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Smart Learning: Approaches and Materials for Language Learning*

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With the exponential growth of smartphone users, mobile learning (mlearning) or ubiquitous learning (ulearning) has enjoyed popularity. This fad in recent years has generated another learning trend: smart learning. While smart learning has some commonalities with mlearning or ulearning, it is distinctive and unique, in that it implies something more than the use of mobile devices. The purpose of this paper is to define what smart learning is in the Korean academic context and examine ways to embody smart learning in the college English classroom settings. This paper aims to describe how problem-based learning (PBL) and flipped learning are related to smart learning. Specifically, the paper suggests that smart learning environments are ideal for realizing the features of problem-based learning, and that the PBL implemented in the smart learning environments is similar to flipped learning in many aspects. In addition, it delineates how materials and tasks can be designed and implemented to facilitate smart learning, and introduces mobile applications that can be useful for creating smart classroom contexts. Finally, the paper discusses prospects and challenges of smart learning and pedagogical implications.

Key words smart learning, mlearning, ulearning, problem-based learning, flipped learning, smart materials, mobile applications
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I. INTRODUCTION

With the advancement in technology, learning has become unlimited and varied as shown in the cases of mobile learning (mlearning) and ubiquitous learning (ulearning). Mobile learning, learning which is mediated by mobile devices, has become prevalent due to the expansion of smartphone users. According to the statistics reported in November, 2014, more than 40

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million people use smartphones in Korea. This means that over 80% of Korean people are users of smartphones. With younger generation considered only, the rate even goes up to 97.7% (Cha, 2017). These students are prepared to experience innovative teaching facilitated by mobile technology. As a matter of fact, Korea is ranked as the 4th in the world in terms of smartphone data use (Ko, 2017): Korean smartphone users are reported to utilize an average of 4.9GB of data monthly, following Finnish(14.43), Taiwanese (11.12GB), and Japanese (5.11GB) smartphone users.

The rapidly growing population implicates that learners are not just confined to K-12 students. Since mobile devices can facilitate learning for preschoolers through senior citizens, lifelong education has become a viable option. Then what can we do to make mlearning smart? Smart learning mediated by smart devices was first introduced in the Korean academic context (Kim, Cho, & Lee, 2013). While smart learning has some common features with mlearning or ulearning, it is slightly different in that it places more emphasis on smart ways of learning than on mobile or ubiquitous nature of learning. According to Kim, Cho, & Lee (2013), smart learning is defined as the "effective, intelligent, tailored-learning based on advanced IT infrastructure."

Their definition, however, is restricted, in that it does not embrace language learning. Thus, this paper aims to define smart learning in the Korean EFL context and introduce ways to implement smart learning in the college English classrooms, including how to design materials or tasks that can contribute to smart learning. This paper also intends to examine how problem-based learning (PBL) can be facilitated by smart learning environments, and how flipped learning can exemplify PBL in smart learning contexts. Finally, it intends to introduce mobile applications useful for constructing smart learning environments and discuss their pedagogical advantages.

II. LITERATURE REVIEW

The past ten years have witnessed a paradigm shift from elearning to mlearning, and this change has been accelerated by the development of wireless technology. Mlearning is defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (Wikipedia, 2017). Mlearning, although it is a subset of elearning, slightly differs from elearning. While elearning takes place via computers, mlearning is mediated by mobile devices (Lee & Son, 2013).

The use of mobile devices, such as handheld computers, laptops, mobile phones, and tablets, helps to overcome space- and time-constraints and make learning readily accessible. In other words, mlearning takes place any time and any place as long as wireless technology is available; therefore it makes 'learning on the move' and 'anytime, anyplace learning' possible (Lee, 2005). This is why mlearning is often equated with ubiquitous learning or ulearning. The accessibility, mobility, and portability of mlearning allow learners to interact with their teachers and peers with ease (Chinnery, 2006; Prensky, 2005). For its convenience, efficiency, and effectiveness, mobile-assisted language learning (MALL) has become popular and is widely adopted (Kim, H.-S., 2014). For instance, digital textbooks have become readily available with mobile devices like ipads and have been in use since 2007 with the Ministry of Education's initiative to reform school education; they will eventually replace printed textbooks (Lee & Son, 2013).

Other advantages of mlearning include personal, situated, authentic, spontaneous, informal, and continuous access (Kukulska-Hulme, 2009). From learners' perspectives, mlearning makes learning more learner-centered, process-oriented as well as better accommodates varied needs, proficiency levels, and learning style preferences of students (Pachler, Seipold, & Bachmair, 2012; Thomas & Reinders, 2012). It also allows teachers to create a more personalized learning context where students can have unlimited, shared access to learning materials (Pachler, et al., 2012). With the help of mobile technology, learners can access materials that are meaningful and relevant to their interests (Obari, 2013; Shehadeh & Coombe, 2012).

For these useful pedagogical features, mlearning has received increased attention from teachers and learners alike. Previous studies have noted positive effects of mlearning on language learning (Briggs, 2015; Chen & Hsu, 2008; Chinnery, 2006; Huang & Sun, 2010; Kang & Kim, 2007; Kim, H.-S., 2011, 2014; Kukulska-Hulme, 2009; Kwon, 2013; Tayebinik & Puteh, 2012). For instance, Huang and Sun (2010) found that mobile-assisted listening practice contributed to enhancing students' English listening skills. Mlearning was also found to be effective for vocabulary learning, compared to the traditional approach (Kennedy & Levy, 2008; Kim, H.-S., 2011; Lu, 2008; Thorton & Houser, 2005). For instance, Kim, H.-S. (2011) found that the short message service (SMS) supported by mobile phones facilitated student learning of new vocabulary as it was fast, immediate, and readily available (Lomine & Buckingham, 2009).

