

AN EXPLORATION OF CHINESE STUDENTS' SELF-DIRECTED MOBILE LEARNING OUTSIDE SCHOOL: PRACTICES AND MOTIVATION

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Published as: He, X. & Wray, D. (2020) "An exploration of Chinese students' self-directed mobile learning outside school: practices and motivation". In Gómez Chova, L., López Martínez, A. & Candel Torres, I. (Eds) *Proceedings of the 13th International Conference of Education, Research and Innovation (ICERI2020)*, ISBN: 978-84-09-24232-0, Valencia: IATED Academy, pp. 1220-1229

Abstract

The proliferation of mobile devices over recent years has ensured that the majority of young people have encountered at least the possibility of using their devices for mobile learning experiences. Recent studies have helped us to understand the use of mobile devices both in and out of school by focusing on the features and effectiveness of mobile learning. Issues of students' self-directed learning with mobile devices outside of school within different social and cultural contexts, however, remain under-investigated. The case study reported here focuses on how learning practices and notions of learning are being updated through the use of mobile devices in the out-of-school learning practices of Chinese secondary school students. Results suggest that these students engage in both curriculum-based and interest-based mobile learning practices and approach these with both extrinsic and intrinsic motivation for learning. Challenges emerged in terms of autonomy, guidance and support which appear to be influential factors in the acceptance and successful employment of mobile learning.

Keywords: Mobile learning practices, motivation, autonomy, Chinese students, self-directed learning.

1 INTRODUCTION

Most contemporary adolescents have been exposed to digital technology since their birth [1] with resulting changes in their literacy practices [2]. They are also experiencing transformations of teaching and learning [3] in school and outside school. In China, as in western countries, technology has begun to be integrated into education in an attempt to 'introduce a "new direction" into the Chinese education system' [4]. The integral role of technology in education was clearly seen in the 'Education and Information Technology Ten-Year Development Plan' (2011-2020) [5] which was followed by a series of efforts including investment in the ICT industry, in school facilities and in teacher training. Apart from the efforts of central government, the mobile learning market has also been growing [6] because of the increasing ownership of mobile devices and the desire for learning anywhere and anytime without restriction [7]. According to the latest 'Statistical Survey on the Internet Development in China' [8], mobile phones have become the most important and frequently used devices for internet access, with 99.3% penetration reported for 2020.

Mobile phone ownership in China has been increasing dramatically, especially among those of school age, which has drawn the attention of scholars as they try to understand the usefulness and efficiency of mobile learning and the ways in which users interact with their mobile devices [9], [10], [11]. Studies have investigated students' experiences of using mobile devices for learning under the guidance of teachers [12] and have tried to develop an understanding of the impact of mobile learning on behaviour and performance [13]. With such powerful accessibility features [14], many researchers have looked at impacts such as engagement and the outcomes derived from mobile learning beyond the classroom as traditional instruction has been extended to encompass real world learning [15], [16]. Motivation has been explored through studying students' practices in mobile learning [10] and the impact of these upon learning and the bonds between learners and teachers. Both extrinsic and intrinsic motivations have been identified when students are engaged in mobile learning activities [17]. In addition to being offered instruction through the physical presence of teachers, students seem to be using mobile devices outside the classroom without instruction from teachers or parents. There has been less research into students' motivation and autonomy in such mobile learning activities

especially when teachers have no presence during learning activities. More studies are needed in order to understand the mobile learning practices of students as self-directed learners and what they think about mobile learning without direct instruction within different social and cultural contexts.

1.1 Mobile learning: An overview

Mobile learning can be simply defined as learning through the mobile technologies widely used in daily life [18]. One of the most significant features of mobile learning is widely considered to be its ubiquity, that is that the technology follows the learners who 'are continually on the move' [14]. Learners are able to gain knowledge without restrictions of time, space and accessibility [19], [20], [17].

