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Park, J orcid.org/0000-0002-6957-3208, Kiaer, J, Seedhouse, P et al. (1 more author) (2016) Korean Language Learning through Cooking in the Digital Kitchen. International Journal of Korean Language Education, 2 (2). pp. 195-222. ISSN 2466-2208

Korean Language Learning through Cooking in the Digital Kitchen

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Abstract

This paper presents a task-based approach to teaching the Korean language, using the example of cooking in the digital kitchen. In particular, we show that teaching Korean vocabulary through real-life tasks such as cooking in the digital kitchen is much more efficient than classroom-based teaching methods. This study uses the existing technology of the EU-funded 'European Digital Kitchen' project and is designed to use the technology-enhanced environment to enable learners to learn both language and culture simultaneously. Korean does not share any cognates with European languages which can pose challenges for European learners of Korean. We present an experimental study which demonstrates that the digital kitchen method of teaching Korean can particularly help learners overcome the challenges of a lack of cognates, all the while offering a more efficient means of learning vocabulary than classroom-based approaches. Moreover, it offers an enjoyable learning experience for Korean language learners.

<Abstract>

본 연구는 과제 중심 학습법과 최신 컴퓨터 기술을 융합한 외국어 교수법을 한국어 교육에 응용하는 것을 목표로 하였다. 구체적으로, 요리라는 과제(task)를 디지털 키친에서 수행하며 한국어를 배우는 사례와 일반 교실에서 사진을 보며 한국어를 배우는 과정을 비교 대조하여, 전자의 경우가 한국어 어휘 학습에 훨씬 효과적임을 보여 주고자 한다. 본 연구의 모체는 EU 주관 하에 실시된 유럽식 디지털 키친 프로젝트였는데, 이 과제는, 유럽의 여러 언어와 문화를 요리라는 과제를 디지털 키친에서 수행하며 습득하게 하는 과제였고, 제2외국어 교육에 획기적인 방법으로 간주되는 큰 성과를 거두었다. 영어나 인구어를 모국어로 하는 학습자들에게 어원적으로 아무 연관이 없는 한국어 특히 한국어 어휘 습득은 결코 쉽지 않는 장애물이다. 그렇지만, 본 연구에서는 학습자들이 요리라는 과제를 수행하는 과정을 통해, 특별한 노력 없이 어휘를 효과적으로 습득하게 됨을 보여준다. 우리는 본 연구와 같이 디지털 기술에 과제 중심적인 언어 교육을 접목한 방법이 향후 특히 영어권에서 한국어 교육에 중요한 역할을 할 것이라고 기대 한다. (Newcastle University, Oxford University, Newcastle University)

주제어: 과제중심 학습법, 컴퓨터 기술, 디지털 키친, 교실, 어휘 학습

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1. Introduction

The advancement of smart technology is contributing increasingly to language teaching and learning. Recently, researchers have developed the design and use of computer technology to examine how our daily kitchen activities can be related to pedagogical design, by observing the ways in which humans interact with computers in this space. Computer technology has made big differences in second/foreign language learning in several ways: in allowing for multimedia applications, this capacity enables learners to interact with both the program and other learners (Felix, 1998); providing great assistance to the learner even without the presence of teachers, which leaves students room for autonomy (Pennington and Stevens, 1992); It allows students to work at their own pace, causing less frustration among students (Brown, 1997). Thus, these wide variety of features have all contributed to the development of CALL programs.

The influence of this technology has recently led researchers to taking the normal kitchen space and using it to create an European-wide consortium for foreign language and culture learning by using state-of-the-art technology. The movement has begun to shift to the other side of the world - Oriental society. At the center of its development is one of the global languages - Korean (Ethnologue). Given the popularity of up-to-date technology and its relevance to global language learning and teaching, it is significant to explore the efficacy of a new form of the digital technology and its impact on foreign/second language learning and teaching. The next section introduces its origin and development, followed by its key components and relevance to learning.

2. Research Background

Digital Kitchen

The design of the digital kitchen was motivated by the clinical problem of eliciting people to do daily activities in the early stages of dementia through multi-tasks in combination with pervasive computing technology (Wherton and Monk, 2008; Olivier *et al.*, 2009). It is called 'The Ambient Kitchen'. The study has allowed computer experts to use the prototype as a design tool, presenting the potential to push the boundaries of knowledge in a discipline. This development has recently been made it into the realm of 'language teaching and learning', contributing to the French Digital Kitchen Project (Seedhouse *et al.*, 2013). This study has attempted to integrate digital technology and pedagogical design into a situated language learning environment where language and culture can be learned simultaneously: portraying the kitchen space as a 'real world' environment helped learning (*ibid.*). The French project took the principles of Task-Based Language Teaching (TBLT) out of the classroom and into the real-world environment to

investigate how the situated environment helps language learning. It was quite a unique and original study in that the kitchen space was used pedagogically in relation to foreign language learning. Thus, the domain of a mundane kitchen has begun to play a role as a learning environment for a far greater variety of people than the classroom alone. It led to another project called 'The European Digital Kitchen'.

The project team constructed a purpose-built kitchen that communicates and interacts with users in a European language and gives them step-by step cooking instructions via a Graphic User Interface (GUI). The European Digital Kitchen has been developed initially by HCI technologists and applied linguistics at Newcastle University. The project had theoretically established a strong basis for learning by using a micro-analytic approach.