As to the effects of mlearning on reading, Chen and Hsu (2008) found that an intelligent mobile learning system with individualized reading materials helped students to improve their reading skills. In a more recent study, Kim, H.-S. (2014) examined the effects of mlearning on college students' reading skills and attitudes to English reading, and confirmed Chen and Hsu's

(2008) earlier finding. Specifically, Kim's study compared the reading performance of students in the two groups: an experimental group that performed mobile-mediated discussion on the reading texts in addition to the in-class discussion, and a control group that performed the reading discussion task only in class for a period of 11 weeks. Her study found that there were significant differences between the two groups in terms of students' reading proficiency, and that the students in the experimental group displayed positive attitudes toward MALL. The students responded that mobile-mediated learning was both useful and helpful, in that they were able to interact with their peers without any temporal or spatial constraints.

Kwon (2013) also reported that the participants of her study showed positive reactions to mobile-assisted language learning. These college students were found to prefer mobile applications for acquiring receptive skills such as listening and reading. The students responded that they had developed their receptive skills and learner autonomy as a result of learning English with mobile applications for 10 weeks.

More recently, Briggs (2015) investigated learner perception of the motivational value of the coursebook, *World English 1* and the mobile application, *TripAdvisor*. Referring to the four categories (attention, relevance, confidence, and satisfaction) in Keller's (1987) ARCS model, Briggs constructed items for an instructional materials motivation survey (IMMS) and administered the questionnaires to 23 college students majoring in Hotel and Tourism. In a comparison of learner responses to the coursebook and the mobile application, his study found that the students were not enthusiastic about learning with the one-size-fits-all type coursebook; instead they displayed more positive reponses toward the mobile application. Nearly two thirds of the students were found to favor studying English with the mobile application; they believed that the mobile application as a language learning tool provided more authentic, interesting learning experiences.

The results of the past studies taken together seem to indicate that mlearning is beneficial for students, as it expands learning opportunities for learners, particularly EFL learners (Briggs, 2015; Chen & Hsu, 2008; Huang & Sun, 2010; Kim, H.-S., 2011, 2014; Kwon, 2013). Mobile learning, as the name indicates, supports high mobility (El-Hussein & Cronje, 2010). Due to the immediacy and the portability of mobile devices, learners can have steady access to target language input and materials; the increased exposures to L2 input can help to produce positive learning outcomes.

The popularity of mlearning or ulearning has generated another learning trend called smart learning. Smart learning, although it shares some features with mlearning or ulearning, is unique and distinctive, in that it accommodates learner differences in learning behaviors and skills; it

also focuses on developing learners' thinking skills and problem-solving skills (Lee & Son, 2013). The differences are summarized in Lee and Son (2013, p. 107).

〔TABLE 1〕 Smart learning, e-learning, m-learning, and u-learning

	Characteristics
e-learning	learning that uses IT and radio & broadcasting technology
m-learning	learning that uses a notebook or mobile device, a type of learning that is not restricted by time but uses the wireless internet, a form of e-learning inducing mobile technology to e-learning
u-learning	a mode of leaning integrated with ubiquitous computing technology, learning that can be conducted anytime, anywhere even without a PC only by connection to the internet no time or space limitation, using various multimedia materials customized education considering each individual's level providing self-direction learning environment
smart learning	student-centered, self-directed, interaction, intelligent, informal learning, and a sense of reality, etc.

Smart learning is a concept that first appeared in Korea. According to the Ministry of Education, Science, and Technology (2011), the acronyms of SMART respectively stand for self-directed, motivated, adaptive, resource-enriched, and technology-embedded. As implied in the acronyms, smart learning does not simply mean learning with smart devices. Smart learning is concerned about connecting via smart infra the components of education (e.g., textbooks, instructional materials, outside experts, learners, teachers, schools, classrooms) that once used to be regarded as separate entities (Kim, H. C., 2011). In other words, smart learning means "smart ways" to teaching and learning as well as "smart infra" (Wikipedia, 2017). While smart infra includes clouding, network, server, smart device, and embedded device, smart ways encompasses learner-centered, tailored, intelligent, integrative, social approaches to learning.

According to Kim, H. C. (2011), these characteristics of smart learning contribute to changing learner competencies from 3R (Read, wRiting, aRithmetic) to 7C (critical thinking and problem solving, creativity and innovation, collaboration and leadership, crosscultural understanding, communication, ICT literacy, career and life skills). In other words, smart learning differs from traditional education that emphasizes textbook-based, lecture-oriented, 3R-focused learning in the limited space, i.e., classrooms. Jeong, Lee, and Kim (2013) also proposed that smart learning fosters 4Cs, such as communication, collaboration, creativity, and

critical thinking. Thanks to these positive aspects of smart learning, learners can have a whole new learning experience (Briggs, 2015) and thus smart learning has become a trend. Consequently, recent studies have focused on the effects of smartphone applications on language learning, strongly supporting them as instructional tools that can accommodate varied learning needs and interests (Martin & Ertzberger, 2013; Tayebinik & Puteh, 2012).

As one of those studies, Seo and Choi (2014) examined if and to what extent a smartphone application called *Speaking 200* would help middle school students form positive attitudes and learn expressions for speaking. In a comparison of a control group and an experimental group that used *Speaking 200*, Seo and Choi (2014) found that the students in the experimental group displayed positive attitudes after six weeks of using the application. Their study, however, did not find significant differences between the two groups in terms of learner achievement in English expressions. When learner proficiency was considered, however, the difference between the two groups was found to be significant for low level learners. In other words, the mobile application was found to be more effective for elementary level students in terms of learning English expressions for speaking.

