ADVANCES IN DIGITAL LANGUAGE LEARNING AND TEACHING

TASK-BASED LANGUAGE LEARNING IN A REAL-WORLD DIGITAL ENVIRONMENT

THE EUROPEAN DIGITAL KITCHEN

Edited by Paul Seedhouse

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Contents

List of Illustrations vii
Notes on Contributors x
Acknowledgements xiii
Transcription Conventions xiv

Part 1 Background

1 Introduction *Paul Seedhouse* 3
2 Locating the European Digital Kitchen in Its Research Context *Sandra Morales* 19

Part 2 Design

3 The Pedagogical Design of the Digital Kitchen *Paul Seedhouse* 45
4 The Technology behind the European Digital Kitchen for Language Learning *Paul Seedhouse* 69
5 The Human Viewpoint and the System's Viewpoint *Natacha Niemants and Gabriele Pallotti* 99

Part 3 Implementation

6 Assessing and Promoting Language Development in an Interactive Learning Environment *Jana Roos, Nina Reshöft, Lea Hartung and Johanna Bußwinkel* 137
7 Cooking, Interaction and Learning: The Finnish Digital Kitchen as a Language Learning Environment *Salla Kurhila and Lari Kotilainen* 157
8 'The More I Cook, the More I Learn': Tracing Ava's Learning Itinerary through Her Participation in Four Cooking Sessions *Dolors Masats, Marta Juanhuix and Javier Albines* 181
9 Vocabulary Learning in a Real-World Digital Environment *Gabriele Pallotti, Natacha Niemants and Paul Seedhouse* 207
10 Sight and Touch in Vocabulary Learning: The Korean Digital Kitchen *Jaeuk Park and Paul Seedhouse* 231

Part 4 Conclusions

11 Conclusions and Future Developments *Paul Seedhouse* 261

Index 283

Illustrations

Figures

2.1	Development of the EDK	31
3.1	Example of slide in audio-visual vocabulary slideshow (screenshot)	51
3.2	This image relates to line 10	52
3.3	Example of cooking instructions with specific cooking terms	54
3.4	Example of prompts for the learners	54
3.5	This image relates to line 500	56
3.6	Example exercise from the post-task	59
3.7	The graphical user interface (GUI)	60
3.8	Mixing the ingredients	64
4.1	Wireless accelerometer sensors	71
4.2	Sensors attached to objects	72
4.3	The tablet in its casing	73
4.4	Interaction tools	76
4.5	Overview of the system	76
4.6	The authoring tool interface	82
4.7	Selecting sensors for the success conditions	83
4.8	Pre-task activity outline with supports	91
4.9	During-task activity outline with supports	93
4.10	Help 2 multimedia gloss in the pre-task phase	94
4.11	Help 3 multimedia gloss video in the during-task phase	94
4.12	Summary of materials design activities	96
5.1	Pair 20 (Recipe 2, Step 25) Help 1 Available	122
5.2	Pair 20 (Recipe 2, Step 25) Help 1 Taken	126
5.3	Pair 20 (Recipe 2, step 25) Help 2 Available	127
5.4	Pair 20 (Recipe 2, Step 25) Help 2 Taken	128
6.1	Pair 24 - Making scones	145
6.2	Pair 11 - Making “Milchreis”	147
6.3	German pre-test/post-test for Milchreis (prepositions)	151
6.4	German pre-test/post-test for Milchreis (verbs)	151
7.1	Pointing gesture, extract 2b, line 7	163

7.2 Dana gazes at the tablet, extract 4b, lines 1–2 171
7.3 Dana and Alex look at each other, extract 4b, lines 4–5 171
7.4 Walking towards the cooker, extract 4b, line 6 172
8.1 Utensils and ingredients have inserted or attached sensors 185
8.2 Interacting with the kitchen 190
8.3 Measuring gesture 194
9.1 The test cycle and the task cycle 212
9.2 Red and green interaction tools 212
9.3 Help 2: multimedia gloss in the pre-task phase 213
9.4 Help 3: multimedia gloss video in the during-task phase 213
9.5 Lexical production scoring protocol (spoken) 218
9.6 Study 1: mean score on 16 items in pre, post and delayed-post test 220
9.7 Study 1: scores for 'sieve' and 'milk' in pre, post and delayed post-test 221
9.8 Study 1: activities undertaken by learners between the post and delayed-post test 221
9.9 Study 2: pre- and post-test scores for individual lexical items in Recipe 1 225
9.10 Study 2: pre- and post-test scores for individual lexical items in Recipe 2 226
10.1 Mixed methods approach 233
10.2 Mixed methods data sequencing 234
10.3 Original experimental design to be adapted 235
10.4 Groups in relation to variables 236
10.5 A representation of the final adapted quasi-experimental design 236
10.6 Carrying out the task 238
10.7 Pre-task in the classroom 239
10.8 The during-task in the classroom 239
10.9 The post-task in the classroom 240
10.10 Task and test procedures 242
10.11 Productive pre-test, post-test and delayed-post-test in the KDK: name the object 243
10.12 Receptive immediate and delayed post-tests in KDK: Matching labels to objects 244
10.13 Productive pre-test, post-test and delayed-post-test in the classroom: Name the object 245
10.14 Receptive immediate and delayed post-tests in the classroom: Matching labels to objects 245

10.15 A comparison of overall vocabulary gains in the KDK and classroom 246
10.16 Vocabulary gains in KDK and classroom settings 252
11.1 The authoring tool interface 265
11.2 Techniques for attaching sensors to equipment 269
11.3 The task and test cycles 275
11.4 A sensor log 277
11.5 The ELAN multi-tier transcription format combining human talk and action with the system's actions 278
11.6 Enjoying the kitchen task 279

Tables

2.1 TBLT in the EDK 24
3.1 Task design features of the FDK 48
4.1 EDK task design components 90
6.1 LanCook descriptors for listening comprehension based on the CEFR 140
6.2 Results for Learners 3 and 4 (prepositions) 152
6.3 Results for Learners 3 and 4 (verbs) 154
9.1 Study 1, mean and standard deviation scores 220
9.2 Study 1, statistical significance in relation to the tests 220
9.3 Study 2, recipe 1, mean and standard deviation scores 224
9.4 Study 2, recipe 2, mean and standard deviation scores 224
9.5 Study 2, all participants, mean and standard deviation scores 224
10.1 The number of international languages used by participants 237
10.2 Vocabulary test results (whisk) 241
10.3 Mean differences between pre-test, post-tests and delayed post-tests 247
10.4 Languages and scripts used in the transcripts 248

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Transcription Conventions

Punctuation marks are used to capture characteristics of speech delivery, not to mark grammatical units.

[	indicates the point of overlap onset
]	indicates the point of overlap termination
=	if inserted at the end of one speaker's turn and at the beginning of the next speaker's adjacent turn, it indicates that there is no gap at all between the two turns
(3.2)	an interval between utterances (3 seconds and 2 tenths in this case)
(.)	a very short untimed pause
word	underlining indicates speaker emphasis
e:r the:::	indicates lengthening of the preceding sound
-	a single dash indicates an abrupt cut-off
?	rising intonation, not necessarily a question
!	an animated or emphatic tone
,	a comma indicates low rising intonation, suggesting continuation
.	a full stop (period) indicates falling (final) intonation
CAPITALS	especially loud sounds relative to surrounding talk
° °	utterances between degree signs are noticeably quieter than surrounding talk
↑ ↓	indicate marked shifts into higher or lower pitch in the following utterance
><	indicate that the talk they surround is produced more quickly than neighbouring talk
( )	a stretch of unclear or unintelligible speech.
(guess)	indicates transcriber doubt about a word
[gibee]	in the case of inaccurate pronunciation of an L1/L2 word, an approximation of the sound is given in square brackets
[æ]	phonetic transcriptions of sounds are given in square brackets
<>	indicate that the talk they surround is produced slowly
S1/S2	Student No. 1 or 2
RA	Research Assistant
KIT	The Kitchen
((*text*))	indicate a turn performed as a gesture
((*text*))	Transcribers' comments
(xxx)	indicate an uncomprehensible fragment

The Kitchen (KIT) is treated as one of the participants. Hence, its verbal turns are represented as plain speech (including pauses, emphasis etc.):

KIT:	no (.) this is the knife

The kitchen's non-verbal actions (such as help availability, success sounds or the display of pictures) which are designed to be overtly available to participants are encoded in double brackets.

KIT:	((help 2 picture))
KIT:	((success sound))
H1	The system is indicating that help level 1 is available

Part One

Background

1

Introduction

Paul Seedhouse

This chapter provides information about the background to the European Digital Kitchen (EDK) project, its motivation, rationale and the real-world challenges which it seeks to tackle. It introduces the central argument of the book. Although individual projects may be ephemeral because of the pace of technological change, the analyses in this collection draw out general principles and a model in relation to real-world, pervasive environments for language learning employing digital sensor technology and a task-based approach. These principles may then continue to be applied to other such environments for language learning (and other areas of learning) which may be built in the future. An overview of the sections and chapters which form the collection is provided, introducing the reader to how pedagogical and technological designs complement each other, as well as to areas of research interest.

Aims of this book

This book explains how a real-world, pervasive digital environment for language learning was conceived, designed, built, trialled and researched. How can the latest digital technology be used to create an environment in which people can learn European languages while performing a meaningful real-world task and experiencing the cultural aspect of learning to cook European dishes? This book explains how to do this from A to Z, covering how a digital environment for language learning was designed, built and researched, as well as revealing what actually happens in practice in terms of the learning experiences of users in five European countries. The project aimed to make language learning motivating by tapping into people's interest in both cooking and technology – you can

learn a language while cooking and interacting with a speaking digital kitchen. The book explains the design and implementation principles and procedures involved, enabling readers to design and implement a real-world digital learning environment themselves in the same way. In-depth research studies show how the system was actually implemented in five different European countries with seven different languages (plus Korean) and with different types of learners. There are numerous photographs of the system in use and evidence of how and what 250 users actually experienced and learnt throughout the project. The research studies illustrate both the process of language learning in this environment as well as the product in terms of measurable gains in language proficiency. We demonstrate how a framework for researching language learning must be integrated into the design of the digital environment itself. The book is written for readers with a background and interest in applied linguistics, as well as educational technology or pervasive computing. We intend it to be particularly useful for postgraduate students and researchers who are planning to create a digital environment for language learning themselves. To make the study relevant, we draw out general principles and a model in relation to real-world, pervasive environments for language learning employing digital sensor technology and a task-based approach. These principles may then prove useful for application to other environments for language learning (and other disciplines) in the future.

