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‘Daily Speaking’: Designing an App for Construction of Language Learning Model Supporting ‘Seamless Flipped’ Environment

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Abstract**—**Seamless learning is becoming a research hotspot in recent years, and the emerging of micro-lectures, flipped classroom has strengthened the development of seamless learning. Based on the characteristics of the seamless learning across time and space and the course structure of the flipped classroom, and the theories of language learning, we put forward the language learning model which can support ‘seamless flipped’ environment (abbreviated as ‘S-F’). Meanwhile, the characteristics of the ‘S-F’ learning environment, the corresponding framework construction and the activity design of diversified corpora were introduced. Moreover, a language learning app named ‘Daily Speaking’ was developed to facilitate the practice of the language learning model in ‘S-F’ environment. In virtue of the learning case of Shanghai language, the rationality and feasibility of this framework were examined, expecting to provide a reference for the design of ‘S-F’ learning in different situations.

Keywords**—**Seamless learning, flipped classroom, seamless-flipped environment, language learning model.

I. Introduction

THE ever-changing information technology has had a tremendous impact on the connotation and derivative of education. The teaching method is changing from the traditional era of paper and pen to the emerging mobile learning, MOOC and social learning. The education mode is also changing, such as flipped classroom, maker education and collaborative learning [1].

Students in the 21st century are "digital natives" from birth. Advantages of portable devices, accessible learning resources and proficient operations by students, digital terminals such as mobile phones, tablet computers have become an unconscious choice for students to fulfil their studies. The time and places of learning is no longer restricted to the limited space and time of the campus or the classroom but can be studied at any time and place. The portability of mobile devices has played an important role in the transition from "teacher-centered" to "student-centered" teaching mode. In a one-to-one technology-enhanced learning environment [2], handheld mobile devices anytime and anywhere enable students to learn what they are interested beyond class, and teachers can act as learning facilitators and knowledge experts to instruct students' learning. It is important that mobile devices, as an intermediary tool, link formal and informal learning together by creating a seamless learning environment. Formal learning in schools generally needs to provide learning tasks that correspond to the content of the course. Informal learning is the learning process that occurs outside the school. The two learning scenarios are different, but they are not antagonistic. The two learning styles can complement each other by mobile devices [3], [4]. In recent years, studies have found that the emphasis of language learning theory has shifted from behaviorism to communicative and situational applications [5]. In addition, the pronunciation and intonation needs to be provided with standardized imitation samples. On the one hand, it can increase the probability of input from the perspective of hearing, on the other hand, it can also create a practicing environment from the perspective of oral language. Based on the above requirements of language learning, the role of seamless learning supported by mobile devices is particularly important. At present, there is a lack of flipped course design and corresponding practice activities centered on learner autonomy in the seamless learning spaces. The paper proposes a seamless flipped environment (abbreviated as "S-F" environment) on the basis of seamless learning and flipped classroom. Based on the characteristics and principles of seamless learning and flipped classroom teaching models, we designed a "S-F" environmental learning model that could support students’ language learning, explored learning activities supported by this model, and introduced an APP software developed to support students’ mobile-assisted S-F learning in different learning spaces.

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II. Seamless Learning and Flipped Classroom

A. Seamless Learning

1.The Connotation of Seamless Learning

In 2006, Tak-Wai Chan [2] proposed seamless learning on the basis of mobile learning. He thought that seamless learning is a learning mode in which students’ learning curiosities can be satisfied in multiple scenarios at any time. He used personalized mobile devices as a medium, which can help students quickly transfer from one situation to another. The interpretation of this concept is also in line with the changes of

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the physical environment and scenarios proposed by Laouris et al. [6] and the viewpoint that mobile learning can improve learners' ability. Seamless learning is a continuous learning process that can cross different learning spaces [2], [9], focusing on integration of formal learning and informal learning, personalized learning and social learning, authentic learning and virtual learning by effective technologies rather than contradiction of these learning forms.

As for the application of seamless learning, there are mainly practices of scientific inquiry [7] and language learning [8]. These studies show that in a seamless learning environment, students have a deeper understanding and a positive attitude towards what they have learned, which can also promote their learning interest and satisfaction. Zhang et al. [9] endeavored to develop a sustainable innovation for seamless learning to transform school teaching and practices. The realization of sustainable education innovation requires the joint action of many factors, including school construction, administrative support, teacher-student cooperation, curriculum resource support and rationality assessment.