As another study that examined the effects of smartphone applications, Kim and Yoon (2014) explored the pedagogical value of the two applications (*Kakao Talk* and *Mocáfe*) for teaching writing. Specifically, their study examined how those applications, when blended into offline classes, would affect student learning in terms of their attitudes and performance on the tests. Eight students' responses to the questionnaires and interview questions and their performance on the pre- and post-tests were collected as data. The study found that the students' written output production improved as a result of experiencing the blended learning approach (*Kakao Talk* for real time social interaction and *Mocáfe* for asynchronous communication) for a period of 4 weeks. Interestingly, the students were observed to prefer *Mocáfe* to *Kakao Talk*. The blended instructional approach was found to be effective for engaging students in learning, and for promoting social interaction and feedback provision.

From the review of the previous studies, it seems that smart learning has been interchangeably used with mobile learning or learning that involves the use of smartphone applications or mobile devices. The meaning of smart learning is quite vague because it has been defined only in theoretical terms; there arises a lot of confusion and misunderstanding as to what smart learning is since the concept has not been defined in practical terms; consequently, while we may know smart learning conceptually, little is known about what it is in practice. Most of prior studies have been limited to the evaluation of mobile applications or learner perceptions of mobile-assisted language learning (MALL) experience (Kukulska-Hulme,

2009; Nash, 2007). With many studies mostly on mlearning, however, there is a paucity of research on smart learning in relation to language learning. Thus, this study aims to revisit the concept of smart learning in the Korean EFL context and illustrate how we can implement smart learning in the college classrooms. Specifically, the paper aims to describe how smart learning is related to problem-based learning (PBL) and how PBL in smart learning contexts can be realized in the form of flipped learning.

III. Smart Learning Approach

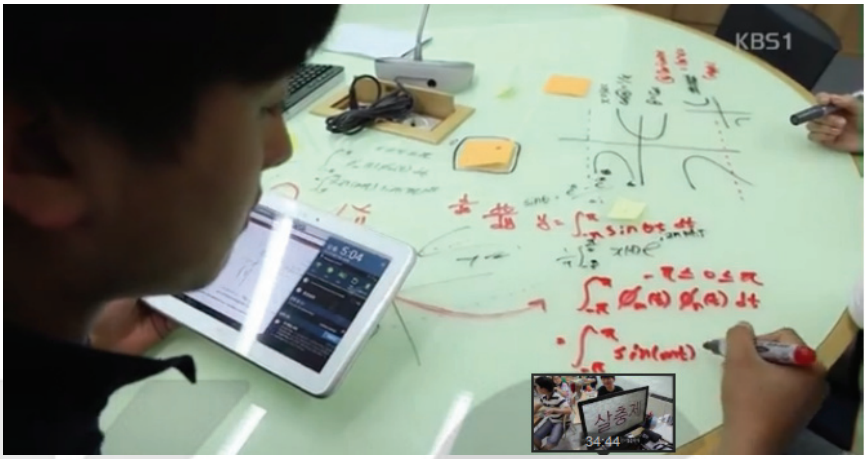
The basic tenets of smart learning are rooted in the principles of problem-based learning (PBL). PBL is an educational movement that tries to realize or emulate how professionals address their discipline-specific or field-specific problems (Bean, 2011). Each field of study has distinctive problems to solve and unique methodologies. For instance, the field of mathematics would pose a problem different from that of the field of sociology. Problem-based learning seems to be a good fit for smart learning environments in that they are effective for realizing the features of PBL (Jayaram, 2013):

> Learning is initiated by a problem.
> Problems are based on complex, sometimes real-world situations.
> All information needed to solve problem is not given initially.
> Students identify, find, and use appropriate resources.
> Students work in permanent groups.
> Learning is active, integrated, cumulative, and connected.

The ultimate goal of PBL is to have students develop problem-solving skills and higher-order thinking skills required by the specific fields of study. To achieve this goal, therefore, learning content should be organized in such a way that students handle discipline-specific problems (Bean, 2011). With the help of mobile devices, learners can explore around and find relevant resources to solve problems, rather than receptively following what is presented in the text.

As shown in the following picture of KAIST students (Park, 2013), smart learning environments can help to maximize the effectiveness of PBL. For example, prior to class, learners can study lecture slides or readings and look for additional resources including video,

audio, blogs, etc. at their will. They can then bring problems to class to work on collaboratively with their group members. They can use ipads or tablet PCs to refer to the posted materials and solve problems collaboratively, writing on the smart table. Here the role of the learner emulates that of the practitioner or researcher, who generates ideas through discussion, collects and analyzes data, and collaboratively works on the problem-solving tasks.



〔FIGURE 1〕 PBL in smart learning environment

The problem-based learning implemented in the smart learning environments is similar to flipped learning where students watch teacher-generated videos or complete assigned readings before class and work on problems in class. Flipped learning is not a new concept as it first appeared almost 30 years ago (Correa, 2015). It was initiated as an alternative to the traditional, teacher-centered classes where learners remain passive, receiving information transmitted from the omniscient, i.e., the teacher (Bergmann & Sams, 2012, 2014; Sung, 2015). Flipped learning has been widely adopted since 2012 when two classroom teachers Bergmann and Sams tried out producing and providing instructional videos to assist their students who could not attend school for many reasons or who had to leave early because of sports or other activities (Flipped Learning Network, 2014).

