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What Makes Chinese College Students Accept and use Mobile Education Applications?

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Abstract: In China, a mobile education app is one of the top-three most popular apps, and its market size is continually growing. As the age of the largest group of mobile app users in China is between 26 and 30 years old, college students will become the largest potential group to use mobile education apps in the future. Therefore, understanding the Chinese potential consumers' attitude and behavior intention to use mobile education apps is a good way for marketers to set up competitive strategies during promotions. Based on the TAM model, this study used perceived usefulness, perceived ease of use, and perceived enjoyment to measure students' attitude and behavior intention to use mobile education apps in China. Based on the research of 125 Chinese college students, the result indicated that perceived usefulness and perceived enjoyment were positively influencing users' attitude and intention to use mobile education apps. However, the perceived ease of use didn't affect participants' behavior intention to use education apps. It confirms that the perceptions of usefulness and enjoyment are indicators of attitude and intention to use mobile education apps among Chinese college students. Moreover, the perceived ease of use has a positive impact on the Chinese college students' attitude toward education apps but not the individual intention to use the apps. Therefore, in order to target Chinese college students, marketers can focus on the usefulness and enjoyment of using education apps.

Keywords: Mobile education applications; Technology acceptance; Perceived usefulness; Perceived ease of use; Perceived enjoyment.

1. Introduction

Nowadays, mobile applications ("mobile apps") are not only used in entertainment and communication but also in education. Mobile-learning, defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices (Berge and Muilenburg, 2013) is becoming popular. As one of the mobile-learning products, mobile education apps have similar benefits such as low cost in learning, convenience to access, and social interaction. For the convenience to access, users can access education apps by mobile devices in a short time without any location limitation (Motiwalla, 2007). For social interaction, users can use the mobile education apps to communicate with others during study time (Godwin-Jones, 2011). Therefore, students show a positive attitude in using education apps to discuss homework with others (Rossing *et al.*, 2012).

Several investigations have been generated topics regarding users' adoption to use mobile apps in learning purpose, including education apps. Gikas and Grant (2013) studied students' intention to use mobile devices in learning in the United States and found that students preferred using mobile devices in learning because they typically provide outside-classroom learning opportunities. Moreover, Sharples (2002) found that many people accepted mobile apps in education because they considered mobile education apps as a conversational learning way. With 330 participants in Taiwan, Wang *et al.* (2009) analyzed Taiwanese' behavior intention in using mobile-learning services and their acceptance toward mobile-learning based on their performance expectancy, effort expectancy, social influence, and facilitating conditions. Numerous previous research exists in regards to users' acceptance to use mobile apps in education. The present paper is mainly focusing on Chinese college students' attitude and intention to use mobile education apps because of the increasing market size, large number of education app users, and the potential of targeting Chinese college students.

In China, mobile education apps have enjoyed popularity in the apps market. Since 2012, mobile education apps have been among the top-three most popular apps in China (Iresearch). The research indicated that, in 2015, the market size of mobile education app in China reached 1.43 billion CNY; it was forecasted to be as large as two times in 2017 (3.12 billion CNY). In addition, in 2015, there were 249 million mobile education app users in China. As of

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2017, there will be 394 million people using mobile education apps in China (Iimedia). Facing increasing app users and fast-growing market size, marketers need to understand about potential users' attitude and intention to use mobile education apps so that they can specifically target Chinese consumers.

Furthermore, based on the statistic report (Iimedia), young people from 18–25 years old were the third largest group (17.9%) of people using mobile apps among all Chinese app users in 2015. The largest group (38.1%) consists of people between 26 and 30 years old, which is the main target group of using mobile education apps. Even though Chinese college students, whose age ranged between 18–25 years old, are not the largest group of people using mobile apps, they will go into the largest group soon. Therefore, they will become the largest group of potential consumers to use mobile education apps in the near future. Targeting young consumers now and figuring out how different perceptions affect their attitude and behavior intention to use mobile education apps can help the marketers centralize consumers' needs during present and future promotion.