2.Seamless Learning Spaces Supported by Mobile Learning

Seamless learning space is a collection of different learning scenarios supported by one-to-one technology. From the perspective of physical setting and learning process, there are four types of learning spaces: planned learning in class, planned learning out of class, emergent learning out of class, and emergent learning in class [10], [11]. It provides a foundation for creating effective learning spaces. The seamless learning environment emphasizes that learners are autonomous, free, with the support of technology, resources, tools, and environment, they can carry out the transformations of learning spaces [12]. Constructive learning theories and situational cognitive learning theories believe that the design of a seamless learning space needs to be carried out around learners, learning environments and learning resources. Through technological support and design of teaching activities, learners and the environment are intrinsically linked to build a seamless learning space.

Through a thorough analysis of academic articles about mobile-assisted seamless learning that published from 2006 to 2016, Wong et al. [16] identified 10 dimensions that characterized the mobile-assisted seamless learning, and believed that seamless learning is not just about anytime, anywhere. It can also connect experiences and gains from various learning spaces through the learning hub of the mobile device (recording the learner's learning history and supporting learning activity materials in real time through cloud computing technology). However, this classification is to a certain extent from the perspective of designers or teachers, and there are some deficiencies. Therefore, Wong [13] further perfects these 10 dimensions from the perspective of students. They are formal learning and informal learning, personalized learning and social learning, across time, across locations, ubiquitous learning resources access, physical and digital worlds, combined use of multiple device types, seamless switching between multiple learning tasks, knowledge synthesis, and multiple pedagogical or learning activity models.

B. Flipped Classroom

Flipped classroom has become the focus of education in recent years. In 2011, the Canadian "The Globe and Mail" rated "a major technological change affecting classroom teaching". The flipped classroom mainly means that students watch videos that recorded by a teacher before coming to class. By adjusting the time inside and outside the classroom, the decision-making power of learning is transferred from the teacher to the student, so that the teacher has more time to communicate with each other, and the individualized learning of the student can be realized [14]. Talbert [15] summarized the implementation structure of flipped classroom as shown in Fig. 1, which includes the process of pre-class preview and in-class problem-solving and feedback.

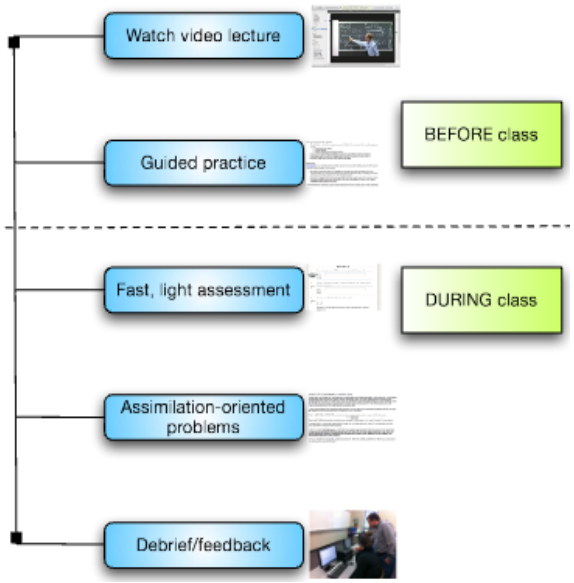


Fig. 1 Flipped classroom implementation structure

As a widely accepted teaching model, the flipped classroom has its unique characteristics, (1) Changes of student-teacher roles: Teachers are providers of learning materials and instructors of learning while students are active learners who are responsible for their own learning behaviors. (2) Allocation of class time: the traditional class time is moved to the front of the class, and students and teachers can interact with each other in class to solve problems. (3) The use of multimedia technology: whether it is videos or other materials, teaching platform or other online platforms can facilitate teaching and learning, students can easily take seamless learning anywhere by using mobile devices through the platform [16], [17]. In the flipped classroom model, knowledge internalization occurs in the process of interaction between teachers and students in the classroom. Knowledge transfer occurs in the self-learning after class, while knowledge consolidation is completed at their homework after class [16].

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III. Language Learning Framework Supporting "S-F" Environment

A. Characteristics of the "S-F" Environment

Hwang et al. [17] combined home study, school activities, and field learning together. They believe that flipped classroom spans home and school spaces, however, seamless flipped learning can happen in various situations. The design principles and strategies include: encouraging students to learn by themselves; designing field learning activities; encouraging students to apply the knowledge they have learned to solve problems; designing in-class learning activities that improve students' higher-order thinking; and encouraging students to develop the interaction between students and students in various learning spaces. Mobile and wireless communication technologies are used to seamlessly engage in self-learning, field exploration, and higher-order thinking in class. These design principles and strategies provide a reference for the construction of the "S-F" environment.