Given the educational application of mobile technologies and the popularity of mobile devices among students, many researchers and educators have been trying to explore the uses and benefits of mobile learning in classrooms from schools to universities [21], [22], [11], [23]. Mobile devices such as mobile phones and tablets have been considered to have the potential to encourage active learning, collaboration, interactivity and interaction in the classroom [24], [25], [23] and many studies have shown positive impacts from the use of mobile devices to enable learning. Students in the mobile learning environment also have the tendency to collaborate with peers [26] with collaborative learning emerging through interactions among students using social networks. Some schools provide students with tablets or other mobile devices with apps or games to promote student engagement and motivation [27]. In a case study of two digitised classes in China [4], students used tablets to answer quizzes, search for information and have online group discussions. Interactions between students and teachers helped to promote student-centred learning in these classrooms.

The usefulness of mobile learning in terms of engagement, effectiveness, and collaboration has also been examined in the context of second language learning [28], [29]. Learners have been found to be more engaged in practicing language through the use of mobile devices than through traditional classroom learning activities. In settings beyond the classroom, mobile devices have been largely used as extension tools to help link the real world to classroom learning in many subjects including computer studies, mathematics and science [19], [30], [29]. Many studies have focused on the use of a mobile learning system with various mobile devices outside the classroom to situate students in a real-world learning scenario (i.e. museums, field trips, plant gardens, zoos) (e.g. [15]). Students in outdoor learning activities have been guided by mobile devices to observe targeted objects with their responses being recorded so that teachers could build on this learning later in the classroom [19]. Based on these approaches, students were expected to gain knowledge from both real world and digital-world learning resources, using pre-installed mobile learning systems in mobile devices rather than by sitting in the classroom and reading from textbooks.

Studies such as these strongly suggest that guidance and instructions for specific mobile learning systems are important for learners, especially when they are not in traditional learning environments, to make sure that students get involved in mobile learning activities. Students' motivation, creativity and ability to learn and absorb knowledge seem to increase under proper guidance and instruction [19]. However, many mobile learning activities are carried out without supervision or instructions from teachers or parents. This begs several questions. For example, what motivates students or learners to engage with mobile learning outside the classroom, in informal settings, and to act as self-regulated learners? How do students manage mobile learning activities and how do they deal with task, time and results?

Some researchers have explored the acceptance of mobile learning based on technological characteristics, compatibility and other factors [31], [32] including perceived usefulness, ease of use, personal innovativeness and learning enjoyment. Others, however, have argued that mobile learning concerns more than just the dimensions of technology and institution [33]. It is how learners experience, explore and create within the mobile learning system that makes them successful [17], [14]. Students' understanding of their roles as self-regulated learners in mobile learning appears to be a crucial factor.

There remain, however, many issues that require greater understanding. How, for example, do learners engage with mobile devices in different social and cultural contexts? As mobile learning has become more personalised and user-centred [34], some studies have focused on the motivation, autonomy, skills and knowledge that learners gain through everyday mobile learning activities [35], [36]. More research is needed to examine the factors that underpin self-regulated mobile learning without instruction or guidance.

1.2 Research questions

Previous studies show that students exhibit a diversity of practices in using digital technologies in daily life [37]. Little is known, however, about Chinese secondary school students' out-of-school mobile learning activities, against a background in which the school experience of these students is dominated by the examinations they have to pass, with the consequent school focus upon the factual, rote learning that these examinations emphasise. Therefore, the present study was designed to answer the following research questions with regard to secondary school students in China.

- What mobile learning activities did a group of Chinese secondary school students engage with outside of school?
- What was driving these students to use self-directed mobile learning activities?
- How did this group of students deal with mobile learning activities and curriculum-based tasks?
- How did the students perceive that the mobile learning activities had impacted upon them?

2 METHODOLOGY

The study used qualitative methods to investigate Chinese students' self-directed learning practices with mobile devices outside of school. Focus groups and individual interviews were used to explore the perceptions of students.

Focus groups were used as 'the preliminary or exploratory stage of a study' [38]. Five focus groups were conducted. Each group consisted of four participating students, two girls and two boys, all aged 15-16 years. Students in the groups were encouraged to talk about their beliefs about and attitudes towards using mobile devices for learning without instructions or guidance. Some mobile learning practices were identified for the follow-up in-depth individual interviews to gain a deeper understanding.