This paper is organized as follows. First, this study reviews relevant literatures. Then, the study develops the hypothesis with the research model. With the regression analysis, the study obtains the findings. Then, the study presents the implications, limitations, and suggestions for the future study.

2. Literature Review

2.1. Technology Acceptance Model

The technology acceptance model (TAM), proposed by Davis (1989) is one of the most commonly used models for measuring consumers' acceptance toward using new technology. In TAM, Davis (1989) found that perceived usefulness and perceived ease of use were two significant factors affecting users' acceptance toward using new technology. Participants perceive new technology as useful and easy to use so they would use the new informational systems. Davis *et al.* (1992). added users' perception of enjoyment to measure people's intention to use the new technology. From the result, perceived enjoyment also showed a positive influence on the intention to use the new technology. A number of researchers applied the perception of usefulness, ease of use, and enjoyment to measure consumers' attitude and behavior intention to use various technology. Based on this, the literature review concentrates on the impact of perceived usefulness, perceived enjoyment, and perceived ease of use on the attitude and intention to use the different types of technology.

2.2. Perceived Usefulness

In the original TAM, Davis (1989) defined usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance." Davis explained that when people perceived using a new technology was useful for their job performance, they were willing to use it. In the education system, perceived usefulness was defined as "Online learners' perception of the expected benefits of using e-learning systems to assimilate IT skills, (Hayashi *et al.*, 2004). The usefulness was relating with the skills' improvement toward using the informational system in education. According to Kleijnen *et al.* (2004), perceived usefulness was defined as "how well consumers believe mobile services can be integrated into their daily activities." In mobile services, the "usefulness" refers to consumers' beliefs of using mobile services with expected advantages.

Empirical studies of TAM have shown that perceived usefulness is one of the major factors in determining users' attitude and behavior intention to use different new technologies. It was successful to apply the perceived usefulness to the intention to use the social robots for older adults (Heerink *et al.*, 2010). In the technology for solving individual financial problems, perceived usefulness positively affected users' attitude to use mobile financial services (Kleijnen *et al.*, 2004). The perception of usefulness also showed the positive influence to individual intention to use online applications such as online websites (Moon and Kim, 2001), online antivirus applications (Lu *et al.*, 2005), online banking services (Pikkarainen *et al.*, 2004), and online shopping (Childers *et al.*, 2002).

2.3. Perceived Ease of Use

The perceived ease of use was defined as "the degree to which a person believes that using a particular system would be free of effort" by Davis in 1989. He explained that users prefer using the new technology with spending less effort. At the meantime, "ease of use" means users could use the systems smoothly without annoying disturbances (Terzis and conomides, 2011). Similarly, Lee *et al.* (2011) concluded perceived ease of use as the less complexity to use, the more likely individual accept to use.

Among to the definition of perceived ease of use, previous research papers described that the higher perception of ease of use, the more willingness that the users accept and use the technology. Wixom and Todd (2005) confirmed that users believed ease of use positively influenced their attitude toward using various online software, including online websites (Moon and Kim, 2001). Terzis and conomides (2011) showed that users believed the ease of use could enhance their behavior intention to use online assessment systems. Perceived ease of use also positively indicated the acceptance toward using mobile services, including payment services (Kim *et al.*, 2010), chatting apps (Nysveen *et al.*, 2005a), and mobile value-added services (Kuo and Yen, 2009). In mobile services, perceived ease of use can increase users' attitude and behavior to use the mobile devices for messaging, downloading other apps, and contacting others (Nysveen *et al.*, 2005b).

2.4. Perceived Enjoyment

In 1992, Davis *et al*. developed perceived enjoyment in measuring users' acceptance of new technology. Perceived enjoyment was defined as "the extent to which the activity of using the technology is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis *et al.*, 1992). Van der Heijden (2004) also described perceived enjoyment as "the extent to which fun can be derived from using the system as such. Turel *et al.* (2010). defined "enjoyment" as "emotional gain that reflect pleasure." In that paper, the researchers showed that enjoyment perception can determine the technology adoption behavior.