Origins and rationale of the project

In this section we explain how the project (or rather, three related projects) started and developed, as well as our reasons for choosing a kitchen environment and cooking as an appropriate task for language learning. Before we do so, we will unpack the terms 'pervasive', 'real-world' and 'digital'. By digital we mean that a digital computer system communicates with learners and tracks their physical actions through digital sensors embedded in the utensils and ingredients which they manipulate. By real-world, we mean that users are actually in a real kitchen cooking real food, as opposed to virtual digital environments which simulate reality. By pervasive we refer to an application of digital technology which is familiar to the vast majority of people in developed countries, but which has not yet had much impact on language learning, namely pervasive computing. In this field, the technology is intended to retreat into the background, providing timely advice, help and feedback whenever necessary to enable users to perform a task. Readers will be familiar for some years now with

the experience of having a computer giving them verbal instructions while they are performing the important task of driving a car (satellite navigation). The digital system, aided by satellite signal data, tracks their progress in the task and provides timely, context-specific feedback. So although pervasive computing has become firmly embedded in our everyday life in the case of some of our daily tasks, its potential has so far not been fully realized in the field of language learning. Weiser (1991) introduced ubiquitous computing (Ubicomp) as an approach 'that takes into account the natural human environment and allows the computers themselves to vanish into the background'. There are a number of similar terms used to describe similar approaches, including 'pervasive', 'ambient', 'everyware'. In this book we follow Ogata's (2008) classification of digital learning environments and use the term pervasive as one particular type of ubiquitous environment. The digital kitchen is a computer-supported pervasive learning environment in that it has a high level of embeddedness in a context, but a low level of mobility. In other words, the technology is designed to function in an ordinary kitchen.

What is the point of trying to create a pervasive, real-world digital environment for language learning? First, a number of well-known problems relating to classroom foreign language teaching are addressed by this project. The universal problem of classroom language teaching is that student rehearse using the language, rather than actually using the language to carry out real-world actions. In the digital kitchen, languages are learnt by physically carrying out a cooking task which engages all of the five senses. Second, there is the difficulty of bringing a foreign culture to life in the classroom, and cuisine offers a window into this culture: 'The relationship among language, food and culture in a society is an inextricable one' (Ayeomoni 2011: 51). In the digital kitchen environment, we intend that learners will be able to learn aspects of the language multimodally while performing a meaningful and enjoyable real-world task and will simultaneously experience the cultural aspect of learning to cook a foreign dish. Third, there is the issue of how to motivate people to learn languages. One solution is to tap into existing motivations, and one such is cookery. Currently there is a huge interest throughout the European Union in cooking, as can be seen in the number of cookbooks sold and the number of cooking programmes on TV. Many adult learners are motivated to learn European languages through their interest in cuisine and culture, and this project taps into this motivation. Also, many people find technology an inherently motivating tool for learning, as evidenced by the plethora of digital materials available for learning via a variety of platforms. Multimodal technology involving physical activity (such as Nintendo Wii

™) is particularly popular, and this project employs similar accelerometer sensor technology to track physical movements in three dimensions. User feedback indicates that many found the technology inherently motivating: 'Wonderful technology'; 'The sensors were cool'; 'I said that it was fun to do and that it's great that you can do something practical whilst learning languages and different recipes and I really like the idea and the technology.' Fourth, the pedagogical design employs task-based language teaching (TBLT), a well-researched approach to language learning, which prompts learners to achieve a goal or complete a task. So far TBLT has predominantly been based on tasks to be undertaken within the classrooms which simulate real-world tasks. Some innovations in TBLT have combined language learning with other, non-linguistic skills in a similar way to this project. Paterson and Willis's (2008) *English through Music*, for example, aims to help children to absorb English naturally as they enjoy making music together. There have been few attempts to employ TBLT in naturalistic settings outside the classroom; the project described here is innovative in combining TBLT and digital technology in a naturalistic kitchen setting outside the classroom. Given the emphasis of the authentic task within TBLT, we have used the kitchen environment as a learning context since the act of cooking a meal is an authentic task with a clear goal and end product. Finally, it means that language learning can be normalized or integrated into everyday activities, such as cooking. One does not necessarily need to take time out of everyday life in order to learn some aspects of a foreign language. Pervasive computing specialists believe that digital sensors will be embedded throughout the homes of the future. We will therefore be able to tell our home what we want to do and it will be able to provide us with help and guidance for everyday tasks such as cooking food, carrying out a repair, travelling and so on. The technology to achieve this is already available and can be adapted to integrate language learning into the task. So, one aim of the project is to establish whether language learning can in principle be normalized by integrating it into everyday activities such as cooking at home.

This project also engages with challenges at national and international levels. A significant challenge for the UK is how to improve the declining foreign language proficiency of its workforce. The number of pupils gaining a qualification in a foreign language has decreased significantly, while a recent British Academy report discussed concerns that the future of the UK's world-class research base might be threatened because of the decline in foreign language learning. At the same time, the EU has recognized the problems that Europe faces in increasing foreign language proficiency, as the number of languages increases with new member states. The EU therefore promotes projects which try to increase social

and professional mobility between member states and the integration of the large number of migrants currently entering the EU. At the international level, globalization of world economy, mass international travel and conflicts place a premium on projects which promote greater understanding and tolerance of other languages and cultures.

We believe that pervasive digital computing, in combination with the real-world task of cooking, offers an appropriate means of addressing these problems and challenges. We therefore developed a series of digital kitchens, projects which involved taking a normal kitchen and adapting it by using digital sensor technology. In the Ambient Kitchen project (2007–2014), a host of pervasive sensors (including RFID, floor pressure and embedded accelerometers) were designed to monitor activity in the kitchen to assist dementia sufferers (Olivier et al. 2009). The system analysed the sensor data to attempt to identify breaks in task progression, so that assistive prompts could be given. When Paul Seedhouse and Patrick Olivier discussed the Ambient Kitchen, it became clear that the technology could be adapted to language learning, since cooking was both an appropriate task for the implementation of a TBLT approach and an interesting way of exploring foreign culture in tandem with a foreign language. In the French Digital Kitchen project (2010–2012), the Ambient Kitchen was therefore re-specified to create a language learning environment for British learners of French (Seedhouse et al. 2013). We used objects instrumented with accelerometers and activity recognition of the way objects were manipulated to inform the system of user actions, together with pre-recorded audio prompts and a user interface for interaction. In the EDK project (2011–2014), we expanded the system to seven languages and five countries and employed photo and video tools to explain unknown words to users. We simplified 'activity recognition' to object movement, as focus on specific cooking techniques was not required. We also developed an authoring tool to enable users to create their own recipes in different languages. We constructed a real-world, purpose-built kitchen (figure 1.1) that communicates with learners in a European language and gives them step-by-step instructions on how to prepare cuisine.. Digital sensors are inserted in or attached to all the kitchen equipment and ingredients, so the digital kitchen detects what learners are doing and gives them feedback, rather like sat-nav in cars. Learners are also able to communicate with the kitchens and can ask for help (photos, videos) if they don't understand any foreign language words. Chapter 4 gives a more detailed account of the evolution of this technology.

We chose to use a kitchen because cooking is a task which has considerable resonance with both language and culture. Cooking allows learners to

immerse themselves in an everyday real-world task with a tangible (and edible) product; the technology should operate facilitatively in the background. We designed the kitchen to support independent, autonomous, collaborative learning – that is, to be used by pairs of learners without the presence of a teacher. The requirement for users to cooperate in the cooking task should generate spoken interaction. The kitchen as a setting provides a tangible connection to what Skehan referred to as 'real-world activities' (1998: 95), where authentic language is used for communicative purposes and a real-world task outcome is seen in terms of a European dish, which is eaten at the end of the task. The notion of cooking as pedagogy or experiential learning has been specifically explored by cultural anthropological approaches as an activity involving 'multisensory experiential learning' (Trubek and Belliveau 2009: 16). The kitchen is seen to 'engage students at an almost instinctive level; the smells, sounds, sights, textures and tastes excite senses and intellects' (2009: 16). One strand of our research has been to investigate how well students can learn new vocabulary when physically touching and manipulating utensils and ingredients and this is reported in chapter 9. The very clear evidence is that being able to touch and manipulate objects in a meaningful task makes a significant difference to vocabulary learning of those objects. The physical nature of the kitchen task provides immediacy relating to all of the senses: sight, sound, smell, touch and (in the post-task) taste. A kitchen setting is therefore eminently suitable for multimodal language learning. The digital kitchen is intended to offer a language learning environment which is not only multimodal but multisensory as well as a part of learners experiencing aspects of the foreign culture and cuisine. The physicality of the experience is intended to enhance learner motivation and interest. TBLT has in the past sometimes been criticized for failing to produce enjoyable, motivating and engaging classroom tasks for learners. The EDK project started the design process by identifying a real-world task which people in all cultures find engaging and enjoyable; the evidence for this is the popularity of cooking programmes on TV around the world. The cooking task is enjoyable and engaging because it involves all five senses, because it is an act of creation in which you are actively involved and because you can consume what you produce. Cooking is not only a universal task which is important in all cultures, but also provides a window into that culture: 'Food is a central activity of mankind and one of the single most significant trademarks of a culture' (Kurlansky 2004: 11). In the EDK, users have the novelty of learning a new cuisine, culture and language all at the same time as a form of integrated learning.

Figure 1.1

From a technological viewpoint, our main focus has been on how the situated nature of language instruction (timeliness and in context of the tasks) could be supported by technology. In broader terms, the project explores how technology can be used to perform real-world and culturally engaging tasks via the medium of a foreign language and also provides an example of how two rather different sets of skills (language and cooking) may be acquired at the same time by use of appropriate technology.

Although some of the chapters focus on the technological development of the system, the EDK needs to be understood as a real-world environment for language learning in which learners make active choices as to which aspects of that environment they are going to employ to help them complete their task. The system is of course a key component of that environment. However, the evidence detailed in this book is that learners make use of a number of other environmental supports, depending on their own learning styles, strategies and prior knowledge of L2 and of cooking. In chapters 3, 7 and 8, we see how participants make use of their partners to collaborate in both the cooking task and the language learning task. Chapter 3 demonstrates how learners are able to exchange relevant skills with each other. Chapter 7 examines in detail how

learners collaborate to manage language learning, while chapter 8 shows how the performance of an individual learner over four sessions varies according to the learner she is partnered with. As seen in figure 1.1, the real-world kitchen environment provides a rich, multisensory, multimodal and stimulating learning environment of ingredients and equipment. For example, learners who do not know the French word 'gousse de vanille' and had never seen a vanilla pod before, were nonetheless able to jointly find and identify a 'pod of vanilla'. In a post-task interview a participant pointed out that 'unfamiliar words were generally easy enough to work out from the context'.

The main argument

The main argument of the book is this: Individual projects may be transient due to the rapidity of technological innovation. Nonetheless, the studies in this book delineate general principles and a model for the development of real-world, pervasive environments for language learning which use digital sensor technology and TBLT. These principles are then applicable to the development of other such environments for language learning (and other disciplines) in the future. The key features of any pervasive, real-world digital environment for language learning are:

- Participants physically carry out real-world tasks (using real-world equipment) which are embedded in everyday, real-world contexts such as a kitchen, an office or a shop. The task can be broken down into a series of specifiable physical actions.
- Participants should receive some L2 input from some source and be able to learn some aspects of the L2 by performing the task.
- Participants physically touch and manipulate real-world objects while carrying out the task, have the opportunity to learn the L2 names of these objects (as well as the processes involved) and may be evaluated on their learning if required.
- The digital system can track how participants are carrying out the series of physical actions which constitute the task via a number of digital sensors embedded in the environment.
- The technology is designed to facilitate performance of the task but is not the focus of the activity – it remains in the background.
- The system provides timely instructions, feedback, help and tips to users to enable them to perform the task. The feedback facilitates multimodal and multisensory learning by use of audio, photos and videos.