Following the focus groups, three students (Ming, Long and Mei), each with a different level of usage of digital devices, were selected for follow-up individual interviews. These interviews aimed to get a deeper understanding of the motivations, strategies and autonomy of these Chinese secondary school students as they engaged in self-directed mobile learning practices. Their perceptions of the usefulness and problems of self-directed mobile learning were also examined. Several semi-structured interview questions were guided by what students claimed in the focus groups in order to find out the reasons underpinning their learning practices outside of school with mobile devices and how they handled curriculum tasks and self-directed learning practices.

Of the three students, Ming, one of the boys, owned his own smartphone and used it very often after class. He said that he knew a variety of software/applications and websites for learning and he regarded himself as a good user and a pioneer in class of mobile learning with his smartphone. Long, the second boy, did not have his own mobile devices but he often borrowed his parents' smartphone or tablet for learning practices. Mei, the girl, had her own iPad and smartphone, and said she would love to use mobile devices for learning purposes but she complained that she got distracted very easily when she used mobile devices for learning on her own.

Thematic analysis was employed in order to identify patterns in these Chinese students' mobile learning practices and what they thought about self-directed mobile learning outside of school without teacher or parental guidance.

3 RESULTS

3.1 Types of self-directed mobile learning practices

From the focus groups and individual interviews, several learning practices with mobile devices were identified, which can be categorised as two types: curriculum-based mobile learning practices and interest-based practices. The most common practices in curriculum-based work included doing quizzes using education applications, systematic revision for examinations and using learning assistant software to help with schoolwork/homework problems. The students suggested that they used education applications from three to five times a week to enhance their understanding of certain topics especially for mathematics or science subjects. Education applications that the students often used were originally

designed for secondary school students for preparation for the GaoKao (National College Entrance Examination). Students had access to quizzes for different subjects and clearly used these regularly.

For interest-based learning practices, students claimed that they often visited online forums where users interacted in different groups based on their interests. Students asked questions related to these interests and answered each other's questions. They also interacted with other members by reading comments and responding. Resources such as articles, video clips and web link were often shared among group members.

3.2 Practices and ownership

Student mobile learning practices were found, to some extent, to differ according to their ownership of mobile devices. Students who did not have personal devices said that they usually borrowed smartphones or tablets from their parents after they had finished the school day. Long had no personal devices and borrowed his mother's smartphone when he came across some hard questions in homework. He said that 'I asked my mom to install the Xueba Jun (type of learning assistant software) on her phone so that I could take pictures of those questions that I cannot solve'. However, he explained that he could only use a mobile phone for no longer than one hour, and so all he could do was to use the software to seek for answers to questions. 'I usually borrow mom's phone three times a week and she sits not far away from me, you know, I cannot do other things on the phone except using that software. There is other software or online forums that I could visit for more than finding answers. But I don't have my own phone, lots of restrictions', Long explained.

Students who had their own mobile devices had much more flexibility in mobile device usage and learning practices with smartphones or tablets. Ming, a self-perceived pioneer user of digital devices for learning, was proud to claim that 'I do different things with my mobile phone for learning. I always tell my friends what software is worth using and what is not that good. I know a lot of software and online forums. They are satisfied with my recommendations'. He claimed that he used learning software or online groups as long as he had time. During class breaks, he liked to share information or websites with friends who had common interests. Mei had different learning practices and said that she spent more time on reading articles or communicating with group members on an online forum than using learning software. She often visited a fan-fiction forum to discuss her ideas of writing and made comments to other users.

3.3 Motivation

Both extrinsic and intrinsic motivations were found among these Chinese students in their self-directed mobile learning practices. They claimed that they were in a highly competitive situation where they were pushed to obtain good outcomes in examinations. Ming said that, 'I used the education software as a systematic approach to review what I learnt so that I can get well prepared for examinations. On the other hand, online education software is an open platform which everyone can access, which means I am not just competing with people around me. I have to compete with people around my age.' Environmental factors such as competition and pressure acted as stimuli for the students to set extra work for themselves by using mobile learning applications. These, they argued, were a good way to get detailed answers for questions without spending a large amount of time asking help from others. Long explained that he could save some time by using assistance software so that he could spend more time doing more quizzes. Mei found that she managed to get higher marks after she frequently used education applications by doing lots of quizzes. She believed that her grasp of knowledge was deepened through these quizzes.