According to Cobb and Steele (2014), flipped learning refers to a "learning strategy that offers preparatory or foundational content outside of the classroom and uses class time for active learning" (p. 2). As the acronyms of the word FLIP indicate, flipped learning helps to create flexible environments, change learning culture, use intentional content, and foster professional educator (Flipped Learning Network, 2014). To those four, Chen, Wang, and

Chen (2014) added three more ideas (progressive activities for P, engaging experiences for E, and diversified platform for D) to make the acronyms for FLIPPED and better express the features of flipped learning.

Pedagogical benefits of flipped learning have been noted in many studies, which include improved achievement (Bergmann & Sams, 2014, Kang, 2015), self-regulated learning (Shim, 2013), high levels of engagement and motivation (Du, Fu, & Wang, 2014; McBride, 2015; Roehl, Reddy, & Shannon, 2013; Zhang, 2015). For these positive aspects of flipped learning, it has recently gained popularity in higher education settings, and Korea is no exception. Some universities in Korea have recently started to require their faculty to adopt flipped learning in the form of smart learning. For instance, newly hired faculty are obliged to implement flipped learning for their content courses. Thus, college instructors have their students preview their teaching videos or other online materials at home and solve discipline-specific problems or perform content-relevant tasks in class afterwards.

What is notable is that flipped learning has the features of both PBL and smart learning in that it premises the creation of smart learning environments and the process of problem solving. Here the role of materials comes into play. When materials are effectively designed, flipped learning can accomplish smart ways of learning: learner-centered, tailored, integrative, social approaches to learning. Learners with smart learning materials in adaptive, resource-free, technology-embedded smart learning environments are expected to become self-directed and motivated.

IV. Smart Materials

1. Smart Media and Tasks

As the name manifests, smart media is used to facilitate smart learning. What is unique about smart media is that information is presented non-linearly and content is genuinely interactive. Smart media does not just provide information but engages learners in the sea of information. Students have to freely access information and select, analyze, and synthesize resources to produce solutions to the given problems.

Mobile devices as smart media are useful since portable mini-computers are always handy and nearly always on (Prensky, 2005). This ease of accessibility is what makes mobile devices distinctive from desktop computers. Learners simply have to explore around to select what they

need. The challenge is then what to use among infinite number of resources and materials. Learners can refer to user reviews to be able to choose appropriate materials or resources. Or they can be provided checklists or evaluation criteria so that they have an awareness of what to look for and whether the given materials are adequate for them.

In the meantime, teachers have to make endeavors to design materials that can contribute to smart learning. For flipped learning, teachers usually have to produce two sets of materials: one for online class and another for offline class. Given that three-credit college courses are often run in two 75-minute sessions, college instructors are supposed to produce their teaching videos or prepare other resources for an online class, and design problems or tasks for their students to work on in an offline class. Teachers can shoot their instructional videos in the self-studio as shown in the picture below.

〔FIGURE 2〕 Self-studio for shooting instructional videos

One thing that teachers have to keep in mind in shooting their instructional videos is that they should keep the length of the video much shorter than that of an offline class. It is recommended that an instructional video for a 75-minute session should be around 20 minutes. This is because students are likely to get distracted and lose interests when online video exceeds the limit. Instructors can use PowerPoint (PPT) slides, Tablet PC, or boards while delivering course content. Depending on how they vary those tools, they can shoot and produce their teaching videos in different ways: 1) PPT slides on one side and instructors' teaching on the other side of the screen, 2) PPT slides on one half of the screen and instructors' writing on their tablet PCs on the other half, and 3) instructors' writing on the glass boards without PPT slides.

While those teaching videos are prepared to provide basics of the course content or topics, the materials for offline classes should be designed around problems or tasks in order to foster problem-based or task-based learning. These problems or tasks used for face-to-face classes are expected to supplement learners' incomplete knowledge or to help them apply their knowledge to problem solving or task performance. Therefore, it is imperative that the tasks or the problems should become channels of further study for students.

Then, what should teachers do to pose problems that are cognitively stimulating for students? What would be the expected challenges? For general English skill courses, it may be a little difficult to implement the kind of problem-based learning conducted in the field of science or business. Yet, it is still worth using tasks or projects in language classrooms because they empower learners by giving them a lot of control over their learning process. When learners are in control of their learning, they are likely to play more active roles in carrying out tasks and become more autonomous, as in the case of the KAIST students mentioned earlier.

Thus, carefully planned tasks or projects in the EFL context can promote self-directed learning as well as make classroom learning learner-centered. For example, for general English speaking courses, teachers can have their students develop a map of a museum that is tailored for a particular target group. Using smart devices, teachers can monitor what kinds of information students gather, how they coordinate their efforts, and how they organize their information and resources in the form of interactive media. Teachers can also implement project based learning by using one of the applications called *iBook* for teaching reading and writing. With the e-publishing application, teachers can have their students make their own story book as a part of a group project.

The tasks in content courses can be provided in the form of worksheets or writing prompts. Suppose that students are pre-service teachers taking a course on principles of language learning and teaching. For the course requirement, students can be asked to watch online a teacher-narrated video on the chapter that describes different perspectives on human learning, and then in an offline class, collaboratively complete the following worksheet (See Figure 3). Specifically, students, after studying the relevant materials in advance, are supposed to retrieve their understanding of three different theoretical perspectives of learning: behavioristic, cognitive, and constructivist. For this, students have to recall core concepts related to scholars that represent the perspectives, and then have to come up with relevant examples. In addition, after summarizing principles of learning for each perspective, they have to think about the connection between theories and practice of learning by inferring pedagogical implications from the theories.

