



Students' Perceptions of Peer Teaching in a Coding Course*

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Abstract

Mobile learning in education has evolved over the last decade and a half. Associated with this evolution is the increased popularity of teaching how to code using mobile technologies. Then again, finding alternative methods to teach coding, such as peer teaching, might affect learning. Peer teaching is a reciprocal learning relationship between peers. This mixed method case study aimed to explore students' perceptions of peer teaching in an mLearning coding course. Twenty-six participant learners, and three peer teachers, voluntarily participated in the study for six weeks. 77% of participants found that learning from their peers was fun, satisfying and more informative than they expected. However, 42% of participants highlighted that they did not have enough confidence to peer-teach the material they learned during the peer teaching process. Thus, it is important to design a teaching process which considers culture, students' expectations, and students' needs, because those factors affect the learning process.

Keywords: Mobile learning, coding, culture, peer teaching

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Öğrencilerin Kodlama Dersinde Akran Eğitime Yönelik Algıları*

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Öz

Eğitimde mobil öğrenme yeni bir kavram olmasa da mobil cihazların çeşitliliği ve yeniliği ile devamlı gelişen bir alan haline gelmektedir. Bu bağlamda mobil cihazları üzerinden kod yazılması ve dersin bir aracı olarak kullanılması üzerine eğitim araştırmaları bulunmaktadır. Bu araştırma akran öğrenmesiyle mobil cihazlar üzerinden kodlama eğitimi verilmesini amaçlayan bir çalışmadır. Bu 6 hafta süren araştırmaya gönüllü 26 katılımcı ve 3 akran eğitimcisi katılmıştır. Araştırma sonuçlarına göre katılımcıların %77'i akran öğrenmesini eğlenceli, tatmin edici ve beklentilerin üzerinde bilgi aktarımı gerçekleştirdiğini vurgularken, %42' si akran eğitiminin veren akranlarına karşı bilgi konusunda güven sağlayamadıklarını belirtmiştir. Akran öğretiminin önemli olduğu vurgulanan sonuçlar ışığında akran öğretim sürecinin iyi ve etkili tasarlanması ve kültürel farklılıkların etkilerinin de dikkate alınması önemlidir.

Anahtar kelimeler: Mobil öğrenme, kodlama, kültür, akran öğretimi

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1. Introduction

Mobile learning (mLearning) and student-centered learning share a commonality, which is, promoting the recognition of student agency. Drawn from social cognition and sociological theories of human agency, student agency refers to the power students have “to achieve intended outcomes in a particular context of action and interaction” (Klemenčič, 2015, p. 16). In other words, student agency refers to the power and ownership that students have during their studentship, which is based on their experience, interactions, actions, both in the past and present (Klemenčič, 2015). mLearning recognizes student agency by allowing students to learners into context instead of being tethered only to the classroom and decentralizing access to knowledge by enabling learner’s power for any time anywhere learning.

Similarly, student-centered learning aims to empower individuals by making the learner the center and disrupts the notion of the sage on the stage. The literature around student-centered learning and mLearning, however, often come heavily anchored in western cultural notions. This leaves one to wonder, what happens when mLearning and student-centered teaching or learning are implemented in a culture that still places high importance on the role of the teacher? Our paper explores this topic by presenting data from a case study of implementing a peer to peer teaching in an mLearning coding class.

2. Literature Review

The concepts being discussed in this paper are contested. There are different definitions and conceptualizations of concepts such as Peer to peer teaching, mLearning and student center. Since the goal of this study is to explore students' perceptions of peer to peer teaching in an mLearning coding class, in this section we use previous work to contextualise how we are using the concepts in our paper. We begin by drawing a connection between student centered learning and technology, then we present our understanding of mobile learning and how it has changed and conclude the section with a discussion on Peer to peer learning.

Technology and Student Centered Learning?

Technology is often cited as an enabler of student-centered learning. Researchers on educational technology are often some of the strongest proponents and advocates of student-centered learning (Hannafin & Land, 2000; Hirumi, 2002; Jonassen, 2000), which is seen as heavily grounded in constructivist approaches (Hannafin & Land, 1997). While there is a significant body of literature espousing the importance of and being student-centered, there is a shortage of cases describing how to implement a student-centered classroom, especially at a university level. Moreover, as Asino and Grant (2014), showed, an understanding of what it means to be student-centered from practitioners and researchers in educational technology-related fields is conspicuously absent. Student-centered approaches offer the promise of improving outcomes for students in higher education (Barthell et al., 2013; Lea, Stephenson & Troy, 2003); however, it is unclear if educators are willing to make the epistemological shift necessary for implementation. For example, Farrington (1991), found that often being a student center is more of rhetoric than it is a reality because a teacher remains firmly in charge of the content and context. Addis et al. (2013), depicted the steady progress of higher education faculty members to make changes to their teaching. The study aims to explore students' perceptions of peer to peer teaching in an mLearning coding class.