Nevertheless, the two studies have been limited from a theoretical point of view in that they failed to reveal clearly what factors have contributed to learning. One of those factors may be a multimodal task-based experience physically manipulating objects in a specific real-world context to learn a foreign language. This is the gap to be filled. Above all, languages used for LanCook were limited to those with the same orthography (Latin form) as research subjects' mother languages were European-based. In this sense, there seems to be a big urge to explore the synergetic effects of digital technology and a real-world activity in a real-world environment on learners whose native language has different orthography from the target language, Korean. All this led to creating the next generation of digital technology: The Korean Digital Kitchen. By applying the latest technological development, this study looks into how to teach Korean vocabularies through cooking, by comparing two different learning environments.

Figure 1 The Korean Digital Kitchen

Why a kitchen?

The kitchen serves significant purposes in various ways. Firstly, the recognisable space provides learners with a chance to perform 'a real world task', which is cooking (Skehan, 1998, p. 95). Through this task, learners can use authentic Korean language for a communicative purpose. In addition, the kitchen allows learners to use all five senses during the activity of cooking. "Cooking engages students at an almost instinctive level; the smells, sounds, sights, textures and tastes excite senses and intellect" (Trubek and Belliveau, 2009, p. 16). Last but not least, cooking in the kitchen helps enlighten learners' cultural knowledge. The cooking task has 'considerable resonance with both language and culture' (Seedhouse, forthcoming, p. 7). Therefore the daily space of the kitchen has influences on foreign language learning. In the KDK, users could learn linguistic knowledge using their five senses by cooking authentic Korean dishes. Despite this, why do learners learn the Korean language through Korean dish-making?

The Korean Language Boom in the US and UK

Korean language learning is becoming increasingly popular, especially among teenagers that are around GCSE age. Many self-study blogs and webpages have flourished online for Korean language learning. The Korean language boom began in the US in the late 1970s due to a combination of a number of factors. It was during this time period that Korea's economy started to grow and gain attention from the global community. Also, the Korean government began its support of Korean studies programs abroad. The US government started to push Korean language proficiency, especially in its intelligence sector, due to the threat of North Korea. Finally the boom gained momentum because of the ever-increasing Korean population within the United States. In 1975, only 10 universities offered Korean as a Foreign Language (KFL) courses, but by the early 2000s, over 130 universities were now offering Korean as a language option, and some even had degree programs for Korean, even in top universities like Columbia, Cornell, and Princeton. The number of Korean Community Schools also increased at an even more dramatic rate, with 7 schools in 1975 and over 900 in the early 2000s. The US Government has even begun intensive Korean language training in its Defense Language Institute, Foreign Service Institute, and the Central Intelligence Agency (CIA). In recent years, however, a new wave has lent the Korean language boom even greater force. Hallyu, or the Korean Wave, is a pop-culture media blitz that has taken most of Asia by storm and has even made inroads in parts of Europe, the Middle East, North America, and South America. Korean music (K-Pop), Dramas (K-Drama), and food are being exported to other parts of the world at an unprecedented rate. Super Junior and Big Bang are arguably the two most popular K-pop boy bands in the world. When they toured Europe in 2013 and 2012, respectively, 12,438 and 24,000 fans attended their concerts in London alone. These numbers testify of the deep and expanding K-pop fandom in UK and signal the existence of large numbers of potential Korean learners in the country. These two groups and others are

just as popular in the United States. On their tour in the United States in 2015, Big Bang played to huge audiences in the largest K-pop Arena Tour in US history. Over 87,000 fans attended one of their shows on their seven-concert North American Tour. As a result of the wide-spread interest in Korean popular culture, interest in the Korean language has expanded as well. In the ever increasing number of Korean language programs being offered around the world, many students cite having selected to take Korean language classes due to their desire to visit Korea, or to be able to understand the lyrics to K-pop songs (Sotirova 2014). In recent years, love of Korean popular culture has led many students to pursue studies of the Korean language for reasons other than professional development. According to a British Council report (2013), Korean is ranked 14th in languages for the future in Britain. Commercial/cultural interaction is growing fast as well as people's interest in Korean language and culture.

The Korean Food Boom

After the dawn of millennium, Korean cuisine has come to receive international recognition. Having gradually spread in Japan and other Asian countries along with the rising popularity of K-pop, by 2010 it finally joined the ranks of better known Asian cuisines in the West such as Chinese, Japanese and Thai. According to a report on Hallyu (Korean Wave) conducted by KOFICE (Korea Foundation for International Culture Exchange), Korean cuisine was picked up as the most popular aspect of Hallyu (46%), narrowly followed by K-pop (39%). Furthermore, a report by the Institute of Management Research of Seoul National University (commissioned by the Ministry of Agriculture, Food and Rural Affairs in 2012) ranked Korean cuisine 7th out of twelve on the globalization index for ethnic cuisines. The number of overseas Korean restaurants is also increasing. One estimate says it was about 12,000 in 2014 and very likely to see a substantial increase as the surveying method has recently been improved.

Learning Korean vocabulary through cooking in the digital kitchen

Korean was for a long time assumed to be an Altaic language, though this has since been widely discredited. It is instead safe to assume that Korean is an isolated language (Lee and Ramsey, 2011). Korean vocabulary is characterized by a high proportion of Sino-Korean words which is not surprising given the cultural influence exerted by China on Korea. Sino-Korean vocabulary started to be used as early as the 2nd century and has since formed a major part of Korean vocabulary. According to the Standard Korean language dictionary, around 57% of Korean vocabulary consists of words of Sinic origin. This may also be the case for other countries within the Sino-sphere, also known as the East Asian cultural sphere. Korean words do not share any cognates with Romance or European languages, although English words in Korean are

growing and being used more frequently in daily life. The lack of cognates can be a big challenge for European learners of Korean, leading them to easily lose motivation. However, in this study, we show that learners can efficiently learn Korean vocabulary in the digital kitchen while enjoying a cooking experience – overcoming this no-cognate barrier.

