segment was coded under a) Outlining and b) Google Document. These layers allowed to identify the stage of constructionism that was conveyed (Exploration of ideas-Construction of artifact-Evaluation of artifact), and the medium through which this was completed (Facebook, Google Document, blog, wiki, Dropbox). Thus, through this process I could identify how each stage of construction was influenced, facilitated or inhibited by the use of the mediating social technology; thus revealing the promises and limitations of social technologies in the arena of social constructionism.

8.4 Results

8.4.1 Promises and limitations of social technologies as Social Microworlds

The use of different types of social technologies as social microworlds in the two studies is described in the sections below. The social technologies used are classified into four types: 1) social networking tools; 2) blogs; 3) wikis and 4) digital artifacts sharing platforms.

8.4.1.1 Social Networking Tools

Facebook, and more specifically Facebook group and chat, has been used extensively throughout all phases of the construction of an artifact. Though not all students valued Facebook, its popularity in all classes is remarkable. Students' familiarity with Facebook was an important factor that enhanced its use detriment to other social technologies:

> S19 Interview (Class 3, Group 2): *It might be a matter of habit that Facebook was more convenient. We use Facebook almost every day but we do not use blog so often, blog is not as widespread as Facebook.*

In a community that is rich of personal computation, the computer culture that grows thrives towards social networking tools. These manifestations catch the essence of technological cultural trends, which is an essential aspect in constructionism. For Papert (1993, p. 9) "[computer is a] carrier of cultural 'germs' or 'seeds' whose intellectual products will not need technological support once they take root in an actively growing

mind". In social constructionism, learners can socially exchange "germs" or "seeds", throughout the construction of the artifact. Here is the need for viewing on one hand the instructor as an anthropologist and the specific tool as a dynamic cultural trend. In other words, the surrounding culture advantages Facebook as a dynamic trend that cannot be missed in a powerful educational environment.

Additionally, Facebook allowed for more personal, less estranged relationships, improving also human's relationships:

> S17 Reflections (Class 2, Group 3): *Facebook bridged the distance between us since through the group created by the members, there was a daily communication.*

The following sections delineate in more depth how the use of Social Networking Tools facilitated or impeded artifact construction by a group of learners.

8.4.1.1.1 Exploration of ideas

The first stage of construction involved orientation by setting up the expected goals and objectives of the artifact and was followed with brainstorming by making a list of ideas that could be used for the implementation of the artifact. Students worked together in compiling the requirements for building their artifact and meet their team's needs and the interests of the wider community –bearing in mind that their artifact would be available not only for them but for the online community. Facebook group provided a ground for communication in which the instructor and students could exchange their ideas and relevant material for implementing their artifact.

The group formation and communication facilities provided by Facebook helped organizing discussion ladders throughout the development of the artifact. These mechanisms allow for an importunate conversation history that is useful for the development of the artifact. The existence of this history allowed to the group members to keep a record of their to-do-list and consequently make modifications, whenever this was deemed necessary. Students used tagging to ask from their classmates to complete a specific task or to inform them of what has been implemented and what needs to be completed.

Material exploration and sharing were also facilitated within Facebook since it allowed posting and commenting of material available on the web or in students' daily lives (i.e. students' photos from authentic real-life situations). Facebook allowed for this material to be available to everyone from the beginning until the implementation of the artifact. Moreover, the notification function allowed for both students and instructor to track new material posted and alert for new documents in the group, although its major limitation laid in its weakness to archive this material in folders.

8.4.1.1.2 Construction of artifact

Facebook was also used for the actual construction of the artifact. Students uploaded their artifact either as a post or as a Word Document on the Facebook group for further discussion and evaluation by their peers and their instructor. However, the use of Facebook throughout the construction phase was not always functional, especially in cases where various different versions of the constructed artifact appeared in the group/chat. When outlining and editing material, students needed a synchronous authoring and reviewing tool that would offer reverts to the previous version and to keep a history of the changes made. Supplementing the Facebook group wall with functionality for managing searching, authoring and editing would make the coordination and monitoring of the artifact easier.

8.4.1.1.3 Evaluation of artifact

Apart from exploration and construction, a basic concept in constructionism is evaluation. Having in mind Papert's (1980, xiii) belief that "people seldom get anything exactly right on the first try"; the construction of an artifact is seen as an iterative process that includes several modifications and revisions. The Facebook group facilitated discussion amongst the members of the group on what needed to be changed or refined for polishing their artifact. For example, a student would upload in the Facebook group the abstract of the research project, which was further discussed and refined by other members of the group. In another group, students' project related to a computer code, in that case the Facebook group would again facilitate the verification of the correctness of the code, by having other members to run the code:

> S12 Interview (Class 2, Group 5): *In the case of a code in our project we would all run the code and we would comment on which part of the code might have a problem or did not work properly […]. We might write a comment like "there is problem in this or that part of the code" and our fellow student would try to identify the problem and solve it.*

However, difficulties were reported, especially in cases in which the constructed artifact was uploaded in Word Document. In such a case, students and the instructor had to download the document and post comments on the Facebook group, which was not always functional. Comments beneath a Word Document were generic, and reviewers had difficulties in pointing to a specific error –especially in the case of a multipage document.

The evaluation of the constructed artifact amongst group members was also conducted through private chats on Facebook rather than through posting comments that were visible by all members of the group including the instructor. This brings to the forefront privacy and security issues. Both Facebook chat and Facebook group serve synchronous conversation, but only Facebook chat affords private access and visibility to the members that are part of the discussion. Students preferred private exchange of messages especially in cases they wanted to converse between the members of the group and exclude the instructor.

Facebook group also facilitated peer reviewing between members of different groups. Students would read their peer's comments, discuss the rationale behind the decisions that they undertook and then refute their peer's arguments. Students found their peers' comments helpful in improving their artifact, however, there were cases in which students appeared resistant in following these comments and emphasized the importance of the grading procedure that would be carried out by the instructor than their peers. Apart from their classmates, students also received comments from their instructor who would evaluate their progress and gave them suggestions for improvement.

Finally, presenting and publishing in all classes was conducted either face-to-face or through Facebook group. Overall, the evaluation process and the constant correction or "debugging" process (Papert 1980, xiii) reached the essence of intellectual activity. Students' problems and difficulties experienced throughout the construction of the artifact served as an instrument for concrete thinking about where to go next.

8.4.1.2 Blogs

8.4.1.2.1 Exploration of ideas

From students' viewpoint, blog facilitated construction rather than exploration and evaluation. Students experienced difficulties in working on the blog during the exploration and evaluation phase. Students expressed their preference in using instant messages for discussing the construction of their artifact. Instant messaging would reach directly someone else who can see it quickly and response immediately. In order for students to overcome this difficulty, they used Facebook group/chat and also face-to-face communication:

> S21 Interview (Class 3, Group 2): *The blog was not always very helpful, we preferred something like chat (chat-style) that could facilitate chatting and make all conversations and discussion immediately visible to everyone. By commenting under a post or text it is difficult because it takes time for each comment to upload. On the blog, we had difficulties because when we added comments under a text it took time for the comments to upload.*

The blog commenting function affords near synchronous communication, however in the arena of putting an artifact together the delay in communication hampered the work between the group members.

8.4.1.2.2 Construction of artifact

Blog-style posting allowed students to formulate their learning, often through their mistakes. Students expressed their preference for using blog as a stepping-stone for outlining their artifact:

> S1 Interview (Class 1): *Blog has assisted so much […]. The reason is that you write your own thinking, you form your own stories and with that one you know how to create a story in Greek and also you write so many words in Greek, you make mistakes, you correct it and that is the way to go.*

However, blog-style formatting was not functional and could not be changed at will. The key issues raised relate to formatting issues, as well as different font styles that each learner is familiar with. Pluralism is an element that should be taken into consideration

when building computational objects, as well as the level of mastery in handling each tool. This is needed in order to enable users to gain ownership of the artifact and create a more close relationship with it, by designing it in a way that suits their needs and preferences.

8.4.1.2.3 Evaluation of artifact

The evaluation process also took place through blogs. Both students and instructor posted comments on the blog in order to evaluate the artifact; these comments were taken into consideration throughout the construction. However, similar issues were reported as in exploration and construction –not supporting synchronous communication and construction of artifact. Thus, both students and instructor would provide their feedback face-to-face.

8.4.1.3 Wiki

Wiki was found to be a useful tool for all phases of construction. Wikispaces has been used in Study 1 for students to develop an online Lexicon and by one Group in Study 2 for developing their course project described above (see section 8.2.1, page 125).

8.4.1.3.1 Exploration of ideas

The use of wiki enabled students to explore and orient the artifact. During this phase, students focused in writing down ideas that could be used in the artifact, exchanged material and built on each other's ideas:

> S23 Interview (Class 2, Group 1): *Each one of us would log into the wiki and add into what the previous one had written. For example, I could have logged in to start the part "Introduction" and then someone else would log in to add some other notes.*

The capability of wiki to allow asynchronous authoring enabled the group to have a single artifact together, whereas the history allowed for keeping an archive of all modifications made and the possibility to revert to a previous version. Wiki, though, did not support

notifications and students would use their Facebook group for notifying changes or for requesting peer/instructor reviewing.

8.4.1.3.2 Construction of artifact

At this stage, students enriched the artifact with more details. This was not always a clear-cut process, since often brainstorming and outlining could have been done simultaneously. Difficulties evolved in the construction phase, especially when Word files replaced the wiki authoring page:

> S23 Interview (Class 2, Group 1): *As we proceeded we started working on Word files, instead of writing directly into the wiki. Of course this was a mistake, we should have written directly into the wiki. […] On the wiki it was easier to check on the changes that were made. On the Word file, you need to open the file, read the file entirely and then identify what changes were made -if any.*

Hence, social authoring is a functionality that wiki can support vis-à-vis Facebook group and blog which hampered learners from putting their ideas together in one formatting. However, wiki did not support synchronous authoring and in cases that two students were working together on the same page, activity malfunction was possible to occur.

8.4.1.3.3 Evaluation of artifact

Reviewing in wiki was conducted using two functions: a) comment in the discussion forum of Wikispaces, and b) Facebook plug-in, which students could add following simple copy-paste from Facebook Developers page (Facebook Developers, 2014). Participants kept track of the constructed artifact regularly, making iterations in terms of content and organization. Additionally, the instructor often challenged participants by highlighting their mistakes within the wiki, not for penalizing them but for allowing to think deep of their artifact. The use of different colours in Wikispaces toolbar afforded for the teacher to pinpoint different types of mistakes, using different colours in a specific point of the document. This feature stands in contrast to the evaluation conducted in other social technologies, where reviewers needed to download the document and comment beneath a Word Document (Facebook group) or beneath a post (Facebook group and blog).

8.4.1.4 Digital Artifacts Sharing Platforms

The Web-based shareable and distributed applications used were Dropbox and Google Documents. Dropbox has been used extensively in Study 1 (1158 files were uploaded by the four participants and the instructor). Google Documents were also used in both studies by all participants. The shift to the use of Google Documents deemed necessary due to the limitations that came up with the use of the Facebook group, wiki, and blog.

8.4.1.4.1 Exploration of ideas

Dropbox shared folder facilitated mostly material exploration and sharing between students. The material was indexed in folders by each student and was then used for artifact construction. This feature stands in contrast to the exploration in Facebook group, blog, and wiki where indexing and archiving was not possible. Dropbox was preferred as a means for collaborative collection and archiving of material by a group of learners. Yet, Dropbox did not afford the actual construction, forcing students to use other tools for putting their artifact together.

Google Documents enabled exploration, construction, and evaluation of an artifact. In Study 1, students engaged in building a monthly calendar with their experiences throughout their life in Cyprus. The instructor provided them with the calendar template within Google Documents and participants worked together for developing their artifact. Each one of them would note on the calendar important dates and photos of the group in each month of the calendar for all group members to remember. Google Documents were used for orientation and brainstorming and its structure supported functions such as synchronous, collaborative authoring. Material exploration was somewhat supported since students posted in their Document the material they found, however they could not archive it and preferred to have it on Dropbox (Study 1) or on their Facebook group (Study 2).

8.4.1.4.2 Construction of artifact

For the construction of the artifact, students brought material from their Dropbox folder and edited it within Google Document. Google Document afforded having the whole artifact together and working on it in real time, vis-à-vis Facebook group, where each member of the group uploaded a different Word Document and ended up in several

versions of their artifact. However, problems emerged related to the content of their artifact in Google Document:

> S6 Focus Group (Class 2, Group 3): *We did not encounter any problems with the text. We had some problems with the pictures. When you move one picture, all of them change.*

With regard to content, Google Document fully supports concurrent editing of the artifact (text), however it can somewhat support visual material since collaborators need to upload their pictures one-by-one. Moreover, Google Document supports history and allows reverting to a previous version, highlighting the changes that were made.

8.4.1.4.3 Evaluation of artifact

The Google Document also facilitates the revision and reviewing of the artifact by peers and instructor:

> S14 Reflections (Class 2, Group 6): *One of the main advantages of Google Docs is the simple and easy suggestion of a mistake at a specific point in the text. It was very helpful in providing and receiving feedback regarding each piece of work.*

The Google Document supports a community space-affording private and group chat in a single space. Different chat channels allow discussion right from the inside of the document, supporting also notifications to the group members. In Class 2 students were encouraged to use Google Document after the difficulties both students and instructor encountered with the use of Facebook Group, blog and wiki in the evaluation process:

> Instructor's Field Notes (Class 2, Week 6): *GoogleDoc was selected as an alternative to Facebook Group since it could facilitate the iterative cycle and allowed for easier provision of comments*.

8.4.2 A framework for sustaining Social Microworlds

Table 23 provides an overview of the potentials and limitations of different social technologies as social microworlds.

Table 23. Potentials and limitations of different social technologies as social microworlds.

		Social Networking Tools	Blogs	Wikis	Digital Artifacts Sharing Platforms
Exploration of ideas	Orientation	✓✓	✗✗	✓	✓
	Brainstorming	✓✓	✓	✓	✓
	Material exploration	✓✓	✗✗	✓	✓
Construction of artifact	Outlining	✓	✓	✓	✓✓
	Editing material	✗	✗	✓	○
	Revising	✗	✓	✓	✓✓
Evaluation of artifact	Peer reviewing	✓	✓	+	✓✓
	Instructor reviewing	○	✓	+	✓✓
	Presenting/Publishing	✓✓	✓	✓	✓

Note: The symbols in the above table have the following meaning: ✓✓ fully supported, ✓well supported, ○ somewhat supported, ✗✗ not supported at all, ✗ not well supported, + supported with extensions.

Exploration of ideas is fully supported by using synchronous discussion ladders; posting material from various sources (web or photographs from authentic situations); keeping conversation history, tagging and notifications (e.g. within Facebook). Exploration is well supported with indexing of material (e.g. in Dropbox) and asynchronous authoring of the artifact by taking primitive notes that could be expanded (e.g. in wikis and Google

Documents). Orientation and material exploration is not supported in near synchronous communication channels (e.g. blog).

Construction of artifact is fully supported using concurrent social authoring/editing of artifact and history keeping and well supported using asynchronous authoring (posts). Yet, material editing is not well supported below posts (e.g. artifact cannot be concurrently edited by the group members in Facebook or blog). Visual material is somewhat supported in concurrent editing channels (e.g. Google Documents).

Evaluation of artifact is fully supported in channels where private and public commenting is available right form inside the artifact, supporting also notifications to group members (e.g. Google Documents). Evaluation is well supported beneath a Word Document or using private chat when generic comments are provided, yet more specific comments are somewhat supported beneath a Word Document. In some cases, evaluation is supported with the use of extensions –e.g. Facebook plug-in within wiki. Finally, presenting/publishing the artifact is fully supported within social networking channels where the artifact can be probed and shared; and well supported in channels where the artifact is available in one space (e.g. blog, wiki, Google Document).

8.4.3 Design principles for supporting the development of social constructionist tools

Social technologies enable and enhance the creation of social microworlds that can support the construction of a shareable artifact. Both Social Networking Tools and Digital Artifact Sharing Platforms seem to afford the development of a shared artifact, whereas their combination opens-up a new pathway for fully supporting social microworlds. Yet, in order for these tools to meet the needs of groups of learners to construct a shared artifact, specific principles need to be met. These principles derived from the identified potentials and limitations of the different types of social technologies in facilitating each phase of artifact construction by a group of learners (see Table 18 for the core elements of social constructionism). The principles below are expected to support the development of social constructionist tools by computer designers and interface architects.

8.4.3.1 Support material exploration

In order for groups of learners to successfully construct their artifact they need to explore previous work found through search engines or to bring into their artifact their own previous work or material from multiple devices. Moreover, it is imperative for the interface to support various types of material (including picture, video, and audio) to be inserted and modified in the artifact by all group members.

8.4.3.2 Allow material archiving and construction

Since it is likely for groups of learners to engage in exploratory search, this material needs to be archived and allow to the group to easily extract it for the construction of their artifact. For example, learners should be able to easily find the material they collected from search engines or from their personal directory (i.e. photos), and build on it for expanding their construction.

8.4.3.3 Enable history keeping and reflection

Keeping history of the constructed artifact enables groups of learners to view previous versions and other alternatives they have tried as well as having the option to return to previous versions. History keeping deems necessary in managing the artifact and following a ‘to-do-list’ for running the objectives of the project from Exploration to Evaluation.

In social constructionism learners are encouraged to focus and understand their errors and involve in the process of correcting them. Errors are not considered as lack of understanding but as part of the learning process in order for the learners to reflect on their learning and reframe the strategies used for completing the artifact (Papert, 1980; Parmaxi et al., 2013a). Thus, refinement is a highly iterative process that allows to the group to polish the artifact. Evaluation tools and plug-ins should allow synchronous private and public chat in order for learners to engage in discussion for supporting decision-making as well as space for new ideas to grow. Moreover, reflections should be supported (i.e. in the form of memos that are saved privately or public) for allowing students to keep track of their progress and strategies employed.

8.4.3.4 Support notifications

Group members need to be informed for new material added. Thus, any modifications to the emerging artifact should be documented and all group members should be alerted.

8.4.3.5 Promote artifact sharing

The constructed artifact should not be considered as a task for a closed group of learners, but it should enable sharing in multiple social networking channels, in order to increase its visibility and bring new ideas to the artifact construction.

8.4.3.6 Enable learners to be researchers

Social microworlds need to resemble real-life scenarios in which learners will find themselves involved in artifact construction not as learners, but as researchers that are engaged in completing real-life activities. Thus, tools that resemble real-life situations and activities should be supported.

Following these principles, Table 27 demonstrates different features that different social technologies need to develop in order to support social construction of artifact by groups of learners. The aforementioned principles together with the list of capabilities below are expected to inform further the needs and philosophy of social constructionism.

Table 24. Capabilities/functions to be developed in different social technologies for facilitating social construction of an artifact by groups of learners.