Apart from being affected and motivated by external factors, these students were intrinsically motivated for self-directed mobile learning practices. They enjoyed using education software in terms of knowing their level and moving to higher levels through practices. Ming claimed that it was a challenge to finish quizzes that he did not come across in homework and he got a sense of fulfilment when he solved hard questions that he did not expect to. They all claimed that it was very interesting to get support and help from group members even though they did not know each other. Mei said she was happy that her ideas were recognised and she could hear different voices and have her voice heard as well.

3.4 Autonomy

According to the students, they were able to balance schoolwork or homework and self-directed mobile learning practices. Apart from those who used their parents' mobile devices within a relatively fixed time, students usually arranged mobile learning practices on a daily basis after they finished their

teacher-set homework. They argued that the secret of finding time to do extra practice was absorbing from class as much as they could with total concentration.

Students adopted different practices with various difficulty levels based on their perceived grasp of material. They claimed that they would do quizzes at a similar difficulty level to homework if they felt that they did not grasp the content of this homework. They would also do extra practice through mobile learning at a higher difficulty level if they were happy with their homework performance.

3.5 Concerns

The students indicated that they were concerned that they might not be able to think independently if they used mobile learning applications too much for curriculum-based tasks. Long claimed that he could not help thinking of taking a picture of questions set even though these were not too hard for him with a bit of thought.

Another concern was that they might choose quizzes and practices which were far too difficult for them. However, they complained that not all problems could be solved because the analysis provided by the application was not always right. They suggested that they sometimes needed support from teachers or others in addition to the learning software.

4 CONCLUSIONS

4.1 Discussion

The present study has focussed on the self-directed mobile learning practices of a small group of Chinese students and their motivations for and autonomy in such practices when they are under extreme examination pressure. Although, obviously, changes of learning practices and notions of learning with the injection of mobile devices in China cannot be fully and well explored within such a small scale, short term study as this, the exploration of students' perceptions has suggested some challenges that might help to understand mobile learning in the Chinese context.

The findings suggest that these Chinese students were using mobile devices for a variety of learning practices outside of school based on personal needs in terms of interests and academic expectation. Chinese secondary school students, like adolescents in other countries, are exposed to the fast-changing development of technology and digital environments [1], [3]. They are regarded as the generation who are becoming competent with skills of using digital technologies through daily living and learning practices in and out of school [39]. The students in this study suggested that their competencies with digital technology and their notions of learning in a digital environment were shaped by emerging applications and software when they were involved in new mobile learning activities. A new skill set for using mobile devices for learning had been developed through their mobile learning practices. Mobile devices had provided them with opportunities for learning beyond the walls of classroom and the ubiquity of mobile learning had enabled them to learn whenever they needed to and wanted to.

Using learning applications/software as one type of self-directed mobile learning activity was, for these Chinese students, very much like an extension of their school curriculum. They practiced quizzes on their mobile devices either to learn new material or revise older content or to complete their homework. Such mobile learning practices, to some extent, can be regarded as indicators of how teaching and learning are embedded in social and cultural contexts. In China, students face extreme pressure and stress in their school experience and are expected to be good at academic learning. The students in this study were trying to deal with the pressure that they were facing in their own way through learning with mobile devices. Apart from the stress and pressure of examinations, the influence of Confucian values on the attitudes toward learning and achievement of these Chinese students can be seen. Most Chinese people place a high value on learning [40] and both parents and students express the belief that learning achievement can be met as long as sufficient effort is put in [41]. The findings of this study suggest that students, when given access to mobile learning devices, direct efforts towards trying different learning practices which can help with their understanding and achievement.