Pedagogical Perspectives

This study adopts Task-Based Language Teaching (TBLT), an approach to language learning which allows learners to achieve a goal via task implementation (Ellis, 2003; Skehan, 2003). According to (Samuda and Bygate, 2008), TBLT is a "holistic activity" (p. 7) in that all sub-areas of language, including vocabulary are employed to make meaning. They argue that such holistic language work plays an instrumental role in foreign language learning and reveal the language learning processes. In other words, TBLT not only allows learners to relate language to meaning and purposes whilst they interactively engage in tasks, but also makes learners involved in getting feedback from interlocutors on whether their understanding is accurate. This is how learners enhance their understanding of new language, with the task providing a constant context for new language to be encountered. It is this pedagogical design that the Korean Digital Kitchen takes.

Furthermore, tasks from the sociocultural perspective create a space for mutual collaboration and interaction, which functions as a vehicle to enhance a deeper level of learning. As Ellis (2003) puts, a primary means of mediation is verbal interaction. This interaction allows one interactant to shape the context in which another person can take part in their own learning and in which the speaker helps support the person. This dialogic process, according to sociocultural theories, is called scaffolding, which is the support students are offered in their needs during the learning process with the intention of achieving their learning goals (Sawyer, 2006). It is tasks that allow learners not only to interact with others to use new linguistics knowledge, but to independently apply what they have internalized in less demanding situation before cognitively using the language information. Two learners in pairs, in two different settings, for example, interact with each other to cook the dish. When they carry out a certain task and they face a problem, one speaker might be able to draw on his or her knowledge and experience of communicating with other interactants to reduce the demand of the task and to scaffold the interaction so that a successful outcome is achieved. Thus, tasks can help build a stage for establishing interaction and collaboration, all of which mediate learning.

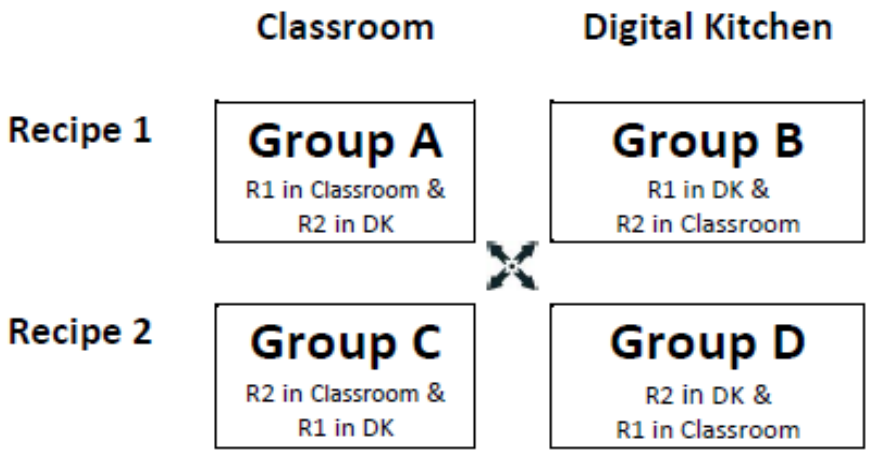
Through the task of cooking, in two different settings, learners could learn an essential part of foreign language learning: vocabulary (Schmitt and McCarthy, 1997). Vocabulary makes up a 'situational set' (Nattinger, 1988, p. 72) of 10 items of cooking equipment and ingredients. All of them are nouns because

of its nature as the most common component of speech in daily conversation (Webb, 2005).

3. Experiment

Based on the research design of Park and Seedhouse (forthcoming)[5], this study uses a quasi-experimental design to investigate which environment - the digital kitchen or a classroom - is better in vocabulary learning and which specific factor helps students' learning. The experiment design employs a previously created diagram by (Nation and Webb, 2011) and adapts it for this study as below.

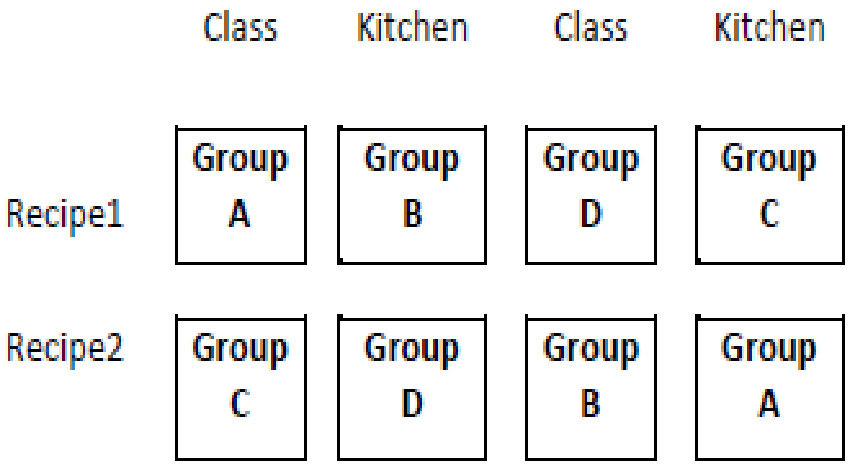
Figure 2 Latin Square



There are four groups carrying out two tasks with two different recipes in two separate settings. Group A performs cooking first with Recipe 1 first in the Classroom and then cooks using Recipe 2 in the Digital Kitchen. In the same way, Group D cooks using Recipe 2 first in the Digital Kitchen and then with Recipe 1 in the Classroom. Group B and Group C have the same procedures. The order of cooking and location differs group by group to isolate the order, or practice effect. Furthermore, each of two recipes includes a set of vocabulary, which is not overlapped. Then, it is possible to control practice and ordering effects. This process allows for group by each variable as below.