Categories	Skinner	Ausubel	Rogers
Core concepts and their definitions			
Examples for the concepts			
Principles of learning			
Implications for teaching			

〔FIGURE 3〕 Worksheet: Compare the views of Skinner, Ausubel, and Rogers

Or students can perform content-based writing tasks after studying online materials on their own. For instance, students can read online resources or watch an instructional video that covers techniques for testing listening skills and then write their responses to the following prompt:

> Suppose that you are a classroom teacher who wants to develop a listening test for high school freshmen. Among the testing techniques introduced in the chapter, which one would you like to use? In addition, explain which method you would like to use for presentation of auditory input: audio recording versus live presentation. Make sure to discuss reasons for your choice of the technique and the delivery method. (15 min., 200 words)

Teachers can vary the worksheets or writing prompts according to the course content or topics. For instance, given that students have studied online materials on the concept of reliability, they may be asked to write to the following prompt:

> You as a classroom teacher have to construct a test that measures your students' English writing proficiency. In order to ensure construct validity, you want to use direct testing rather than indirect assessment. However, due to the practicality of the test, you can only ask 2 questions. The problem is the reliability of the test. Your colleagues tell you that the two-item test will not be reliable. How are you going to make the test more reliable? Identify the dilemma and present solutions, referring to the chapter on reliability. (15 min., 200 words)

In addition, as Sung (2015) suggested, instead of performing short writing tasks in class, students can be asked to write their "thought papers" individually as a part of online class assignment and bring them to class to share with other students via group work. The students

in Sung's (2015) study, enrolled in the *English Curriculum and Evaluation* course, were required to post their thought papers regarding the core concepts or principles from the assigned readings before attending the face-to-face session of the course. In addition to the papers, the students were also guided to ask questions on the bulletin board in the learning management system (LMS) called KLAS and via Kakao Talk. In their face-to-face meetings, the students shared their thought papers and discussed the topics or the questions posted on the board. In class, they also participated in group activities or projects, such as constructing questions about the readings, gathering samples of test-items for scrutiny, specifying instructional goals and objectives, and making an evaluation plan for a certain group of learners in a particular context.

As shown in the examples above, in the face-to-face component of flipped learning courses, there is no teacher-oriented lecture but student-led activities like Q&A, role-plays, discussion and group-based work. For project based learning, learners are guided to gather, select, manipulate resources and create materials as in the case of the book making project. For task- and problem-based learning, they are expected to collaboratively work on tasks or solve problems in class after watching instructional videos or reading uploaded texts or resources. The objective of task-based learning, whether it is for a language class or a content course, is not in the learning of language like grammar or lexis, but in the completion of tasks. In the task-based class, language is just a means of communication. The same applies to problem-based learning in content courses, where problems matter more than language itself.

Another thing to note that is that the tasks or the problems in offline classes are not necessarily mediated by analog interaction only; learners can carry out tasks or solve problems in smart learning contexts: For instance, they can have digital interaction via mobile devices, tablet PCs, smart boards, smart table, etc. In other words, as in the case of the KAIST students, students can solve problems in collaboration with others at the smart table, using their tablet PCs. This kind of smart learning contexts can be created easily with mobile applications that support smart classroom learning.

2. Smart Applications for Smart Classroom

This section will introduce three most popular mobile applications that can engender smart learning environment: Kahoot, Google Classroom, and Edmodo. Among twenty-one helpful applications<https://www.digitaltrends.com/mobile/best-apps-for-teachers-education/2/>, the following three were chosen primarily because they can be of great use to classroom learning rather than self-study. As many applications for self-study are already introduced in

Kwon (2013), this study focuses on the applications that are useful and helpful for creating smart classrooms.

1) Kahoot <https://kahoot.com/>

It is a game-based learning platform that allows teachers to change a teacher-led lesson into a game. Therefore, it is engaging and motivating for students. It is available both on the web and via mobile applications (downloadable from Itunes and Google Playstore). You can develop your own game as well as look for ready-made games.

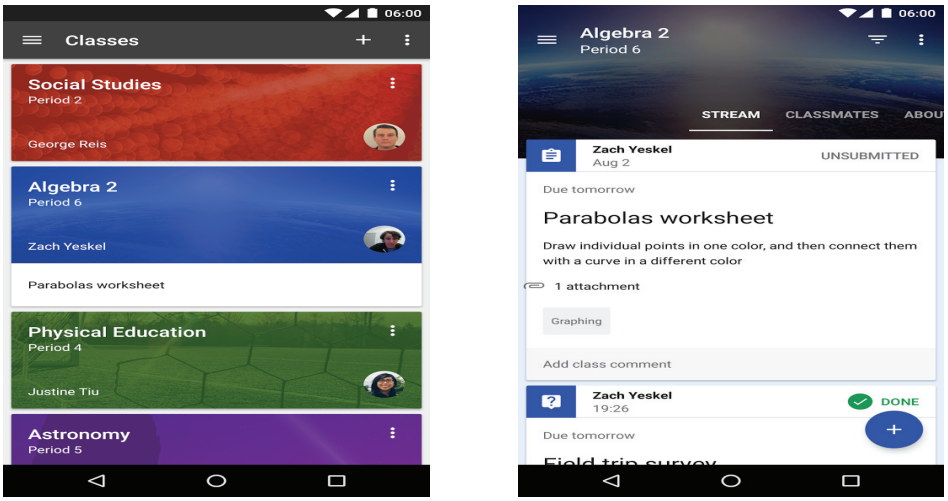
It helps to create a fun classroom by making three modes of learning possible: creating, playing, and sharing. First, teachers can create a fun learning game, *Kahoot* with a number of multiple choice items; they can incorporate videos, pictures, and other visual materials into their questions. Students then download the application to use it as a buzzer and play games in a group. As shown in Figure 4, the game is shared on the screen, while students play with their own mobile devices (https://kahoot.com/). After playing games, students can create their own Kahoots and share them with others. This process of sharing is an opportunity for social learning, and it helps students to consolidate their understanding of the course topics.