However, the mobile learning practices in which these students engaged involved more than just the extension of the school curriculum. The students described how they chose quizzes for specific topics or knowledge about which they wanted to have deep understanding. Such quizzes could be amended

either based on their results or on their own judgment of their grasp of knowledge. It seemed that their ways of learning with mobile devices were becoming more personalized, a concept which is somewhat at odds with the philosophy underpinning their school experiences. Using mobile devices for learning practices had enabled these students to be less passive in their approaches to learning. With the injection of mobile devices, the typically perceived characteristic of Chinese students as passive learners [40] had been affected by their self-directed learning practices. It appeared that they were beginning to get into the habit of using different means and methods to meet their learning expectations and needs. In this study, students were using new processes of learning by using online forums, learning software and assistant applications. In these learning processes they were assessing their own performance, finding information, evaluating and connecting information to previous knowledge rather than relying on rote-learning and memorisation [42]. The students realised that they had to be critical about the information they found through mobile learning albeit that this may have involved simply downloading pictures. Completing quizzes and getting information are only a part of mobile learning practices. What is more important is to develop the ability to evaluate whether the provided analysis is right and thinking about other perspectives to solve questions. The mobile devices and mobile learning application/software provided these students, on one hand, with a new platform to assist them with deepening understanding of materials. On the other hand, the students' notions of learning and the learning process had been changed within the mobile learning environment.

The notion of problem-solving or problem-based learning was reflected in these students' implementation of mobile learning, which is not very common within the traditional authoritarian studying environment they were used to. Students in the study were acting as active learners to use mobile devices to solve problems that they did not understand and were interested in. Both types of mobile learning practices were based on the concept of problem-solving learning or 'learning by doing' instead of accepting what teachers transmitted to them. The data suggests that these students acknowledged their own responsibility for solving the problems they had been set or had set themselves. For curriculum-based mobile learning practices, they used mobile learning applications to overcome weaknesses in their knowledge.

With regards to interest-based practices, these students went beyond disciplines and, rather than sitting in the classroom being lectured, they were exposed to online groups with like-minded members with different backgrounds in which conversations and meanings were generated. Within these online groups, what students did was more than connecting prior knowledge to information for decision making. As students claimed in the study, they posted questions on the forum to get answers as well as providing help to others by joining in interactions. During the process of solving problems, they consumed information offered by other group members and shared information to keep continuous conversations going. In a traditional learning environment, discussion happens in fixed settings. It is worth pointing out that mobile devices with a wide range of web-based tools or features provide learners with opportunities to join in conversations whenever they accessed something useful related to the problem. More importantly, it appeared that problem-based learning in the mobile learning environment helped these Chinese students cultivate their long-term self-directed learning skills in the digital environment. From what they said, the students valued the skills they gained through interaction around the solving of problems. They suggested that skills with mobile devices, using self-directed learning, would be useful when they entered higher education where they would have more freedom and flexibility in their learning. It may be that mobile devices can become a powerful vehicle to affect Chinese students' learning habits and concepts of learning in the long run.

As discussed previously, these students' mobile learning practices were embedded in a Chinese social and cultural context. Chinese students are recognised as highly extrinsically motivated learners rather than motivated intrinsically [43]. In this study, these students were found actively participating in self-directed mobile learning experiences within the influence of environmental factors such as a highly competitive society and an examination-oriented education system. Students in the study adopted mobile learning applications or used software for curriculum-based learning with the purpose of self-improvement, as well as preparation for examinations and higher scores. As they explained, Chinese students had to be well prepared in order not to be left behind within the competitive environment. They wanted to try different ways of learning in order to become more competitive. Students believed that their curriculum-based learning was quite helpful for both examinations and understanding of knowledge. It can be seen that to some extent, extrinsic motivations relating to academic or career development should not always be regarded as having negative effects [44]. The perceived usefulness of mobile learning practices among these students could in return be represented as a type of intrinsic motivation.

It was noticeable that these Chinese students were found to be intrinsically motivated within their curriculum-based mobile learning practices when they chose to increase the difficulty level of quizzes as an optimal challenge. Such goal-oriented/driven activities can be considered as intrinsically motivated [45] because of the sense of fulfilment and enjoyment that participants achieved when they reached the level they set. Apart from this kind of challenge, these students were also identified as intrinsically motivated learners when they used mobile devices to participate in learning practices based on their interests. They enjoyed their learning on the online forum or in interest groups especially when they could interact with each other with the exchange of information and use of feedback. The enjoyment which emerged from these mobile learning practices enabled them to make creative contributions to interactions. In a traditional learning or non-mobile learning environment where learning tends to be linear and fixed, Chinese students may not often experience such intrinsic motivation. The flexibility of mobile learning for self-directed learning practices, additionally, stimulated a cognitive curiosity for learning [35]. In the study, therefore, this group of Chinese students were found not only extrinsically but also intrinsically motivated through self-directed mobile learning.