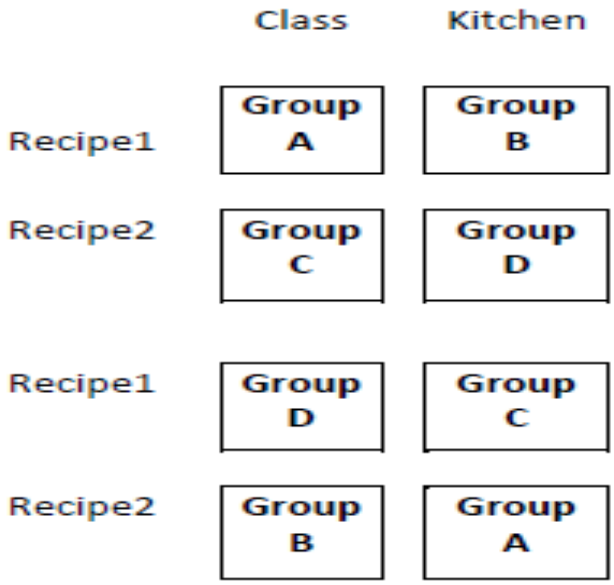
Figure 3 Group by Recipe

[5] This study is based on the previous study of 'Sight and Touch in Vocabulary Learning: The Korean Digital Kitchen' by Park and Seedhouse (forthcoming)



The diagram below indicates how the location can be controlled. Each group from each location goes through two different recipes.

Figure 4 Group by Location

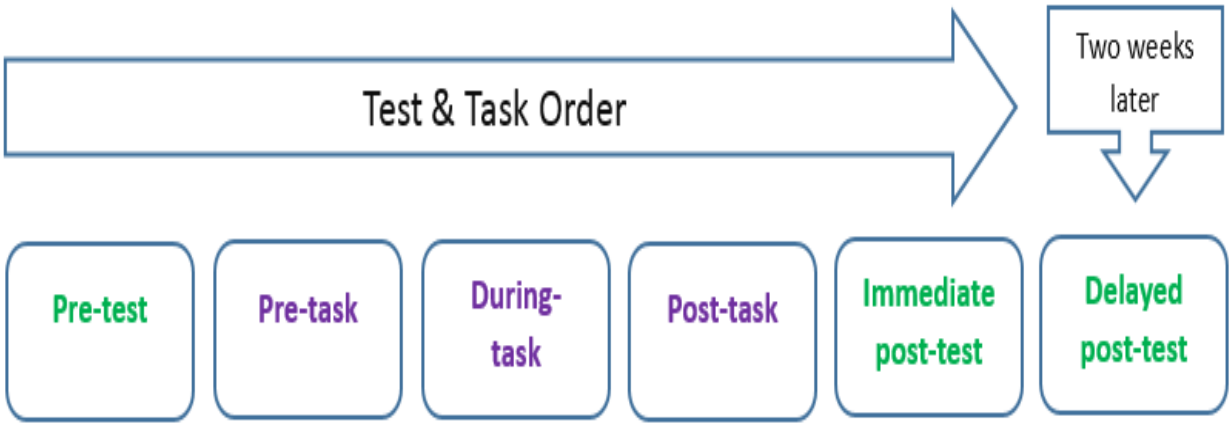


Thus, the diagram was designed to minimise the confounding variable as much as possible. This process allows for group by each variable as below.

48 international participants joined this cooking event to learn Korean linguistic knowledge, all of whom were absolute beginners in Korean. They were tested on a 'situational set' of 10 items of cooking equipment and ingredients (Nattinger, 1988, p. 72). All of these were nouns, and the word knowledge included both receptive and productive, each of which was tested through matching the card with the label onto each item for the former and reproducing phonological forms for the latter.

Following the standard three step framework of Task-Based Language Teaching (TBLT), this study asked each pair to carry out pre-, during-, and post-task activities. In pre-task, participants were required to collect each item one by one according to instructions by the KDK; during-task asked users to manipulate what they had collected to make the dish and the final task demanded subjects to evaluate the dish that had already been made. There were pre, immediate, and delayed-tests before and after the task. The diagram below demonstrates the whole procedure from task to test. Each step is explained in the next two sub-sections and this procedure applied to each setting in the same way.

Figure 5 Test & Task Procedure



Three Tasks

The *pre-task* requires users to prepare each step for the task. This phase is designed to expose students to the language itself through their engagement with the task. The *during-task* phase involves students' engagement into the task. It is in this phase of the task that learners' attention can be manipulated. Finally, the *post-task* aims to reflect and evaluate task transactions. Through the outcome of the task, students produced the use of target language, which can be reshaped and consolidated via their self-correction or computer feedback. Furthermore, language learners are given a chance to practice the language form they found hard during *tasks*. Thus, the task is pedagogically used in such a way as they handle in a meaningful way in relation to Korean language learning.