	Capabilities/functions needed
Social Networking Tools	• Indexing of material • Concurrent social authoring/editing • Private and public commenting inside the artifact
Blogs	• Synchronous discussion ladders • Tagging • Notifications • Indexing of material • Concurrent social authoring/editing • Private and public commenting inside the artifact
Wikis	• Tagging • Notifications • Indexing of material • Synchronous discussion ladders • Conversation history • Concurrent social authoring/editing • Private and public commenting inside the artifact • Allowing the artifact to be probed and shared
Digital Artifacts Sharing Platforms	• Indexing of material • Synchronous discussion ladders • Tagging • Notifications • Allowing the artifact to be probed and shared

8.5 Discussion

In this chapter, social technologies have been explored as tools that involve subjects of social settings in the creation of constructs. Social microworlds encourage students in constructing their knowledge on a topic by having their artifact as an instrument for

conversations and as a stepping-stone for concrete thinking about where to go next. The contribution of this chapter has been to specify the features of social technologies as social microworlds and inform their potentials and challenges in this new arena, thus enhancing the process of advancing a particular set of instructional design elements with constructionism at its heart. The aim has been to find ways for making learners to use the ubiquity of technologies to do things at a level of perplexity that was not previously known to them. Social microworlds are not only learning tools but are meaningful, shared objects that facilitate deep thinking by providing a testing ground to turn abstract ideas to concrete. Thus, the essential point about social microworlds is not the artifact as such but its role as an object-to-think-with.

The design of well-structured social microworlds needs to accommodate the needs and expectations of both learners and instructors as well as the features of technology. Most importantly, the cultural trends need to be taken into consideration for applying them in the learning environments. This chapter has shown the prevalent position of Facebook as a social trend that cannot be missed from the learning practice. Moreover, this chapter highlighted the potentials and limitations of five different types of social technologies (Facebook, blogs, wikis, Google Documents, Dropbox) in facilitating social construction of an artifact and subsequently answering SQ5 ("What features of different types of social technologies can facilitate groups of learners to socially construct an online artifact?"). Each one of the tools has been examined in terms of its functionalities for facilitating the three phases of construction: Exploration of ideas, Construction and Evaluation of the artifact. In each case, the features can be understood based on the action that stakeholders (learners and instructors) need to take for constructing their artifact. Currently, the development of social microworlds needs to integrate functions that are present in different tools and facilitate different action(s). For example, the artifact construction can be enacted in Facebook group that can facilitate exploration phase; the construction can take place in Google Document in order to have the whole document in the same space and then evaluation can take place in Facebook group or in the Google Document –using comments or chat.

Finally, this chapter brought forward specific principles that need to be met by computer designers and interface architects in order to address the needs of groups of learners to construct a shared artifact, thus answering SQ6 ("Which design principles can be brought forward for supporting the development of social constructionist tools?"). The potentials

and limitations of social technologies as social microworlds, as well as the principles that derived from this chapter provide a novel way for using them. Exploration of ideas is supported by affording searching and archiving of different types of material from different devices; artifact construction can be supported by allowing building on existing material; evaluation can be supported through history keeping, reflections, notifications to group members and artifact sharing. This highly social and iterative process needs to allow social cohesion and reinforcement of social relationships in a real-life project. Thus, artifact construction should enable learners to act as researchers in environment(s) that resemble real-life activities. Most importantly, this chapter has provided a closer understanding of the relationship between learners' experiences, needs, and expectation with computational tools and theoretical framings.

8.6 Summary

In summary, this chapter provided a deeper understanding of social microworlds as a different concept of using social technologies in learning. The delineation of the potentials and limitations of social technologies in the arena of social constructionism unpacked a novel approach for supporting the design and implementation of such tools across a new culture of computational tools. Moreover, the specification of the dynamics of social technologies to act as social constructionist tools provided a springboard for advancing a particular set of instructional design elements. In order to make progress in enabling students to learn through experimentation rather than lecturing, comprehensive understanding of learners' experiences, needs and expectations, computational ideas and theoretical aspirations is needed. Thus, this chapter linked the core dimensions of social constructionism with the students' needs whilst constructing a shared artifact using social technologies.

The design of well-structured social microworlds needs to accommodate the needs and expectations of both learners and instructors as well as the features of technology. This chapter revealed Facebook as a social trend that cannot be missed from the learning practice. Moreover, this chapter capitalized the potentials and limitations of five different types of social technologies (Facebook, blogs, wikis, Google Documents, Dropbox) in facilitating social construction of an artifact and subsequently answering SQ5 ("What

features of different types of social technologies can facilitate groups of learners to socially construct an online artifact?").

Finally, this chapter brought forward specific principles that need to be addressed by computer designers and interface architects in the design of social microworlds, in order to meet the needs of groups of learners to construct a shared artifact, thus answering SQ6 ("Which design principles can be brought forward for supporting the development of social constructionist tools?").

9 How we give learners powerful opportunities to construct: the instructional design model of Social Constructionism

This chapter chronicles the use of social technologies by groups of learners in order to construct a shareable artifact. In an attempt to infuse elements of constructionism in the use of social technologies, group of learners in three different classroom settings have been assigned a task for social construction of an artifact using social technologies. This chapter offers an overview of the tasks, thus answering SQ7 ("What alternatives does constructionism offer to current educational practices in the use of social technologies?"). The cycle of DBR provided deep insights into understanding the processes that emerge through the construction of the artifact using social technologies, thus deepening our understanding of the relationship between theory, artifact construction and social technologies. For sustaining and establishing social constructionism, a set of instructional elements emerged, thus answering SQ8 ("What instructional design elements can be brought forward for establishing Social Constructionism?"). Finally, the characteristics of a Social Constructionist environment are outlined vis-à-vis constructionism, thus replying to SQ9 ("What are the differences/similarities of these alternatives vis-à-vis previous implementations of constructionism in different contexts?").

9.1 Introduction

The rapid popularity of social technologies has led to a wide spread of research studies conducted in formal and informal contexts demonstrating a wide range of benefits (cf. Kessler & Bikowski, 2010; Mills, 2011; Blattner & Fiori, 2011; Mitchell, 2012; Bennett, Bishop, Dalgarno, Waycott, & Kenne, 2012; Castañeda & Cho, 2012; Klimanova & Dembovskaya, 2013; Papadima-Sophocleous & Parmaxi, 2012; Sockett, 2013; Jalkanen & Vaarala, 2013; Chwo, 2015). Yet, as stated earlier, the burst of studies exploring the use of social technologies in teaching and learning confronts with two threads with regard to their theoretical and pedagogical alignment. Firstly, a substantial number of studies do not provide a theory to ground their research (Wang & Vasquez, 2012; Merchant, 2012); whereas the implementation of Web 2.0 technologies in learning and teaching calls for better task-technology alignment (Bennett, Bishop, Dalgarno, Waycott & Kennedy, 2012). The conundrum raised through the research is that, whilst students increasingly engage with these tools in their everyday lives, there is still lack of Web 2.0 practices that draw on the specific features of these tools and align them with educational goals under well-designed activities (Crook, 2008; Bennett et al., 2012; Wang &Vasquez, 2012; Chwo, 2015). For real progress to be made in the use of social technologies in learning, more research needs to take place that will align the features of these tools with theory for the design of learning tasks that promote new educational practices. With this in mind, this chapter provides a holistic description of a three-year intervention, employing constructionism as an overarching theoretical framework and unpacking the potential of social technologies as tools that support social construction of an artifact by a group of learners.

9.1.1 Objectives

Following the constructionist aspirations, groups of learners were tasked with socially constructing an artifact using social technologies in three different language learning settings. This chapter reports on the three-year design-based research work, aiming to frame the use of social technologies in the theoretical framework of constructionism, thus bridging the gap between theory and practice, and unpack key components of this intervention. The specific subsidiary questions that guide this chapter are:

SQ7. *What alternatives does constructionism offer to current educational practices in the use of social technologies?*

SQ8. *What instructional design elements can be brought forward for establishing Social Constructionism?*

SQ9. *What are the differences/similarities of these alternatives vis-à-vis previous implementations of constructionism in different contexts?*

This chapter begins by reviewing the background of this research and proceeds by presenting the methodology and findings, using DBR as a grid for reporting the three phases of the project. Finally, a summary section reflects on this three-year's work, along with challenges of Social Constructionism design.

9.2 Method

9.2.1 Research design and background of the research

Figure 14 illustrates the four stages of this DBR inquiry: (1) review of the literature, current use of Web 2.0 technologies and constructionist aspirations; (2) design of intervention that promulgates the use of social technologies as social constructionist tools; (3) application of designs in real situations. Initially, social constructionism was infused in a Greek as an L2 course in which students evidenced the construction of shareable artifacts including an online dictionary within wiki and a shared calendar within Google Documents (Cycle 1). The initial design problem was to allow groups of learners to socially construct a meaningful artifact using social technologies. Micro-analysis of students' and teachers' behaviors and choices was conducted, demonstrating three core dimensions of social constructionism, that is, exploration, construction and evaluation (see Chapter 6, page 94). The design problem moved further on the types of technologies that support social construction of an artifact. Stepping on the aforementioned dimensions, they were infused in a Greek for academic purposes/dissertation writing course, tasking students to socially build an artifact that had the form of an academic manuscript within social technologies of students' choice (see Chapter 8, page 122). This study evidenced how different types of social technologies facilitated or inhibited the construction of a shared artifact, yielding Facebook as a popular cultural trend that reached the interest of students as an instructional tool (Cycle 2). Facebook was then used for the development of an artifact in an English for specific academic purposes course (Cycle 3), yielding its potential to act as a common

brain for the team (see Chapters 7 and 8; pages 109 and 122). (4) In view of these results, this chapter chronicles the intervention holistically, with an eye to claiming success through a set of instructional design elements that generate "heuristics for those interested in enacting innovations in their own local contexts" (The Design Based Research Collective, 2003, p. 6). The theoretical understanding is considered to be the final step of a DBR study bringing to the forefront conceptual models for making sense of the context and the intervention and adjusting them for maximizing its effects (Reeves, 2000; Anderson & Shattuck, 2012).

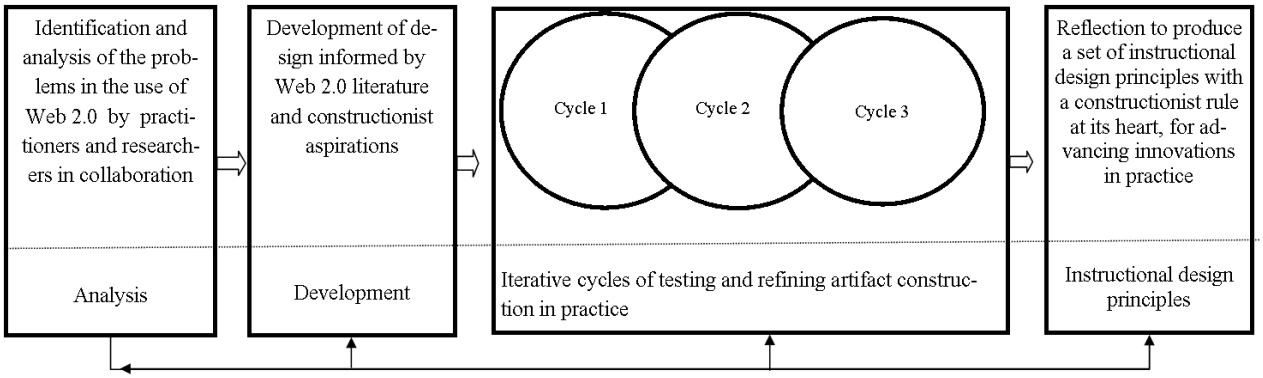


Figure 14. Four stages of DBR followed in this dissertation.

9.2.2 Data collection

The first two stages (Analysis and Development) involved an extensive literature review, which identified the problems in theoretical and task design alignment in the use of Web 2.0 tools. Thereafter, constructionism was employed for designing the intervention.

In Stage 3, data collected in the three cycles included instructors' field notes, students' and instructors' reflections, focus groups and semi-structured interviews, aiming at investigating how social technologies have been used for constructing an online artifact. To triangulate the findings, data were also collected by observing students' activity within social technologies (see also Chapter 5.3.5, page 91). Finally, Stage 4 included reflections from all three phases along with instructors' participation in the evolvement of a set of instructional design elements for establishing and sustaining Social Constructionism.

9.2.3 Data analysis

In DBR comparative and retrospective analysis are essential for explaining the design, constructing design principles and compare collected data with available literature (Wang & Hannafin, 2005). This is also reflected in the data analysis. The data set (see Chapter 5.3.5, page 91) was analyzed using the NVivo qualitative data analysis software (QSR International Pty Ltd. Version 10, 2012), applying both inductive and deductive components.

Figure 15 depicts the individual steps of the analysis process. From the early stages of the project, growing ideas were recorded as memos in definitional statements and linked to text from the dataset (Bazeley & Richards, 2000). The interaction developed within social technologies by all groups of learners was also explored in order to gain a deeper understanding of what took place in real-life settings.

At the end of cycle three, Reeves's (2000, p. 9) recommendation was followed and proceeded into "reflection to produce design principles and enhance solution implementation". The data set was read thoroughly and made further links in existing or new memos. The writing and linking of text with memos identified the parameters of each group of data through which relationships were explored and hypotheses were generated (Bazeley & Richards, 2000; Birks, Chapman & Francis, 2008). Then, text linked with memos was clustered in categories as a way to achieve more integration amongst data (Miles, Huberman, & Saldaña, 2013). Statements or meaning units that emerged as possible commonalities from the memos formed first-level codes within Nvivo as initial themes (Creswell, 1998). In creating and classifying categories a five-fold repository of theoretical perspectives was followed that brought into view multiple planes of analysis within learning environments (Rogoff, 1995; Collins, Joseph & Bielaczyc, 2004):

- *Cognitive layer*: learners' and instructors' understanding of the environment, understanding of the changes within the learning environment;
- *Interpersonal layer*: fractions on teachers' and learners' interpersonal relationships, bonds developed, incidents of respect/disrespect between each other;
- *Classroom layer*: issues of participant structure, power relations, participation level
- *Resource layer*: learners' interactions with elements of the environment;
- *Institutional layer*: issues of communication with outside parties and support from outside communication is recorded.

These layers -to a great extent intertwined- capture disparate areas of the sociocultural activity that took place and flesh out concepts, patterns and themes that emerged. Thus, segments revealing students' use of the social technologies as social constructionist tools were coded under *cognitive layer*, since they demonstrated learners' and instructors' understanding of the learning environment. Preliminary themes were then refined by removing overlapping ones; in an attempt to encapsulate the essence of each theme's meaning (Du, Ge, & Xu, 2015). In order to polish theorizing and understand in depth the concepts underpinning the construction of artifacts using social technologies, I tried to make sense of the categories and sensitize them to Papert's (1980) theoretical framework. This process was rather iterative than sequential, that is, I moved back and forth between data and emerging theoretical understanding of social constructionism until the narrative emerged.

A dynamic audit trail was facilitated through NVivo's built-in tools for recording decisions, conceptual thinking and linking between memos and nodes throughout the three year project, thus meeting the criterion of transparency and enhancing confidence that findings are warranted (Bringer, Johnston, & Brackenridge, 2004; Du, Ge, & Xu, 2015). Moreover, I discussed the research process and findings with HCI and TEL experts, as a form of debriefing, and assessed the evolving design of the project (Krefting, 1991). Finally, findings of each cycle were fed back to the instructors involved in the project, ensuring that the final presentation of the narrative accurately reflects their experience throughout the intervention (Krefting, 1991; Mays & Pope, 1995; Cohen, Manion, & Morrison, 2007; Torrance, 2012).

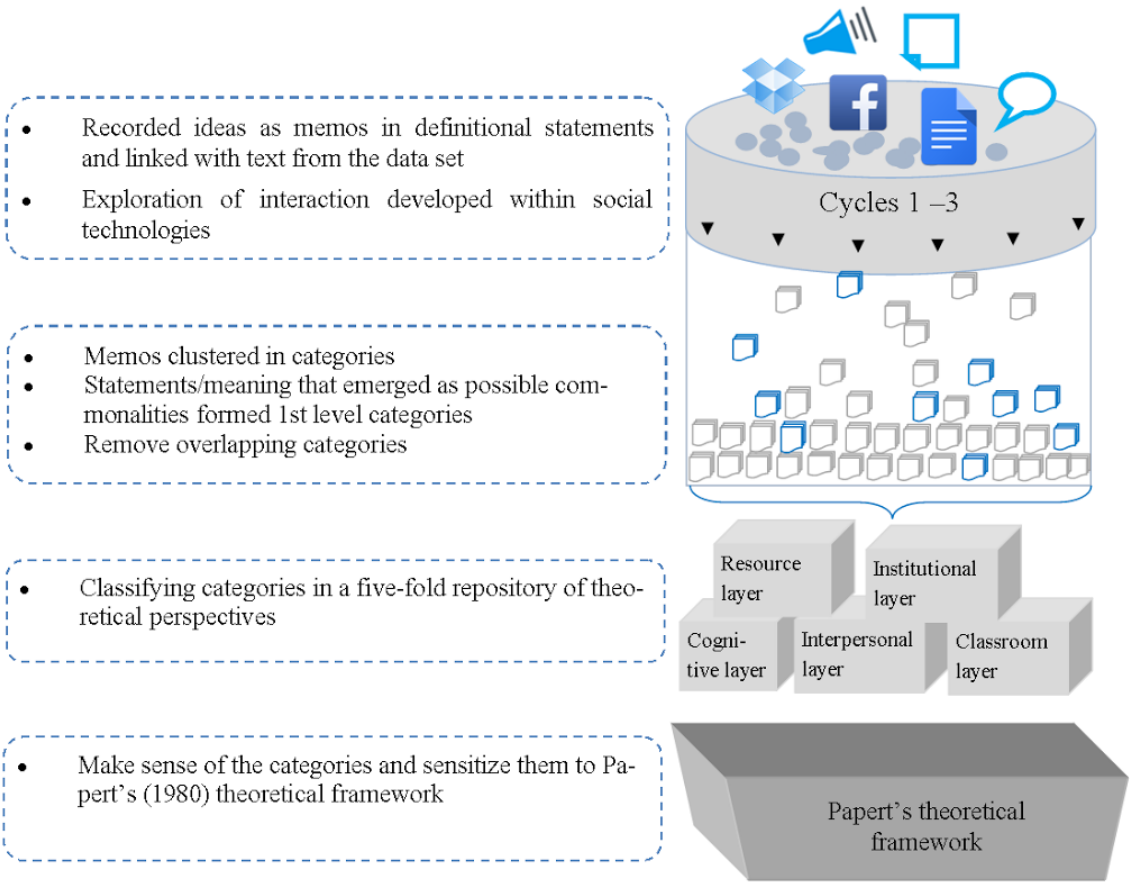


Figure 15. Analysis of the data set in Stage 4 of DBR.

9.3 Iterative design cycles

Following the constructionist notion that fluency cannot be achieved through mechanical exercises such as fill-in-the-gap or crossword puzzles (Papert, 1980,1993; Resnick, 2014), students were allowed opportunities to develop their language competence through artifact creation on topics that are important to them and meet their language needs –either first, foreign or second language. An initial assumption of the design was "give them the tools and they will build". Yet, throughout the cycles of DBR, new issues came up, informing both the local design and the evolvement of usable knowledge in the field.

9.3.1 Cycle 1

In the first cycle, students worked throughout an academic year and developed multiple artifacts using social technologies. Social Constructionism (SC) design, that is, tasking

students to socially construct an artifact using social technologies, was instilled within the course design, whenever students were introduced to a new thematic unit. The first task assigned to students related to the development of an online dictionary covering topics of their interest. Students were asked to use wikispaces for developing their artifact. Having assigned the task, the instructor challenged students to think over the assigned artifact, and how it could enable them to expand their language competences. Students shared their ideas and excitement on being able to build something concrete that will justify how they learned Greek and be of use to other students with the same needs. For building their artifact students started exploring other online dictionaries and discussing their format, whilst they developed a page within wiki where they kept their notes and ideas on how the dictionary should be designed. There were three important theoretical ideas that emerged out of this first face of SC: a) *learning beyond classroom walls*; b) *powerful expertise;* c) *alert for trends*; and d) *artifact oriented task design*.