They were also found to some extent to have become autonomous learners. Their ability to arrange independently the time and direction of their learning practices can be counted as aspects of learner autonomy [46]. However, the students' mobile learning practices were affected or restricted by their ownership of mobile devices. Students who did not have personal mobile devices had the tendency to carry out simple mobile learning practices using borrowed devices. They complained that they could not fully engage in mobile learning practices because their parents usually set a time limit or even sat beside them. This could be one of the current challenges of mobile learning. It seems that some parents are not quite convinced by the potential transformative effects of mobile devices on their children's learning. With the competitive educational system in China, it would not be easy for parents to be so convinced in the short term, although getting parents to support their children's autonomy in terms of availability of mobile devices and power of being in charge could positively promote academic motivation [47].

Some concerns that students mentioned suggest other challenges of mobile learning in the Chinese context. Chinese secondary school students who are under the 'influence of a high-stake public examination' [48] would not expect their independent thinking capability would be affected by getting into the habit of using mobile devices for answers. However, using software/applications on mobile devices cannot be counted as successful mobile learning unless learners reflect and learn new things or deepen their understanding through it. In this sense, it could be seen that learners' perceptions of what counts as successful mobile learning could affect the adoption of mobile devices for learning. This concern also raises the question of the need to provide students with appropriate support and guidance for mobile learning, especially for Chinese students who tend only to be exposed to paper-based and fixed learning settings.

How to use mobile devices for learning effectively without causing too much pressure appeared to be another challenge for these Chinese students' self-directed mobile learning. Students in the study would sometimes face inappropriate challenges and felt depressed when they selected a difficulty level far beyond their grasp and understanding. This could lead them to be reluctant to use mobile learning if they felt pressured in their learning. This pressure might negatively affect students' beliefs about mobile learning. Apart from the issue of difficulty level, the findings suggested that these students also faced accumulating problems as they engaged with mobile learning practices. Mobile learning does not merely refer to using mobile devices for learning. It is more about 'learning on the go' [49], [46] within an internet-connected environment. Therefore, regardless of the availability of mobile devices, sufficient guidance and direction about, for example, learning strategies needs to be made available for students. Such guidance could be delivered efficiently through teachers using mobile devices within their classroom teaching, thereby helping students to combine school and home learning.

4.2 Implications

This case study has provided an in-depth view of the self-directed learning practices of a small group of Chinese students using mobile devices in out-of-school settings. Together with the exploration of motivations, autonomy and perceptions, the study has also enriched our understanding of the change of learning practices in a Confucian Heritage-driven education system such as China implied by the injection of mobile devices. Chinese students were found to engage in learning practices which could loosely be termed problem-based learning and to operate with both extrinsic and intrinsic motivations.

It seems, from the study, that mobile devices can to some extent stimulate learners' intrinsic motivation for certain features of a mobile learning system. Intrinsic motivation is generally regarded as positively related to learning engagement and outcome [50]. Following this perspective, it would be useful for researchers who are devoted to mobile learning system design to take motivation factors into account to achieve engagement and expected learning outcome.

It is a bit tricky to guarantee parents' support for students' autonomy and self-directed learning with mobile devices because Chinese students are currently in a trial stage of mobile learning in their highly competitive situations. Further studies regarding parents' perceptions of mobile learning are needed. Meanwhile, it is not easy for students to gain mobile learning strategies with self-directed learning. Carefully designed modules in school with an integration of mobile learning could be a good way to help students to gain strategies for learning with mobile devices.

Concerns mentioned by students in the study indicate some challenges that students might come across when experiencing self-directed learning with mobile devices. Understanding these challenges, and the potential factors that may affect the acceptance of mobile devices for learning, is crucial if we are to help students to overcome the challenges of employing self-directed mobile learning practices within a rigid and examination-orientated educational system.

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