Three Tests

Pre-test is designed to assess the knowledge of 10 vocabulary items. It was a verbal production test. Each individual were shown ten real objects and then asked to produce them in Korean language one by one as shown in Figure 6 (Park and Seedhouse, forthcoming) below. The researcher held an audio-recorder by hand to record his or her performance. The results were scored according to according to the LPSP framework: 0, 0.25, 0.75, and 1.

Figure 6 Pre-test in a digital kitchen

An immediate post-test was designed to see whether or not the individual learned the target vocabulary item, and two tests were presented after the cooking session. One was to match the label onto each item for recognition and the other verbal sound for production. Each learner was asked to match a piece of paper with Korean lettering within one minute to each physical objects employed in a cooking task (**Figure**) and then, the researcher took all labels back from each object, so the participant implemented a production test (Nation, 2001). Learners pronounced each equipment and ingredient into a Korean word in oral. The matching test was scored '0' or '1' and the result was written into an excel file, whereas the verbal test was scored according to the Barcroft' framework

Figure 7 Immediate & Delayed post-tests in the KDK

A delayed post-test attempted to assess learners' ability to recall. It included the same tests as conducted in an immediate test, and maintained the circumstances as similar as possible to the previous one. The only difference was that the test was done two weeks later. The diagram below might help see how the cooking procedures proceed.

Tasks in two locations are exactly the same, but the only difference is whether participants were able to use real objects or simply photos of the objects to cook. Photos below clearly demonstrate what and how they perform the task in two settings.

Figure 8 Real Objects in Digital Kitchen

In the digital kitchen as in Figure 8, participants have access to tangible objects such as food ingredients and equipment to perform the daily activity of cooking. However, in the classroom, the only thing students are allowed to use is photos of objects as in Figure 9 below.

Figure 9 Photos in Classroom

A range of data sources were used for triangulation purposes: numerical data and observations. Statistical data helped draw meaningful conclusions (Chance and Rossman, 2006), whereas observations provided insight into the situation (Cohen et al., 2011). In particular, an approach of Conversation Analysis helped demonstrate learners orientation to their activity by examining the moment to moment development of

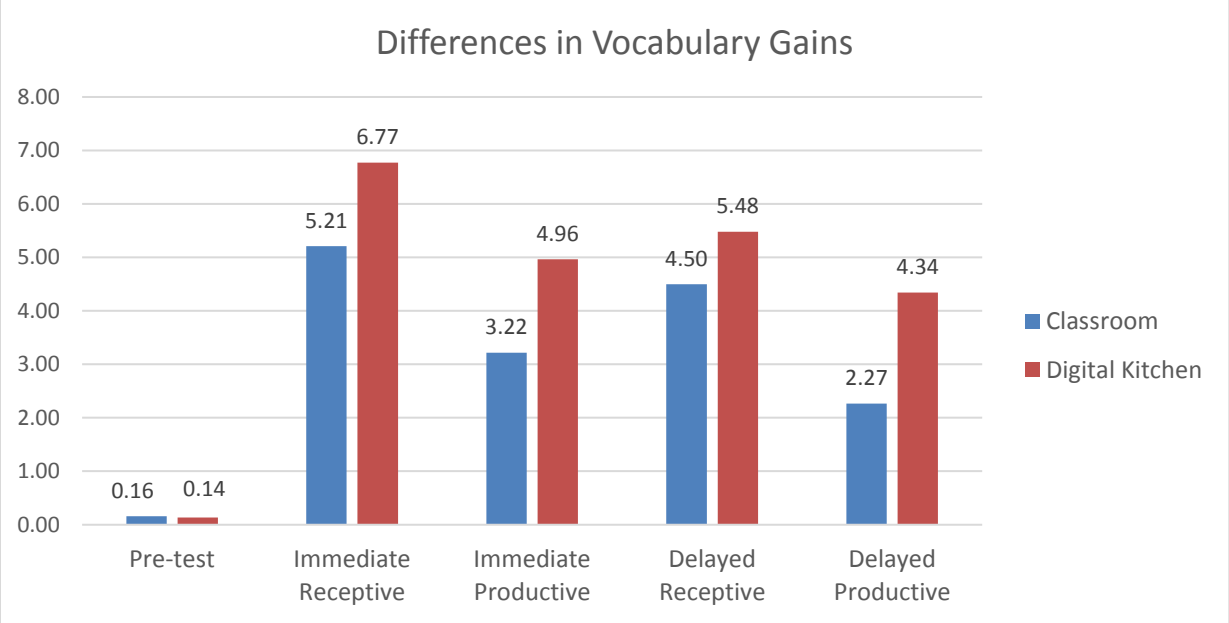
interaction in a real world environment (Preston et al., 2015). The quantitative data helped show the difference in vocabulary gains between two locations as a learning product, whereas qualitative ones revealed how and why the learning product is different: learning processes. The next section show the mechanism and learning outcomes.

4. Findings

Learning product

The figure below demonstrates the overall vocabulary scores between two locations (Park and Seedhouse, forthcoming). It is obvious that the digital kitchen helped students learn a specialised set of vocabulary better than the classroom.

Figure 10 Vocabulary Gains



However, to show that the KDK had a better influence on learning than a classroom, significance in each score gap should be proved. The scores below took into consideration pre-test scores to make statistics as precise as possible. For example, 6.63 comes when 6.77 is from 0.14.