9.3.2 Findings from Cycle 1

9.3.2.1 Learning beyond classroom walls

The initial goal of the design was to allow groups of learners to socially construct an artifact within social technologies. Yet, the artifact needed to be meaningful to the students in order to be engaging, and foster the development of a close connection both with the artifact, and the knowledge needed for its construction. Starting to work on the shared dictionary, the instructor, together with the research team, prepared a set of communicative situations that would allow students to meet their needs as newcomers in Cyprus. Such instances were relevant both to their academic life –library, student affairs– and their social life –cafeteria, market, etc. Although the value of outdoor activities in raising students' interest was hypothesized, it was uncertain how these experiences could be used in the construction of the artifact. Eventually, these situations were used as a point of departure for students to deal with each communicative instance and the language needed for addressing such needs. Students were encouraged to move out of the classroom and practice language in real life settings, whilst documenting these activities with photographs taken. Thus, the classroom expanded beyond classroom walls as the instructor encouraged students to move outside for collecting material for their artifact:

> Instructors' reflections: *Students were given cameras and we all went to the museum of folk art. They were assigned to go to the museum, take pictures and*

make a wiki page dedicated to the museum. At the museum, we saw many of the traditional costumes of Cyprus and the signs at the museum helped them to find out the names of many traditional clothes and objects of Cyprus.

This brought at hand the need to share this material with the whole group in order for all group members to obtain and easily retrieve this material for building their artifact. Thus, a shared Dropbox folder was created in order to add their photos and share them with the whole group. Following the out-door activities carried out –either with the instructor or on their own- students enriched the dictionary with new links. For each communicative situation, a new link was prepared and was enriched with the language and new material that students were confronted with in each practiced situation (e.g. *dialogue* practiced with the librarian at the library, *signs* read in museums; *catalogue* read in café/restaurant). Moreover, online translators were employed as well as YouTube videos for enriching the artifact with multimedia material.

What was observed throughout these activities was students' increased interest. Being engaged in activities that triggered students' curiosity, and connected their out of class experiences with artifact construction, made the learning experience more engaging. As noted by Wilensky (1991, p. 198), notions and ideas that were hopelessly abstract at one time can become concrete for us if we get into the 'right relationship' with them". These activities allowed students to develop a closer relationship both with the artifact and the knowledge needed for the construction of the artifact:

S1 (interview): *I was so much involved in the whole process, at the museum and also when we returned to class to do our assignment. Because when we were at the museum we participated by asking questions, and in that not only seeing what was there, but also asking more question to learn more about it.*

By introducing real-life experiences for the construction of the artifact, an essential mathetic principle brought forward by Papert (1980, p. 63) was met: "Make sense of what you learn". Language learning was no longer isolated in learning nouns and grammatical rules but resonated what is important from students' real-life experiences. Moreover, since language is not only related to written but also to oral speech, constructing, i.e. producing oral language in real life situations is of major importance for developing oral competence. As noted by one student: "*we might say the wrong pronunciation so when we go out and meet real Greek people, real Cypriots it can help us, we get some speaking experience and to actually see how people live"* (S3, interview). The artifact establishes a bridge through which interpersonal experiences are fostered. Thus, real-life environment offers instances

where students practice the language and get corrected. Ultimately, out-of class experience offers opportunities for authentic construction on-the-go. Eventually, the computer and the artifact act as a "transitional object to mediate relationships that are ultimately between person and person" (Papert, 1980, p. 183).

9.3.2.2 Alert for trends

Whilst students were engaged with the construction of their artifact, the instructor received a "friend request" from a member of the group to become "friends" on Facebook. This unexpected event resonated Papert's (1980) notion of the surrounding culture and encouraged the research team to see Facebook as a dynamic cultural trend: "educational innovators must be aware that in order to be successful they must be sensitive to what is happening in surrounding culture and use dynamic cultural trends as a medium to carry their educational interventions" (Papert, 1980, p. 181). Unlike wiki, Facebook was infused into design as a cultural trend with which students were familiarized and could not be overlooked from the learning environment. Triggered from this event, a Facebook group was created in which all group members were invited to join. Only members of the group were able to see the group information and content. Within the group, students were invited to post and discuss issues relevant to the course, and to the development of their artifact. Ultimately, Facebook allowed students to share material relevant to their dictionary (e.g. photographs from real-life experiences, examples of other dictionaries), and its use was encouraged by the instructor for exchanging material for the construction of the artifact.

9.3.2.3 Powerful expertise

Papert (1980, p. 5) identified powerful ideas as an integral part of learning with the computer, "computers can be carriers of powerful ideas and of the seeds of cultural change". The notion of powerfulness pervades quite explicitly his first book *Mindstorms,* as an attribute of 1) *computers* as powerful tools; 2) *ideas* that grow throughout the engagement with the computer; and 3) *children* that engage with an activity within the Logo programming language. In social constructionist design, powerful is an attribute of the expertise gained as students engage with the development of an artifact within social technologies. Language learning was an initial gain achieved:

S4 (interview): *I reached a time in that I just found myself knowing Greek, I was like "wow" from where? I just found myself speaking Greek. I never expected it to be... that very early.*

Yet, apart from language, students expanded their competences in cultural awareness of the target language by being "out there", experiencing from first-hand the people's way of living. Moreover, students enhanced their computer literacy. Yet, in order for such literacy to be enhanced, the instructor needed to orient the use of technology and allow time for students to embrace such use:

S3 (interview): *At first, I wasn't so used to the use of computer and the Internet during class work. But now, I am getting used to both and I like using technology as a means of acquiring knowledge, and I think I will go on to like it.*

Students need to explore the tool before gaining mastery of its use and start building their artifact. But the task is appealing enough to carry students through this learning process. By being able to build the artifact, students learn to speak about the language as researchers building a dictionary, rather than students. Students are learning the language by thinking over their artifact, like professionals in the relationship with the outer world. Finally, the artifact serves as a manifestation of the progress, as it is synchronized with people's goals and sense of knowledge development:

S1 (interview):[*Through the wiki] you can evaluate what you have done and you realize that you have gone a long way.*

The SC project allowed language learners to engage in the construction of an artifact using social technologies and use the target language in authentic, real-life situations. Yet, it was observed that other important social goals have been achieved. Students developed expertise in using the computer and social technology, and enhanced students' confidence in themselves by seeing their artifact to grow and expand as a solid proof of their progress.

9.3.2.4 Artifact oriented task design and tool selection

The third notion that emerged reflected artifact-oriented task design. Learning tasks (see Table 25) are shaped with an eye to allow students to collaboratively develop an artifact that is shared and visible to the world and provide alternatives to the use of these technologies (see SQ7: "What alternatives does constructionism offer to current educational practices in the use of social technologies?").

The construction and refinement of the artifact was a rather social than individual task, as a topic could be enacted by one student and developed or refined by another. Unlike Word Documents, students expressed difficulties in writing Greek within the wiki and not being able to correct their mistakes. Thus, students were introduced to the use of a spell checker extension for chrome to facilitate identification of spelling mistakes and correct them. Peer and instructor reviewing of the artifact also took place. The instructor would visit the wiki pages and highlight mistakes that students needed to address. A color-code was also developed for facilitating the identification of different types of mistakes -spelling, syntax etc. Students were also moving back and forth between the various pages and links developed and edited the pages. Yet, wiki did not allow students to comment on a page, and provide ideas for expansion or refinement of the artifact. This raised the need for adding a Facebook plug-in within the wiki, which allowed students to place their comments beneath each page, like and share their dictionary with their Facebook friends. Examples of pages developed within the wiki included, a visit to the bookshop, the library, the museum, the gym, Greek proverbs, Greek songs and medical situations. The complexity of the task was decided based on the specific communicative situation, and students were engaged in exploration of each situation before finalizing the form of each dictionary page. Finally, each page was presented to the group either within the Facebook group or orally in class, received comments, and refined accordingly. Continuous and persistent monitoring of the artifact, reviewing and revising captures Papert's (1980) notion that is rare to get something exactly right on the first try. Constant refinement of the artifact allows for a more enclosed relationship with the artifact, as noted by one student "*when you stick on doing something, maybe you learn more*" (S4 interview). This notion also reflects Papert's notion of "bricolage" (Papert, 1993; 1996) demonstrating the continuous improvisation and negotiation of the artifact.

As stated earlier, learning tasks have being designed with an eye to allow students to collaboratively develop an artifact that is shared and visible to the world. These tasks encouraged students to think of language not as an end-product, but as a means to develop their artifact. The verbs, *create, develop, construct, share, review, monitor* describe in a nutshell the focus of social constructionism. Together with the online dictionary, the instructor catered for preparing students for the Nursing School and allowed them to engage in nursing-related material, by sharing a Google folder with authentic course material from the Nursing department. Students were invited to join the folder and take

comments for unknown words, take the role of the instructor and present the material to their peers. Moreover, the instructor invited students to build their own stories and share them on Facebook and Blog (see Table 25 for the list of tasks).

These activities moved further traditional crossword puzzles, drag and drop and fill-in-the-gap activities by offering opportunities to use the language in tasks that resembled research work rather than school-type activities, enabling students to act as researchers, designers, lexicographers, instructors in real life environments. For the completion of these tasks constant monitoring of the artifact is necessary since failures are valuable lessons in providing concrete examples for future improvement. Through constant monitoring, students decide which route is more appropriate and revise their artifact, developing at the same time the knowledge needed for the construction of the artifact (meta-construction knowledge). In this endeavor, team effort is necessary since all stages of construction are seen as a social rather than an individual tasks. Finally, this reciprocal relationship between the artifact, the context, and the social interactions brings to light construction as a cyclical process since artifact -and the knowledge needed for its development- is fostered after several iterations.

For the development of their artifact, students followed a three-step path, which included 1) exploration of ideas, 2) construction of artifact, and 3) evaluation of artifact. As noted earlier (see Chapter 6, page 94), nine actions were followed: i) exploring ideas -students orient their artifact, set the goals of the artifact or the activity that took place by collectively commenting within Facebook group; ii) brainstorming – students came up with a list of ideas that could be included in the artifact within Facebook group; iii) exploring material that could be used in the artifact either from the web or from their Dropbox shared folder. In the second stage (Construction of artifact) learners iv) outline their artifact by drafting the main and supporting ideas (in Facebook, wiki, Blog) and moved on to v) collaboratively edit the artifact by adding links and other multimedia material. In the final stage (Evaluation of artifact), students involved in vi) revising; vii) peer and viii) instructor reviewing the artifact by commenting within Facebook, Blog or Google Document; and finally ix) presenting/publishing the constructed artifact within social networking channels.

Table 25. Artifact oriented task design in Cycle 1.

Type of artifact	Task Design
Online Dictionary	- *Explore* ways of developing a dictionary (sharing and commenting on Greek-English dictionaries) - *Develop* an online dictionary on topics related to students' interests. Dictionary pages included Greek proverbs, presentation of the University, presentation of Nursing courses, presentation of local places of interest (markets, museums), presentation of Greek songs (lyrics and music). Unknown words were translated in English using links within wiki or photos. - *Present* wiki entries and *monitor* the artifact through comments and revision history
Collective storytelling	- *Collect* photos (saved in Dropbox) from real-life situations or from the web (e.g. Flickr noticing copyright issues). - *Create* a photo album with captions on wiki, *present* it in class, and refine - Create a shared video-clip within Photo story 3 and Movie Maker - *Build* a shared calendar with shared important dates and photos. - *Share* stories on Facebook and blog and receive comments from peers/instructor - Share video-clip on YouTube and Facebook
Collective note-taking	- *Explore* authentic material from the Nursing school -i.e. presentations from students' courses within Google Documents - Collectively *keep and share* notes on Nursing material in Google Documents - *Develop* a shared note-taking page on wiki with verbs' and nouns' declension

9.3.3 Cycle 2

In spite of the initial success of the Social Constructionism (SC) design, it was noticed that the social technologies that students employed varied, often complementing or overlapping one another. For example, Dropbox has been used for sharing material from real-life situations, whereas the wiki allowed for the whole artifact to be in one place, and then shared through other communication channels (e.g. Facebook). Moreover, students' low technology skills hampered extensive use of other types of social technologies: Blogs demonstrated their potential to serve as social constructionist tools but have been only used for a short period of time. The following key findings emerged from the first cycle and guided the decision to refine the (SC) design:

1. Students' technology skills were not high, however once introduced to the tools they were able to deal with the artifact construction easily. Yet, allowing students with higher technology skills to adopt a social technology of their choice and work on the construction of their artifact would shed deeper insights into social construction using social technologies.
2. Some technologies (such as Dropbox) were complementary for the construction process. Therefore, exploring how different types of technologies facilitated or inhibited the construction of the artifact would unfold the relationship between social technologies and artifact construction.

This cycle took place in a course specifically designed to meet the needs of students who were preparing their dissertation and needed to produce language at an academic level. It involved 27 students aged 21-32 years (see Chapter 5.3.1, page 85). The dimensions of SC that derived from the previous study were integrated and informed the design of the assigned task of this cycle: 1) exploration of material, 2) construction of the artifact, and 3) evaluation of the artifact. The recommended actions were employed and supported the instructors to plan the course activities and facilitate the intervention.

As mentioned in Chapter 7 (page 109), to confront the challenges revealed by the first cycle, students were tasked to build an artifact that had the form of a research manuscript with an aim to submit it at the local students' competition of the Research Promotion Foundation in Cyprus. By having students work in a research topic of their choice, the research team aimed at a) using the artifact as a stepping stone for discussing issues of academic writing; and b) employ different types of social technologies and explore their use for constructing an artifact.

There were three important theoretical ideas that emerged out of this cycle of SC: 1) *synergetic alliance of social technologies*; 2) *diversity and unity in classroom relations,* and 3) *powerful expertise* (expanded from Cycle 1).

9.3.4 Findings from Cycle 2

9.3.4.1 Synergetic alliance of social technologies

For the artifact construction, teachers allowed students to opt for the social technology of their preference, resulting in the use of Facebook group (6/6 groups), wiki (1/6 groups) and Blog (1/6 groups). In order for students to develop an online artifact, multiple social technologies were employed in alliance; firstly, Facebook, blog or wiki for exploring and orienting their artifact, then for the construction of their artifact they worked within Google Document. This shift deemed necessary when the Facebook group, blog, and wiki could not accommodate the needs of learners and instructors in constructing the artifact. All teams started the exploration within Facebook, wiki or blog setting the goals of the activity and sharing material, yet they encountered difficulties with multiple Word Documents or posts in blog, Facebook group, or wiki. Multiple Word Documents in the Facebook group caused confusion and did not allow for evaluation of specific errors rather than generic comments. Similarly, in wiki, students started uploading Word Documents that did not track the history of the document, thus revisions or changes made needed to be manually tracked. Blogger allowed only near-synchronous communication, which hampered the construction of the artifact, since students preferred immediate and quick response from their peers/instructor. Ultimately, Google Documents allowed synchronous editing, reviewing of the artifact and history keeping. Social technologies can be interconnected and blend for achieving artifact construction. This interconnection provides an additional value in the classroom supporting exploration and construction and triggering evaluation with the wider network of the group. Hitherto, in order for SC to take place a synergy of social technologies is necessary to confront the needs of the group: exploration can begin with the use of Facebook; Google Document can accommodate social construction; whereas both Facebook and Google Documents can drive Evaluation of the artifact. Presentation and publishing of the artifact is better facilitated through Facebook, in which the artifact can be probed and shared to a wider community.

In the arena of SC, Facebook affirmed itself as the dominant social network (Lenhart, Purcell, Smith, & Zickuhr, 2010; Tess, 2013). Looking for a deeper understanding of the

design elements that students valued, Facebook evolved as a tool that students know well, and are familiarized with. Students noted that they "*already had and used a Facebook group before starting the course"* (S12, focus group) and were accustomed to "*the logic of the [Facebook] wall*" (S6, focus group). Facebook appeared to transcend learners' daily routine, allowing them to connect and work with their team in a well-known environment. As stated earlier, Facebook reflects a dynamic cultural trend that offers a springboard for cultivating a sense of control that resembles a real-life setting in collaboration with friends.

9.3.4.2 Diversity and unity in classroom relations

A striking aspect of SC is the engagement with the artifact as a space in which different tasks take place. This cycle revealed the notion of *diversity and unity in classroom relations*. In view of constructing their artifact, both students and instructors performed in unity, collaborating and supporting one another for the development of the artifact. The teacher is called upon to act as a collaborator and supporter, learning along with the students on how the constructed artifact should be formed. In constructing their research manuscript, students were not limited to theoretical knowledge on academic writing, but they had their artifact at hand to develop, design, discuss practical issues in a real-life project, and gain mastery by receiving and providing feedback from their peers and instructor. The following comment was provided in a group's post on Facebook. It was written during the peer review process, and provides comments on the introduction of the research project:

> S24 (Facebook comment): *Comments on introduction: a) very good structure. They adopt a deductive approach, starting from something general (use of laser) to something more specific (inducing structures); b) formal tone and correct grammar, c) the content could include more information on the topic, so that it could be comprehensible by people that are not familiarized with the specific topic; d) more progress is needed in the project development […].*

Such comments, allow the group to act in unity, discussing issues related to academic writing (i.e. deductive approach, formality, target audience), not on a theoretical basis but on concrete examples that evolve in front of them. The use of the artifact can provide a way of thinking about knowledge "like advanced professionals, in their relationship to their intellectual products" (Papert, 1980, p. 31). Students adopt a powerful role in a SC design, as reviewers in a working manuscript, providing its strengths and weaknesses and

suggesting ways for improvement. Adopting such a role, students engage in a different type of relationship with the artifact fostering reflection and communication amongst group members. This brings to light another powerful key element in SC. Working on a real-life project allows students to act in unity, developing a common ground of communication related to the components of the artifact and the principles of academic writing. As noted by one student "*through this project I learned to follow the 'protocol' of academic writing*" (S8 reflections). Evaluation and polishing of the artifact seemed to pervade the construction process, whilst students share their views with their peers and instructor on how the artifact ought to be formed.

At the same time, the instructor orchestrates the construction process, co-acting in unity with the students by providing comments and coaching their progress. These comments are provided, for example, when the teacher monitors students' artifact. Yet, there are incidents where the instructor differentiates from the construction process for assessment purposes and acts more like a referee (grading and applying discipline measures) rather than a coach (supporting and inspiring). Switching between coach and reviewer is inherent in a SC environment. Yet, the assessment process makes students resilient in following their peers' comments, emphasizing the importance of the grading procedure that would be carried out by the instructor, and not by their peers. The grading process triggers students to deal amongst them in competition, valuing grades rather than the construction process: "[during peer review] a*nyone could say anything he/she wants. We wouldn't be graded from the others but by our instructor* (*S9, focus group).* Ultimately, this assessment process brings to the fore competition amongst peers and diversifies group's unity. When students view grading as a milestone, competitiveness and pressure are maximized, not allowing for collective efforts for learning. At the same time, the instructor engages in arguing with students on the grading process. These observations resonate Brian Harvey's (2014, p. 82) notion "I hate grades! Grades are the enemy of learning". Competitiveness in this case is rather problematic as it disconnects individuals from the overall artifact construction process. In this environment, the instructor's role is considered vital in "relaxing" competitiveness and emphasizing the importance of the construction, rather than measuring and translating group's effort in numbers. Although, complete delegation of grading was not feasible, the artifact offers a great opportunity for shifting students' focus.