〔FIGURE 4〕 Students playing *Kahoot*

2) Google Classroom <https://classroom.google.com/h>

Google Classroom is a free mobile application available for schools or nonprofit organizations with Google accounts (downloadable from Itunes and Google Playstore). It can easily connect teachers with students both inside and outside of school. What is good about this program is that it does not carry advertisements, nor use learner work or data for commercial purpose. It helps to save time and paper, in that teachers can create an online classroom and run their classes effectively in terms of assignment distribution, communication, materials

organization, etc.



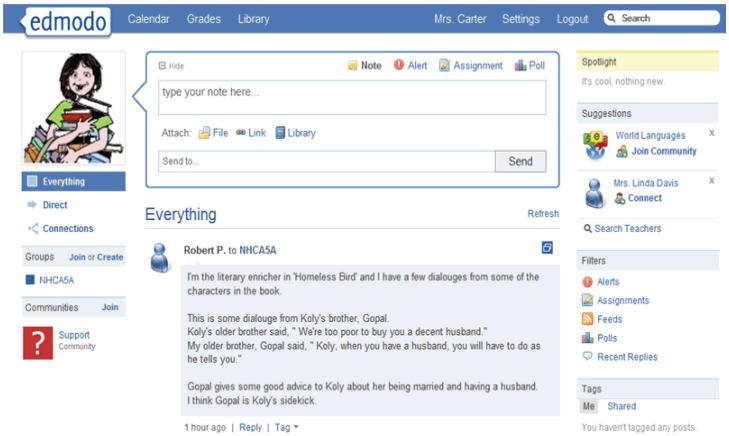
(FIGURE 5) Classes offered with *Google Classroom* (left) and one of the classes (right)

With Google Classroom, teachers can add learners and manage learner participation by sharing class codes. Teachers can create a folder on Google Drive where they store class materials including documents, images, videos, and so forth. They can also send notifications and announcements to students to engage them in assignments or discussions.

As shown in Figure 5, teachers can open many classes with Google Classroom (left), and post worksheets for students to work on in each class (right). Students can check assignments or tasks easily, and share their work and responses to the questions posted by teachers. These assignments or tasks can then be reviewed and evaluated by teachers.

3) Edmodo <https://www.edmodo.com/>

Edmodo is the largest K-12 social learning network that connects learners, teachers, and parents. It resembles Google Classroom in many aspects: students can check classroom tasks, activities, announcements, and latest updates anytime, anywhere; students can turn in their work and receive feedback and grades based on their performance; students and teachers can have ongoing discussion outside the classroom as well as share course content and information in the form of documents, images, and videos.



〔FIGURE 6〕 Example of a class offered with *Edmodo*

Moreover, teachers can conduct polls and testing as well as post announcements and assignments. They can also keep track of learner progress and performance, which can then be reflected in student report cards. What is unique about this program is that it is available not only for students and teachers but also for parents. Furthermore, Edmodo provides an android application specifically designed for parents: *Edmodo for Parents*. This application focuses on communication with parents: it enables parents to view lessons, tests, schedules, announcements, etc. and to check the status of tasks: whether their kids are on right track in terms of time. It also sends out notifications to parents when student assignments are received.

Thus far, three most popular mobile applications for creating smart classrooms have been reviewed. Given the enormous number of mobile applications, they are just the tip of the iceberg. Although these three can not represent all the applications, they are introduced as examples of mobile applications for constructing a smart learning environment. In addition to those applications, online resources, in-class tasks, and problems are all important components of smart learning materials. What is notable about the smart materials is that they allow students to freely explore and control the content. In the process of using the materials and solving problems, learners are likely to develop higher order thinking skills as well as language communication skills. Most of all, as agents of learning, they are expected to become more autonomous and self-directed.

V. Conclusion

This study has surveyed what smart learning is and how it is distinctive from mlearning or ulearning. Smart learning, while it is similar to mlearning or ulearning in terms of high mobility and ease of accessibility, places more value on learner empowerment. Consequently, learners engaged in smart learning are expected to be self-directed in the way they gather, select, organize and use information to perform tasks. As smart learning environments help to create optimal conditions for problem-based learning (PBL) or task-based learning (TBL), their combination is just right for developing critical thinking skills, problem-solving skills, and creativity.

Smart learning is also useful and beneficial for language learning because it creates authentic, simulated, and experiential learning opportunities for learners. The varied contents and applications can accommodate different needs and proficiency levels of learners. It is smart because it helps to minimize individual differences or regional differences in students' learning outcomes, by letting all the students have equal access to open-ended learning environments.

The open-ended learning environments are expected to increase with the expansion of mobile technology. Smart learning is expected to thrive, partly due to the rapid growth of smartphone users and due to its pedagogical benefits. Thus, for successful implementation of smart learning in Korean academic context, we should predict possible problems and seek solutions to the problems. One of the potential problems is that Korean students are not used to this new mode of learning where they have substantial amount of control over their learning process. They are likely to feel uncomfortable about the self-directed learning experience in smart learning contexts as they have to adjust the pace of learning and choose materials or applications on their own. Students are likely to find it strange as they are not familiar with this new learning approach.