The role of teacher changes from knowledge transmitters to learning promoters. Through in-class discussions, collaborative learning activities and personal guidance, we can help students improve their self-reflection ability to form learning behaviors with advanced cognition. According to the design principles and strategies of Hwang et al. [17], teachers should design teaching plans that encourage students to learn in extracurricular situations. Students also need to try to apply what they have learned in daily life.

Traditional second-language learning is often an over-interpretation of contextualized information, indirect or abstract knowledge concepts, and second-hand experiences in the classroom. Students could not master it effectively. Therefore, as the language learning theorists suggest, formal learning should be integrated with informal learning as an effective complement to traditional language learning. According to the research of Little [18], in the context of language learning, there are three principles of interaction in classroom teaching, it is the participation of learners, the reflection of learners and the use of the target language. And the 1:1 technology-enhanced learning environment can support the implementation of these three principles effectively.

B. Construction of Language Learning Framework

The language learning framework to be constructed in this study is to use mobile APP as the learning medium, relying on language learning resources for output and input, to realize the interconnection of learning tasks and resources in the classroom environment, home study, and extracurricular places. Feedback and evaluation of the situation will enable the learner to create strong environmental and technical support within a wide range, such as autonomous learning and inquiry learning [19]. On this basis, the study designed a language learning framework in the "S-F" environment, as shown in Fig. 2.

In the pre-class home learning spaces, students preview relevant materials provided by teacher and have a preliminary understanding of the planned knowledge in the curriculum system. This is the process of transferring knowledge. While in the classroom, activities like group discussion and role-playing are carried out to share learning achievements. In the process of discovering problems—solving problems—sharing the process of collision, the teacher "collides with sparks" of generating knowledge and internalizes the planned knowledge. In the after-school learning environment, students consolidate the review of planned knowledge and apply new knowledge in life. The knowledge transfer process of the language learning framework is shown in Fig. 3. In addition, the "Daily Speaking" APP as a personal learning "hub" places the individual's learning recordings across formal and informal learning contexts, creating a "seamless flipped" learning environment for language learning.

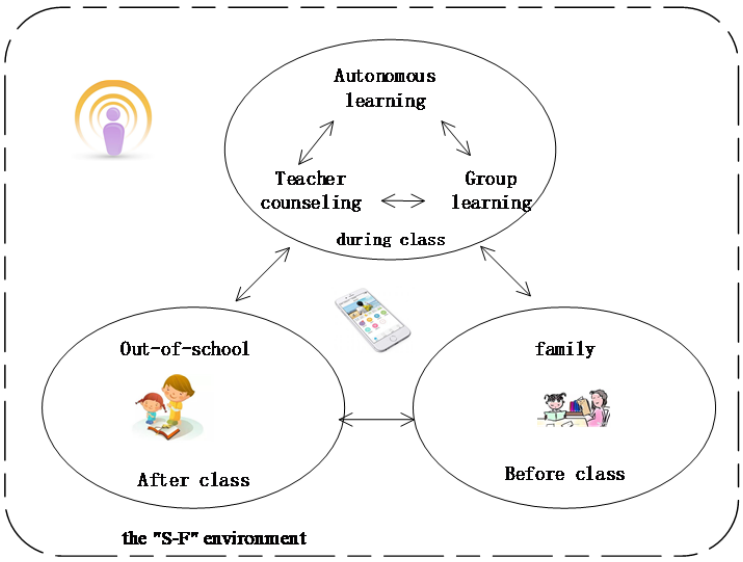


Fig. 2 Language learning framework supporting S-F environment

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The "S-F" environment language learning framework embodies the three stages before and after class. Each stage is mediated by mobile devices, and the learning path is connected through OSS technology to form a complete language learning process. Technological support for the purpose of language learning is to improve the understanding of learning problems and the construction of knowledge. And the purpose of technological support for language learning is to improve the understanding of the learning problem and the knowledge construction, and to satisfy the teacher's personalized teaching, stimulate learning motivation, and improve the opportunity of language output and hearing sensory input [20].