- The learning environment provides a range of possible supports or scaffolds to cater for a variety of learning styles and L2 proficiency levels, and learners can decide for themselves which to make use of.
- Participants can ask the system for help or for explanations, but are not obliged to.
- Participants may work in pairs or groups and tasks may be designed to promote interaction between them in L1 or L2.
- There should also be a real-world outcome, for example, drawing a picture, singing a song.
- A task cycle should be planned, consisting of pre-task, during-task and post-task.
- If testing of language learning is required, there should be careful planning of how the testing cycle relates to the task cycle (see Chapter 9, figure 9.1).
- Evaluation of language learning is integrated into the experience in some way so that participants (and others) can see what has been learnt.
- Consideration should be given to how evaluation of learner performance can be undertaken and related to the Common European Framework of Reference for Languages (CEFR). Chapter 6 provides examples of how to relate performance to Can Do descriptors and CEFR bands.
- It is a good practice to develop an authoring tool so that materials can easily be developed for other languages.
- The task employed should be a motivating and engaging one.

It is essential that a framework for researching both the process and the product or the effectiveness of language learning is built into the structure of the environment itself from the beginning rather than as an afterthought.

These principles are intended to guard against obsolescence in the future; the tasks that people wish to learn will change, as will the technology, but the principles may be adapted to these. During the course of this book, we explain how the EDK project developed procedures, systems and materials based on the above principles. We will return to these key features again in the concluding chapter in order to evaluate how these features have been put into practice.

The design and structure of the book

In this section I explain how the book is structured, how pedagogical and technological designs complement each other and how the diverse component chapters are intended to cohere to form a whole. The whole book is pedagogically

conceived as a case study which will enable others to design and implement a real-world pervasive digital learning environment using a task-based approach. It is intended to be particularly useful as a model for students of pervasive computing who are required to develop real-world applications as part of their studies. At Newcastle University, for example, year 1 Computing Science undergraduate students produce language learning apps for their end-of-year projects. Conversely, students of applied linguistics or education who are interested in developing applications of digital technology should also find this model useful. Moreover, the book serves as an example of interdisciplinary collaborative work on the development of digital learning environments. In their chapter conclusions, all chapter authors relate their findings to the bigger picture such as: What can their chapter tell others about how to design and implement a real-world digital learning environment? What general lessons can be drawn and what advice might be given to others?

The analyses of data and the discussions in this collection draw out general principles and procedures in relation to real-world digital environments for language learning employing digital sensor technology and a task-based approach. Chapter 11 summarizes these principles and procedures, and condenses them into an explicit model, which may then be used to design and implement future real-world pervasive environments for learning using digital sensor technologies. There is also a discussion of other real-world learning settings that might be suitable for approaches employing digital sensor technology and a task-based pedagogy. The research infrastructure for both the process and product or effectiveness of language learning is integral to the structure of the environment. We review the lessons learnt from the empirical research presented in this collection and arrive at a methodological model for researching language learning in real-world digital environments.

The emphasis throughout the book is on the principles and procedures of designing, implementing, researching and evaluating a real-world pervasive digital learning environment employing a task-based approach. The EDK project illustrates a successful, functioning environment, so that there is a continuous interplay between theory and practice.

This book comprises four parts. Part 1 consists of the 'Introduction' (chapter 1) and Chapter 2, which is a literature review chapter entitled 'Locating the European Digital Kitchen in its Research Context'. This chapter sets the project in the context of the research literature on language learning pedagogy and technological developments. It does so by reviewing the literature on Computer-Assisted Language Learning, Human-Computer Interaction and language

learning and teaching. The project is portrayed as drawing on a number of research traditions and methodologies, which are adapted to develop project aims. The chapter identifies the areas in which the project is innovative, as well as the ways in which it builds on previous work.

Part 2 discusses the design of the environment and consists of three chapters which cover pedagogical, interactional and technological aspects of the design process, as well as how these can be analysed and researched. Chapter 3 covers pedagogical design and explains the pedagogical principles underlying the system, materials and procedures. The project employs the principles of TBLT. Tasks are divided into three phases: pre-task, during-task and post-task, providing a clear design structure for materials, for conduct of sessions and for evaluation of performance. It is argued that the project attempts to realize some of the advantages of TBLT using digital technology in a real-world setting outside the classroom. The chapter explains and exemplifies how the concepts and principles of TBLT have been operationalized in the digital kitchen setting, from the pedagogical perspective.

Chapter 4 explains the technology used in the EDK project, assuming a non-specialist readership. We look at how the technology was designed and developed to deliver specific environmental features for the EDK, and how materials were designed to work with the technology. There is particular emphasis on two technological aspects: How does the system recognize what is going on in the kitchen? How can the system present appropriate materials to the users at the right time, thereby promoting language learning, interaction and effective cooking?

The technological components of the pervasive system consist of the sensors, the tablet with its graphical user interface and the interaction tools. The authoring tool allows materials to be uploaded onto the system. The principles behind the technology are described, and the TBLT principles underlying materials design for individual languages and recipes are elucidated.

Chapter 5 compares the human viewpoint and the system's viewpoint, describing how the same real-world language learning session is 'seen' from two different points of view; the human users' and the digital systems. Two transcripts are placed side by side, one containing the users' verbal and nonverbal actions, the other showing sensor logs from the system, that is, evidence of who did what and when. This contributes to an understanding of what type of 'communication' takes place in an EDK cooking session, with implications for redesign and technology development. We also see how a task is implemented from both perspectives. This chapter demonstrates how a session in a real-world

digital environment can be seen as a case of communication between computers and humans, which is best understood if the reader is aware of the perspectives of both sides.

Part 3 provides a detailed research picture of how the digital environment was implemented in five countries with 250 learners and presents a range of data and perspectives which explain how it works from a user's perspective. The digital kitchen environment is a complex one, involving users across a range of experiences. Therefore, the contributing authors have employed a range of research methodologies and both quantitative and qualitative approaches to investigate both the product of learning (in terms of gains) and the process of learning. The studies have focused on a range of phenomena in order to do justice to the multiplexity of experiences. The chapters investigate listening skills, the learning experience, the progress of an individual, vocabulary learning and comparing the human and system viewpoints.

Chapter 6 investigates the assessment and development of listening skills. One of the key competences promoted through the EDK is listening comprehension. By listening to the digitized cooking instructions in the target language, learners at different competence levels are guided in the preparation of one food item and achieve an outcome, namely the preparation of a dish typical of a European country related to that language. As they implement the procedure, learners demonstrate how well they can understand and follow the instructions. Examples taken from audio-visual data collected during cooking sessions in the German Digital Kitchen are presented. They are analysed in relation to specific descriptors for listening and receptive skills developed for the EDK. The descriptors are related to the scale for overall listening comprehension in the CEFR. The data illustrate that assessing learner data in this way can serve two different purposes. First, it is possible to rate the learners' linguistic performances during the cooking sessions. Second, it becomes possible to determine which future language learning goals can be identified for individual learners in order to support them in their language learning process. In the last section of the chapter, the results of a vocabulary pre-test and a post-test are presented, which exemplify how cooking in the EDK can support learners in understanding instructions and learning topic-related vocabulary.

Chapter 7 covers cooking, interaction and learning in the Finnish Digital Kitchen. The authors discuss and demonstrate how language is learned in and through interaction during the real-life activity of cooking. The data consist of video recordings from EDK cooking sessions by exchange students learning Finnish in different Finnish universities. In particular, the focus is on how

the authentic environment supports learning. Given that the participants are involved in a goal-oriented real life activity, our examples illustrate that they have great motivation to understand the language used by the computer system and perform the cooking activities in the manner requested. Thus, when confronted with a linguistic problem, students will not let the problem pass. Instead, they actively seek affordances and use both the interactional and technological resources that are available to them in the situation. For example, when the computer uses an unknown word, learners can get support from each other, or they can deduce the meaning of the word on the basis of their former knowledge and experience of cooking. It will be argued that the interactional setting and task-based nature of the EDK offers the learners resources to construct meanings and thus scaffold their understanding process.

Chapter 8 is entitled "The More I cook, the More I Learn" and traces one student's learning itinerary through her participation in four cooking sessions. The Catalan and Spanish materials for the EDK offer a variety of four dishes, two in each language. Most often, each recipe was trialled with different pairs of students. However, a few individual learners volunteered to try another one. This is the case of Ava, a French learner of Catalan, who had some knowledge in Spanish as well. As language learning is a social activity, Ava's case is an interesting one because her performance in the EDK varied, depending on who she was cooking with, and on the familiarity she gained with the system. In this chapter, we follow Ava's individual progress as a learner in the EDK. We will chronologically examine how, in each trial, she interacts with the system; her discourse is mediated both by the task instructions and by the relationship she establishes with her cooking partner; they both interpret and conduct the cooking task; she activates and puts into play her linguistic resources and repertoires, as well as the knowledge she possesses on how the kitchen works, in order to negotiate meaning and to produce the recipe.

Chapter 9 reports on how learning of vocabulary items was assessed in the English and Italian Digital Kitchens, the methods being different but complementary. In Italy the results of various questionnaires and forms of lexicon assessment were reported and supplemented with micro-genetic analyses of learning of new vocabulary items using transcript data. In England a quantitative approach was adopted, involving pre-test, post-test and delayed post-test of sixteen vocabulary items (utensils and ingredients) learnt by individuals. The results showed significant gains resulting from the learning sessions in the EDK. A combination of the two studies provides a rich and detailed perspective on one single aspect of the overall learning experience in the EDK.

Chapter 10 reports on the Korean Digital Kitchen (KDK) research project, which investigated the relative importance of sight and touch in vocabulary learning. The project involved teaching a non-European language with a different script, culture and cuisine. We attempted to disaggregate 'seeing' the objects and ingredients from the other supports in the KDK environment and took two parallel groups in a quasi-experimental design. One group carried out the standard digital kitchen cooking task as described in this book, whereas the other group carried out a parallel task in the classroom, learning the same items by looking at photographs of the objects only. This aimed to see whether there was any significant difference between vocabulary learning, which involved *seeing* the learning items only, and learning which involved *touching* and using the items in a meaningful task in the KDK environment.

Learners were able to learn Korean vocabulary items significantly better in the KDK than in the classroom for both reception and production, for both spoken and written media and in both the post-test and delayed-post-test. Being able to touch and manipulate physical objects as part of a meaningful task in the KDK involving all of the senses as well as self-organized learning helped students learn vocabulary more effectively than merely being able to see them in photographic format in a classroom. This was suggested by the qualitative analysis of the interaction and learning processes in each environment.