9.3.5 Cycle 3

Having completed the second cycle of the SC design, the following key findings guided the decision to proceed to a third iteration:

1. Teachers might not have time to squeeze a long-term activity of artifact construction within the curriculum. Time constraints for monitoring groups' artifact might also be an additional deterrent. Therefore, there is a need for ensuring that artifact construction using social technologies could be integrated and sustained as a shorter task within a course.

The SC design was implemented in another group employing the cultural trend that evolved from the second cycle (Facebook). The popularity of the tool was a determinant for its adoption as an educational tool, along with its potential to unfold the dynamic of the team with limited time spent for orienting students on the use of the tool. The intervention took place in an EFL classroom for specific purposes (English for Agriculture) with 43 students aged 18-29 years (see Chapter 5.3.1, page 85). The intervention centered on the thematic area of modern technology in agriculture and aimed at exploring cause and effect writing, as well as at honing students' oral presentation skills. The activities were undertaken in a span of three weeks and all students attending the course were engaged. The dimensions of SC that derived from Cycle 1 were integrated and informed the design of the assigned task for this cycle, whereas the potentials and limitations of social technologies (as described in Chapter 8, page 122) also informed the selection of a popular cultural trend in tasking students to construct their artifact.

9.3.6 Findings from Cycle 3

Facebook was integrated in the design to facilitate collaborative construction of an artifact. Students had a good command of Facebook and no further instruction was deemed necessary. At first, the instructor gave students their task by uploading the instructions on the Course Management System (Moodle). Students were tasked to act as agricultural researchers. They were asked to build an essay/report related to advantages and shortcomings of modern agriculture, and present their results in class. Students started forming their groups and worked collaboratively in and out of class, actively participating in the Facebook group. The group was used for the purpose of sharing/exchanging information or ideas related to the artifact, researching, construct their cause and effect essay, putting together their presentation and coordinating group activities.

Ultimately, the third cycle provided a positive implementation of the SC design. The Facebook group allowed students to explore, construct, and evaluate the artifact, and facilitated discussion amongst the members (and the instructor) on refining and polishing the artifact. As stated by one student, the Facebook Group served as a "*common brain for the team*" (S7, Focus group), that is, a shared locus, where all group members handed their ideas and saw their artifact grow. Similarly, another student stated that the group helped them "*work as a team*" (S6, Focus group). The elements of discipline and organization were also noted by learners within Facebook, in an effort to archive and organize the material needed for the artifact. It was also observed that students demonstrated the use of the physical and virtual world (Skype) in getting together and working on the artifact, yet all stages were explicit within their Facebook group. The educational gain of Facebook was also recognized, as noted below. Specific functionalities of Facebook are linked with specific educational practices and goals for the construction of the artifact:

> S28 (Students' reflections): *Specifically, [this task] contributed to activating the use of Facebook for academic reasons, enabling students to communicate with the rest of the group […]. Moreover, it helped to prioritize the material for this work keeping a complete file on Facebook that you can refer any time wherever you are - as long as there is wifi. Finally, this activity made the whole process more enjoyable and interactive, which is required in education!!!*

From the instructor's viewpoint, the students' activity was also valued as rewarding and enthusiastic:

> Instructor interview: *technology was smoothly integrated in the course. Students were familiar with Facebook and found it very easy to coordinate their collaborative project on this tool. Students exhibited enthusiasm from the beginning of the project and maintained excitement at high levels throughout the whole period of the assigned task. Most students participated actively in group discussions, exchanged ideas, shared resources, completed various stages of the task, and evaluated each other's work.*

The role of the teacher in the activities was of a facilitating nature, mostly providing students with feedback on the progress of their assigned tasks. This required constant monitoring of their Facebook group activity and making comments that would guide students into the successful completion of the artifact. Whilst working in groups there is a crucial phase of evaluation that takes place both in class and online and allows groups to review and revise the artifact and the instructor to guide and trigger discussion on how the

artifact should be formed. During this stage, the instructor can state linguistic rules to facilitate the construction process, orient the design of the artifact and challenge its expansion. Instruction was not criticized, yet the instructor was involved as a member of the team in the construction, keeping in check that teaching would leave students away from a constructionist's opportunity (Papert, 1993).

Ultimately, the short span of the activity allowed for a respectful coach-player relationship between the members of each group and the instructor. The instructor valued the fact that she was able to "*take class home*" (Instructor interview) and experience students in a different context, working along as a team for a common purpose. She also highly valued her involvement into the project as a pleasant surprise and an educational gain as noted by the instructor:

> Instructor interview: *I discovered the pedagogical affordances of social media, such as Facebook. Along with students, I myself experienced enthusiasm and motivation to engage in the task. In addition, I found it very easy and convenient to provide groups of students with immediate and constructive feedback regarding their progress in the project. […] Finally, constant monitoring of the students' involvement, contribution and participation in the project assisted in evaluating each and every student's effort, as well as in assessing the groups' overall project outcome.*

9.4 Instructional design model

The intended outcomes of this DBR were twofold, 1) to frame the use of social technologies in the theoretical framework of constructionism, thus bridging the gap between theory and practice and provide alternatives for the use of these technologies for educational practice, and 2) unpack key components for using social technologies within a SC framework. The emerged data compose a way to imprint the whole picture of the teaching and learning process in a Social Constructionist Classroom (SCC). The gears behind the emergent instructional design model (see Figure 16), focus mostly on the classroom culture: people, activities, and interactions fostered between group members using social technologies. This is in line with Papert's view of technocentrism "if you want to understand (or influence) change you have to centre your attention on the culture-not on the computer" (Papert, 1987, p. 22). An instructional design model is a set of instructional

elements on which teaching and instructional organization draws upon. Effective instructional models are based on learning theories, in this case constructionism, a theory of learning which assumes that knowledge is better gained when students find this knowledge for themselves, when engaging in the making of concrete and public artifacts (Papert, 1980; 1993). These elements provide guidance on the organization of pedagogical scenarios to achieve instructional goals whilst using social technologies. Still, it should be kept firmly in mind that the model is not a clear-cut map of principles, but it is rather a heuristical understanding of the instructional design elements of the intervention for those interested in enacting innovation in their own settings.

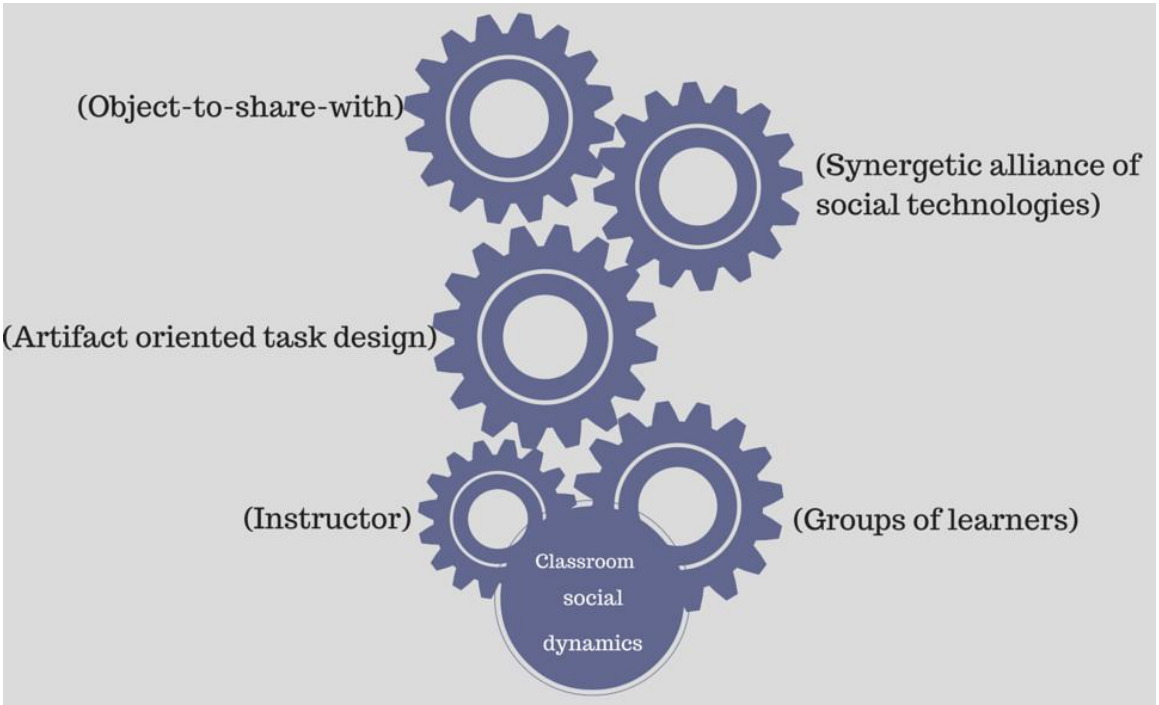


Figure 16. The gears of the instructional design model of Social Constructionism.

In the following section, the instructional design model is demonstrated. The model consists of a set of instructional elements that emerged from the SC project for supporting artifact construction by a group of learners:

1. *Extension of the classroom walls*: out-of class activities come to inform artifact construction, and link students' real-life experiences with the language needed in describing them. Beyond classroom walls, students can collect material for constructing their artifact, and then share it for inspiration with their group through

social networking channels or digital artifact sharing platforms. Out of class encounters that are necessary for artifact construction link classroom with real-life environment and cultural elements of language -way of living, historical information, etc. Thus, teachers can open up and foster these types of activities, with an eye to give their students more authentic material and settings to practice and use the target-language.

2. *Merging physical and digital artifacts*: students' real-life experiences from the physical world (e.g. photographs, street signs, etc.) can be transferred into the construction of their artifact, giving them a meaningful springboard for finding the knowledge needed to express those experiences in the target language. Thus, students are encouraged to produce content, not because the exercise demands them to, but because the environment gives them a reason to do so.
3. *Artifact-oriented task design*: having students working in groups for the construction of an artifact can be probed by tasking students to collect, explore, find, discuss, develop, build, post, create, review, and comment. The SC environment revolves around an artifact that is probed and shared through social technologies. This gives the opportunities to students to follow the triptych of exploration, construction, and evaluation in order to build their artifact and share it with their group or with their wider network.
4. *Real-life scenarios*: the construction of the artifact involves learners in real-life scenarios. In order to engage in artifact construction, students are not passive learners, but act as researchers who are engaged in completing real-life activities. Students can align with the work of professionals, build, and monitor an artifact that is meaningful to them and to the wider community. Students engage in a concrete relationship with the product as professionals, acting as lexicographers, as researchers or as designers, whilst constructing and reviewing their artifact.
5. *Artifact stepping-stone*: examples of artifacts developed in this intervention (e.g., shared dictionary: *tolexikomas.wikispaces.com*) can inspire instructors and students in other contexts and to have their knowledge visible and probed to the world. By displaying these types of examples, students can draw inspiration and engage in similar activities.
6. *Powerful expertise*: having groups of learners working on an artifact of their preference, students benefit in multiple aspects. They gain knowledge both in the technology and the knowledge needed for the construction of the artifact. The artifact allows the group to build bridges of communication amongst the members of the

group, offering authentic opportunities to use the language by taking advantage of social technologies that are omnipresent in their daily life.

7. *Valuing failure*: failure and unsuccessful constructionist attempts are valued as an opportunity to find a solution. Learners working on their artifact seek solutions to their problems by reflecting on their strategies and employ social process for solving their difficulties. Social technologies foster linking the knowledge needed with an external artifact upon which students can reflect upon and engage in meaningful argumentation. New knowledge is expected to evolve through multiple iterations between the artifact and the actors involved in realizing it.
8. *Synergetic alliance of social technologies*: a wide range of social technologies can be adopted by a group for constructing an artifact. This work has shown that different types of technologies such as Facebook and Google Documents can foster SC design. For SC to take place a synergy of social technologies is necessary to address the needs of collective construction: exploration can begin through Facebook; Google Document can accommodate social construction; whereas both Facebook and Google Documents can drive Evaluation of the artifact.
9. *Cultural trend*: Emphasis should also be given to technological cultural trends that are omnipresent in students' life. Including this type of technologies in the instructional design, teachers re-enforce students' enthusiasm and engagement in an activity that reflects work with friends rather than school-setting tasks. Instructors need to be aware of students' changing needs and the rapid change of technology. Fundamentally, instructors need to go where the learner is, and therefore meet students' needs to be involved in activities that encompass known and well-received technologies.
10. *Unity (rather than diversity) in classroom dynamics*: the instructor needs to promote and establish unity in the classroom by encouraging collaboration and support in the construction of the artifact, rather than competition and assessment-driven learning. Such an environment supports contextualized and meaningful learning, builds stronger relationships between the instructor and the students, and optimizes involvement of a community in the construction process. The crucial phase of evaluation, which takes place both in class and online, allows to all groups to review and revise the artifact; whereas the instructor guides and triggers discussion on how the artifact should be formed. Fundamentally, in a SC environment the instructor acts as a prompter, facilitator, or referee but above all coach and collaborator.

11. *Communication between teacher and students*: the construction of the artifact within a social constructionist task fosters communication between students and teachers. During exploration, students engage in collective brainstorming and develop the structure of the artifact; during the construction phase, students put the pieces of the artifact together, and finally during evaluation of the artifact, the students engage in peer reviewing and monitoring of the artifact. Such communication enhances authentic use of the target language, in situations that students need –and are not forced– to use the language.
12. *Sharing and reflecting*: reflection on the running objectives of the project between the group members, the instructor, and the wider community is an imperative part of the process. Sharing the artifact is important both for increasing its visibility and for bringing new ideas into the construction, not only from the group, but also from the wider community of the group members.
13. *Duration of SC design*: both long and short-term interventions can support the construction of an artifact by groups of learners. At any case, the time needed for mastering a specific tool, as well as the teachers' time investment in monitoring artifact construction should be considered in the design.

The elements of the instructional design model demonstrate and optimize understanding of the key components of the intervention. Having presented the content of the intervention, in the following paragraphs specific choices dealing with instructional organization will be highlighted.

The strengths of social constructionism lay in its potential to bring together a team for a common venture, to construct an artifact that is meaningful to the members of the group who are able to share it through social networking channels. In this endeavor, a synergetic alliance of social technologies can facilitate the construction of a shared artifact, supporting ideas from multiple actors.

In a Social Constructionist Classroom, the artifact is the nexus for directing group's interactions whilst dealing with real life problems. For such a venture to be successful, learners' skills and interests should be a cornerstone in deciding the form of the artifact, since, the more engaging an artifact is, the more students will value their interaction with it. In the process of setting and co-forming the artifact, considerable amount of thinking and design needs to take place by the group for setting the scope of the artifact and its benefits, and for exploring similar implementations before deciding the directions that their

artifact should take. Being in place to understand the benefits of the artifact, and broaden its scope and audience, groups' motivation is activated by involving subjects and problems of real-life settings. Whilst engaging in the construction, several decisions need to be made that might alter the initial form of the artifact. Taking notes and reflecting on the decisions made throughout the construction process is an important step for keeping a history of the constructed artifact whilst running its objectives. In social constructionism, learners are encouraged to focus and understand their errors and involve in the process of correcting them. Thus, errors are not considered as lack of understanding but as part of the process, in order for the learners to reflect on their learning and reframe the strategies used for completing the artifact. Finally, in SC the centralized role of the artifact in the construction process needs to be highlighted through consecutive cycles of evaluation enacted by the instructor and peers. The artifact needs to act as a palette upon which students' ideas can grow and expand, thus creating a learning environment filled with real-life problems on which students think and reflect upon.

As stated earlier, constructionism does not set into dispute the value of instruction, yet it endorses the view of Piaget that "every act of teaching deprives the child of an opportunity for discovery" (Papert, 1993, p. 139). In a Social Constructionist Classroom, the teacher needs to engage in all stages of the construction. Teacher's evaluation is highly valued by students, yet such engagement is often time-consuming and demands from the teacher to "take class home". Hence, time frame and duration of the activity should be carefully planned before the enactment of the activity.

A toolkit has been developed that demonstrates how SC can be supported using examples of application of such intervention in language classroom. The toolkit provides a form of a step-by-step understanding of a SCC. Examples of technologies used are only indicative of the ones used in this project (see Table 26). The suggestions made are based on learning contexts, thus local adaptability must be allowed in the model (Barab & Squire, 2004, p. 11).

Table 26. Teacher's SC toolkit.

Dimension of SC	Social Technology	Example to be applied in language learning
Exploration	Facebook Dropbox	Students form groups and identify a topic they would be interested to explore: triggers could be provided by the instructor for fostering brainstorming and material exploration. Material could be shared through social networking channels. Students are encouraged to work collectively using their group, dictionaries and material available in their daily life to bring inspiration from real-life experiences or from the world wide web for building their artifact.
Construction	Facebook Google Document Wiki Blog	Students are expected to bring all material together within a digital artifact-sharing platform (i.e. Google Document), enrich the artifact with material collected in Exploration phase.
Evaluation	Facebook Google Document Wiki Blog	Monitoring of the artifact pervades all stages of the artifact construction. Students and instructor are expected to work as collaborators for refining and polishing the artifact.

9.5 SC vis-à-vis other applications of constructionism

This study applied constructionism in the use of social technologies and expanded the notion of an artifact as an object-to-think-with towards the notion of an object-to-share-with. Social technologies can facilitate the notion of making public and visible artifacts (Papert, 1980; 1993); since students afford sharing of the artifact in an audience of tutors, critics, and supporters.

Essential dimensions in Papert's constructionism are the elements of making, personal, social, cultural, and tangible connections/reflection (Papert, 1980; Papert & Harel, 1991; Papert, 1993; Resnick & Kafai, 1996; Brennan, 2013). The first element, *making* refers to having students engage in the construction of their artifact through a variety of materials and media. The second element, *personal*, refers to personal engagement with the constructed artifact. The third element, *social*, refers to the process of sharing the artifact with a community, fostering the social environment for learning. The fourth element, *culture*, refers to the cultural environment that determines how knowledge is valued over another. Finally, the fifth element, *tangibility*, refers to the extension of abstract knowledge to an artifact that is shared in the real world. Tangibility is closely related with the element of reflection: students reflect upon their artifact having ideas to be externally expressed and shared (Papert & Harel, 1991; Resnick & Kafai, 1996). Table 27 presents the differences and similarities between constructionism and social constructionism as applied in this research work. SC emphasizes social networking as a source for bringing new material and ideas into the artifact, as well in the power of social technologies for fostering sharing of artifact and allowing for constant monitoring of its development. Papert (1980, p. 7) valued surrounding cultures as a source of materials that learners need to relate and build. The burst of social technologies offers a new world of these materials which, when aligned with well-designed activities, allow learners to be active constructors of a shared artifact that can be shared and probed.