Enjoyment has an effect on the information technology usage. When people perceive that using the technology is enjoyable, they will accept and intend to use it. This finding is examined by numerous prior research in the study about users' attitude to use the blogs (Hsu and Lin, 2008). In Internet usage, the perception of enjoyment motivated users' intention to use online banking services (Pikkarainen *et al.*, 2004), online movie website (Van der Heijden, 2004), and online shopping (Childers *et al.*, 2002; Chiu *et al.*, 2009). Nysveen *et al.* (2005a) concluded that perceived enjoyment positively affected participants' attitude and behavior intention to enjoy different mobile services such as text messaging, payment, and games.

3. Hypothesis

This study is using the TAM to measure participants' attitude and behavior to use mobile education apps, which are the relatively new technology. The previous research paper has proved that the perceived usefulness had positive impact on the attitude and intention to use the learning tools. In the study about users' attitude of learning tools, perceived usefulness positively affected university students' attitude toward using online tools in study (Lee, 2010; Ngai *et al.*, 2007). In the positive influence to the behavior intention to use educational tools, perceived usefulness had a positive impact on individual intention to use an online learning community (Liu *et al.*, 2010) and blackboard system (Limayem and Cheung, 2008).

Prior research demonstrated that participants accepted and used different online learning tools because they perceived that learning tools were useful for their study. According to previous research, considering that mobile education apps are one of the new learning tools, Chinese college students' perception of usefulness will positively influence their attitude and intention to use it.

Therefore, hypotheses 1a and 1b are suggested as follows:

H1a: Perceived usefulness has a positive effect on Chinese college students' attitude to use mobile education apps.

H1b: Perceived usefulness has a positive effect on Chinese college students' behavior intention to use mobile education apps.

Perceived ease of use also demonstrated the positive influence to users' attitude of the new technology (Davis, 1989). In addition, the previous study also supports that the perception of ease of use is positively affecting the behavior intention to use the educational products. For the perceived ease of use positively related with users' attitude to use online products, Huang *et al.* (2012) introduced that the perceived ease of use was a positive motivation to the attitude to accept the English learning system for Chinese college students. The perceived ease of use also positively influenced the attitude to use online course tools (Ngai *et al.*, 2007). For the intention with the student participants, the study found that perceived ease of use positively indicated the intention to use a learning system (Saadé and Bahli, 2005) and online learning community (Liu *et al.*, 2010).

According to the previous research, because a mobile education app is a mobile learning platform, this study expects perceived ease of use will positively influence students' attitude and intention to use education apps among Chinese college students.

Therefore, hypotheses 2a and 2b are suggested as follows:

H2a: Perceived ease of use has a positive effect on Chinese college students' attitude to use mobile education apps.

H2b: Perceived ease of use has a positive effect on Chinese college students' behavior intention to use mobile education apps.

Perceived enjoyment is another indicator of the attitude and behavior intention to use the new technology (Davis *et al.*, 1992). When users feel that using the technology is enjoyable, they will show a positive attitude and intend to use the technology. This conclusion is supported by a number of research paper, and it can apply to the papers with Chinese participants. For the attitude of learning technology, perceived enjoyment positively correlated with Chinese college students' attitude to use a web-based learning system (Lee, 2010) and mobile learning apps (Huang *et al.*, 2007). For the intention to use online services, perceived enjoyment had a positive impact on participants' intention to use Internet learning tools (Lee *et al.*, 2005) and the various mobile services (Liao *et al.*, 2007).

In the previous research, perceived enjoyment had a positive impact on Chinese consumers' attitude and intention to use learning technology and mobile services. Taking Chinese college students as participants, the present paper may reveal that perceived enjoyment will positively influence users' attitude and intention to use mobile education apps.

Therefore, hypotheses 3a and 3b are suggested as follows:

H3a: Perceived enjoyment has a positive effect on Chinese college students' attitude to use mobile education apps.