In Part 4, Chapter 11 draws together all of the points which emerged from the empirical evidence and discussions in the previous chapters. The analyses of data and discussions in this collection have drawn out general principles and procedures in relation to pervasive environments for language learning employing digital sensor technology and a task-based approach. These principles and procedures are summarized in this chapter as an explicit model for the future design and implementation of other real-world pervasive environments for learning using digital technologies and TBLT. The model delineates the stages and procedures involved and suggests which other real-world learning settings might be suitable for similar projects. Finally, we review the lessons learnt from the empirical research presented in this collection and present a methodological model for researching language learning in real-world digital environments.

One advantage of the EDK project is that all of its aspects have been conceived, designed, implemented and researched from scratch by the same team, including technology, pedagogy, materials, assessment procedures, research design and data analysis. This means we can be confident that learning is due to the designed interventions. Another key aspect to this project has been the

European dimension. The EDK was an EU-funded language learning project with the short name LanCook, meaning 'Learning languages, cultures and cuisines in digital interactive kitchens'. This project developed language learning materials for European languages and cuisines: English, French, German, Spanish, Catalan, Italian and Finnish. It involved partners throughout Europe: Newcastle University (UK), Università degli Studi di Modena e Reggio Emilia (Italy), Helsingin yliopisto (Finland), Universität Paderborn (Germany) and Universitat Autònoma de Barcelona (Spain). Websites in all these languages form part of the main project website www.europeandigitalkitchen.com. The five different partners involved developed and trialled new materials with a range of users linked to CEFR levels A to C; adult, higher education and vocational students as well as migrants and overseas students. This widened the range of groups for whom the materials were relevant. Furthermore, working as a trans-European consortium led to cross-fertilization of ideas concerning the relationships between language, cuisines and cultures, as well as different working practices. LanCook also engaged with many European agendas by promoting language learning, as well as linguistic and cultural diversity, in that our project provided materials in seven different European languages. The project supports development of innovative ICT for language learning, mobility across EU countries and the integration of migrant language learning. In Finnish and Catalan, our project promotes the acquisition of less-used languages. With the development of the authoring tool, materials for the EDK can now be produced for any language in the world; Chapter 10 reports on the follow-up Korean Digital Kitchen project. A wealth of materials about the project, including videos of the EDK in use, can be found on www.europeandigitalkitchen.com.

References

Ayeomoni, M. O. (2011), 'Language, food and culture: Implications for language development and expansion in Nigeria', *International Journal of Educational Research and Technology*, 2 (2): 50–55.

Kurlansky, M. (2004), *Choice Cuts: A Savory Selection of Food Writing from Around the World and Throughout History*, Michigan: SOS Free Stock.

Ogata, H. (2008), 'Computer supported ubiquitous learning: Augmenting learning experiences in the real world', Fifth IEEE International Conference on Wireless, Mobile and Ubiquitous Technology in Education.

Olivier, P., X. Guangyou, M. Monk and J. Hoey (2009), 'Ambient kitchen: Designing situated services using a high fidelity prototyping environment', IPETRA

09: Proceedings of the 2nd International Conference on Pervasive Technologies Related to Assistive Environments: 1–7, New York: ACM Press.

Paterson, A., and J. Wills (2008), *English through music*, Oxford: Oxford University Press.

Seedhouse, P., A. Preston, P. Olivier, D. Jackson, P. Heslop, T. Plötz, M. Balaam and S. Ali (2013), 'The French digital kitchen: Implementing task-based language teaching beyond the classroom', *International Journal of Computer Assisted Language Learning and Teaching*, 3 (1): 50–72.

Skehan, P. (1998), *A Cognitive Approach to Language Learning*. Oxford: Oxford University Press.

Trubek, A. B., and C. Belliveau (2009), 'Cooking as pedagogy: Engaging the senses through experiential learning', *Anthropology News* 50(16), doi: 10.1111/j.1556-3502.2009.50416.x.

Weiser, M. (1991), 'The computer for the 21st century'. Available online: http://www.ubiq.com/hypertext/weiser/SciAmDraft3.html. (accessed 19 December 2013).

2

Locating the European Digital Kitchen in Its Research Context

Sandra Morales

Introduction

Languages are essential for communication and the development of individuals, societies and cultures. Therefore, to promote second language acquisition (SLA), investigations in second language teaching and learning become relevant so as to contribute theories and practical strategies to facilitate language education. Through decades, there have been a series of debates around issues regarding *what* to teach (e.g. whether to prioritize linguistic features and/or communication, productive and/or receptive language skills) and *how* to teach languages more effectively. To this end, language teaching and learning approaches (e.g. grammar-translation, audio-lingual, communicative language teaching) have been proposed according to different theoretical perspectives (e.g. cognitive, interactional) to meet the learners' needs (Cook 2008; Hall 2011; Larsen-Freeman and Anderson 2011). Due to this variety of language teaching and learning views, the current reality of language education is that of a 'methodological eclecticism' (Hall 2011: 60), which allows educators and researchers to combine theoretical and pedagogical principles from different methods and areas of research to improve SLA.

Bearing this in mind, the European Digital Kitchen (EDK) is a multimodal innovation in language teaching and learning due to its interactive, effective and sustainable framework (Olivier et al. 2009; Hooper et al. 2012; Seedhouse et al. 2013; Seedhouse et al. 2014). The design, implementation and evaluation of the EDK incorporate principles or 'ingredients' from second language teaching and learning methods which engage learners in communicative real-world tasks through an everyday life activity such as cooking. The EDK also applies criteria

from computer-assisted language learning (CALL) in its user-friendly authoring tool, interactive interface, help options and feedback cues to scaffold learners. Furthermore, foundations from human-computer interaction (HCI), ambient technology, in particular, inform the technological choices of the EDK's software and hardware. In addition, cultural aspects of language (e.g. authentic recipes) are also considered as a means to provide learners with a genuine learning situation so as to improve their understanding of pragmatic elements of SLA.

This novel combination of pedagogical and technological properties allows learners to use the EDK outside the classroom to a more realistic context. Here, learners can work collaboratively and independently without direct guidance of a teacher. Instead, they are at the centre of their learning experience and teachers take the role of material developers (i.e. supported by the authoring tool) and facilitators of the learning process (i.e. lesson planning). In general, language learning and teaching innovations such as the EDK, involving ubiquitous computing and multimodal high tech resources, have been under-researched mainly due to their interdisciplinary nature.

The aim of this chapter is therefore to locate the EDK in its research context. To do so, we explore how languages are taught considering language teaching approaches such as communicative language teaching (CLT) and task-based language teaching (TBLT), in particular, as the main methods that support the pedagogical foundations of the EDK. The role of technology in SLA is also examined, as well as the main concepts of CALL and HCI. The principles regarding language teaching and their importance in learning with technology are discussed in order to show their contribution in SLA. They are further explored as they build up the foundation of the EDK's unique framework as an innovative resource for language teaching and learning.

Language learning and teaching approaches

For decades, language teaching and learning approaches have been a reflection of the theoretical views of certain eras (Richards and Rodgers 2001; Cook 2008; Hall 2011; Cutrim Schmid and Whyte 2014). For instance, in the 1930s, behaviouristic tendencies predominated in language teaching and learning and hence approaches such as the direct method (e.g. language association) and audio-lingual method (e.g. repetition, memorization of structures) appeared. In the 1940s, linguistic knowledge became the main indication of language proficiency, thus grammar-translation techniques (e.g. direct L1/L2 translation of

forms) were used to foster language learning and teaching. However, regardless of the grammatical accuracy that was observed, and demanded at that time, learners could mainly use linguistic features in isolation and lacked the proper knowledge to apply their competence in different communicative situations. As a result, in the 1970s, language educators shifted their teaching focus towards communication and fluency. In this sense, the learners' communicative competence (i.e. awareness of language rules and appropriate use, Hymes 1972) started to develop in language classes under the assumption that conveying messages in the target language (TL) correctly seemed to be more important than proper use of grammatical forms. In this sense, SLA was theoretically linked to how people learn their first language: immersed in an authentic environment where the language is used in order to obtain input naturally. Based upon these assumptions, the CLT approach appeared as a significant strategy to recreate contexts of 'real' communication in the second language.

Communicative language teaching (CLT)

In general terms, 'CLT is an approach to L2 instruction which is primarily meaning-based and includes attention to both fluency and accuracy' (Spada 2007: 272). To promote second language communication, teachers started to incorporate CLT into their language lessons so that their learners could be exposed to opportunities where they had to interact to know the meaning and, in turn, the forms of the language (Spada 2007; Cook 2008). Strategies such as role plays, information gap activities and situations that resembled real life were therefore applied with language learners to foster the development of language skills (Cook 2008; Hall 2011; Larsen-Freeman and Anderson 2011). At the same time, the role of teachers in CLT changed to that of a facilitator who engaged students into using the language rather than that of a knowledge authority and feedback provider.

The use of CLT in language classrooms has predominated since the 1970s (Nunan 1987; Richards and Rodgers 2001). However, its popularity has not been spared from challenges and 'misconceptions' (Spada 2007: 269). For example, debates regarding whether or not learners should use their native language (L1) as a resource to complete CLT tasks have arisen, or, more importantly, what 'judicious use' of L1 (Larsen-Freeman and Anderson 2011: 125) means and its impact in the language classroom. Also, it has been difficult for learners to getting used to the idea that feedback, something that is relevant for SLA (Hattie

and Timperlay 2007), is not given by the teachers explicitly. As CLT is learner-centred, the students can work in pairs or groups, which highlights even more the role of the teacher as a guide and not the (only) language 'expert', as students can also contribute to each others' learning. Nevertheless, this poses questions as well. How can learners use the language if they do not receive useful input that they can actually understand and use? (see notion of comprehensible input in Long 1998). Since learners in CLT should pay attention mainly to the message they want to communicate rather than the form to use to achieve that goal, a lack of linguistic knowledge might undermine their performance, causing issues in terms of, for example, language evaluation.

As the definition and use of CLT can be wide and therefore interpreted in different ways, it has been suggested (Cook 2008; Larsen-Freeman and Anderson 2011) that it can be manifested in either 'weak' or 'strong' forms. The former suggests incorporating controlled practices (e.g. grammar exercises) into CLT to provide comprehensible input that students can later use in their interactive tasks. The latter, on the other hand, suggests a more open CLT approach where learners can use the language naturally and focus mainly (or only) on the meaning of the task to achieve a communicative goal (Savignon 2007; Spada 2007; Cook 2008; Hall 2011; Larsen-Freeman and Anderson 2011). This strong version of CLT has been commonly denominated TBLT. Thus, it is possible to link the principles of CLT in the strong form with the development of the EDK. In this sense, the different cooking tasks that the users perform foster collaborative negotiation and language interaction that make language learning a more natural process.

Task-based language teaching (TBLT)

As explained earlier, TBLT derives from CLT and has gradually become popular in second language teaching and learning mainly due to its use of 'authentic tasks' to promote second language interaction and negotiation. It also fosters learner-centred, collaborative and autonomous learning as, for instance, the teacher acts as a facilitator of tasks and students take greater responsibility on their learning to complete the tasks.