Another application of constructionism, known as distributed constructionism, was introduced at the MIT Media Laboratory and draws on research on constructionism and distributed cognition (Resnick, 1996b). Distributed constructionism focuses on situations in which learning occurs when a person is interacting with its surrounding environment for designing and sharing meaningful artifacts; thus distributed constructionism develops the constructionist theory towards the direction of distributed construction activities. Resnick (1996b) focuses on three main categories of activities: discussing constructions, sharing constructions, and collaborating on constructions. SC aligns and diverges from distributed constructionism. SC shares the notion of sharing and discussing constructions as a group (and not individually), yet diverges in monitoring, evaluating and reflecting within different tools. Where distributed constructionism makes use of discussion through email, newsgroups, bulletin boards, and text-based virtual worlds, SC uses social media allowing for a different channel of construction that values constant monitoring through

peer/instructor reviewing and publishing. Moreover, SC values both online and offline interactions for the construction of the artifact.

Finally, this research draws on the notion of social constructionism as Shaw (1996) firstly applied it in a community computer networking system, and supports the potential of social technologies to organize activities in which groups of learners are involved for a common purpose. Social technologies offer a fertile ground for supporting social microworlds, through which a reciprocal relationship is built between groups of learners, the artifact, and the context.

Table 27. Differences between constructionism and social constructionism.

Constructionism (Papert, 1980; 1993)	Social Constructionism
1. *Making* -students engage in the construction of their artifact through a variety of materials and media	1. *Social making* -students collectively engage in the construction of their artifact blending real-life situations and digital media
2. *Personalized learning* -students engage with an artifact that is meaningful to them, building on the existing knowledge of individuals or groups	2. *Social learning* -students engage with an artifact that is meaningful to the group
3. *Sharing of artifact* - the social context is important for allowing learners to share their artifact with groups or individuals as audience, collaborators, reviewers or tutors	3. *Sharing of artifact through social networking channels*- social technologies are important for allowing learners to share their artifact with groups or individuals as audience, collaborators, reviewers or tutors
4. *Culture*- cultural environment which determines how knowledge is valued over another	4. *Beyond classroom walls*- context offers opportunities for inspiration and real-life construction
5. *Tangible connections/Reflection* - students reflect upon their artifact allowing for ideas to be externally expressed and shared	5. *Evaluation* – students collectively monitor their artifact allowing for failures and successes to evolve

9.6 Discussion

Unlike pre-packaged learning materials –including fill-in-the-gaps exercises or crossword puzzles- that drive users through requests that reflect mechanical ways of learning; social constructionism supports shared processes of exploration, construction, and evaluation. For example, instead of ready-made channels of language use, learners have opportunities to work with the language in ways that conform to real-life activities, in situations that language usage is needed for addressing a real-life problem. Focus needs to shift from knowledge transmission to knowledge seeking, using the information highways that new technologies open. Most importantly though, social constructionism offers a fertile ground for aligning theoretical aspirations with well-designed activities using different features of different types of social technologies.

By refining design and exploring several parameters of the use of social technologies in multiple settings, a ground for understanding how technology can facilitate the development of a shared artifact is offered. Working on an artifact is an example of getting to know an idea by being in close relationship with it, sharing, and refining it, working in unity with instructor(s) and peers, building a common ground for discourse, cooperation, and discovery. The findings provided in this chapter have shown the reciprocal, mutually supportive relationship between theory and artifact construction using social technologies. Theory informs artifact construction supported by the context; whereas social technologies embrace students' realities and signify a cycle of social argumentation between the artifact and the key actors involved in its construction. It is through this process, that learners get in a closer relationship with the artifact, the social community, and the knowledge needed for the development of the artifact. In this process, students and instructor are challenged to adopt a multifaceted role in the relation to the artifact and the knowledge needed for its development: students act as researchers and professionals in the relationship to their artifact, whereas the instructor becomes a collaborative member of the team, joining forces for the achievement of a common purpose. Reviewing and evaluation is an impartial element of the process, allowing to the group members to develop a common ground for communication.

This chapter yields how SC design was optimized through a technological intervention that fosters the construction of an artifact by a group of learners within social technologies. The evolution of the project does not simply lay in its design but also in the evolvement of a set of instructional design elements with constructionist theory at its heart. Through a rich

account of instructional intervention in three different areas of instruction, contextualized theories of learning and teaching are unpacked along with cumulative design knowledge and practices as they apply in real-life environments. The needs, constraints, and interactions of this project were based in the local context applied, which served as a lens for unfolding theoretical understanding of teaching and learning that can transform educational settings. Even though some of the elements that evolved are project-specific, they can inform others in their efforts to confront with similar group projects.

9.7 Summary

Overall, this project offered an informed perspective of the challenges and opportunities associated with the use of social technologies by a group of learners and consequently answered SQ7 (“What alternatives does constructionism offer to current educational practices in the use of social technologies?”). SCC resonates an environment rich in objects-to-share-with, following an artifact oriented task design and fostered through synergetic alliance of multiple social technologies, in a dynamic classroom environment. A set of instructional design elements evolved, thus answering SQ8 (“What instructional design elements can be brought forward for establishing Social Constructionism?”): 1) extending the classroom walls; 2) merging physical and digital artifacts; 3) artifact oriented task design; 4) real-life scenarios; 5) artifact stepping stone; 6) powerful expertise; 7) valuing failure; 8) synergetic alliance of social technologies; 9) cultural trend; 10) unity in classroom dynamics; 11) communication between teacher and students; 12) sharing and reflecting; and 13) duration of SC design. This environment fosters powerful expertise that moves beyond language learning, embracing multiple computational skills, and challenges students to adopt a multifaceted role in the relation to the artifact and the knowledge needed for its construction. The set of instructional design elements that emerged from this study is by no means competitive with other theories or models, but makes use of an existing theory and applies it in a specific context. Differences and similarities between Social Constructionism and other applications of constructionism are brought forward, demonstrating the notion of an object-to-share-with within social technologies and consequently answering SQ9 (“What are the differences/similarities of these alternatives vis-à-vis previous implementations of constructionism in different contexts?”).

Precise replication of such intervention is rather unfeasible since new cycles lead to new phenomena and new lines of inquiry (Hoadley, 2002; The Design Based Research Collective, 2003; Barab & Squire, 2004). By offering a rich account of both the theory and the setting, it can allow others to understand how to re-contextualize the theory-in-context with respect to their local particulars (Barab, 2006). In other words, this account allows small-scale generalizations, but not precise prediction of an outcome. As each realization is implemented in a unique environment, it unfolds tendencies that can steer decision-making and parameter setting (Stake, 1995; Confrey, 2006; Barab, 2006).

This chapter has brought to light instructional design elements for using social technologies within a SC framework. The constructionist notion of making an artifact that is shared and visible to the world can be applied to teaching with social media that can become the impulse for promoting active participation and collaboration for building an artifact that is visible to the world.

10 Discussion and conclusion

This chapter discusses the findings of this research work providing deep insights into the relationship between theory, artifact construction, and social technologies. On the basis of social constructionism, the findings of the individual studies are combined and a holistic description of the social constructionist environment is provided. The chapter then summarizes the contribution of this work and gives directions for future research.

Throughout this dissertation, a series of studies have been presented in order to unpack the potential of social technologies as social constructionist tools that facilitate groups of learners to construct a shared artifact. Initially, I described how constructionist elements are infused in the classroom for the development of a shared artifact, leading to the core dimensions of social constructionism and the resulting role of the learner and the instructor in such an environment (Chapters 6-7). Then I focused on the role of technology, and more specifically, on how the social technologies facilitated or inhibited a group of learners to construct a shared artifact, building on learners and instructors needs and expectations in a social constructionist environment (Chapter 8). These elements are brought together, under a set of instructional design elements that describe this intervention, as well as the learners' and instructors' decisions that guided the construction of their artifact (Chapter 9). Figure 17 (page 187) demonstrates how the elements of this dissertation (artifact construction and social technologies) come together under the theory of constructionism, informing the framework of social constructionism. The whole process demonstrated how building a close relationship between these elements places in the center the actors, in other words the learners, who actually build and expand their learning borders through the construction of an artifact within social technologies.

This work adopted a developmental path, following a DBR inquiry. Early literature review informed the analysis and development of the intervention, focusing on the artifact construction and the capabilities of social technologies. As a result, a set of instructional design elements was developed. This provided a rich account of the development of the learning environment, along with successes and failures of the designed intervention. Yet, for the intervention to be both critical and informative, special focus was placed on the shared processes of those experiencing the development of the artifact. The technology itself cannot and will not make the difference. Instead, it will be the "army" behind it, its users, their needs, and expectations that draw from the use of the technology and affect social change. As noted by Papert "if you want to understand (or influence) the change, you have to center your attention on the culture -- not on the computer" (Papert, 1987, p. 23). Thus, the context for unpacking human development is a social process, taking place in a culture of people and not in the use of an isolated technology. In the presence of social technologies, learning cultures might and can change, along with people's ways of thinking, teaching, and learning.

Unlike pre-packaged learning materials –including fill-in-the-gap exercises or crossword puzzles– that drive users through requests that reflect mechanical ways of learning; social constructionism supports shared processes of exploration, construction, and evaluation. Instead of ready-made channels of language use, learners have opportunities to work with the language in ways that conform to real-life activities, in situations that language usage is needed for addressing a real-life problem. It is through this process that learners get in a closer relationship with the artifact, the social community, and the knowledge needed for the development of the artifact.

Social technologies provide a tool to people to communicate, discuss in groups, and access a network of people and/or information. Yet, this type of use limits the potential of these technologies as information, communication, and networking platforms. A different type of approach towards social technologies involves the force of a group working towards the development of a shared artifact. This research work has shown how the use of social technologies is informed by a specific theory to meet the needs of individuals in constructing an artifact. In the context of social constructionism, a group of learners can be thought as a setting that follows shared processes and supports seeds of learning and problem solving. Papert (1980, p. 23) argued that children advance in Logo when they see bugs in their programs as a prospect to find a solution and learn something new. Learners working on their artifact seek solutions to their problems by reflecting on their strategies and seek solutions through their social interactions. The shared process that individuals are involved in allows personal relationships to grow, through a common basis of communication developed for the construction of the artifact. Moreover, this type of use provides a framework for bringing together school learning and everyday practical learning in situations that resemble real-life contexts. Unlike in-school problems, real-life problems involve long-term engagement in a complex condition, which demands deep understanding of the problem through information seeking, resulting in several possible solutions (Sternber et al., 1993; Lebow & Wager, 1994). This is the case in SC, building on real-life scenarios and seeing students as professionals immersed in the solution of a problem.

The following section provides a holistic description of the Social Constructionist Classroom (SCC), building on the studies conducted in this dissertation. Each SQ is revisited, and the findings are presented by answering each SQ one by one.

10.1 Findings of the studies

10.1.1 SQ1: What are the key aspirations and implementations of constructionism as they appear in the literature

The first subsidiary question was answered by exploring the theoretical framework of constructionism, from its infancy towards its more recent applications, and provided key notions and ideas that evolved. The term constructionism originates from Papert (Papert, 1980; 1987; 1993; 1996; Papert & Harel, 1991) and captures the concept of construction of knowledge by engaging in the making of concrete and public artifacts. Papert's theory can be summarized in his vision of a new educational environment in which learners build meaningful knowledge artifacts by taking advantage of the ubiquity of new technologies around them. Amongst the constructionist concepts that evolved from this chapter are, appropriation, knowledge construction, learning cultures, mathetics, microworlds, object-to-think-with and bricolage. The dynamic progression of constructionism leans towards distributed and social constructionism, whereas recent applications of constructionist aspirations include Scratch, Snap!, Dresscode, c-book, Makey Makey and DSIL school in Thailand. For constructionists, the development of an artifact that is visible to the world enhances the engagement with the knowledge needed for the construction of the artifact, whereas the social environment and culture enhance the creation of a close relationship, both with the artifact and the knowledge needed for its construction. For the purposes of this research work, the findings in this SQ provided a springboard for understanding the notions and aspirations of constructionism, and enabled infusing such a concept in real-life settings.

10.1.2 SQ2: What are the core dimensions of social technologies as social constructionist tools?

This subsidiary question was addressed in a longitudinal Greek as a second language course. Qualitative content analysis of instructors' field notes, students' and instructors' reflections, interviews and focus group data was employed. To triangulate the findings, the study also collected data by observing students' activity within social technologies. To respond to this SQ, this study revealed results in favor of the use of social technologies as social constructionist tools, demonstrating a code scheme with its major dimensions: exploration of ideas, construction of online artifact and evaluation of the constructed

artifact. The development of this code scheme demonstrated that, in order for social technologies to be used as social constructionist tools, nine actions take place, that is, Orientation, Brainstorming, Material exploration, Outlining, Editing material, Revising, Peer reviewing, Instructor reviewing, and Presenting/ Publishing. These actions provide a thorough view of how the construction of an online artifact manifests in practice and unpack the potential of social technologies to act in the arena of social constructionism. An example of an online artifact constructed is an online dictionary with words and expressions in both Greek and English. Students developed their artifact within several social technologies (e.g. using wiki, Facebook group, Facebook comment plug-in). From the perspective of knowledge creation, the construction of an online artifact within social technologies allows learners to think and understand abstract scenarios by linking them to their artifact. From the perspective of design, constructionism is viewed as a fertile ground for framing social technologies, which allows students to experience the design of an online artifact as designers and researchers, rather than learners.

10.1.3 SQ3: Which role(s) are adopted by students and instructor within a social constructionist environment?

This subsidiary question was answered in the study deployed in SQ2. With regard to the role of the teacher and learners within a social constructionist environment, learners are an energetic part of the whole process starting from exploration throughout the evaluation of the artifact. The instructor acts as facilitator in orienting the ideas in the exploration phase, supporter for participants in the construction phase, and reviewer in the evaluation phase. Peers are involved in co-forming decisions in the whole process. Social technologies constitute an integral part of the process; however, the findings indicate that the essence of social constructionism lays in the artifact itself that produces understanding through construction of an explicit representation.

10.1.4 SQ4: How are the dimensions of social constructionism applied in different language settings?

The success of the first study lays in revealing the core dimensions of social technologies as social constructionist platforms, capitalizing the core actions that are inherent in each dimension. As informed by DBR, the elements of this study were taken into consideration

in two different settings with an eye to claiming success of the intervention. Thus, the core dimensions of social constructionism are set into practice in two different language learning settings, a) Greek for academic purposes/dissertation writing; and b) English for specific academic purposes. The aim was to develop a methodological framework for their use. The two studies provided deep insights into the social constructionist environment, illustrating the prevalence of evaluation for monitoring and polishing the artifact.

Studying the effects of the intervention across a variety of settings enabled articulating the methodological framework of social constructionism that communicates how social constructionism operates in action. The emergence of this framework opens up a novel pathway for the use of social technologies towards the direction of social constructionism, and optimizes the advancement of a particular set of instructional design elements of social constructionism.

10.1.5 SQ5: What features of different types of social technologies can facilitate groups of learners to socially construct a shared artifact?

The social technologies that students employed varied. Some facilitated and other inhibited the construction of an artifact. It was noted that an important element in sketching a holistic understanding of the intervention and the relationship between theory, designed artifact and social technologies, related to the potentials and limitations of social technologies to act as social constructionist tools. To address this need, the various social technologies used in the first two studies were explored and their dynamics to serve as social constructionist tools/social microworlds were specified. This study highlighted the potentials and limitations of five different types of social technologies (Facebook, blogs, wikis, Google Documents, Dropbox) in facilitating social construction of an artifact. Each one of the tools was examined in terms of its functionalities for facilitating the three phases of construction: Exploration of ideas, Construction and Evaluation of the artifact. In each case, the potentials and limitations were understood based on the action that stakeholders (learners and instructors) needed to take for constructing their artifact. The development of social microworlds is facilitated through functions that are present in different tools. For example, the artifact construction was enacted in Facebook group that could facilitate the exploration phase; the construction can take place in Google Document in order to have the whole document in the same space and then evaluation can take place in Facebook group

or in the Google Document –using comments or chat. Finally, this study revealed Facebook as a cultural trend that cannot be overlooked from the learning practice. This study has provided a closer understanding of the relationship between theory, learners' experiences, needs, and expectations with computational features. By bridging the gap between the specific features of technology with the needs of teachers and learners, a further step is made towards the evolvement of a set of instructional design elements of social constructionism.

10.1.6 SQ6: Which design principles can be brought forward for supporting the development of social constructionist tools?

The design of well-structured social microworlds needs to accommodate the needs and expectations of both learners and instructors as well as the functionalities of technology. The principles derived from the identified potentials and limitations of the different types of social technologies can be of use to computer designers and interface architects in facilitating each phase of artifact construction by a group of learners. Exploration of ideas is supported by affording searching and archiving of different types of material from different devices; artifact construction can be supported by allowing building on existing material; evaluation can be supported through history keeping, reflections, notifications to group members and artifact sharing. This highly social and iterative process needs to allow social cohesion and reinforcement of social relationships in a real-life project. Thus, artifact construction should enable learners to act as researchers in environment(s) that resemble real-life activities. Ultimately, these principles link the features of technology with the needs of teachers and learners, allowing computer designers and interface architects to progress in the development of social constructionist tools. Moreover, a further step is made towards the evolvement of a set of theoretical constructs of social constructionism.

10.1.7 SQ7: What alternatives does constructionism offer to current educational practices in the use of social technologies?

The final chapter of this dissertation provided a rich account of using social technologies as social constructionist tools, and subsequently answering SQ7. Through a holistic view of the intervention, the alternatives that constructionism offers in the use of social

technologies are delineated. Overall, constructionism comes to inform the use of social technologies for the construction of an artifact that is visible and probed to the world vis-à-vis the existing uses of social technologies as social writing and communication tools. The type of artifact varies: it can be an online dictionary, a shared note taking folder, a research manuscript, or a report. In all cases, social technologies are used by groups of learners with an eye to bring together elements from the world-wide-web or from real-life experiences and construct an artifact that can be shown, probed and evaluated by peers and instructor. In this endeavor, different types of social technologies are employed, in different stages of the construction process. Learners embrace a multifaceted role whilst engaging in the construction like professionals in their relationship with the artifact, and the knowledge needed for its construction.

10.1.8 SQ8: What instructional design elements can be brought forward to establish these alternatives?

In view of these results, at the final stage of this DBR inquiry the intervention was explored holistically. The aim was to claim success through a set of instructional design elements that generate "heuristics for those interested in enacting innovations in their own local contexts" (The Design Based Research Collective, 2003, p. 6). The derived instructional design elements include:

1. Extending the classroom walls
2. Merging physical and digital artifacts
3. Artifact oriented task design
4. Real-life scenarios
5. Artifact stepping-stone
6. Valuing failure
7. Powerful expertise
8. Synergetic alliance of social technologies
9. Cultural trend
10. Unity (rather than diversity) in classroom dynamics
11. Sharing and reflecting
12. Duration of SC design
13. Communication between teacher and students

In relation to the currently un-theorized use of social technologies, these elements ground the use of these technologies under a sound theoretical framework. The Social Constructionist Classroom fosters powerful expertise that moves beyond language learning, embracing computational skills, and challenges students to adopt a multifaceted role in the relation to the artifact and the knowledge needed for its development. The elements that emerged from this study are by no means competitive with other theories but make use of an existing theory and apply it in a specific context.

10.1.9 SQ9: What are the differences/similarities of these alternatives vis-à-vis previous implementations of constructionism in different contexts?

This study applied constructionism in the use of social technologies and expanded the notion of an artifact as an object-to-think-with towards the notion of an object-to-share-with. SC emphasizes social processes supported through social technologies as a source for social material exploration, construction, and evaluation of a shared artifact. Social technologies can facilitate the notion of making public and visible artifacts, since they afford sharing of the artifact in an audience of tutors, critics, and supporters.