- immediate receptive scores in the kitchen (6.63) were higher than in the classroom (5.05) $MD = 1.58$, $p < .00$
- immediate productive results in a daily setting (4.83) registered more than in a lecture room (3.05) $MD = 1.78$, $p < .00$

- delayed receptive average in a cookhouse (5.26) experienced was bigger than in a study room (4.43) $MD = 0.83$, $p < .04$
- delayed productive points in the kitchen (4.22) were better than in the classroom (2.11) $MD = 2.12$, $p < .00$.

No ordering effects were seen according to test results. This clearly suggests that the KDK was more effective in vocabulary learning than a classroom for both reception and production in both the immediate post-test and delayed-post-test.

Learning processes

Having established that learning outcomes were better in the KDK than in a classroom, we now analyse specifically what happens in the two learning environments which might explain the difference. To this end, it compares direct observation of behaviours in both settings from different participants but the same task for the same vocabulary items through examining their talk-in-interaction on a micro level. Each section in which learning was especially evident was marked and transcribed using the adapted Jeffersonian transcription conventions which allow for a precise notation of prosodic features and voice quality.

Table 1 CA Conventions

Transcription Conventions	
KDK & alphabet initial	Each interactant's name
[	Overlapping speech
((*text*))	Annotation of non-verbal activity
text	Sounds of Korean letterings learners make
text	Text in bold to indicates a translation into English but not talk in English produced by speakers
TEXT	Capital letters to show shouted or increased volume speech.
(Numbers)	the time of a pause in speech
↗ ↘	Rising and falling tones
:	Prolongation of a sound
underline	Indicating the speaker is emphasizing or stressing the speech
?	Rising pitch or intonation

☆	'Image Help' available on the computer screen
√	Sound to indicate successful performance on the step
/?/	Help symbol on and off on the GUI screen

The first episode is from a digital kitchen scenario in which two learners are conducting the pre-task activity of collecting each item for cooking *yubuchobap* according to instructions given. Since learners were not taught the word item, they are supposed to guess what the 10 items were. The final step was designed for the pair to bring *gawi*, the Korean word for scissors. There should be one final object on the desk, but they ended up moving all of the objects onto the other desk, so they have no idea which one is which. They are trying to figure out the form and meaning of 'gawi' in several ways: mutual collaboration and negotiation, information transfer, and interaction with the KDK.

The interaction starts with an audio prompt from the KDK, which ask learners to collect scissors. In lines 1 to 6 M tries to work it out by imitating the sound from the computer, followed by the second ready-made repetition of sound. She explains what happened to N, who agrees with M's opinion by nodding. M picks up a plate to see if it is scissors, but her rising tone and gazing at GUI obviously shows her uncertainty in line 7 as in Figure 11. So, M gives the plate to N and does confirmation checking by verbally pronouncing the word, during which help indicated from the KDK makes M rely on the computer in line 9. Upon putting the plate down in line 10, the computer recognizes the sensor movement, which is not what should be collected. This causes the KDK to encourage N and M to give it another try in line 11. N then demonstrates her orientation to collaboration both with M by non-verbal cues and with the KDK by verbal indications in lines 12 and 14. Communicating with GUI, M agrees to turn to the KDK to listen to the sound and watch the image again.

Figure 11 Checking out understanding

Extract 1

1	KDK	*gawi* **scissors**
2	Mu	*gawi* **scissors**
3	KDK	*gawi* **scissors**
4	Mu	hm I think we have switched something earlier, which is to come later hm
5		perhaps the ((*picking up a plate and looking at N to ask for her confirmation*))
6	N	[hmhm hmhm ((*agreeing and nodding*))
7	Mu	saucer? ((*picking up a plate, and looking at GUI to check if she's right*))
8		you put it there ((*giving the plate to N*))
9	KDK	☆
10	Mu	and bring it back ((*N takes it and puts it back on the surface*))
11	KDK	아, 아니었어요. 다시 한 번 해 보시겠어요? would you try that again?
12	N	((*gazing M*))
13	Mu	((*trying to control GUI*))
14	N	let's see it again
15	Mu	yes ((*managing GUI*))

The subsequent sequence (Extract 2 below) displays successful performance. Another prompt from the KDK now allows two learners to have a chance to repair the problem. Lines 16 to 18 show the learners'

shared decision to resolve the problem by practicing the word. In terms of their learning, M understands the form but not the meaning, whereas N figures out neither of them. However, meaning making processes occur when the KDK offers further help in line 19. It plays the audio file and subsequently shows a photo, which opens the duo's intellectual eyes. They finally work out the meaning of the target word in lines 20 to 22. Interestingly, their learning is reinforced twice in lines 23 and 26: first by producing verbal acknowledgements when the successful sound plays to indicate they are allowed to move onto the next step and then, by explicitly conveying non-verbal contentment as in Figure 12 when the KDK provides feedback of compliments. It is evident that both verbal and non-verbal exclamations delight the duo, contributing to increased motivation which, in turn, reinforces their learning. The initiation of a interactional problem by the GUI caused learners to interact with one another, creating a learning space in which they could address the problem.