Although there is no clear consensus about a standard definition of 'task', TBLT researchers agree that a task is *a means* which would systematically help the students to improve their productive and receptive language skills (Long 1985; Willis and Willis 2001; Nunan 2004). Ellis (2003: 3) differentiates tasks

options, students have time and/or input restrictions (i.e. being given specific information to do the task). On the other hand, if process options are implemented, decisions are made when the task is in progress. For instance, students use their experiences and prior knowledge to finish the task as the teacher facilitates interaction, negotiation and collaboration through pairing or group work.

The post-task stage, Ellis (2003) explains, fosters noticing and awareness of language structures. In this follow-up phase, students are able to (1) repeat the task (2) explain how they conducted the task (3) practice linguistic forms and (4) receive explicit feedback. The decisions on what techniques to use in the post-task will depend on the focus of the main task and objectives to support the experiential learning students went through while doing the task. In this sense, the post-task helps confirm grammatical competence and appropriate language use.

Like CLT, the use of TBLT presents some challenges. For instance, the lack of a standard definition of task might lead to a misunderstanding regarding both their use and usefulness as the design and implementation of a task-driven lesson will depend on how tasks are perceived. In addition, although tasks have been widely recognized for their benefits to increase interaction as they recreate 'natural communication situations', issues regarding how effective a TBLT-oriented syllabus can be in the long term have been discussed (Richards and Rodgers 2001; Seedhouse 2005; Hall 2011). As Cook (2008: 260) states, 'Task-based learning concentrates on what can work in the classroom. Its expressed goal is short-term fluency. It does not appear concerned with overall teaching goals, which are hardly ever mentioned.' It has also been suggested that TBLT could not work properly in cultures where, for example, learning is predominantly teacher-centred or the syllabus is test-oriented (Cook 2008; Hall 2011; Larsen-Freeman and Anderson 2011; Willis and Willis 2001). Due to the guiding role of the teacher, students might feel they are not receiving enough corrective feedback or even feel uncomfortable by having to increase their talk time during the lesson. Also, if students needed to prepare themselves for an evaluation, including tasks that are not related to this objective might not meet this purpose.

As discussed earlier, TBLT can pose some difficulties – like most of language teaching approaches – however, it provides a valuable student-centred framework which allows the flexible design of meaningful tasks to develop language skills. Due to this flexibility, TBLT can be combined with other L2 teaching approaches and learning resources to tackle some of the issues explained previously as a means to improve SLA. For example, in his discussion about the link between tasks and technology Skehan states:

> 'What is really exciting about the use of technology is its potential as a *source* of language learning materials and input. And in that respect, the major change in the last 5–10 years has been the emergence of the web as a colossal language-materials resource. On occasions, this may consist of resources which have been put together specifically for language learners. But the vast majority of the materials exist for other purposes, and are simply there with potential to be exploited.' (2003: 403)

Thus, digital resources can be used to support TBLT. Technological tools and materials are part of the real-world, and technology-mediated tasks can be designed and implemented to promote authentic language education. The development of the EDK therefore includes innovative multimodal technology (e.g. sensors, audio-visual materials, feedback) which facilitate task completion and SLA.

Technology uses in the digital age

As stated earlier, technology plays an essential role in today's globalized world. It is used to facilitate everyday activities (e.g. online shopping), to communicate in real time (e.g. chat), delayed time (e.g. email) and to build up personal and professional relationships (e.g. social networks).

Considering this notion of technology as 'ambient' or 'ubiquitous', the field of HCI has widely contributed to designing, implementing and evaluating digital resources (e.g. software, computational systems, mobile devices) for the benefit of technology users. Kim (2015: 1) states that 'aside from merely making the necessary computational functionalities available, the early focus of HCI has been in how to design interaction and implement interfaces for high usability. The term high usability means that the resulting interfaces are easy to use, efficient for the task, ensure safety, and lead to a correct completion of the task'. For instance, ambient technology has been used to improve people's quality of life and to promote autonomy and social collaboration. One example of this is the Ambient Kitchen (Olivier et al. 2009), a situated design developed using ubiquitous computing (i.e. sensory technology) to provide cognitive support to people with dementia. Olivier et al. suggest that kitchens in homes provide an appropriate environment to exploit pervasive technologies; thus the aim of their design was to implement a computer system to help these individuals to be more independent and transform their lives. Another example is the 'Kitchen stories' project (Terrenghi, Hilliges and Butz 2007), where researchers brought technology

to the kitchen to foster communication. The project sought to engage a group of people with different backgrounds in live cooking sessions which could be recorded and shared through a tablet PC. The findings show that participants found the experience motivating, in particular, when the cooking was done in pairs. However, there were factors, such as the level of difficulty of the recipes, the participants' prior cooking knowledge and technological skills to manage the tablet, that need to be further researched.

In terms of education, and language learning and teaching particularly, computer-mediated communication (i.e. CMC, human interaction that is supported by digital tools, according to Murray 2000) provides communication resources (i.e. virtual learning environments, blogs, discussion forums, chatrooms) which can be beneficial and motivating for SLA. In this sense, CALL has played a significant role in L2 education.

The role of technology in language teaching and learning

Technological resources have been considered enablers for innovation and interaction in language teaching and learning. Since the advent of the digital era, computers and CMC tools have been included in the language classroom as a means to support teachers and students. However, as technology develops at a rapid pace, its uses in language education change as well. For example, Warschauer (2002: 453) explains that 'the role of the computer in education has gradually been transformed from that of a *tutor* to that of *tool*'. That is, the computer is no longer a provider of information but a device with multiple resources used to get access to and create new knowledge. Therefore, in order to make use of technology effectively, educators and learners need to develop digital skills (Warschauer 2003).

Also, the use of technology in SLA has not only been supported by technological developments but also by the evolution of approaches for language teaching and learning. For example, computers have been included in language classrooms in different ways according to language learning theories and methodologies. Initially, computers were used to promote SLA through repetition and explicit grammatical exercises (e.g. Warschauer's 'tutor' role), techniques strongly linked to behaviourist learning. Later on, with the arrival of multimedia tools (e.g. sound, images), computers were used in combination with CLT principles as a means to encourage learners to communicate (e.g. Warschauer's 'tool' role). As a result, language learning and teaching became more interactive

and multimodal (e.g. use of subtitles), thus communication and negotiation in the target language was highly improved. Additionally, as technology becomes more social, CMC resources are used with other language teaching approaches, such as TBLT, to promote authentic communication and cooperative learning to foster collaborative work. Moreover, technology nowadays allows users to have access to real communicative situations in the target language. This not only facilitates language learning but also the presentation of necessary cultural and pragmatic aspects of the language. Such features are important to understand how to use the language in different contexts. Consequently, the EDK incorporates technology interactively by providing students with lexical and grammatical input and feedback and by implementing real-world materials and tasks as catalysts for interactive communication.

Language teachers and learners' role

This technological evolution has also had an influence on the profile of students and teachers. Nowadays, technology is embedded in learners' academic and personal lives. Today, technology is used inside and outside the language classroom, not only to learn and construct knowledge, but also helps learners to communicate, create their own identity and relate with their peers. These learners have been denominated 'digital natives' as they 'have spent their entire lives surrounded by and using videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age' (Prensky 2001: 1). Prensky also indicates that 'digital natives are used to receiving information really fast. They like to parallel process and multi-task' (Prensky 2001: 3), therefore, digital natives have become more technologically active and demanding to meet their learning and personal needs.

This label, however, has been cause for debate. Bennett, Maton and Kervin (2008) question the digital native concept, as they suggest not all learners have the same learning opportunities and access to technology. Warschauer (2003) also agrees that there is a technological gap (i.e. he calls it 'digital divide') in some parts of the world, particularly regarding the contact students have with technology and whether and how it is used for learning purposes. Thus, this disparity may surely affect the students' educational context. Furthermore, the fact that learners are born surrounded by technology does not necessarily mean that they actually know how to use it for academic purposes. Despite this ongoing debate, it is clear that students nowadays are more exposed to

technology than in the past. As a result, Prensky (2001) also suggests that language educators should acknowledge these characteristics and be prepared to engage students with this new profile. In L2 education, teachers, on the one hand, are aware of the students' digital role, the benefits that technology brings to their language courses and the large variety of resources available for language teaching (Egbert, Paulus and Nakamichi 2002; Hubbard and Levy 2006). On the other hand, however, they might find it difficult to apply technological resources with language learners without the appropriate digital competence (Hampel and Stickler 2005; Hubbard and Levy 2006; Compton 2009). Also, they have to be prepared to promote their students' computer literacy so that they can take better advantage of technology to learn a new language (Hubbard 2004). Therefore, teacher education in technology (i.e. either as part of a continuing professional development course or self-taught experience), becomes essential for the sustainability of digitally mediated language teaching and learning.

Thus, it is possible to say that language instruction in general has been transformed with the incorporation of technology in education. For instance, nowadays with the prolific and flexible use of mobile resources, language learning and teaching can be taken outside the limits of the classroom (Kukulska-Hulme and Shield 2008). Incorporation of mobile tools into L2 learning might help reduce not only the sometimes restrictive utilization of technological resources in educational contexts, but also the opportunities students have to practice the language. With mobile technology, for example, informal learning (e.g. gaming) can also be implemented to promote student-centred learning, language skills, learner autonomy and motivation. The EDK design, therefore, uses mobile technology resources (e.g. tablet and sensors) and principles (i.e. learning beyond the classroom) as a means to support and improve students' L2 learning in an authentic task-based environment.

Computer-Assisted Language Learning (CALL)

According to Levy (1997: 1), CALL is defined as 'the search for and study of applications of the computer in language teaching and learning'. Currently, however, as technology rapidly evolves, the term CALL has expanded and includes a wider range of resources (e.g. internet, mobile devices), which can be used for language instruction (Kern 2006; Chapelle 2010). Garret (2009: 719) states that CALL is the 'full integration of technology into language learning' and explains

them as 'embedded application resources that assist learners in performing computing operations and/or support language learning'. They state that these can be, for example, annotations, sounds or images which can promote different language skills when learners encounter difficulties conducting CALL tasks.

The second category uses the computer as a tool and incorporates authentic materials (e.g. newspaper articles, TV shows) in the language classroom. Garret (2009: 272) states that they 'characterize materials created by and for native speakers, in contrast to those created for pedagogical purposes'. The use of authentic materials for language learning can be tremendously beneficial if they are used with a pedagogical purpose. If they are applied just for the sake of using genuine communicative messages in the target language, their effectiveness may not be guaranteed. Today, the internet provides easy access to authentic resources; however, they should be chosen and implemented properly to foster SLA. In this sense, this category is related to the first one because in order to make authentic materials useful for learners, features from tutorial CALL (i.e. annotations for lexical items) might be incorporated in CALL activities to facilitate learning.