Another problem is in the quality of smart learning materials. While smart applications and mobile devices allow students to search and select materials easily for various learning purposes, in some cases, they are not so much different from printed materials. The smart materials may just have an interactive touch added to printed materials. Moreover, an immense number of materials are available for smart learning so it can be quite challenging for students to choose appropriate ones. As materials selection is the key to the successful problem solving or task completion, teachers should help their students make informed choices among vastly available resources. In other words, students need to be trained in working through resources, and evaluating and choosing right materials for their problems or tasks. Otherwise, they will end up

wasting time and energy, feeling overwhelmed by the influx of information. This is particularly so for young learners who do not have experience and training in distinguishing valuable information from useless one.

How can teachers then sort out what is beneficial for their students? This presents an enormous challenge for classroom teachers. While smart learning environment makes it easy to organize teaching materials with more and better resources, the process of organizing them can be time-consuming and labor-demanding. Ironically, teachers are usually quite busy, dealing with their teaching and administrative duties. Given this challenge, would classroom teachers want to spend time and energy to work with more diverse and complex materials that smart learning requires? Or for convenience, would they simply resort to conventional curriculum resources other people have already developed for them? This question concerns not only teachers, but also material designers.

It is important to note that materials designers, application developers, or classroom teachers should be able to predict or anticipate the types of learning experience or sequences our students would take for PBL. In the traditional textbook, content sequencing was relatively easy because material designers linearly sequenced grammar items in terms of difficulty or functions in terms of coverage and use. In smart environments, however, this becomes more tricky because smart learning can take place in far more varied forms. Our students may not follow what is normally expected by application developers. Therefore, material designers should be able to predict the path of learning our students would take and develop materials accordingly.

Given the positive possibilities and persistent problems with smart learning, what can we conclude? It seems that problem-based learning or task-based learning can be the best approaches for smart learning environments. When students are challenged with real-world tasks through smart devices, they can experience what traditional approach could not afford for its rigid structure and organization. In addition, when classroom tasks are carefully designed and effectively connected to prior online learning tasks in flipped classrooms, students can develop higher order thinking skills and creativity from problem solving or task completion.

Despite the enormous possibility of smart learning, we should note that the presence of technology alone is not sufficient to bring out the kinds of change we need. This is where teacher role comes into play; and teacher role shifts from a knowledge dispenser to a coach or a guide to lead students to find their ways in the era of information. In order to perform well as classroom teachers, they need to train themselves with what is possible in smart learning and how classroom learning is to be organized. This involves not just learning about new hardware,

but changes in the way they view classroom teaching because the nature of teaching and learning is different in smart learning environment. Teachers should get ready for this change, and at the same time be aware of learner needs.

We also need institutional and governmental support. Teachers need consistent training, and technical support and administrative support. Unlike the traditional method with uniform textbook and teaching method, the new environment involves much more diverse options and complex planning. Therefore, we need some professionals, such as e-content curators or media technicians, who can help to reduce teachers' work load through technical assistance. Only then will classroom teachers be able to initiate changes that foster the critical thinking and problem-solving skills our students require.

REFERENCES

Bean, J. (2011). *Engaging ideas* (2nd ed.). San Francisco: Jossey-Bass.

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Washington DC: International Society for Technology in Education.

Bergmann, J., & Sams, A. (2014). *Flipped learning: Gateway to student engagement*. Washington DC: International Society for Technology in Education.

Briggs, N. (2015). Motivational value of mobile-based communicative tasks as coursebook supplements. *Multimedia-Assisted Language Learning, 18*(2), 11-36.

Cha, F. (2017). *Ten things South Korea does better than anywhere else*. Retrieved August 1, 2017, from the World Wide Web: http://edition.cnn.com/travel/article/10-things-south-korea-does-best/index.html

Chen, C. M., & Hsu, S. H. (2008). Personalized intelligent mobile learning system for supporting effective English learning. *Educational Technology & Society, 11*(3), 153-180.

Chen, Y., Wang, Y., & Chen, N. S. (2014). Is FLIP enough? Or should we use the FLIPPED model instead? *Computers & Education, 79*, 16-27.

Chinnery, G. M. (2006). Going to the MALL: Mobile assisted language learning. *Language Learning & Technology, 10*(1), 9-16.

Cobb, L., & Steele, C. (2014). *Exploiting the fringe: Flipping, microcredentials, and MOOCs*. Carrboro, NC: Tagoras.

Correa, M. (2015). Flipping the foreign language classroom and critical pedagogies: A (new) old Trend. *Higher Education for the Future, 2*(2), 114-125.

Du, S. C., Fu, Z. T., & Wang, Y. (2014). The flipped classroom: Advantages and challenges. *Proceedings of International Conference on Economic, Management and Trade Cooperation*, 12-13.

El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining mobile learning in the higher education landscape. *Educational Technology & Society, 13*(3), 12-21.

Flipped Learning Network. (2014). *Definition of flipped learning*. Retrieved August 1, 2017, from the World Wide Web: http://flippedlearning.org/definition-of-flipped-learning/

Huang, C., & Sun, P. (2010, September). *Using mobile technologies to support mobile multimedia English listening exercises in daily life*. Paper presented at the international conference of Computer and Network Technologies in Education, Beijing.

Jayaram, S. (2013). Implementation of active learning and problem-based learning in an undergraduate control systems course. *Proceedings of ASEE Annual Conference and Exposition*, *USA*, 2-15.

Jeong, M., Lee, J., & Kim, J. (2013). An analysis of learner interaction in smart English education. *Multimedia-Assisted Language Learning, 16*(4), 39-65.