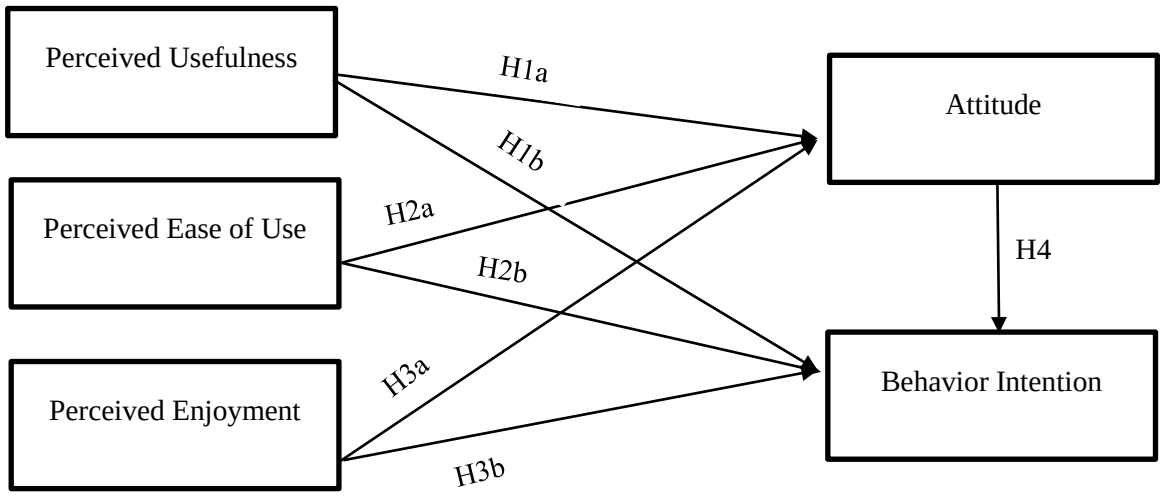
H3b: Perceived enjoyment has a positive effect on Chinese college students' behavior intention use mobile education apps.

The positive relationship between attitude and intention to use technology is proved in learning tools. Huang *et al.* (2007) and Cheon *et al.* (2012) proved that students' attitude of mobile learning had a positive effect on their behavior intention to use mobile device services in higher education. In online learning, Lee *et al.* (2005) recruited 544 Chinese undergraduate students and found that their attitude positively indicated individual intention to use the online virtual environment.From the previous research, Chinese participants confirmed that individual attitude toward learning tools will positively indicate their intention to use the tools in study. With these findings about learning products, the present paper expects that, among Chinese college students, the attitude of mobile education apps will motivate the intention to use education apps for study.

Therefore, hypothesis 4 is suggested as follows:

H4: Chinese college students' attitude will directly and positively influence their behavior intention to use mobile education apps.

Figure-1. The research model



4. Methodology

One hundred and twenty-four Chinese college students participated in this survey. The age of respondents ranged from 18 to 25 years old. The sample included female (55.65%) and male (44.35%). All the respondents were undergraduate (68.5%) and graduate (31.5%) students.

The 28 item measurements of this study were adapted from the previous research. There were five items measuring perceived usefulness, such as "Using education apps would be useful in my study" and "Using education apps would make it easier to do my study." Perceived ease of use was measured with five items, including "I would find education apps are easy for me to get information" and "I would find education apps are easy for me to become skillful." The perceived enjoyment was developed with six items with such statements as "The education apps would be fun to use" and "The education apps would provide an attractive study environment." Attitude toward behavior intention to use mobile education apps was measured with six items, such as "I think using education apps in study is a good idea" and "I think education apps are poor/excellent; worthwhile/not worthwhile." Finally, the behavior intention to use mobile education apps was assessed with five items, for example: "I intend to increase my use of the education apps in the future" and "I intend to use education apps in my study frequently." All the responses were measured by a Likert 7-point scale, ranging from 1 = strongly disagree to 7 = strongly agree. At the end, the study measured the demographic information, such as gender and school years (Appendix A).

5. Result

5.1. Reliability

The reliability test showed all the value of Cronbach's alpha is higher than 0.7 (Nunnally *et al.*, 1967), which means the items in this study are reliable to measure Chinese college students' attitude and behavior intention to use mobile education apps.