In the third category – communication CALL – technological resources from CMC are widely used to promote SLA through communicative experiences. Here, elements from social networks and mobile tools can be applied for L2 learning and teaching not only to develop language skills, but also to present the cultural aspects of the language. For example, online learning (i.e. purposeful education with technological resources) can help build communities of practice for students and teachers around the globe. This can be of great help to support language learning outside established instruction time in schools. In addition, telecollaboration applies technological resources to connect students beyond the boundaries of the language classroom as a means to promote language and cultural learning (Hauck and Youngs 2008; O'Dowd 2013). As seen, the use of communication CALL can be diverse and is not restricted to specific physical places such as the computer laboratory, school or university.

This CALL taxonomy is helpful to know which technological resources to use and how to use them accordingly. The discussion of which of these categories should be prioritized when using CALL is debatable as they are not mutually exclusive. Nowadays, it is possible to take elements from each category to improve language teaching with CALL. In this sense, the EDK applies the concept of a computer as a tutor and a tool, as the design incorporates learning resources (e.g. real L2 recipes as authentic materials) and options (e.g. feedback) provided by the software to promote collaboration and communication.

its framework, the EDK provides learners not only with immediate feedback (e.g. positive/negative), but also with options such as captions and audio-visual materials which will support the users' L2 acquisition.

Doughty and Long argue that the students' internal learning processes (i.e. interlanguage) should be paid attention to in SLA. They indicate that TBLT promotes the students processes by 'providing input that is at least roughly tuned to learners' current processing capacity by virtue of having been negotiated by them during collaborative work on pedagogic tasks' (2003: 66). Therefore, they strongly recommend collaborative and cooperative work in technology-mediated tasks. Particularly, as such tasks can be completed more productively in collaboration. This is relevant especially nowadays with the ubiquitous nature of technology and the proliferation of mobile devices and social networks. Finally the authors state that the learners' individual differences should be considered in TBLT with technology to increase SLA. In the EDK, the use of genuine cooking tasks in collaboration increase L2 learners' interaction so as to foster the use of their prior language and the input provided in the multilingual recipes.

Thus, teachers should take advantage of technological resources, as they can cater for factors such as learning styles, lesson purpose and motivation, which might have an effect on the students' learning processes. Gonzalez-Lloret (2003) implemented Doughty and Long's TBLT principles in the design of a web-based CALL tool for L2 Spanish learners. To evaluate the application, the author observed and analysed the interaction and negotiation instances among twelve English- speaking learners of Spanish. Findings show that the tool fostered negotiation of meaning and engaged the students in completing the task successfully.

Language researchers have studied the use of TBLT and technology and have made useful contributions to an increasingly growing area of study (Salaberry 1996; Collentine 2009; Hampel 2010; Sarre 2013; Ferreira et al. 2014). In 2010, Thomas and Reinders edited a selection of papers which dealt with a variety of relevant aspects of TBLT and technological resources. For example, they presented investigations regarding the design and application of tasks in technology-mediated learning environments, such as telecollaboration and virtual worlds, and how teachers can implement tasks with technological resources for L2 lessons. More recently, Gonzalez-Lloret and Ortega (2014) discuss TBLT mainly in online or blended learning contexts with CMC resources.

The epistemological tendency of TBLT and CALL research has been based on interactionist theories for SLA and, more recently, on sociocultural perspectives of language teaching and learning. However, the implementation of TBLT in CALL-mediated *and* face-to-face environments has been under-researched.

learning with technology (i.e. interaction in real-world tasks) and provide sustainable solutions for the benefit of SLA. To do so, the EDK uses tasks as the main tool for communication in a collaborative CALL environment and takes language learning outside the classroom to a genuine communicative situation. This can further support instruction that takes place inside the L2 classroom by increasing the opportunities learners have to use the language, particularly in collaboration and through experience. Furthermore, the flexible design of the EDK (later in this book) allows language teachers to adapt and create their own tasks according to their students' needs and proficiency levels. In addition, cultural language input included in the design makes the learning experience more authentic by providing the learners with background information, which will help them improve their use of language within a specific context. The computational system of the EDK further supports SLA by incorporating multimodal communication (i.e. video, sound) and help options. These give students the opportunity to control their learning and facilitate communicative interaction which, in turn, can support language learning in the long term.

For these reasons, the EDK provides sustainable and innovative properties which help to enhance language teaching and learning with technological resources. Additionally, the multimodality of the EDK in terms of language learning methods (i.e. TBLT), technology (HCI, CALL) and the collaborative application of real-world materials that activate senses (e.g. taste) make it a novel and unique object of learning and research.

Therefore, this book presents a collection of studies that shows the sustainable use, effectiveness and challenges of designing, implementing and evaluating the EDK. Following chapters will discuss its inception, development and application with language teachers and learners across five European countries in seven different languages.

Note

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References

Bennett, S., K. Maton and L. Kervin (2008), 'The "digital natives" debate: A critical review of the evidence', *British Journal of Educational Technology*, 39 (5): 775–786.

Bygate, M., P. Skehan and M. Swain (eds) (2001), *Researching Pedagogic Tasks, Second Language Learning, Teaching and Testing*. Harlow: Longman.

Chapelle, C. (2010), 'The spread of Computer Assisted Language Learning', *Language Teaching*, 43 (1): 66–74.

Chapelle, C. (2001), *Computer Applications in Second Language Acquisition*, Cambridge: Cambridge University Press.

Cárdenas-Claros, M. S., and P. Gruba (2009), 'Help options in CALL: A systematic review', *CALICO Journal*, 27 (1): 69–90.

Collentine, K. (2009), 'Learner use of holistic language units in multimodal, task-based synchronous computer-mediated communication', *Language Learning & Technology*, 13 (2): 68–87.

Compton, L. K. L. (2009), 'Preparing language teachers to teach language online: a look at skills, roles and responsibilities', *Computer Assisted Language Learning*, 22 (1): 73–99.

Cook, V. (2008), *Second Language Learning and Language Teaching*, London: Hodder Education.

Cutrim Schmid, E., and S. Whyte (eds) (2014), *Teaching Languages with Technology: Communicative Approaches to Interactive Whiteboard Use. A Resource Book for Teacher Development. Advances in Digital Language Learning and Teaching* (Series Editors: Michael Thomas, Mark Warschauer & Mark Peterson), London: Bloomsbury.

Dewey, J. (1933). *How We Think: A Restatement of Reflective Thinking to the Educative Process*, Boston: D. C. Heath (Original work published in 1910).

Doughty, C., and M. Long (2003), 'Optimal psycholinguistic environments for distance foreign language learning', *Language Learning & Technology*, 7: 50–80.

Egbert, J., T. Paulus and Y. Nakamichi (2002), 'The impact of CALL instruction on classroom computer use: A foundation for rethinking technology in teacher education', *Language Learning & Technology*, 6 (3): 108–126.

Ellis, R. (2003), *Task-Based Learning and Teaching*, Oxford: Oxford University Press.

Ferreira, A. F., J. G. Salinas and S. Morales (2014), 'Using a task-based approach for supporting a blended learning model for English as a foreign language', *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, 4 (1): 44–62.

Foster, P., and P. Skehan (1999), 'The influence of source of planning and focus of planning on task-based performance', *Language Teaching Research*, 3 (3): 215–247.

Garrett, N. (2009), 'Computer-assisted language learning trends and issues revisited: Integrating innovation', *The Modern Language Journal*, 93 (s1): 719–740.

Gonzalez-Lloret, M. (2003), 'Designing task-based CALL to promote interaction: En busca de esmeraldas', *Language Learning & Technology*, 7 (1): 86–104.

González-Lloret, M., and L. Ortega (eds) (2014), *Technology-Mediated TBLT*: *Researching Technology and Tasks* (vol. 6), Amsterdam/Philadelphia: John Benjamins.

Guichon, N., and S. McLornan (2008), 'The effects of multimodality on L2 learners: Implications for CALL resource design', *System*, 36 (1): 85–93.

Hall, G. (2011), *Exploring English Language Teaching: Language in Action (Routledge Introductions to Applied Linguistics)*. Oxon: Routledge.

Hampel, R. (2010), 'Task design for a virtual learning environment in a distance language course', in M. Thomas and H. Reinders (eds), *Task-Based Language Learning and Teaching with Technology*, 131–153, London: Continuum.

Hampel, R., and M. Hauck (2006), 'Computer-mediated language learning: Making meaning in multimodal virtual learning spaces', *The JALT CALL Journal*, 2 (2): 3–18.

Hampel, R., and U. Stickler (2005), 'New skills for new classrooms: Training tutors to teach languages online', *Computer Assisted Language Learning*, 18 (4): 311–326.

Hattie, J., and H. Timperley (2007), 'The power of feedback', *Review of Educational Research*, 77 (1): 81–112.

Hauck, M., and B. L. Youngs (2008), 'Telecollaboration in multimodal environments: The impact on task design and learner interaction', *Computer Assisted Language Learning*, 21 (2): 87–124.

Heift, T. (2004), 'Corrective feedback and learner uptake in CALL', *ReCALL*, 16 (2): 416–431.

Hooper, C. J., A. Preston, M. Balaam, P. Seedhouse, D. Jackson, C. Pham, C. Ladha, K. Ladha, T. Ploetz and P. Olivier (2012), 'The French Kitchen: Task-Based Learning in an Instrumented Kitchen'. Paper presented at the Ubiquitous Computing 2012 Conference, September 2012, Pittsburgh, USA.

Hubbard, P. (1996), 'A methodological framework for call courseware development', in M. C. Pennington (ed.), *The Power of CALL*, 15–32, Houston: Athlestan Publications.

Hubbard, P. (2004), 'Learner training for effective use of CALL', in S. Fotos and C. Browne (eds), *New Perspectives on CALL for Second Language Classrooms*, 45–88, Mahwah, NJ: Lawrence Erlbaum.

Hubbard, P., and M. Levy (eds) (2006), *Teacher Education in CALL*. Amsterdam: Philadelphia, PA: John Benjamins.

Hymes, D. H. (1972), 'On communicative competence', in J. B. Pride and J. Holmes (eds), *Sociolinguistics. Selected Readings*, 269–293, Harmondsworth: Penguin.

Kern, R. (2006), 'Perspectives on technology in learning and teaching languages', *TESOL Quarterly*, 40 (1): 183–210.

Kim, G. (2015), *Human Computer Interaction: Fundamentals and Practice*. Boca Raton, FL: Taylor and Francis.

Kress, G. R., and T. Van Leeuwen (2001), *Multimodal Discourse: The Modes and Media of Contemporary Communication*. London: Arnold.

Kukulska-Hulme, A., and L. Shield (2008), 'An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction', *ReCALL*, 20 (3): 271–289.

3

The Pedagogical Design of the Digital Kitchen

Paul Seedhouse

This chapter explains the pedagogical principles underlying the digital kitchen systems, materials and procedures. The pedagogical design is based on the principles of task-based language teaching (TBLT). Tasks are divided into three phases: pre-task, during-task and post-task, providing a clear design structure for materials, for conduct of sessions and for evaluation of performance. We demonstrate how the phases are implemented in practice by analysing extracts of learners working through the cycle. It is argued that the project realizes some of the advantages of TBLT using digital technology in a real-world setting outside the classroom. The chapter explains how the concepts of TBLT were operationalized in the digital kitchen setting by reference to the French Digital Kitchen (FDK) project, as a prelude to the presentation of the design of the European Digital Kitchen (EDK) in the following chapters.