Papert (1980, p. 7) valued surrounding cultures as a source of materials that learners need to relate and build. The burst of social technologies offers a new world of these materials which, when aligned, allow learners to be active constructors of a shared artifact. Essential dimensions in Papert's constructionism are the elements of making, personal, social, cultural, and tangible connections/reflection (Papert, 1980; Papert & Harel, 199; Papert, 1993; Resnick & Kafai, 1996; Brennan, 2013). Social constructionism diversifies these elements towards, social making, social learning, sharing of artifact through social networking channels, beyond classroom walls, and evaluation.

Another application of constructionism, known as distributed constructionism, focuses on situations in which learning occurs when a person is interacting with its surrounding environment in order to design and share meaningful artifacts; thus distributed constructionism develops the constructionist theory towards the direction of distributed construction activities (Resnick, 1996b). Resnick (1996b) focuses on three main categories of activities: discussing constructions, sharing constructions, and collaborating on constructions. SC shares the notion of sharing and discussing constructions as a group (and not individually), yet diverges in monitoring and evaluating within different tools. Finally,

this research work draws on the notion of social constructionism as Shaw (1996) firstly applied it in a community computer networking system and supports the potential of social technologies to organize activities in which groups of learners work together for a common purpose.

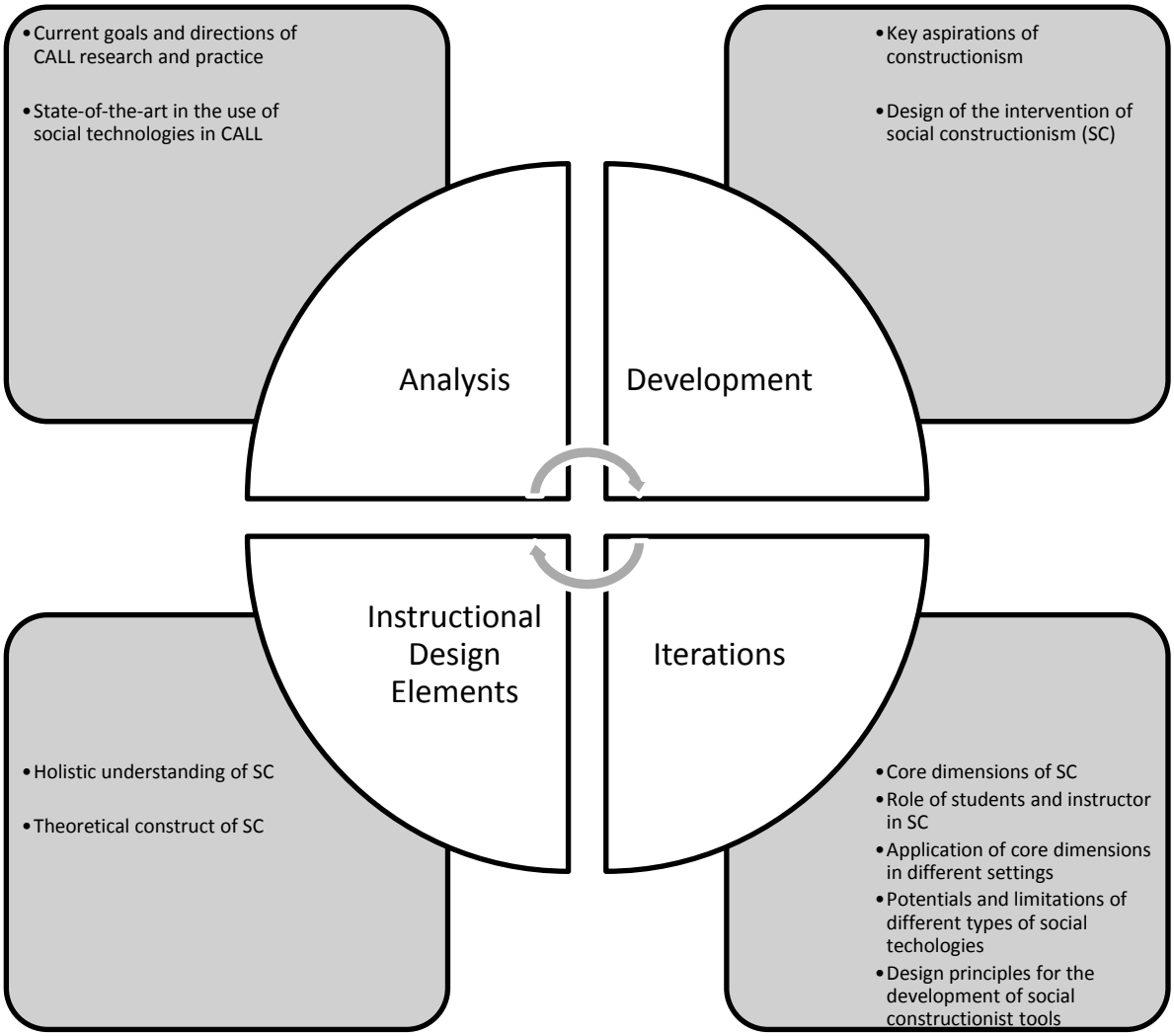


Figure 17. Matrix demonstrating the four stages of this dissertation.

10.2 Holistic description of the Social Constructionist Classroom

Whilst the social movement continues to grow, social constructionism stresses a new arena for the use of these technologies involving groups of learners to construct a shared and meaningful artifact. In this research work, social technologies have been employed for the development of artifacts by groups of learners. The constructionist model that emerged

demonstrates the core dimensions of social technologies as social constructionist tools, with actions held for the social construction of an artifact; and a set of instructional design elements that encloses the theoretical understanding of the classroom whilst groups of learners use social technologies for constructing an artifact. The Social Constructionist Classroom (SCC) is a theoretical construct with its main constituents evolving from the physical classrooms elaborated in the previous chapters (see Figure 18). I decided to place SC in the level of the classroom as the classroom is considered a small, yet comprehensive context, in which SC can take place. SCC yields an environment rich in objects-to-share-with, following an artifact oriented task design and fostered through synergetic alliance of multiple social technologies, moving beyond classroom walls. SCC places in the center the artifact, which is geared by a group of learners working towards its implementation, making use of different types of social technologies. The set of instructional design elements provides a framework for optimizing the implementation of the SCC by educators. In the following paragraphs, the aforementioned constituents are brought together as they evolved from the three different classroom settings explored in this dissertation.

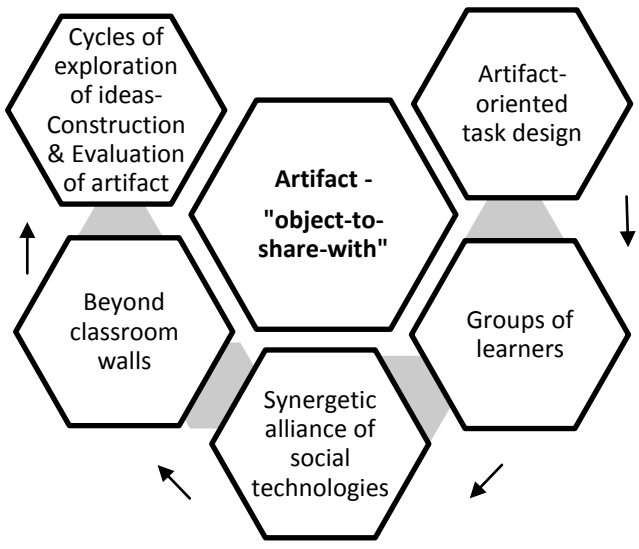


Figure 18. Constituents of the Social Constructionist Classroom.

Firstly, in a Greek as an L2 course, students worked in groups for constructing an artifact that can be shared and probed, such as a shared dictionary within wiki and a shared calendar within Google Documents. Three core dimensions manifest the construction of an artifact within social technologies, that is, *exploration of ideas*, *construction,* and *evaluation of artifact*. Each of these dimensions also reveals the actions that take place under each dimension in order for a group of learners to construct an artifact. In a social constructionist environment, students act primarily as active constructors and reviewers of the artifact, whereas the instructor acts as a member of the construction team, facilitating and supporting the group in the construction of the artifact.

The evolvement of these dimensions facilitated the implementation of social constructionism in two different classroom settings: a) Greek for academic purposes/dissertation writing; and b) English for specific academic purposes. Infusing the core dimensions of social constructionism in different settings provided deep insights into the use of social technologies as social constructionist platforms, and informed the methodological framework that communicates the manifestation of social constructionism in action.

Once the core dimensions of social constructionism have been established, the features of different types of social technologies in supporting artifact construction were investigated. Stepping on the core dimensions of social constructionism, different types of social technologies have been explored and their potentials and limitations to act as social microworlds in the arena of social constructionism have been reported. Articulating how different types of social technologies enable a group of learners to construct an artifact, as well as the design principles that support the design and development of such environments, deeper understanding of the intervention was achieved. Social technologies enable and enhance the creation of social microworlds, that is, learning environments that facilitate groups of learners to engage in the social construction of an online artifact. Both Social Networking Tools and digital artifact sharing platforms afford the development of a shared artifact, whereas their combination opens-up a new pathway for fully supporting social microworlds.

Once the methodological framework for implementing social constructionism and the potentials and limitations of different types of social technologies evolved, a set of instructional design elements emerged. These elements provide deep insights in using social technologies as objects-to-share-with and contribute in understanding the

relationship between theory, artifact construction, and social technologies. Ultimately, the set of instructional design elements enriches the currently un-theorized use of social technologies and grounds their use under a sound theoretical framework.

10.3 Contribution

The intent of this dissertation is to provide new knowledge and understanding of the use of social technologies under the framework of constructionism. This project brought change at a local level, whilst contributing to universal knowledge that can be of value to others. Social constructionism allowed students to construct a shared and meaningful artifact, taking advantage of the ubiquity of technologies around them, engage in a close relationship both with the artifact, and the knowledge needed for its construction. This long-term intervention offers a framework within which researchers, multimedia designers, instructors, and students can touch upon social technologies and unpack new prospects for their use. Yet, this research goes beyond mere identification of technological features of social technologies; it provides a holistic understanding of how the strengths and challenges of these technologies come across theoretical aspirations, whilst learners engage in the construction of a shared artifact. The account provided in this research work covers multiple aspects of the intervention including: (i) core dimensions of social constructionism; ii) roles adopted by learners and instructors in a social constructionist environment; iii) features of different types of social technologies as social constructionist tools; iv) design principles for fostering the development of social constructionist tools; and v) instructional design elements of a Social Constructionist Classroom.

Ultimately, this dissertation provides three main contributions: the first contribution is the development of a framework under which social technologies are touched upon. The most important significance of this contribution is to move the discussion about the use of social technologies further in the direction of social constructionism. The emergence of this prospect is expected to supply designers, instructors, researchers, and practitioners with a better understanding of the features of social technologies. As a second contribution, the core concepts of social constructionism can also serve as a formula providing guiding principles for curriculum design, materials' development, and classroom practice, nurturing new cultures of learning, educational practice, and theoretically and pedagogically aligned task-design. Although social constructionism is framed within the

context of CALL, the rich account of the use of social technologies can inform future efforts to support groups of learners to engage in the construction of a shared artifact.

Finally, this dissertation contributed in understanding the relationship between theory, social technologies, and artifact construction, demonstrating how the latter can advance the way social technologies are used. Findings stress the reciprocal relationship between theory and artifact construction using social technologies. The artifact sparks a relationship between the group, signifying a cycle of social argumentation between the artifact and its stakeholders. The different features of social technologies mediate this multi-trajectory social process and inform artifact construction. The character of the conversation mediated by the artifact is *multimode* and *multi-trajectory*. The first term, highlights the various features of social technologies employed. The second term pinpoints the multifaceted role that actors are challenged to adopt in the relation to the artifact and the knowledge needed for its development: students act as researchers and professionals in the relationship to their artifact, whereas the instructor becomes a collaborative member of the team, joining forces for the achievement of a common purpose. The interaction between the context and the argumentation between group members highlight the connection between the artifact and real-life experiences. It is through this process that learners get in a closer relationship with the artifact, the social community, and the knowledge needed for the development of the artifact.

10.3.1 Implications for research

Rapid and widespread new technologies such as social technologies claim new forms of instructional design that lead to effective learning. Yet, computer and technological advancements per se cannot improve learning effectiveness. For social technologies to promote deep learning, their use and adoption needs to respond effectively to the needs, expectations, and demands of real world activities.

This dissertation explored social technologies from the perspective of constructionism. The three dimensions that emerged along with the respective actions that accompany each dimension reveal further dynamics of social technologies as social constructionist tools or as objects-to-share-with. A social constructionism action model that takes into consideration the dynamics of social technologies is represented in the triptych: *exploration of ideas*, *construction*, and *evaluation of artifact*. This triptych captures the actions that take place throughout the social construction of an online artifact process.

These actions offer a better understanding of the features of social technologies, leading to a new perspective of their use that entails groups of learners working towards the construction of a shared artifact. The SC framework of this dissertation contributes significantly to the research conducted in the design and implementation of these technologies. On the one hand, designers and interface architects can draw relevant information on the development of social constructionist tools that facilitate social construction of an artifact by groups of learners. Implementation of research can build on the elements of this project, and ground the use of social technologies. Researchers in the fields of CALL and TEL can draw on the framework of this research work and stress a different approach in the use of technology in language classroom. Early in this dissertation, methodological and theoretical issues have been raised, regarding the theoretical alignment of social technologies in CALL. The findings of this research suggest several new directions for the field. One direction involves the tracking of the ways in which social technologies can be used. Another direction deals with lengthening activities that place learner in the center, following well-designed artifact-oriented activities and practices. Ultimately, social constructionism can be employed as a stepping-stone for researchers in the fields of TEL, CAI, HCI, and CALL by informing the design of learning environments that will allow groups of learners to engage in the construction of a shared artifact.

10.3.2 Implications for practitioners

As real classroom environments are complex and highly fluid in-nature, ready-made solutions to practical problems cannot be provided. As noted by Eisner (1991, p. 204-205):

> The researcher might say something like this: "This is what I did and this is what I think it means. Does it have any bearing on your situation?" … Researchers are not the ones to provide rules of procedures to practitioners; there are no sacred seven steps to effective teaching. We offer considerations to be shared and discussed, reflected upon and debated.

The research reported in this dissertation gives the baton to practitioners, lecturers and students who need to see the intervention through the lens of their own settings. There are also many implications for multimedia developers, interface architects and instructional designers, some of which are described below. The implications apply both to the design of

social constructionist tools, and to the implementation of these tools in the learning environment.

10.3.2.1 Implications for the design of social constructionist tools

For developers and interface architects, this research provides a playful exploration for generation of social environments that will support social construction of an artifact. The principal implication for designers is that constructionism can inform the design of social media programs.

Computer designers and interface architects can take into consideration the potentials and limitations of social technologies as social microworlds, as well as the design principles that derived from this dissertation and engage in developing social microworlds that embrace the needs of learners and instructors. Exploration of ideas can be supported by affording searching and archiving of different types of material from different devices; artifact construction can be supported by allowing building on existing material; evaluation can be supported through history keeping, reflections, notifications to group members and artifact sharing. This highly social and iterative process needs to allow social cohesion and reinforcement of social relationships in a real-life project.

A further important implication of this research is the need by designers to consider the needs and expectations of both learners and instructors as well as the features of the existing social media before moving to the design of the software itself. Currently, the development of social microworlds needs to integrate functions that are present in different tools and facilitate different action(s). Facebook holds a prevalent position as a cultural/social trend that cannot be missed from the learning practice. Moreover, the potentials and limitations of five different types of social technologies (Facebook, blogs, wikis, Google Documents and Dropbox) are understood based on the action that stakeholders (learners and instructors) need to take for constructing their artifact. Recommendations can be made for supporting these actions in new media that will be designed to be used by groups of learners, where exploration and construction by peers and coaching by the instructor will be facilitated. Ultimately, the actions that take place throughout social constructionism could inform designers to refine the development of social tools and facilitate the construction of online artifacts. Social technologies are an integral part of the process; however, the essence of social constructionism lays in the

artifact itself that produces understanding through construction of an explicit representation.

10.3.2.2 Implications for implementation of social constructionism

Social technologies are increasingly gaining attention in the classroom, allowing for a more student-centered approach. Social constructionism offers new directions in using these technologies altering both teachers' and students' role in the classroom. The former is no longer the sole source of knowledge, whereas the latter is immersed in technologically evolving environments. At a practical level, the methodological framework and the theoretical construct that evolved from this dissertation offer a pervasive array for using social technologies under a sound pedagogical framework. Although social constructionism is framed within the limits of CALL, the emergent dimensions provide a rich account of the designed innovation and actions that can be localized for others to apply to other settings, provided that, they will tailor the activity to the needs and characteristics of a particular classroom. The framework revealed in this project manifests different aspects of the construction of an artifact by a group of learners. The theoretical construct has the form of a map of conceptual directions producing a more dynamic instructional model for the use of social technologies. These directions can be set into practice following the methodological framework that resonated in the triptych exploration-construction and evaluation.

There are many advantages to be gained from implementing social constructionism. Groups of learners come together for a common purpose, employing a technology with which are familiarized and resembles an authentic environment. Ultimately, artifact construction fosters learners to act as researchers in environment(s) that resemble real-life activities. The SC environment entails powerful expertise that moves beyond language learning, embracing computational skills and challenges students to adopt a multifaceted role in the relation to the artifact and the knowledge needed for its development. The set of instructional design elements that emerged from this research work is by no means competitive with other theories, but make use of an existing theory and apply it in a specific context. From the perspective of knowledge creation, the construction of an online artifact fosters learners to think and understand abstract scenarios by linking them to the

artifact. Finally, this dissertation views constructionism as a fertile ground for learners to experience the design of an online artifact as designers and researchers.

10.3.3 Methodological implications

This research project has gone through a developmental cycle following a DBR inquiry. Such an inquiry revealed both strengths and challenges with regard to implementing DBR in practice and addressing issues of credibility, validity, and sustainability. At this point, I attempt to bring forward these considerations, along with methodological implications.

10.3.3.1 Challenges in DBR

DBR engineers new learning environments and improves learning in context whilst communicating usable knowledge for learning and teaching in complex settings. In terms of measuring learning outcomes, this project placed emphasis in informing students' actions and behaviors, and provide a richer account of the setting, where the intervention took place. Success or failure of the intervention valued students' and instructors' attitudes and researchers' observations in the classrooms (Collins, Joseph, & Bielaczyc, 2004).

A basic premise of DBR is the close collaboration of teachers, learners, and researchers in a real-life environment, where an intervention takes place. In SC project, learners, instructors (including myself), and researchers have been in close cooperation from the design through the evaluation project, employing often debriefings as a control trait. The use of the qualitative software Nvivo maximized the transparency in communicating the complexities of the intervention (Bringer, Johnston & Brackenridge, 2004). The major implications for researchers that strive into a DBR inquiry is the need for close cooperation between researchers and instructors and the need to employ group debriefing, along with early capture of notions and aspirations that evolve from the data set. Capturing notions and aspirations keeps a history of the evolvement of the project, allows for reflection upon earlier hypotheses, and sketches a holistic view of the iterations of the project.