Kang, N. H. (2015). The comparison between regular and flipped classrooms for EFL Korean adult learners. *Multimedia-Assisted Language Learning, 18*(3), 41-72.

Kang, N-H., & Kim, J-Y. (2007). Mobile contents for teaching and learning English listening skills and vocabulary using TV Drama. *English Language Teaching, 19*(1), 113-134.

Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of Instructional Development, 10*(3), 2-10.

Kennedy, C., & Levy, M. (2008). L'italiano al telefonino: Using SMS to support beginners' language learning. *ReCALL, 20*(3), 315–350.

Kim, H., & Yoon, M. (2014). Adopting smartphone-based blended learning: An experimental study of the implementation of *Kakao Talk* and *Mocafé*. *Multimedia-Assisted Language Learning, 17*(2), 86-111.

Kim, H. C. (2011). *Smart learning contents quality management and instructional model development* (스마트교육 콘텐츠 품질관리 및 교수학습 모형 개발 이슈). KERIS.

Kim, H. S. (2011). Effects of SMS text messaging on vocabulary learning. *Multimedia-Assisted Language Learning, 14*(2), 159-180.

Kim, H. S. (2014). Effects of using mobile devices in blended learning for English reading comprehension. *Multimedia-Assisted Language Learning, 17*(2), 64-85.

Kim, T., Cho, J. Y., & Lee, B. G. (2013). Evolution to smart learning in public education: A case study of Korean public education. *International Federation for Information Processing (IFIP) AICT, 395*, 170-178.

Ko, H. (2017, March 18). Korean people use an average 4.9GB of data per month. *Yonhapnews*. Retrieved August 6, 2017, from the World Wide Web: http://www.yonhapnews.co.kr/bulletin/2017/03/ 16/0200000000AKR20170316210000017.HTML?input=1195m

Kukulska-Hulme, A. (2009). Will MALL change language learning? *ReCALL, 21*(2), 157-165.

Kwon, Y. H. (2013). A case study of college EFL learners' mobile-assisted language learning with smart applications. *Multimedia-Assisted Language Learning, 16*(1), 37-65.

Lee, M. J. W. (2005). Mobile learning: Should we get a move on? *Training and Development in Australia, 32*(4), 8-11.

Lee, M-S., & Son, Y-E. (2013). A study of learning system for smart learning using BYOD. *SoftTech, 19*, 106-111.

Lomine, L., & Buckingham, C. (2009). *M-Learning: Texting (SMS) as a teaching and learning tool in higher arts education*. Winchester University, Faculty of Arts, UK.

Lu, M. (2008). Effectiveness of vocabulary learning via mobile phone. *Journal of Computer Assisted Learning, 24*, 515-525.

Martin, F., & Ertzberger, J. (2013). Here and now mobile learning: An experimental study on the use of mobile technology. *Computer & Education, 68*, 76-85.

McBride, C. (2015). Students' attitudes and success during my first attempts at flipping. *International Journal for Cross-Disciplinary Subjects in Education, 6*(2), 2174-2183.

Ministry of Education, Science, and Technology. (2011). *Strategies for implementing smart learning in Korea* (스마트교육 추진전략 실행 계획). Seoul, Ministry of Education, Science, and Technology.

Nash, S. S. (2007). Mobile learning, cognitive architecture, and the study of literature. *Issues in Informing Science and Information Technology, 4*, 811-818.

Obari, H. (2013). The impact of employing mobile technologies and PC for learning coursera on-line: Lectures and TOEIC practice kit. *Multimedia-Assisted Language Learning, 16*(4), 97-109.

Pachler, N., Seipold, J., & Bachmair, B. (2012). Mobile learning: Some theoretical and practical considerations. In K. Friedrich, M. Ranieri, N. Pachler, & P. de Theux (Eds.), *The 'My Mobile' handbook: Guidelines and scenarios for mobile learning in adult education* (pp. 11–16). Retrieved August 6, 2017, from the World Wide Web: http://www.mymobile-project.eu/-Resources-.html

Park, S. K. (2013, July 21). Smart learning is coming III: Conditions of School. *KBS Special Documentary*.

Prensky, M. (2005). In digital games for education, complexity matters. *Educational Technology, 45*(4), 22-28.

Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning strategies. *Journal of Family & Consumer Sciences, 105*(2), 44-49.

Seo, W. H., & Choi, I. C. (2014). The effect of using a smart-phone speaking application on Korean middle school students' English expression learning and satisfaction. *Multimedia-Assisted Language Learning, 17*(1), 34-57.

Shehadeh, A., & Coombe, C. A. (2012). *Task-based language teaching in foreign language contexts: Research and implementation*. Amsterdam: John Benjamins Publishing.

Shim, S. K. (2013). Influence of learning instrument and self-regulated learning strategy on learning achievement in online learning. *The Journal of the Korea Contents Association, 13*(3), 456-467.

Sung, K. (2015). A case study on a flipped classroom in an EFL content course. *Multimedia-Assisted Language Learning, 18*(2), 159-187.

Tayebinik M., & Puteh, M. (2012). Mobile learning to support teaching English as a second language. *Journal of Education and Practice, 3*(7), 56-62.

Thomas, M., & Reinders, H. (2012). *Task-based language learning and teaching with technology*. New York: Continuum.

Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of Computer Assisted Learning, 21*(3), 217-228.

Zhang, L. (2015). Teaching model design of business English based on flipped classroom case study. *Proceedings of the International Conference on Education, Management and Computing Technology*, 176-181.

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