What is task-based language learning and teaching (TBLT)?

The pedagogical design of the FDK (Seedhouse et al. 2013) employs TBLT, a well-established approach to language learning which prompts learners to achieve a goal or complete a task (Skehan 1998, 2003). TBLT seeks to develop students' language through providing a task (such as asking for directions) and then using language to solve it. According to Ellis (2003: 9) the criterial features of a task are that: a task is a workplan; meaning is primary (language use rather than form); a classroom task relates directly to real-world activities; a task can involve any of the four language skills; tasks engage cognitive processes; task completion is a priority and assessment is done in terms of outcomes. Willis (1996: 1) defines the aim of tasks as 'to create a real purpose for language use and to provide a natural

context for language study'. Van den Branden (2006: 6) suggests that in TBLT, people not only learn languages to make functional use of it, but also by making functional use of it, and proposes that tasks invite learners to act more like language users than learners. Samuda and Bygate (2008: 7) see TBLT as involving holistic activity in that all sub-areas of language are employed to make meaning. They argue that it is in such holistic language work that key language learning processes take place. It is generally assumed (Ellis 2003: 263) that tasks are carried out in pairs or in small groups to maximize interaction and autonomy.

There has been a substantial programme of research in relation to TBLT, summarized in Skehan (2003). Ellis (2003: 320) suggests that 'there is a clear psycholinguistic rationale (and substantial empirical support) for choosing "task" as the basis for language pedagogy'. Skehan (1998: 95) argues that transacting tasks 'will engage naturalistic acquisitional mechanisms, cause the underlying interlanguage to be stretched, and drive development forward'. Long (2015) outlines seven criteria which any approach to language teaching should meet: (1) consistency with theory and research findings; (2) embodying progressive social values; (3) accountability; (4) relevance; (5) avoidance of known problems; (6) learner-centredness and (7) functionality. Long concludes that TBLT meets all of these criteria. From the perspective of the FDK project, the major advantages of TBLT as pedagogy were these. There was a natural match with the chosen activity of cooking, which could be easily conceptualized as a task. TBLT has well-developed procedures and principles for task design which could be followed and which blended well with HCI design principles. Johnson (2003: 96) stresses the importance of an iterative development cycle when designing language learning tasks. He examines the cyclic episodes that task designers actually go through, listing actions such as 'compare'; 'evaluate'; 'reject'; 'modify' and 'review'. This iterative cycle is very much in harmony with the iterative development approach employed in pervasive computing and HCI, and so it proved easy to integrate pedagogical and technological design from this perspective. Tasks form a useful basis for designing research as well as pedagogy. As the FDK and EDK were both research projects, this proved a distinct advantage. A description of a task specifies the type of input learners are expected to receive, if operating within an input-output model of learning. This means that it can be planned to include certain variables in the input but to exclude others. As Ellis (2003: 34) suggests, the relationship between research and pedagogy is strengthened when practitioners of both work with shared constructs.

TBLT has so far predominantly been based on tasks to be undertaken within the classroom which simulate real-world tasks. Some innovations in TBLT have

U1: [so]
U2: [I think] it's very: it's fantastic this one
U1: [yes]
U2: [for] me it's really a marvel
U1: yes
U2: it's really good
U1: we would never think that anything like this
U2: could [could]
U1: [exists]
U2: no
RA: really?
U1: no matter you told us (.) the spoon is going to talk to you, ((laughs))
U2: the spoon is going to talk to you

- *It is essential that a framework for researching both the process and effectiveness of language learning is built into the structure of the environment itself from the start, rather than being an afterthought.* We have seen in this collection that research studies of both process and product (Chapters 6–10) have been facilitated by having a clear methodological model built into the environment. This model is made explicit in the final section of this chapter.

A model for planning a real-world digital learning environment

Each of the chapters from 4 to 10 provides conclusions which can advise interested parties on how to design and implement a real-world digital learning environment. What general lessons can be drawn and what advice might be given to others? The analyses of data and the discussions in this collection have drawn out general principles and procedures in relation to immersive environments for language learning employing digital sensor technology and a task-based approach. This section summarizes these principles and procedures, and condenses them into an explicit model which may then be used to design and implement future real-world environments for using digital technologies. In this section we look at the stages and procedures which should be followed and the issues to consider to produce a real-world, pervasive environment for (language) learning, employing digital sensor technology and a task-based approach. The model consists of a conceptual stage and a practical stage

Conceptual stage

The relationship between theory and practice in research, technology, pedagogy and interaction is a very complex one. Seedhouse and Knight (2016: 8) attempted to portray this relationship through narratives of how projects have unfolded and by outlining a three-stage conceptual model for the application of digital sensor technology, namely: Technology – Problem – Iterative Development and Research.

First, one should try to understand the potential of the digital technology, namely what it can and cannot do. Second, identify an existing and worthwhile problem in the field of applied linguistics which may be tackled using the technology. Third, engage in iterative development and evaluation of the pedagogical and technological system design with suitable human subjects. The design can be revised as evidence of system use comes in. A problem-solution approach is most appropriate to this specific area of research. Research design has to focus not only on product or outcomes in terms of language learning, but also on the process of user engagement with the digital learning environment. This is accomplished by a combination of automatic logging of digital sensor activity and video and audio recording of user-spoken interaction, which is transcribed for Conversation Analysis (CA), thus providing access to the micro-detail of behaviour. The ability to relate these different levels to each other for analysis is vital to understanding how the overall environment functions. Niemants and Pallotti (Chapter 5) have therefore developed a suitable transcription system. Research has two purposes in the context of this study of digital learning environments; first, to provide data for iterative system redesign and second, to tackle the problem identified at the start.

Practical stage

In this section we detail the action needed to be taken to design and produce a real-world digital learning environment.

- *Participants physically carry out real-world tasks (using real-world equipment) which are embedded in everyday, real-word contexts such as a kitchen, an office or a shop.* Identify the real-world context and real-world equipment. Break down the real-world tasks to the most basic level so that each component action involved in the task can be specified and recognized by the system.

- *Participants should receive some L2 input from some source and be able to learn some aspects of the L2 by performing the task.* Specify the form of L2 input – spoken, written or both. If you are using audio, you need to record a separate audio file for each separate occasion on which the system will speak to the user. If you are using written text to appear on a screen, this will need to be written out for each occasion it is to appear. Specify which language items you wish learners to learn, in which mode (written/spoken) they will encounter the items and how many times.
- *Participants physically touch and manipulate real-world objects, have the opportunity to learn the L2 names of these objects, and may be evaluated on their learning if required.* List what actions you expect participants to perform with each object and how you will prompt them to do this. Normally, users will learn the names of objects in the pre-task stage by hearing the name, selecting and moving the object and then receiving feedback from the system. In the during-task stage, users will hear the names of the objects again during the task instructions and encounter the names again in the post-task in some way. It is vital to design the testing cycle carefully in relation to the task cycle (see Chapter 9, figure 9.1).
- *The digital system can follow how participants are carrying out the task via a number of digital sensors embedded in the environment.* You need to decide on the type of sensor required and how it will transmit information to the system. You need to consider how exactly each sensor will be embedded in or on each piece of equipment. Figure 11.2 illustrates a number of possibilities, including attaching using Velcro, using rings, magnets, holders or by insertion. Some equipment may be bought off the shelf, whereas others may need to be 3D-printed.
- *The technology is designed to facilitate performance of the task, but is not the focus of the activity – it remains in the background.* Plan the environment so that the technology is relatively unobtrusive and 'camouflaged' as much as possible through appropriate design features.
- *The system provides timely instructions, feedback, help and tips to users to enable them to perform the task.* Go through all the components of each task and sub-task and consider from the viewpoint of the user what they will need in terms of instructions and help for each one.
- *The learning environment provides a range of possible supports to cater for a variety of learning styles and L2 proficiency levels, and learners can decide for themselves which to make use of.* Plan the environment and list all of the possible learning supports the users may potentially make use of during

Index

accelerometer 6–7, 70–1
active learning 149, 222, 271
agency (of the learner) 166–8, 174–5, 272
ambient
  computing 85
  display(s) 50, 58–61
  kitchen 7, 17, 26, 41, 70, 97, 231, 253
  learning 85
  technology 20, 26, 31, 85–6
applied linguistics 4, 12, 40–2, 68, 97, 177–8, 229, 267, 281
approximating linguistic items 168, 272
assessment
  design and processes 217, 275
  procedure(s) 4, 11–14, 16, 23, 30, 33, 45–62, 81, 88–101, 116, 130–1, 137, 185–7, 198–203, 208, 214–19, 227, 236–44, 261–2, 266, 269
  structure 11–13, 20–5, 30, 33, 45, 48, 77, 90–1, 97, 100, 106, 133, 202, 211, 217, 226, 248, 266, 270, 273, 275
attentional manipulation 87
audio
  lingual 19–20
  message(s) 53, 55, 57, 79–80
  repetition 86, 92, 216, 269
  visual 14, 26, 34, 50–1, 79–80, 93, 137, 141, 238, 269
authentic task 6, 22, 29, 33, 254
authoring tool 7–20, 70–87, 95, 118, 232, 265, 270, 279–80
  interface 7, 13, 20, 26, 57–60, 70–87, 95, 105–7, 132, 142–3, 183–5, 190, 265
automaton 76–7
autonomy 26–9, 46, 63, 118, 128

bystander 187, 195

can do descriptors 11, 138, 150, 155
case study 12, 42, 183, 205, 261, 272
Catalan digital kitchen 187
CEFR 11–17, 137–49, 155, 271
classroom 5–8, 13–18, 20–9, 30–8, 45–9, 60–6, 87, 121–3, 158–60, 176, 184, 191, 223, 228–56, 273
  interaction 121, 158, 176
  outside the 6, 13, 20, 38, 45, 47, 62, 66
collaborative learning 8
common European Framework of Reference for Languages (see CEFR) 11, 137–8
communicative event 103, 105, 187, 190
communicative Language Teaching (CLT) 19–21, 30
competence 14, 21, 25, 29, 35, 102, 130, 137–9, 144, 146, 149–59, 183, 186, 203, 222, 271, 280
  level of 149, 271
computer Assisted Language Learning (CALL) 12, 20, 29, 181, 183
conceptual stage 266–7
constructive 104, 182–3
conversation analysis (CA) 63, 99–100, 157–8, 267
  CA-for-SLA 182–5, 202
culturally relevant tasks 191
culture 5–8, 16–19, 25, 66–7, 91, 141, 191–3, 203–4, 227, 231, 261, 265, 279–80