C. Learning Activity Design of Diversified Corpus

The flexibility and seamless connection of the "S-F" environment need to provide learners with sufficient learning autonomy. It puts forward higher requirements to the design of the "S-F" environment as for class organization, resource organization and interaction. In addition, in the process of language learning, it is more necessary to take advantages of the learning environment to provide rich corpus learning resources at any time. Therefore, the design of learning activities in the "S-F" environment is shown in Table I, including three stages, namely before class (home environment), in class (classroom environment), and after class (expansion of the learning environment).

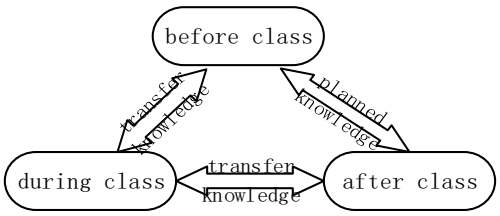


Fig. 3 Knowledge transfer process of language learning framework

TABLE I
ACTIVITY DESIGN OF "SEAMLESS FLIPPED" LANGUAGE LEARNING

Learning time	Learning activities
Before class	Individual learning: watch micro videos of Shanghai dialect conversations
	Social learning: share and discuss learning contents and proper scenarios
In class	Analyzing learning contents: teachers lead to read conversations of videos
	Problem solving: answer students' questions in the preview
	Role playing: team members imitate roles of micro videos
	Harvest Sharing: gains of visiting Shanghai residential communities.
	Reviewing: reviewing what you have learned in class.
After class	Stepping into communities: learning frequently-used Shanghai dialect from local people as a group
	Recording new words: recording pronunciations of new words anytime and anywhere, keep learning and communicating.
	Rehearsing your own performance: taking photos or micro videos as a team.

1. Learning Activities Before Class

This stage is mainly to help students perceive how shanghai dialect are used in everyday life. The teacher uploads relevant micro videos to the online teaching platform in advance. Students need to carry out self-study with support of the network and mobile devices, thinking about the meaning and pronunciation of Shanghai dialect in the micro videos. Students can also share their learning experiences and reflections to other companions in the forum, which is an online social learning process.

2. Learning Activities during Class

It is a stage of interaction between teachers and students. During class, teachers can solve the problems students encountered in the preview or review, including instructing students' pronunciation, introducing Shanghai culture and so on. Also, students can put what they have learned into practice to better master shanghai dialect. By rehearsing melodrama, their perceptions of Shanghai dialect increased while entertaining. In addition, since they have come into different communities to talk with local residents, authentic vocabularies or Shanghai culture can be shared with other classmates, so that students can learn more about Shanghai culture. During this time, teachers act as instructors and promoters of students learning.

3. Learning Activities After Class

To prompt students to summarize and digest Shanghai dialect they have learned. Teachers encourage students to step out of the classroom and try to speak Shanghai dialect to local people in order to reinforce their language learning in authentic situations. Students can review the micro-videos of shanghai dialect again and again, trying their best to be proficient in language pronunciation. They can record and learn new vocabularies by themselves whenever they like or just enlarged their insight by discussing with companions in the online forum with devices.

IV. THE PRACTICE OF LANGUAGE LEARNING FRAMEWORK

A. "Daily Speaking" APP Development

Based on framework proposed above, this study designed and developed a mobile language learning platform called "Daily Speaking", which can combine students' language learning experiences of the three stages of flipped classroom together and effectively construct an autonomous learning ecosystem with seamless integration of learning resources and learning environments.

"Daily Speaking" APP system adopts B/S operation mode

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which consists of a Web server, a streaming media server, and a database server. Alibaba Cloud provides the reliable cloud storage services. On this platform, students can complete tasks assigned by teachers and communicate with other classmates conveniently while teachers could perform class establishment, activity management and corpus recommendation. The server processes and responds to information received, providing real-time feedback, supporting learning activities in flipped classroom and connecting different learning environments seamlessly.

1. The Design of Content Module

"Daily Speaking" is the entrance to virtual learning and its technology-enhanced learning spaces provide conditions for informal learning. This APP has two versions of operating system, namely Android and IOS. It can also support simultaneous learning of the Web pages. The content module includes construction of user-friendly learning spaces which cover knowledge sharing, evaluation and communication, assignment organization that consists of homework assignment, resource management, students' learning outcomes, Automatic Speech Recognition and recommendation systems

2. The Hierarchical Operation Interfaces

The operation modules in the "Daily Speaking" are organized according to the four logical levels of creation, distribution, evaluation, and speech recognition. The learning function cooperates to complete the activity task—mobile APP—learner space—the "transmission" process between Baidu voice. Teachers can use the web platform to distribute language packs. Students can download, operate, and share through individual learning space. Call OSS service storage and use Baidu speech recognition to compare and score student's speech output, and feedback results to learners, teachers, and parents in time. And then they can complete high-quality voice jobs for seamless learning.