Figure 12 Line 28

Extract 2

16	KDK	*gawi*. scissors
17	Mu	*gawi*. **scissors**
18	N	*chui*.
19	KDK	*gawi*. **scissors** *((displaying the image of scissors))*
20	Mu	hm ((*sounding understood*) this is it
21	N	((*focusing on the screen of GUI*))

		this is a scissor. ((*holding up scissors*))
22	Mu	ok you put it there.
23	KDK	√
24	N	ooh. ((*sounding quite happy*))
25	Mu	yeah.
26	KDK	너무 잘하셨어요! **very good job!** Great!
27	N	((*clapping and smiling*))
28	Mu	((*giving herself thumbs-up*))

This pre-task episode clearly demonstrates how learning takes place. Two learners show shared orientation to collaborate, explain and negotiate mutually to resolve the problem of figuring out the target word. What is notable is that learners' activity and movements being recognized by the sensor attached to ingredients and equipment make them aware of the problem and find out a solution by interacting with the GUI, which in turn gives them a compliment. Two learners are motivated to take the next step. Thus, a virtuous cycle of interaction could be built up by the digital computer in such a way to foster learning. This clearly demonstrates the effects of digital technology on learning. Furthermore, digital technology is playing an integral role as another collaborator, which offers both controlled and uncontrolled timely prompts, thereby creating an interactive space for learners. Thus, the KDK enters in and out of focus in the interaction between two learners. The notion that the computer as the third interactant is communicating with humans is evident.

On the other hand, the classroom contrasts strongly with the digital kitchen. Interactive features seen in the digital kitchen are rarely present. Since what's left is the final item, Ma picks up the photo even before the computer sound is played in line 1. Ma looks like he collects the item habitually, rather than trying to link the linguistic knowledge to his memory. When audio is played by the computer, both learners attempt to figure out the phonological form of the word by copying the sound in lines 3 to 4. Following the second sound made by the computer, they also practice the word form and meaning to understand and store the information in their memory (lines 5 to 7).

Extract 3

1	Ma	*((picking up the final photo))*
2	Computer	*gawi=* **scissors**

3	Ma	=[*gawi*] ((*looking at the computer screen*))
4	S	[*gawi*] *gawi*
5	Computer	*gawi*=
6	S	=*gawi* ((*simply gazing at the computer screen*))
7	Ma	*gawi*

Figure 13 Something missing in the Classroom

The same episode in a classroom demonstrates a different atmosphere in terms of interactive features. To figure out the word, the duo shows a few repetitions. The teacher provides students with audio-visual help via the computer, which scaffolds students to learn the form, but the two learners show no sign of negotiation and collaboration, which can contribute to a deep level of learning. Nor do they display any orientation in turning to the teacher. The presence of a teacher in front of them seems to keep them relatively distanced from active interaction, and the teacher in the classroom does not appear to play a big role as an interactant.

This is probably why they do not exhibit as cheerful interaction mood as in the digital kitchen. It is clear that the differences lead to less learning, which is further evidenced by the vocabulary gain of the word from test results. In the table below, the Digital kitchen users (DK) scored higher in total than those in the Classroom. Thus, it was evident that a classroom setting did not create enough learning space for the trio to shape active interaction, compared to the digital kitchen.

Table 2 Vocabulary Item results (gawi, scissors*)*

	DK	**Classroom**

	N	Mu	S	Ma
Pre-test	0	0	0	0
Immediate Receptive test	1	1	0	0
Immediate Productive test	1	1	0	1
Delayed Receptive test	1	1	0	0
Delayed Productive test	1	1	0	1

5. Discussion

These findings are similar to a range of studies which investigated the effect of technology. Technology-mediated learning has been combined with task-based learning and the new trend has allowed for well-established lessons and outcomes (Salmon, 2011; Hinkelman and Gruba, 2012). Unlike fewer modes available in the classroom, multiple modes were possible for learners to use for learning in the digital kitchen in which learners communicate with more than one form of interaction due to the technological development (Hampel and Hauk, 2004; Norris, 2004). In particular, using physical objects turned out to give learners phenomenal links to their vocabulary memory, thus supporting findings from previous studies (Nattinger, 1988). This resulted in different learning outcomes. Since these studies did report positive effects of the digital technology on vocabulary learning in a general sense only in the classroom, this study broadened the research scope by taking a real world space.

One possible explanation for learning processes behind different levels of learning is related to the atmosphere in each setting. The findings of the current study suggest that the digital technology allowed for autonomous learning, which enhanced learning, thus lending further support to the results of previous research (Larsson, 2001; Bax, 2003; Reinders, 2010). In the digital kitchen, a learner-centered environment allowed for more progressive interaction, which brought in a self-learning space and a range of interactional features such as meaning negotiation and collaboration. The feeling of autonomy and being an essential part of a pair helped achieve end products which in turn motivated them to learn (Larsson, 2001; Ellis, 2003). This encouraged them to gain a deeper sense of learning. On the other hand, in a classroom, students were found to be nervous, and this teacher-oriented learning kept them away from oiling wheel of interaction, which might explain why correspondingly, repetition was detected less.

However, it turned out that not all learners prefer technology-based learning. So, language teachers should pay keen attention to how to minimize the grey shade of the classroom. Nevertheless, overall, the digital technology could make a difference on vocabulary learning. The reasons behind different levels of learning between two separate environments were the availability of real objects to complete the task and the

interaction styles. This affordance of digital technology opened the door of opportunity for pedagogical activities for young children. In an attempt to put this innovative approach to Korean language education into practice, the first public event[6] has been recently held at Newcastle University, with 5 family groups and 24 people in total. This activities fascinated both children and parents to the point where they alike would like to get involved in the cooking event as in Figure 12. It was because they found it enjoyable to cooking a foreign cuisine in a motivating learning environment controlled by digital technology. Thus, up-to-date technology allowed for enjoyment and learning Korean language.