An additional challenge encountered in this project is replicability. A DBR narrative needs to support "petite generalizations" (Stake, 1995), that is, report insights into the potentials and opportunities that emerge, as well as strategies for navigating these potentials and opportunities effectively. Hoadley (2002) noticed the difficulty in replicating others'

findings since DBRs cannot (and may not want to) machinate cultural contexts. On a similar note, The Design Based Research Collective (2003) brings forward that research in this paradigm would be difficult to generalize in other settings. Yet, if success means that a certain form of intervention could be effective in any setting, then the intervention should be investigated in a variety of settings. DBRs lay the completed design open offering a rich account of the local dynamics in an endeavor to advance theory that will be of use to others (Barab & Squire, 2004).

In this project, the effects of an intervention were explored across three different contexts, with an eye to claiming success by "generating heuristics for those interested in enacting innovations in their own local contexts" (The Design Based Research Collective, 2003, p. 6). This inquiry envisioned to draw connections to theoretical assertions that transcend the local context, but are by no means decontextualized principles or grand theories that function with equal effect in all contexts (Anderson & Shattuck, 2012; Barab & Squire, 2004). For Design-Based Researchers, the significance of a study is determined from its ability to influence practice, while moving forward theory that will be suffice to others (The Design Based Research Collective, 2003; Barab & Squire, 2004; Bell, 2004). This project has brought to light the completed design and implementation in a way that brings insights into the dynamics of the local context. Yet, it keeps firmly in mind that the design is not a clear-cut map of actions, but it is rather a heuristical understanding of the intervention for those interested in enacting innovation in their own settings.

10.3.3.2 Implementation and analysis of DBR

This dissertation aimed at communicating knowledge with regard to its specific application of a grand theory in facilitating a group of learners to construct an artifact within social technologies. As noted by the Design Based Research Collective (2003, p. 1) "research on design must lead to shareable theories that help communicate relevant implications to practitioners and other educational designers". This endeavour though needs to keep firmly in mind the components of these *shareable theories* that include instructional organization, teaching decisions, roles of the teacher and students, duration of activity, instructional strategies and so on (Lopes et al., 2008; Tiberghien, Vince, & Gaidioz, 2009). This study employed a multi-manuscript path in an attempt to explore each of these elements and consequently receive in-depth insights for the intervention, whilst the project was still in-

progress. In addressing aspects of a learning environment, different methods of analysis have been employed:

- *Analysis*: content analysis was utilized in an attempt to gain deep insights into the intervention. At a first stage the application of inductive analysis allowed for the core dimensions of social constructionism to evolve, based on the actions that students and researchers adopted. Following this first stage, a deductive qualitative analysis took place in identifying a) how the core dimensions of SC have been applied in different contexts; and b) how different types of social technologies facilitated the intervention. Whilst the aim of the inductive qualitative analysis was to describe the SC with a set of categories, the deductive qualitative analysis was conducted in order to harness these categories for further analysis. Overall, this dissertation showed that a mixture of inductive and deductive analysis can provide deep insights in a classroom intervention.
- *Observation of social technologies*: this research conducted a technological intervention employing different types of social technologies. In this endeavor, constant monitoring of the work conducted was needed in order for iterations to take place. In order to do this, the interaction within each group was explored regularly. The small size of the groups allowed for the full range of social interactions to transpire and for researchers to find what is going on within each group (Stahl, Koschmann & Suthers, 2006).
- *Maximizing transparency through Nvivo*: Nvivo has been an integral part of this research starting from initial transcription of data towards analysis and illustration of results. At the early stages of the project, interview and focus groups audios have been imported and transcribed within Nvivo, along with field notes and students' and instructors' reflections. The Ncapture tool was employed for capturing web content from social media and archived it into the project sources. From the early stages of the project, memos have been used as a means for recording ideas, interpretations, and growing understanding of the project. One advantage of keeping memos within Nvivo is its capability to link those memos with text and nodes, thus keeping an analytical development of the categories. Ultimately, for revealing a holistic understanding of SC, data set and linked memos resonated the path of the research design. Visualizations of the dataset and of the nodes were exported making possible a visual representation of the dataset. Hence, the researcher could have an overview of the data analysis, along with parent and child

nodes. These visualizations made possible the clustering of categories, and elucidation of themes that best described the dataset. Finally, matrix coding queries that represented coded sources per node were run. Matrix nodes were particularly useful for understanding whether a node was comprehensive enough and captured segments from the entire dataset, or whether a more comprehensive category should be defined.

10.3.3.3 Limitations

The findings of this research provide strong support for grounding the use of social technologies under the framework of SC. Yet, it is kept firmly in mind that the framework is not a clear-cut map of actions, but it is rather a heuristical understanding of the intervention for those interested in enacting innovation in their own settings.

Any research project has limitations, which need to be considered. Firstly, the target group in this research consisted only of young adult learners, whereas other age groups such as children and elderly are not explored. Moreover, all subjects were tertiary education students, thus had some competencies and experiences in collaborating with others. Even if they did not know how to use some technologies, they were more motivated and apt to learning about them -compared to a group of elderly with no technological background, or immigrants with just basic literacy levels. It should also be acknowledged that some of the tools employed in this research can be hardly employed by children, as Facebook users, for example, must be at least 13 years old. Yet, children of various ages are a dominant target group of CALL and language learning and can provide avenues for applying the ideas presented in this dissertation using other types of social technologies with which children are familiarized.

Secondly, this type of research leaves many questions unanswered in observed learning and assessment of learning outcomes. As a DBR inquiry, the intervention and its construct are laid open, demonstrating the relationship between theory, technology, and artifact construction in this context. The assumption is that theorized use of social technologies leads to better instructional design and therefore better leaning, yet there is not proven evidence for this here.

Moreover, this project employed only five technologies, that is, Facebook, Google Documents, Blogger, Wiki, and Dropbox. The decision to limit the intervention to these

technologies was guided from the initial analysis of Web 2.0 literature and development of the design, learners' needs from each study and the fear for technology overuse.
In the context of a specific learning domain, in this case language learning, there is no single theory that can cover all topics, skills, learning and teaching types. This research made use of an existing theory and applied it in a specific context allowing for a set of instructional design elements to emerge. Yet, it is expected that different theories and tasks should be employed and tailored to the needs of a specific classroom.

Two aspects of the study may have influenced the research.

Firstly, the very positive response from the students in the first study might be related to their previous learning experience that was limited to paper and pencil. All students reported that they have never experienced computer-based instruction, rather than traditional lecture.

A second limitation refers to the complexity and messiness of the learning environment. As the research was carried out in real-world classroom where teaching and learning takes place, there are many variables that cannot be controlled (Collins, Joseph & Bielaczyc, 2004, p. 19). Yet, the longitudinal engagement in the field and the iterative cycles in three different classroom settings offered detailed understanding of what is happening.

None of these limitations influenced directly the development of the SC design. Support for the SCC remains, whilst these limitations provide scope for further research described in the following section.

10.4 Future research directions

10.5 Lessons learned

From the perspective of practitioners in the fields of CALL and TEL, social constructionism can inform curriculum design, materials development, and classroom praxis. Research on the contributions of social constructionism has just established. Future research could be conducted in applying social constructionism in other social and 3D environments as well as mobile applications in order for learners to construct their artifacts on the go. The framework and the actions that are described in this study may also inform several stages of research in HCI, enabling the analysis, design, development, and

evaluation process within a social environment following the framework of social constructionism.

Future research is encouraged to apply social constructionist design. Taking into consideration the intertwined relationship between language and culture, further research can be conducted exploring whether cultural scenarios can provide an exemplary framework through which social constructionism can be implemented. Further research is also sought for exploring the components of constructionism in other environments and learning subjects, which could result in its wider applicability as a means for enhancing knowledge. Future research is also encouraged in applying social constructionism design in areas other than language.

Social microworlds are designed to serve learning by engaging a group of learners to the construction of an artifact, however, since technologies change rapidly; we need to deepen our understanding of the principles that ground social microworlds by applying the theoretical grounding of Papert (1980; 1993) in different types of technologies. This research designed interventions that employed five social technologies. Still further studies could also apply other technologies such as Twitter, LinkedIn, Evernote, and Google+. The concept of social microworlds needs to be further investigated in order to understand the process of learning that takes place, as well as to understand how people ascribe meaning to social microworlds. A further issue is the need to draw attention to design environments that are open to exploration and modification during use.

10.6 Further applications and extensions of social constructionism

Further studies are invited that will use social technologies as social constructionist tools for allowing learners of various ages to build an artifact that is open and visible to the world. Further implementations could employ the framework of this dissertation in in-class and out-of-class activities in order to allow groups of learners to explore, construct, and socially evaluate digital artifacts by taking advantage of the ubiquity of social technologies and mobile devices in today's world. Moreover, there is a need for understanding and analyzing the thinking and design process that take place within each group, the decisions that define the artifact formation, and the classroom practices that expedite artifact construction.

In this research, participants were engaged in the construction of an artifact augmented by the technological tools provided, whilst issues have been resolved face-to-face. Future research could involve artifact construction by groups of learners within a purely online environment, where learners will need to employ a variety of features of technological tools in order to communicate and solve any issues that might arise. In addition, social technologies as social constructionist tools can be explored in different framing contexts with subjects of different age groups with different technological backgrounds (e.g. children of various ages, immigrants, and elderly).

Practitioners are encouraged to explore and inform further this framework and the capabilities of other social technologies (e.g. Twitter, Evernote, Flickr etc.) in supporting groups of learners to construct an artifact. Exploring further the social capabilities of these technologies can allow for richer interaction with communities of real language speakers who can evaluate and provide feedback on the constructed artifact. Moreover, centralizing the artifact in cultural aspects of the target-language, could also enhance intercultural awareness, as an important, yet often neglected, aspect of language learning.

Moreover, the construction of different types of multimodal artifacts enriched with audiovisual/3D representations can also be added in the research agenda. Examples of such artifacts could include a musical piece, a language game, a 3D visualization, an information platform with audio and video from foreigners'/immigrants' perspective, a culture-rich shared multimedia story, a 3D simulation of a city where the target-language is spoken, a shared storyboard or even a fictional perspective for the progress of the universe. The observation of the construction of these types of artifacts could possibly inform further the relationship between artifact construction and different types of social (and other) technologies. Further research could also take place exploring how groups engage in specific cognitive process and assessment of learning outcomes following the Tiberghien and Malkoun framework (2010). In addition, group dynamics and the role of the teacher in different types of teams can also be explored, in order to provide concrete directions and instructions in dealing with social constructionism in different contexts.

Finally, a holistic approach to language learning could take elements from social constructionism and other theories in order to address specific skills, learning and teaching types. Such an approach, could cater for language learning skills and competences that learners need to develop, in order to address their needs in academic and social level.

10.7 Conclusion

In this dissertation, I provided a comprehensive understanding of the use of social technologies as social constructionist tools. The design of the intervention was based on constructionism, a theory of learning and design that manifests that learning occurs more effectively when students understand the world around them by constructing meaningful artifacts.

As a result, the dissertation provided deep insights into the SC design, by enlightening a methodological framework and a set of instructional design elements that offer an enfolded view of their use. With the increase attention that social technologies receive, this dissertation contributes to unfolding the potential of these technologies to act as social microworlds, and support the collective effort of a group of learners to construct an artifact.

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APPENDICES

Appendix 1: Key terms

Social technologies encompass the technologies that came into view as a major element of the Web 2.0 movement. Prevalent software of this movement is blogs, wikis, podcasting, videoblogs, microblogs, digital artifacts sharing platforms, social networks, and social bookmarking tools. The concepts of social creation and sharing are said to give in a nutshell the philosophy behind social technologies which include social network sites such as Facebook, Twitter, Linkedin, and Google+, social software such as blogs and wikis and digital artifacts sharing platforms such as Dropbox, Evernote and Google Drive. These types of software differ significantly from static web pages in the sense that they are open to the world and editable by everyone. In this dissertation, social technologies have been explored in the context of CALL. Educators in the field of CALL and second language (L2) learning began to explore these technologies, seeking to identify their impact on L2 teaching and learning. A burst of research investigating the affordances of social technologies provided a long list of its applications in the L2 classroom (see Chapter 4 for an extensive review of the affordances of Web 2.0 technologies in CALL).

Constructionism provokes that learning occurs more effectively when learners are engaged with making shared and meaningful artifacts (Papert, 1980; 1993). Papert (1980) coined the term constructionism advancing a theory of learning, teaching and design, which can be summarized in the conviction that individual learning occurs more effectively when learners understand the world around them by creating connections between old and new knowledge, in interactions with others whilst creating meaningful artifacts (see Chapter 2 for an extensive review on the theory of constructionism).

The notion of ***affordance*** is potentially both rich and provocative. The word affordance was firstly used by the psychologist James J. Gibson referring to Ecological Context (Gibson, 1977; 1979), defining an affordance as an action possibly available in the environment to an individual, independent of the individual's ability to perceive this

possibility. Gibson (1991, p. 127) defined affordances as "all 'action possibilities' latent in the environment, objectively measurable and independent of the individual's ability to recognize them, but always in relation to the actor and therefore dependent on their capabilities". Similarly, for Salomon (1993, p. 51): 'Affordance' refers to the perceived and actual properties of a thing, primarily those functional properties that determine just how the thing could possibly be used. This definition sets affordance as independent of an individual's experience, capabilities, values or skills.

Donald Norman (1988) in his work *The Psychology of everyday things* deviates from Gibson (1977; 1979), by claiming that an individual's perception for an object may provoke the existence of the affordance. The following quote encapsulates Norman's (1988, p. 9) understanding of affordances:

> the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used. A chair affords ('is for') support and, therefore, affords sitting. A chair can also be carried.

Where Norman (1988; 1998) stands in deviance with Gibson (1977) is in making a distinction between perceived and real affordances of an object, linking design with both, yet emphasizing the importance of perceived affordances for determining usability. McGrenere and Ho (2000) make an important distinguish distinction between utility and usability of an object: utility refers to the actions that an object affords for the user, whereas usability refers to the perceptual information that signals the affordances. Moreover, where Gibson (1977) views affordances independently of an actor's experience and culture; Norman (1988, 1998) links affordances with an actor's past knowledge, experience or culture (McGrenere & Ho, 2000; Conole, 2013).

Appendix 2: Curriculum Vitae

Antigoni Parmaxi

Personal Details

Name	Antigoni Parmaxi
Email	antigoni.parmaxi@cyprusinteractionlab.com
Website	http://antigoniparmaxi.weebly.com/

Education

09/2010 – 06/2015 **PhD**

Department of Multimedia and Graphic Arts, Cyprus University of Technology, Limassol, Cyprus

Dissertation title: *The development of a constructionist learning model for social technologies*

09/2007 – 06/2009 **MA in Pedagogical Sciences** (specialisations: intercultural education; educational administration and evaluation)

Department of Education, University of Cyprus, Nicosia, Cyprus

Courses of studies: Computer-Assisted Language Learning (CALL), use of new technologies in the teaching of language courses, curriculum development

GPA: 9.11 out of 10

09/2003 – 06/2007 **BA in Classical Studies and Philosophy**

Department of Classics and Philosophy, University of Cyprus, Nicosia, Cyprus

GPA: 8.70 out of 10

Professional Experience

08/2009 – present	**Greek Language Instructor** Language Centre, Cyprus University of Technology, Limassol, Cyprus
09/2012-05/2015	**Teaching Assistant** Department of Multimedia and Graphic Arts, Cyprus University of Technology
07/2014-05/2015	**Principal Investigator** on *Womenpower* project, funded by UNDP-ACT
12/2011-11/2014	**Researcher** on the LUCIDE project (Languages in Urban Communities - Integration and Diversity for Europe), funded by the European Commission (KA2)
04/2009 – 06/2009	**Greek Language Teacher** The Junior School, Nicosia, Cyprus
09/2008-06/2009	**Greek Language Teacher** Upgrade private institute, Nicosia, Cyprus
10/2007 – 04/2008	**Research Assistant**, Department of Byzantine and Modern Greek Studies, University of Cyprus
10/2007 – 04/2008	**Students' Assistant** Department of Education, University of Cyprus, Nicosia, Cyprus

Research Related Activities

(A) Research Interests

My general research interests are on Technology-Enhanced Learning with emphasis on social technologies for language learning. More specifically my research interests are:

- *Computer-Supported Collaborative Learning*
- *Social technologies for supporting collaboration in online communities*
- *Cultural differences in the use of online social communities*
- *Technology for social inclusion*
- *Computer-Assisted Language Learning (CALL)*

(B) Participation in Funded Research Projects

06/2014-05/2015 **WoMEnpower (WE-ME)**

Research project supported by Mahallae (funded by UNDP)

Total funding: $30,000

Role in the project: Principal Investigator

Summary: WoMEnpower (WE-ME) is a community platform that aims to link women mentors and mentees together. More specifically WE-ME is developed for helping young women receive support and advice in regards to self-improvement, aiming to increase their self-esteem, personal and social power, and solidarity. WE-ME aims at encouraging dialogue and mentoring between women both online and offline. The project consists of different components: an online exchange platform, where women across the Euro-med region can share their stories and overcome barriers, bimonthly successful narratives/stories from women in Euro-med region, and a social media plugin that will encourage visitors to share content with their friends and followers.

Duties: a) general management of the project b) state-of-the-art research in available technologies for mentoring provision and gender issues; c) online platform development following a user-centered approach; d) data analysis related to the role of social technologies for artifact construction e) summary report of user centered approach for the development of the platform.

04/2014 – 04/2018 **Structuring Discourse in Multilingual Europe (TextLink)**

COST action supported by the EU Framework Programme Horizon 2020

Funding amount: €2,000/meeting

Role in the project: Member of Management Committee

Summary: The TextLink Action will facilitate European multilingualism by (1) identifying and creating a portal into such resources within Europe "including annotation tools, search tools, and discourse-annotated corpora; (2) delineating the dimensions and properties of discourse annotation across corpora; (3) organising these properties into a sharable taxonomy; (4) encouraging the use of this taxonomy in subsequent discourse annotation and in cross-lingual search and studies of devices that relate and structure discourse; and (5) promoting use of the portal, its resources and sharable taxonomy. With partners from across Europe, TextLink will unify numerous but scattered linguistic resources on discourse structure. With its resources searchable by form and/or meaning and a source of valuable correspondences, TextLink will enhance the experience and performance of human translators, lexicographers, language technology and language learners alike.

12/2011 – 11/2014 **LUCIDE project- Languages in Urban Communities - Integration and Diversity for Europe**

Research project supported by the European Commission under the KA2 scheme of the Life Long Learning Program.

Total funding for Cyprus University of Technology: €15,000

Role in the project: Researcher

Summary: LUCIDE is a network which is developing ideas about how to manage multilingual citizen communities by building up a picture of how communication occurs in multilingual settings across the EU and beyond. The aim is to help institutions (councils, schools, hospitals) and local and national economies make better productive use of diversity as an economic resource and to strengthen social cohesion by fostering better communication and mutual understanding.

Duties: state-of-the-art research in the area of language, immigration and diversity. This involves a) essential desk research on the current situation and gather basic linguistic data

from Limassol; b) questionnaire development with key questions addressing the various aspects of language, urbanization, migration and policy making in Limassol; c) data analysis related to aspects of multilingualism in economic, educational, urban, public and private sphere in the city of Limassol and d) summary report of key themes for the city of Limassol.

08/2009 – 07/2011 **Creativity: New technologies in Intercultural/Multilingual Education**

Research project supported by the European Commission under the Grundtvig scheme of the Life Long Learning Program.