Table-1. Reliability

Items	Cronbach's Alpha
Usefulness	.947
Ease of Use	.918
Enjoyment	.882
Attitude	.941
Behavior Intention	.916

5.2. Regression Analysis

This research measured Chinese college students' attitude and behavior intention to use mobile education apps by three perceptions, usefulness, ease of use, and enjoyment. The regression analysis with SPSS 22.0 computer software program was used to test the relationships between independent and dependent variables. The related data is shows in Table 2.

Table-2. Summary of Multiple Regression Analysis

Hypothesis	Items	β	t –value
H1a	PU-ATT	.464**	5.802
H1b	PU-BI	.415**	4.513
H2a	PEOU-ATT	.206*	2.350
H2b	PEOU-BI	.092	.916
H3a	PE-ATT	.283**	3.807
H3b	PE-BI	.409**	4.785
H4	ATT-BI	.878**	20.245

Note: * p <0.05; ** p <0.01 β = Standardized coefficient (PU: Perceived Usefulness; PEOU: Perceived Ease of Use; PE: Perceived Enjoyment; ATT: Attitude; BI: Behavior Intention)

A multiple regression was run to test Chinese college students' attitude and behavior intention to use mobile education apps from perceived usefulness, perceived ease of use, and perceived enjoyment.

In hypotheses 1a and 1b, the impact of perceived usefulness on the attitude and behavior intention to use mobile education apps are positive. In the findings, perceived usefulness positively affected Chinese college students' attitude in using the education apps (β = 0.464, t = 5.802, p<0.01). At the same time, usefulness also positively signified intention to use the education apps among Chinese college students (β = 0.415, t = 4.513, p<0.01). Therefore, the hypotheses 1a and 1b are supported. Similarly, the result confirmed that perceived enjoyment positively indicated users' attitude (β = 0.283, t =3.807, p<0.01) and intention to use the mobile education apps (β = 0.409, t = 4.785, p<0.01). With the positive and significant relationship between enjoyment and attitude as well as intention to use the apps, hypotheses 3a and 3b are supported. Furthermore, in the result, college students' attitude toward mobile education apps is positively affecting their intention to use the apps in China as hypothesized in the model (β = 0.878, t = 20.245, p<0.01). Hence, hypothesis 4 is also supported.

In hypothesis 2a, the result showed the perceived ease of use had a positive impact on the attitude of mobile education apps (β = 0.206, t = 2.350, p<0.05). However, when it turns to the link between ease of use and users' intention to use the mobile education apps, the result rejected hypothesis 2b (β = 0.92, t = 0.916, p = 0.361). The result described the ease of use positively affected users' attitude but not their behavior intention to use the education apps. Therefore, hypothesis 2a is supported while hypothesis 2b is rejected.

6. Findings

The result showed that perceived usefulness and perceived enjoyment had a positive impact on the participants' attitude and intention to use mobile education apps for their study among Chinese college students. This finding is not surprising because a number of research papers have proven perceived usefulness and enjoyment as important factors positively influencing users' attitude and behavior intention to use the various online services. For the perceived usefulness and perceived enjoyment positively affecting Chinese users' attitude of mobile devices, the examples are including chatting apps (Nysveen *et al.*, 2005a), instant messaging apps (Lu *et al.*, 2009), and mobile learning system (Huang *et al.*, 2007). In addition, perceived usefulness and perceived enjoyment also positively influenced users' intention to use online tools, such as electronic learning system (Roca and Gagné, 2008), online movie websites (Van der Heijden, 2004), and online shopping (Chiu *et al.*, 2009).

However, this paper found that Chinese college students didn't perceive ease of use as an indicator to affect their intention to use mobile education apps. Although it is the opposite result with the majority of research papers, previous research has obtained same findings. In the case of participants having experiences using mobile services (Castañeda *et al.*, 2007; Van Raaij and Schepers, 2008), the researchers found that the perceived ease of use didn't have a direct positive effect on the behavior intention to use the mobile services. In the previous research, participants had already been using mobile devices and Internet-based technologies in daily life before the investigations. Therefore, they were familiar with the systems of mobile devices and online technology. Hence, with high experience of using Internet and mobile devices for study, "ease to use" was less important to participants' intention to use those learning platforms (Castañeda *et al.*, 2007).