Figure 14 The 1st Children's Asian Digital Kitchen Day

This calls on Korean language educators to raise awareness of the effectiveness of digital technology. It is because technology can have tremendous influence on the extent of their language learning. Considering the prevalence of technology all over the world in the 21st century, it is a de-facto must-use tool for foreign and second language learning. Korea is among the leading countries in Information, Communication and Technology (ICT), therefore if educators can make the most of it, not only can we meet the rising needs of Korean language education across the globe, but also raise our national status.

[6] The 1st Children's Asian Digital Kitchen Day was held at Newcastle University. The poster is attached in Appendix.

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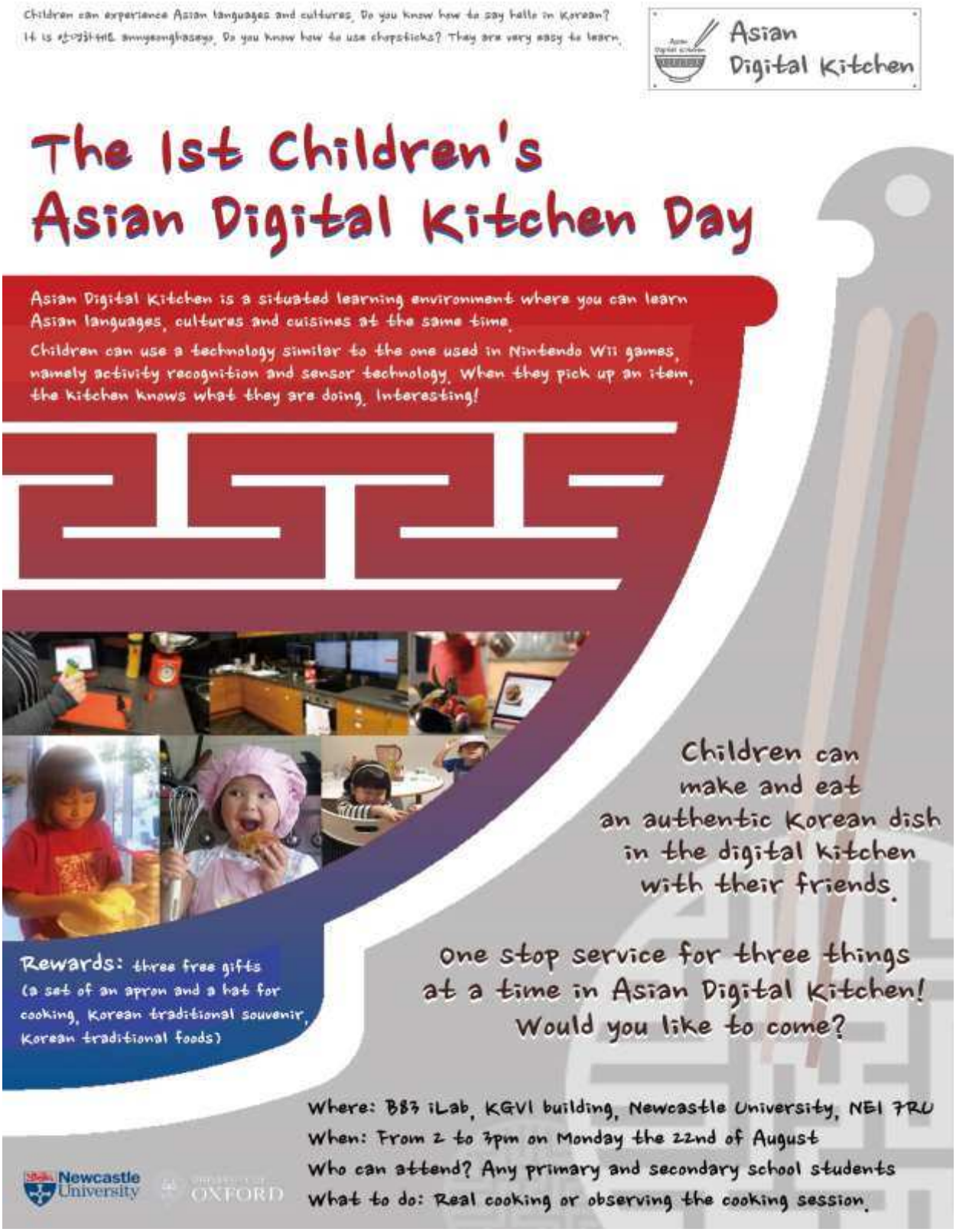
Appendix


Children can experience Asian languages and cultures. Do you know how to say hello in Korean?
It is 안녕하세요 annyeonghaseyo. Do you know how to use chopsticks? They are very easy to learn.
Asian Digital Kitchen
The 1st Children's Asian Digital Kitchen Day
Asian Digital Kitchen is a situated learning environment where you can learn Asian languages, cultures and cuisines at the same time.
Children can use a technology similar to the one used in Nintendo Wii games, namely activity recognition and sensor technology. When they pick up an item, the kitchen knows what they are doing. Interesting!
Children can make and eat an authentic Korean dish in the digital kitchen with their friends.
Rewards: three free gifts (a set of an apron and a hat for cooking, Korean traditional souvenir, Korean traditional foods)
One stop service for three things at a time in Asian Digital Kitchen! Would you like to come?
Where: B83 iLab, KGVI building, Newcastle University, NE1 7RU
When: From 2 to 7pm on Monday the 22nd of August
Who can attend? Any primary and secondary school students
What to do: Real cooking or observing the cooking session.
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Received: 2016. 9.15
Revised: 2016. 9.30
Accepted: 2016.10.10