3. Corpus Creation and Speech Recognition Mechanism

The "Daily Speaking" corpus resources include audio, video, text, and pictures, supporting the uploading, playing, and testing of micro-videos. The corpus resources are stored in the cloud server by using the "packaging" of textbooks. And the online language corpus is distributed by using the recommendation mechanism. Learners can download corpus packages for learning in any environment. At the peer discussion forum, students can freely speak and share their audio and video information for conversations which is shared and evaluated by all partners.

"Daily Speaking" enhances the interaction between learners from a technical point of view. It also stimulates learners' interest through audio media and realizes learning contents and learning data with mobile technology to be stored anytime and anywhere. In a true sense, it realizes the seamless of learning scenarios and living scenes. "Daily Speaking" provides strong support for learners to learn languages.

B. Case Study

The study of the language learning framework in the "S-F" environment was conducted in a primary school in shanghai. The research objects are students from migrant families who are from other different places in China, and they know nothing about Shanghai dialect. Before the experiment, they had no deep contact with Shanghai dialect. There may be some obstacles from the behavioral reaction to the psychological acceptance level, such as psychological conflict or shyness. So, the environment created the atmosphere and conditions for learning Shanghai dialect. In the classroom, teachers and students use the video viewing function on the "Daily Speaking" platform to focus on interpreting the Shanghai-Chinese vocabulary that students find difficult to understand. In role-playing, the students record the whole process with their mobile devices. Through careful analysis of the video, the errors in the language expression are identified and corrected. And partners can also communicate with each other to promote the internalization of the Shanghai language. At the same time, with the replacement of the physical space, this study records the language learning process and practice process in the informal learning environment, and completes the conversion from class to extracurricular, formal learning to informal learning.

After a four-week experiment, this study interviews participants and collects their subjective and experiential impressions on the APP language learning to examine their acceptance of the language learning framework for the "S-F" environment. At the same time, this study uses the TAM model proposed by Davis [21]. It is used to explain the influence of external factors toward the belief, attitude of users with the causal relationship between "perceived use (feeling ease of use and usefulness)—attitude—willingness—action".

The results of the interview indicated that students are highly receptive to mobile apps and can meet their functional needs for vocalization, practice, and assessment. When communicating with local residents in Shanghai, students can use the recording function to record communication content and learn new Shanghai vocabulary. According to the recording, students can continuously review the knowledge. The experimental process completed the seamless transition from the classroom learning environment to the extracurricular real environment. And it also supports students to experience the acquisition of experience and corpus materials, helping students quickly become familiar with the language features and social culture of Shanghai.

V. Conclusions

Seamless learning is a new norm of digital learning [1] which is free from time and places. It can connect formal learning and informal learning, personal learning and social learning, authentic learning and virtual learning together with the support of mobile devices. In the teaching process, different types of learning tasks also help construct and integrate students' knowledge. However, it does not mean that students should always use mobile devices to learn, but that they can

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have an access to mobile devices whenever they need. The flipped classroom subverts the traditional class, shifts the learning tasks in and out of class, and designs a learner-centered activity that can give full play to the students' subjective initiative and solve the problem of internalization of knowledge effectively. The language learning needs to be mastered through communication. The use of mobile learning enhancement technology can seamlessly connect with the learning space to support learners to apply the learned Shanghai dialect knowledge to real daily communication. In the other words, technology-enhanced seamless learning can help learners to learn more in the practice process.

This paper proposes a language learning framework which is compatible to the "S-F" environment, being tested by the Shanghai dialect learning that is which takes the as an example to implement the practice based on the learning framework. It also designed and developed a "Daily Speaking" app to provide real technical support for the application of the learning framework and achieves the effective construction of S-F environment. At present, Shanghai dialect learning project is undergoing in-depth research and analysis, attempting to discover the influence and changes of the learning framework in the "S-F" environment on learners through more social and cultural environments. Further empirical research is conducted in the perspective of mobile data analysis.

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