decoding instructions 203
delayed post-test 15–16, 207, 214–27, 242–7, 256, 273–8
digital environment 3–5, 9–16, 62–9, 99, 130, 207–8, 222, 227, 261–2, 270–5
digital natives 28, 38
digital sensor 3–12, 16, 69–71, 183, 232, 237, 261–4, 266–70
discursive behaviour 183
discursive role 200, 203
diversity 17
dual focus 50–1, 57, 88–9
during-task 11, 13, 45, 48–58, 92–5, 160, 213–15, 238–9, 250, 263–4, 268

educational technology 4
ELAN 99, 105, 121–30, 271, 276, 278
embedded
  in the environment 10, 69, 263, 268
  in everyday setings 5, 10, 28, 69, 85, 262–3, 267
  in equipment 4, 61, 268
emic 100, 103, 116, 131, 187
emotionally engaging learning 66, 183, 202
English
  digital kitchen 232, 241, 243
  through Music 6, 47
  learners of 47, 141–5, 208, 272
  translation(s) 19, 49–50, 53–5, 57–60, 65, 86, 120–3, 173, 177, 209, 211, 248, 269
enjoyment 278
environment (see also digital environment)
  kitchen 4–6, 10, 14, 48, 61, 72, 75, 228, 264
  language learning 7, 8, 157, 176, 207, 262, 277
equivalent(s) 59
ethnomethodology 100–1
ethno-methods 101
Describing interactions in European Digital Kitchen 106
Research context 12, 19–40
European digital kitchen 12, 19, 24, 37, 45, 49, 69–70, 99, 106, 137, 207, 261, 279
evaluation
  of (learner) performance 11
  of language learning 11, 265, 270, 275
  of task outcomes 49, 58, 186
explanation 11, 70, 101, 169, 191, 194, 255, 264, 269
explanatory design 233
expressing quantity 193

familiarity 15, 104, 181, 187–8, 190, 272
feedback
  corrective 25, 31
  negative 33, 79–81, 110, 185
  positive 107, 109, 146–9, 162
Finnish 14, 157–177, 223, 263
  digital kitchen 14, 157, 159
food
  culture 141
  english 255
  ingredients; item(s) 4, 7, 8, 10–19, 37, 48–53, 58–64, 70–91, 106, 123, 153, 183–5, 195, 207, 217–25, 232, 236, 239, 242, 255
French
  digital kitchen 7, 45, 70, 208, 231, 264, 269
  language 50, 62, 269
  learner 15, 181
  skills 50–1, 264
  vocabulary; words(s) 50, 60

German digital kitchen 14
gestures 35–6, 112, 158, 162, 241
Graphical User Interface GUI 13, 57–60, 70–8, 83, 86–7, 92–5, 107, 139–43, 183–5, 190, 215, 238, 249

help function 139–55, 163, 271
holistic 46–7, 53, 122, 207–8, 217, 226, 232, 271–6
human-computer interaction (HCI) 12, 20, 56, 85, 95, 99, 104, 128–9, 137, 183, 271

illustrative verbatim 253
immediate post-test 214, 224, 246
incidental vocabulary learning 247, 254
inference module 76
information gap 21, 52, 63, 65, 214, 218, 270
information transfer 63, 65, 218, 260
input
  comprehensible 22, 24, 90, 93, 182
  graphical 48
  L2 10, 69, 233, 263, 268
  linguistic 85–6, 89–90, 168, 274
  procedural 88–90
  targeted 226, 273
integrated transcript 99, 104, 111, 126, 129–30
integration 7, 17, 29, 222, 234, 274, 280
interaction design 85–7
interaction tools 13, 70–8, 87, 95, 212
interactive 17–20, 28, 35, 50, 91, 102, 128–30, 137–9, 186, 195
interview 10, 62, 66, 100, 185, 195–9, 222–3, 252, 276
IRF sequence 107–8

Italian
digital kitchen 15, 99, 129, 207
L2 223

knowledge construction 181
Korean
cuisine 231, 246, 255
digital kitchen 16–17, 67, 227, 231, 273
language 227, 237, 248
vocabulary; words 16, 227, 231, 236, 247–8, 256, 273

L1 11, 20–1, 35, 47, 63, 78, 81, 117–18, 123, 209–11, 218–23, 270
L2
learning 23, 29, 32, 158–9
learners 34, 36, 129
Lancook 17, 96, 108, 137–56, 192
language choices 187
language learning
in real-world digital environments 16, 271–4
research 158, 163, 275
and teaching 20–1, 27, 29, 33, 45, 160
learners' competences 150, 183
learners' linguistic repertoires 197
learning framework 86
learning itinerary 15, 181
learning opportunities 28, 121, 157–9, 164, 168, 175, 186, 264, 271–2
learning style 9, 11, 34, 57, 69, 95, 182, 253, 264, 268, 278
lexical item 35, 60, 63, 132, 161–3, 168, 174–5, 209, 217–18, 222–7, 272
linguistic challenges 198, 203
linguistic repertoires 197
linguistic resources 15, 89, 168, 183
listening comprehension 14, 137–55
longitudinal study 184

materials
audio-visual 14, 26, 34, 50–1, 79–80, 93, 137, 141, 238
authentic 31–7
learning 17, 26, 66, 88, 279
real-world-28, 35, 38
meaning
based 21, 89
focused 23, 33
making 168, 171, 182
of a word 175, 272
memorization 20, 241
Milchreis 141, 146–54
mixed methods 233, 234, 273, 274
mobility 5, 7, 17
model
explicit 12, 16, 261, 266
methodological 12, 16, 261, 266, 271, 273–4
multilingual milieu 181, 198, 203
multimedia gloss 93–5, 213
multimodal
CALL 35–7
interaction 112, 129
kinesic 47, 210, 227, 231
(task-based) experience 227, 231
language learning 8, 35
technology 5, 26
multimodality 35–42, 106
multisensory 8, 10, 57, 69, 255

negotiation of meaning 23, 34, 63, 89, 108, 149
notice 24, 53–4, 57, 86, 89, 95, 104, 120, 197, 201, 214, 263

obeying instructions 185
observation 63, 100, 208–9
oral instructions 183–6
orientation to learning 166, 174

paraphrasing 169, 202–3
participation 15, 61, 102, 175, 181–7, 194–6, 222–4
pedagogical design 6, 13, 45–67, 86–8, 92
pedagogical principles 13, 19, 45, 67, 87
pedagogy 8, 12, 16, 46, 101, 261, 267
peer interaction 157, 160, 175, 183, 264, 272
pervasive
(digital) computing 7
(real-world) digital environments for language learning 5, 10, 69, 262
system(s) 13, 70, 95, 264
physical action 4, 10, 62, 69, 160, 176, 211, 249, 263, 274, 278
physicality 8, 238, 255
playback tool 77

post-task
  interview(s) 10, 62, 66, 252
  phase(s) 49, 58, 95, 160, 264
  stage 25
  tab(s) 84
  taste 8, 63, 672
practical stage 266–7
preferred learning 255
preparation 14, 24, 50–60, 78–92, 137, 146
presentation 28, 45, 49–51, 78, 89–92, 99–105, 111–12, 116, 123–5, 236
pre-task phase 49, 89–92, 94, 161, 213, 227
pre-test
  and post-test 138, 150–1, 234, 276, 278
  Post-test and delayed post-test 15–16, 207, 214, 217–27, 242–7, 256, 273–9
previous knowledge 194
processing information 50, 186
production
  active 219, 243
  oral; spoken; verbal 211, 217–18, 227
  reception and 16, 48, 209, 247, 256, 273
productive tests 242–3, 247
prompting and interaction system 76

QUAL 233–4
QUAN 233–4
quantitative 1, 14–15, 102, 130, 207, 224, 228, 233, 244, 256, 263, 272–5
quantitative analysis 224
quasi-experimental design 16, 232–6
learner performance 11, 139, 141, 145, 150, 155, 271

reading comprehension 150, 154
real-world
  contexts 10, 69, 263
  digital environments 12, 16, 261, 271–4
  language learning 13
  materials 25, 28, 38
  pervasive 3, 4, 10, 12, 16, 261–2, 266
  tasks 6, 10, 19, 23, 38, 69, 86, 182, 197, 263, 267
reception 16, 48, 155, 209, 247, 256, 273–5
receptive tests 243–4
repair sequence 107–8, 121, 123, 126–9
repetition
  audio 86, 92, 216, 269
  slow; slower 126–7, 170, 212
  verbal 107, 211
research
  design 16, 207–8, 222, 232, 237, 267, 270, 275–7
  question(s) 208, 222, 232–4, 255, 275

salience 88, 90, 275
scaffold(ing) 158, 173
scones 106, 118, 141–5, 149
Second language acquisition (SLA) 19–38, 65, 108, 158, 181–5, 202
self-introduced learning items 168
sensor logs 13, 103–14, 126, 129–32, 263, 271, 276
situated learning 85, 181, 184
situated social practice 182
skills (see also French)
  catering/cooking 63, 65, 218, 264
  listening/reading comprehension 150, 154–5
  receptive 14, 137, 142, 155, 161, 271
social constructivism 81
social practice 101, 181–2, 186, 202–3
sterile 255
strategy 21, 57, 216
subtitles 28, 35, 37, 50, 61, 78, 80–1
sustainability 29, 37, 281

talk-in-interaction 105, 184, 202
Task Based Language Teaching (TBLT)
  approach 7, 233, 256
  and/in CALL 33–4
  methodology 67, 95
  principles 13, 34, 62–3, 66–7, 87, 95
task
  complexity 88
  cycle 11, 47, 49, 60, 87, 89, 184, 194, 208, 211–14, 226–7, 263–4, 270–5, 286
  implementation 62
  instructions 15, 54, 66, 183, 187, 203, 268
  outcome 8, 49, 58, 95, 186–7
task-as-outcomes 185
task-based instruction 35
task-based interaction 63, 181, 202, 274
task-based language learning (TBLL) 45, 160, 184
task-Based Language Learning and Teaching 45, 160

task-based language teaching (see TBLT) 6–38, 20, 22, 45–67, 86–96, 160, 183, 217, 233, 256
task-in-process 63, 185, 192
technological design 3, 11, 46, 53, 57, 60, 67, 85, 90
technological principles 30
testing
  cycle 11, 264, 268
  environments/procedures 208, 227, 241–4
touch screen 72, 77, 108, 116–17, 121, 130, 276
transcript(s); transcription 13–15, 62, 85, 99, 103–32, 143–55, 187, 248, 251, 263, 267, 271, 276, 278
transforming information 186
translation 19–20, 49–65, 86, 120–3, 173, 209, 211, 248, 269
trial 3, 13, 15, 17, 31, 54, 57, 67, 81, 141, 183–94, 202–3, 218, 264

ubiquitous 5, 20, 26, 34, 85
uptake 163, 249–50

video
  data 150–4
  recordings 14, 35, 103–4, 159, 271, 276
virtual 4, 27, 34–7, 70–2, 85, 184, 246
vocabulary
  acquisition; gains 150, 217, 246, 252, 254
  items 15–16, 48, 53, 60–3, 137, 207–28, 231–43, 247–55, 272–8
  learning in the EDK 217, 231–2, 274

wireless accelerometer 70–1
wireless receiver 72
word search 162, 172