The previous research showed that smartphone apps were commonly used in China (Van Raaij and Schepers, 2008). In 2009, China Youth and Children Research Center revealed that over 90% of college students in China had a smartphone and used different apps everyday (Lou *et al.*, 2009). Based on the data, this study assumed that perceived ease of use didn't affect their acceptance to use mobile education apps because most of participants were familiar with using mobile apps in learning. Thus, "ease of use" didn't have positive impact on the behavior intention to use mobile education apps.

7. Implication and Future Study

According to the results, marketers can focus on the Chinese college students' perceptions of usefulness and enjoyment. For the perception of usefulness, if Chinese consumers perceive that education apps are useful then they will use the apps for study. Because perceived usefulness positively affects users' attitude and intention to use education apps, during promotion, marketers should emphasize the useful content. Promoting that mobile education apps are useful for students may increase their intention to use the apps in the Chinese market. Therefore, marketers need to point out that using mobile education apps is useful in study for Chinese college students. The more they perceive that mobile education apps are useful, and then the higher intention they will use them.

In addition, marketers can concentrate on the perception of enjoyment. Users perceive that using education apps is interesting, thus they are willing to use the apps. The expected enjoyable feeling in using mobile education apps will motivate college students to use education apps in China. Therefore, the interesting learning environment, playful music, colorful pictures, internal educational games, and external interaction with friends can be highlighted in order to attract Chinese college students to use mobile education apps.

This study has the following limitations. First, participants in this study come from the southern part of China; therefore, they can't represent all college students in China. The future study should have a larger sample size, and participants from different cities in China can strongly represent all Chinese consumers. Second, in the sample, there are mobile education app users and nonusers. Nonusers may perceive that usefulness, ease of use, and enjoyment are all important for them to intend to use the education apps. The future study can analyze the differences between two groups of participants. Finally, researchers can develop a cross-cultural study between Chinese and American participants in the future. Comparing students' attitude and intention to use the mobile education apps from both countries, the researchers may discover the cultural differences in the acceptance of education apps.

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Appendix A: List of Measurement

Variables	Items	Authors
Perceived Usefulness	Using Education Apps would be useful in my study. Using Education Apps would make it easier to do my study. Using Education Apps would improve my study performance. Using Education Apps would enhance my study effectiveness. Using Education Apps would enable me to accomplish my study quickly.	Davis (1989) (Venkatesh *et al.*, 2003)
Perceived Ease of Use	I would find Education Apps are easy for me to get information. I would find Education Apps are flexible to interact with. I would find Education Apps are easy for me to become skillful. I would find the interaction with Education Apps is clear and understandable. I would find Education Apps are easy for me to remember how to carry our tasks.	Davis (1989) (Davis *et al.*, 1992) (Venkatesh *et al.*, 2003)
Perceived Enjoyment	The Education Apps would be fun to use. The Education Apps would make me feel good. The Education Apps would be enjoyable to use. The Education Apps would make me forget the work I must do. The Education Apps would provide an attractive study environment. With the Education Apps, I would not realize the time elapsed.	(Ajzen and Fishbein, 1980) Moon and Kim (2001) (Mun and Hwang, 2003)
Attitude	I think using Education Apps in study is a good idea. I think using Education Apps is beneficial in my study. I think using Education Apps is pleasant. I think learning how to use Education Apps is desirable. I think Education Apps are poor/excellent. I think Education Apps are worthwhile/not worthwhile.	(Hu *et al.*, 1999) (Bruner and Hensel, 1996)
Behavior Intention	I intend to increase my use of the Education Apps in the future. I intend to use every function provided in Education Apps. I intend to use Education Apps in my study frequently. I intend to share my Education Apps using experience with my friends. I intend to use Education Apps to improve my study performance as often as needed.	Davis (1989) Hu *et al.* (1999) (Constant *et al.*, 1994).