Total funding for Cyprus University of Technology: €20,000

Role in the project: Researcher

Summary: The project aims at improving the quality and accessibility of mobility throughout Europe of people involved in adult education, and at improving the quality of cooperation between organisations involved in adult education in Europe. The specific actions supported by the Grundtvig Programme include mobility of individuals which funds visits to the countries of the participating organisations and attendance of meetings, as well as partnership focusing on themes of mutual interest to the participating organisations. Fundamental activities of this project are to provide key expertise of creativity, linguistic and intercultural learning through technology for young people, for adults and for emigrants, organise intercultural activities to support a better social and cultural integration.

Duties: a) design and development of a social media platform for collaborative learning (http://www.createchgrundtvig.wikispaces.com/); b) qualitative research on cultural elements that facilitate and/or hinder the adaptation of foreigners in the Cypriot context; c) design and development of an online collaborative dictionary in five languages.

(C) Memberships in Professional Associations

European Association of Technology Enhanced Learning (EATEL)

Cyprus Pedagogical Association

Scientific Association of Doctoral Candidates Cyprus

International Association of Intercultural Education (IAIE)

Hellenic Association for Intercultural Education (HAIE)

The Cyprus Linguistics Society (CyLing)

Association for Computing and Machinery (ACM)

Association for Computing and Machinery on Women (ACMW)

(D) Research Lab Affiliation

09/2011 – present **Cyprus Interaction Lab**, Lab Member

Since 2011, when the Cyprus Interaction Lab was established (http://cyprusinteractionlab.com/), I participate actively in research studies that relate to a) the use of social technologies in language learning; b) the use of online communities for older adults; c) addressing intergenerational knowledge transfer to use skills and competencies based on experience. My participation also involves events organization, for example, the annual event of World Usability Day and the 9th Joint European Summer School on Technology Enhanced Learning.

(E) Reviewer in Scientific Articles in Journals of Science Citation Index

*International Journal of Human-Computer Studies (1)**

International Journal of Technology-Enhanced Learning (1)

CALICO journal (1)

* In parentheses is the number of scientific articles per journal examined.

(F) Editor in Scientific Journals and Proceedings

09/2011 – 12/2012 Guest Editor in the Young Researcher Special Issue (2011) on State-of-the-Art in Technology Enhanced Learning in the *International Journal of Technology Enhanced Learning* (IJTEL)

(G) Text Editing

03/2011 – present	Text editing (Greek) of the Scientific Proceedings of the Symposia of Oral History, Pattichion Municipal Archive, Museum and Research Centre, Limassol, Cyprus
2010-2012	Text editing (Greek) of the Cyprus University of Technology Language Centre brochure (2nd and 3rd Edition, 2012)

(H) Conference, Special Sessions, and Workshops Organization

Conference & Sessions Organization

04/2015	Member of the Programme Committee of the 11th Joint European Summer School on Technology-Enhanced Learning in Ischia, Italy.
09/2015	Board member of the 2nd International Conference on Learning and Collaboration Technologies in the context of HCI International 2015, Los Angeles, USA.
09/2014	Member of the Social Events Committee of the JURE (JUnior REsearchers of EARLI) 2015 Conference, Limassol, Cyprus.
04/2014	Member of the Publicity and Programme Committee of the 10th Joint European Summer School on Technology-Enhanced Learning in Valetta, Malta.
06/2014	Board member of the 1st International Conference on Learning and Collaboration Technologies in the context of HCI International 2014, Chania, Crete.
06/2014	Parallel session organisation entitled 'Computer Assisted Language Learning' during the 1st International Conference on Learning and Collaboration Technologies in the context of HCI International 2014, Chania, Crete.
03/2014	Member of the local organizing committee 1st International Conference on ipads in Higher Education, Paphos, Cyprus.
05/2013	Local Organisation Chair of the 9th Joint European Summer School on Technology-Enhanced Learning in Limassol, Cyprus. Total number of participants: 72

Role: locate and secure a venue for the Summer School, manage all-inclusive costs for the summer school, financing with the finance chairs, manage day-to-day logistics during the

summer school, manage the local billing, organise social activities (gala dinner, cultural events), oversee the dissemination of information concerning the programme, coordinate interactivity between students and professors, organise social networking (Facebook, Linkedin, Twitter, Flickr), solicit ideas for student-lead activities

11/2012 Member of the Cyprus University of Technology Language Centre committee that organised the public lecture entitled "Dealing with multiculturalism in Social and Educational Levels" by George Nicolaou, Associate Professor, University of Ioannina, Cyprus University of Technology, Limassol, Cyprus.

Workshop organization

04/2014 Work with the JTEL Community: Transform your idea of TEL innovation to work collaboration. Perifanou, M., Loureiro, A., Torres, A. & **Parmaxi, A.** Workshop organised during the 10th Joint European Summer School on Technology Enhanced Learning, Valetta, Malta.

05/2013 Discover a new theory of learning bottom-up. Laouris, Y., & **Parmaxi, A.** Workshop organised during the 9th Joint European Summer School on Technology Enhanced Learning, Limassol, Cyprus.

05/2013 Knowledge modelling from activity traces. Toussaint, B. M., Kawase, R., **Parmaxi, A.** & Luengo, V. Workshop organised during the 9th Joint European Summer School on Technology Enhanced Learning, Limassol, Cyprus.

04/2013 CV, cover letter and preparation for job interview. Workshop co-organised with the Cyprus University of Technology Liaison office during the course GRE411: Greek for Academic Purposes/Dissertation Writing II, Limassol, Cyprus.

05/2012 After PhD. Perifanou, M., & **Parmaxi, A.** Workshop organised during the 8th Joint European Summer School on Technology-Enhanced Learning, Estoril, Portugal.

03/2012 Paper Reviewing Workshop. Kraker, P., Leiba, M., Rau, M., Leony, D., Gutiérrez Rojas, I., **Parmaxi, A.,** Börner, D. & Reinhardt, W. Workshop organised under the Young Researcher Special Issue (2012) on State-of-the-Art in TEL in the International Journal on Technology Enhanced Learning (IJTEL). The workshop was organised online via Adobe Connect and intended to familiarise junior reviewers with the blind peer-review process.

(J) Other Activities

Talks in seminars and colloquia

09/2014 Multilingualism in urban communities: The case of Limassol. Papadima, S, Nicolaou, A., **Parmaxi, A.** & Boglou, D. (2014). Presentation at the LUCIDE Final Conference: The Future of the Multilingual City, London School of Economics, London, UK.

03/2013 LUCIDE - Languages in Urban Communities - Integration and Diversity for Europe. Nicolaou, A. & **Parmaxi, A.** Presentation given as part of the activities organised during the LUCIDE research project at the St. Ioannis secondary School, Limassol, Cyprus.

11/2012 Best Practices in Multilingual Cities. **Parmaxi, A.** & Nicolaou, A. Presentation given as part of the LUCIDE's first international seminar, Utrecht, Netherlands.

06/2011 Creativity-Grundtvig Project: a review. **Parmaxi, A.** Presentation given as part of the activities of the annual in-service training held at the Cyprus University of Technology Language Centre, Limassol, Cyprus.

05/2011 Learning Greek at the Cyprus University of Technology Language Centre. Presentation given as part of the visit of St. Petersburg's university delegation in Cyprus, Limassol, Cyprus.

03/2010 CALL at the Language Centre: How we use new technologies in our language programmes. Nicolaou, A. & **Parmaxi, A.** Presentation given as part of the activities organised during the 2nd official meeting of the Grundtvig programme in Cyprus. Cyprus University of Technology, Limassol, Cyprus.

02/2010 The Language Centre of the Cyprus University of Technology. Nicolaou, A., **Parmaxi A.** & Boglou D. Presentation given as part of the Open Day organised at the Cyprus University of Technology. Cyprus University of Technology, Limassol, Cyprus.

Meetings and Networking

09/2014 Participation at the LUCIDE Final Conference: The Future of the Multilingual City, London School of Economics, London, UK.

04/2014 Participation at the 1st International LUCIDE seminar: Global cities and multilingualism. Madrid, Spain.

11/2012 Participation at the 1st LUCIDE seminar: The Multilingual City in 2012. Utrecht, Amsterdam.

06/2011 Participation at the 7th official meeting of the Grundtvig Programme. Rome, Italy.

04/2011 Participation at the 6th official meeting of the Grundtvig Programme. Budapest, Hungary.

06/2010 Participation at the 5th official meeting of the Grundtvig Programme. Athens, Greece.

05/2010 Participation at the 3rd official meeting of the Grundtvig Programme. Wiener Neustadt, Austria.

Student Clubs/ Other University Activities

11/2014 Membership chair of the ACM-W (Cyprus) chapter

11/2012 Secretary of the Scientific Association of PhD candidates Cyprus

10/2012 Founder and secretary of the CUT students' Research Club

05/2010 Co-organisation of educational trip to Dubai Men's College with the Foreign Languages and Culture Student Club

04/2010 Co-organisation of Foreign Languages and Culture Festival

Honours and Awards

10/2014 **Travel and conference grant from Google** for participation at the Society of Women Engineers Conference in Los Angeles, California.

08/2014 **Travel scholarship from Association for Computing Machinery Committee on Women** for participation at the 3rd International Constructionism Conference 2014 in Vienna, Austria.

04/2013 **Member of the national winning entry** for the annual European Charlemagne Youth Competition with *Let's Research* e-magazine (http://letsresearch.eu/)

05/2012 **Full scholarship** from European Association of Technology-Enhanced Learning (EA-TEL) for participation at the 8th Joint European Summer School on Technology Enhanced Learning 2012, Estoril, Portugal.

06/2011 **Full scholarship** from the STELLAR network of excellence(**S**ustaining **T**echnology **E**nhanced **L**earning at a **LAR**ge scale) for participation at the 7th Joint European Summer School on Technology Enhanced Learning 2011, Chania, Greece.

06/2007 **Excellent Graduate Student**, Award from the Department of Classics and Philosophy, University of Cyprus.

Teaching

(A) Overview of Teaching Experience

Since 2009 I have been working as a Greek language instructor at the Cyprus University of Technology Language Centre (CUT LC). Due to being at a new university I have been actively involved in the design and development of several Greek language courses, under the supervision of the CUT LC Director. Since then, I have also co-ordinated all Greek language courses offered at the CUT LC, under the supervision of the CUT LC Director. The online and paper-based language teaching material has been prepared following the Common European Framework of Reference for Languages. Moreover, new technologies are an integral part of the course development, both from the instructor and students, adhering to the theory and practice of CALL. My duties also involve exam preparation and evaluation for governmental and semi-governmental organisations.

(B) Courses Delivered

Cyprus University of Technology, Language Centre

2009-2014 Greek for academic purposes/dissertation writing I

Greek for academic purposes/dissertation writing II

Greek for Specific academic purposes II (Nursing)

Greek for Specific academic purposes I (Nursing)

Intensive Greek language course for specific academic purposes (Nursing)

Erasmus Intensive Language Course in Greek Language and Culture

Junior School, Nicosia

Spring 2009 Greek as a foreign language for Key Stage 2 students

(C) Development of Greek Language Courses

At the CUT LC I have been actively involved in the development of several Greek language courses:

- Foundation course to scholarship students from Kenya and Uganda who currently study at the Department of Nursing of the University: GRE111: Intensive Greek Language and Culture Course I; GRE112: Intensive Greek Language and Culture Course II; GRE122: Advanced Greek I; GRE123: Advanced Greek II

- **Greek courses for Erasmus and international students** who study at the CUT: GREE110: Erasmus Intensive Language Course; GREE111: Greek Language Course I; GREE112: Greek Language Course II; GREE113: Greek Language Course III

- **Greek for academic purposes/dissertation writing** for undergraduate students of the University: GRE410: Greek for academic purposes/Dissertation Writing I; GRE411: Greek for academic purposes/Dissertation Writing II.

(D) Pedagogical Approach

My pedagogical philosophy is underpinned by social constructivism and constructionism (Papert, 1980; 1991; 1993). I believe that learning can happen most effectively when people are collaboratively active in making tangible objects in the real world or in the world of the computer. In this sense, constructionism is connected with experiential learning. In my classroom I endeavour in engaging students in challenging authentic real-life situations in which they bring theory and action together with an aim of constructing a tangible artifact. I also place special emphasis on student-teacher relationships, recognising also the participatory nature of the learning process for both student and teacher. I present myself as a knowledgeable collaborator rather than an information provider; nurturing a classroom environment in which students' thoughts and questions become tools for substantive discourse.

I believe that technology enables the development of constructionist learning environments, in which students can engage in collaborative construction of an online artifact and make maximum use of their own cognitive potential. Computer literacy is enhanced through computer assisted tutorials and research of online resources.

Administrative Duties

An important administrative role in my case is the development and coordination of several Greek language courses offered at the Cyprus University of Technology Language Centre (CUT LC), under the supervision of the CUT LC director. Moreover, as a PhD candidate I am also involved in several committees and associations such as the senatorial committee of post-graduate studies, through which I put forward the needs of doctoral students and young researchers. Finally, I am a co-founder and membership chair of the first Association of Computing and Machinery–Women (ACM-W) Chapter in Cyprus aiming at engaging women in exciting computing activities. More specifically my administrative duties include:

11/2014 – present	Founder and membership chair of ACM-W Chapter (Cyprus)
11/2012 – present	Secretary of the Association of PhD Candidates of Cyprus
01/2011 – present	Member of the committee that represents the PhD Candidates of the Cyprus University of Technology at the Association of PhD Candidates of Cyprus
02/2014– present	Member of the Gender Equality Committee of the Cyprus University of Technology
09/2009 – present	CUT LC Greek Courses Coordinator, under the supervision of the Cyprus University of Technology Language Centre Director
03/2013 – 06/2014	Member of post-graduate studies university committee
04/2013	Member of the Evaluation Committee of the annual competition related to the creation of Computer Games "Logipaignion 2013" Role: Evaluation of submitted computer games in the category: Secondary Education
12/2012	Member of the CUT LC committee for the preparation of Master in Computer-Assisted Language Learning
09/2012	Member of the CUT LC committee for Intercultural Education. The committee has been co-operating with the Ministry of Education and Culture with an aim to integrate elements of intercultural education in the teaching of Greek as a second language in primary education

01/2011	Member of the CUT thesis' and dissertations' committee representing the CUT LC in determining the structure of graduate dissertations.

Appendix 3: List of publications

(I) Refereed Journal Papers

1. **Parmaxi, A.**, & Zaphiris, P. (2015). Computer mediated communication in Computer-Assisted Language Learning: Implications for culture-centered design. *Universal Access in the Information Society Journal.* DOI: 10.1007/s10209-015-0405-4
2. **Parmaxi, A.**, & Zaphiris, P. (2015). Developing a framework for social technologies in learning via design-based research. *Educational Media International*, *52*(1), 33-46, DOI:10.1080/09523987.2015.1005424
3. **Parmaxi, A.**, & Zaphiris, P. (2015). Specifying the dynamics of social technologies as social microworlds. *Behaviour & Information Technology*, *34*(4), 413-424, DOI:10.1080/0144929X.2015.1004650.
4. **Parmaxi, A.**, Zaphiris, P., Papadima-Sophocleous, S. & Ioannou, A. (2013). Mapping the landscape of Computer Assisted Language Learning: An inventory of research. *Interactive Technology and Smart Education Journal*, *10*(4), 252-269. DOI:10.1108/ITSE-02-2013-0004
5. Michailidou, E., **Parmaxi, A.** & Zaphiris, P. (2014). Culture effects in online social support for older people: Perceptions and experience. *Universal Access in the Information Society Journal*, *14*(2), 281-293. DOI: 10.1007/s10209-014-0346-3

(II) Book Chapters

1. Papadima-Sophocleous, S., & **Parmaxi, A.** (2012). The use of wiki in teaching and learning Greek as a second language for Specific Academic Purposes: challenges and future perspectives. In J. Burston, D. Tsagari & F. Doa (Eds.), *Proceedings of the 1st Conference on Foreign Language Instruction and Technology: Theory & Practice* (128-139), Nicosia: University of Nicosia Press.

(III) Refereed Conference Publications

1. **Parmaxi, A.**, & Zaphiris, P. (2015). Technology disrupting learners' and teachers' practices in Computer-Assisted Language Learning. In *Proceedings of INTED2015 conference* (pp. 2828-2837). Madrid, Spain.
2. **Parmaxi, A.**, & Vasiliou, C. (2015). Communities of interest for enhancing social creativity: the case of Womenpower platform. In *Proceedings of INTED2015 conference* (pp. 2838-2847) . Madrid, Spain.
3. **Parmaxi, A.,** & Zaphiris, P. (2014). Affordances of social technologies as social microworlds. In *CHI'14 Extended Abstracts on Human Factors in Computing Systems* (pp. 2113-2118). New York, USA: ACM Press. Available from: http://dl.acm.org/citation.cfm?doid=2559206.2581267
4. **Parmaxi, A.,** & Zaphiris, P. (2014). The evolvement of constructionism: an overview of the literature. In Learning and Collaboration Technologies. Designing and Developing Novel Learning Experiences (pp. 452-461). Springer International Publishing.
5. **Parmaxi, A.** (2014). Framing the use of social technologies towards social constructionism. In 1st ACM-W Europe womENcourage Conference, Manchester, UK [peer reviewed; presented as poster]. Available from: http://womencourage.acm.org/archive/2014/PostersPDFs/083_ParmaxiAntigoni.pdf
6. **Parmaxi, A.,** Zaphiris, P., Michailidou, E., Papadima-Sophocleous, S., & Ioannou, A. (2013). Introducing new perspectives in the use of social technologies in learning: Social constructionism. In P. Kotzé et al. (Eds.), *Proceedings of INTERACT 2013, Lecture Notes in Computer Science* (Vol. 8118, pp. 554-570). Springer.
7. **Parmaxi, A.** (2013). Using social technologies in Computer-Assisted Language Learning: development of a theoretical and methodological framework. *Doctoral Consortium of the 8th European Conference on Technology Enhance Learning* (EC-TEL), Paphos, Cyprus.
8. **Parmaxi, A.,** Kyriacou, S., Stylianou, C., Zaphiris, P. & Papadima-Sophocleous, S. (2013). Using phenomenography to compare the variations of language teachers'

and learners' attitudes towards Computer Assisted Language Learning. *4th WorldCALL Conference*. Glasgow, UK.

9. **Parmaxi, A.,** Zaphiris, P., Papadima-Sophocleous, S., & Ioannou, A. (2013). Charting recent development in Computer Assisted Language Learning. *4th WorldCALL Conference*. Glasgow, UK.
10. Kawase, R., & **Parmaxi, A.** (2013). Online student engagement as formative assessment. Workshop on Technology-Enhanced Formative Assessment (TEFA) 2013, *8th European Conference on Technology Enhance Learning* (EC-TEL), Paphos, Cyprus.
11. Papadima-Sophocleous, S. & **Parmaxi, A.** (2013). Cyprus language centres: Profiles and survival strategies in an era of diminishing resources. *8th National AICLU Conference*. Foggia, Italy.
12. Kyriacou, S., **Parmaxi, A.,** Stylianou, K. & Zaphiris, P. (2012). Using phenomenography to capture the variation of students' attitudes towards Computer Assisted Language Learning. 15th International Conference on Applied Linguistics. Thessaloniki, Greece.

(IV) Technical Report

1. Papadima-Sophocleous, S., Nicolaou, A., Boglou, D., **Parmaxi, A.** (2015). *Multilingualism in Limassol LUCIDE city report*. ISBN: 978-1-909890-15-2