What is Mobile Learning?

Mobile Learning (mLearning) is defined as learning across multiple contexts, using personal electronic devices (Crompton, 2013). mLearning may also be used to facilitate distance learning by utilizing mobile devices and educational technology (Crescente & Lee, 2011). Mobile devices impact educational outcomes by improving access to education while maintaining the quality of education (Roschelle & Pea, 2002; Looi et al., 2009; Valk, Rashid & Elder, 2010; Leinonen, Keune, Veermans & Toikkanen, 2016). According to Roschelle and Pea (2002), mobile devices bring a new dimension to traditional teaching. Mobile devices may provide students with an opportunity to decide how and where learning takes place (Looi et al, 2009). Mobile devices also have the benefit of being cost effective may reduce barriers to learning, particularly e-learning (Valk, Rashid & Elder, 2010). The ubiquity of cell phones provided more of an opportunity for learning through mLearning than it does through e-Learning, which may require computers and associated (Laskin & Avena, 2015; Valk, Rashid & Elder, 2010; Navaridas, Santiago & Tourón 2013; Thomas & Muñoz, 2016).

Changes to Mobile Learning

Mobile learning and its capacity to impact education have evolved over the last decade and a half. Through the process of innovation, more digital technologies have become more personalized (Sharples, 2000). Since educational research improved parallel to the improvement of digital technologies, learning similarly became more individualized and student-centered, just as digital technologies became more personal (Sharples, 2000). The significant advancement of mobile networked technology of the 1990s enabled people to communicate regardless of their location (Sharples, 2000). One major, positive consequence of the parallel improvement of digital technologies and new theories of education is that their convergence allowed for the possibility of constructing personal mobile technology for lifelong learning (Sharples, 2000). The main technology that was prominent in the 1990s was the personal computer. Computers were seen as having the ability to substitute for the classroom teacher or substitute for a tutor or mentor. Research on the connection between mobile learning and lifelong learning has not focused on the replacing the teacher. Instead, the goal was to find and make uses of software and platforms that can take decades and centuries worth of information, and organise them using methods such as information filters and graphic visualizations (Sharples et al., 1996) that could be used to display the detail of individual ideas and events within the context of broader representations and experiences.

In 2018, the perceptions of mobile learning had not changed very much. Ott, Magnusson, Weillenmann and Segerstad (2018), collected data from surveys and focus group interviews of Swedish upper secondary students on understanding how they were using mobile phones in school. The students in the study explained that mobile phones are helpful for completing schoolwork, but mobile phones may also present a distraction that the teachers are constantly wrestling with. During school, students are battling against their teachers' arbitrary enforcement of the school's mobile phone policy. Despite this setback, mobile phones still continue to be a resource in students' learning environments (Bou & Boud, 2001).

Peer Learning

Peer learning is defined as a type of learning a process in which students engage in mutual reinteractions (Nielsen, Johansen, & Jørgensen, 2018), for their mutual benefit (Bou & Boud,

2001). The benefit of this relationship for students is that they can work together on activities, provide and receive feedback, while in the process develop critical thinking skills and discover different ways of communicating concepts (Meschitti, 2018). “The concept of peer learning is original in that it represents a move from learning in which a hierarchical relation is assumed, to a reciprocal relationship. Importantly, it underlines the active role of students in both engaging in their learning and supporting the learning of others and the contextual nature of learning” (Meschitti, 2018, p.1210).

Underpinning the philosophy of peer to peer teaching is the belief that those who teach, learn (Manyama, 2016). Using this approach, students can take turns teaching their peers, and then being instructed (Manyama, 2016). The alternating of roles experience in this process, allows students to learn how to prepare lessons, learn about student engagements, while at the same time benefiting from the instructions that the students receive (Tzuriel, 2017). By involving learners in the responsibility for their own learning and that of others, peer teaching changes the venture of learning from a private experience to a social activity (Kawu, 2017). Other benefits of peer teaching include promotion of active learning by engaging in direct interactions, which results in greater understanding due to sharing similar discourse and reinforcement of learning through instructing others (Cheng et al, 2017). This literature is the basis for our study exploring the perception of coding being taught using the peer to peer teaching method.

Research Question

Our study endeavors to explore the following question: What are the attitudes of students regarding peer teaching?

3. Method

A mixed-method case study was employed in this exploratory study. Yin (2009), emphasized that mixed-methods design helps researchers deal with research questions and collect rich, reliable data. Kitchenham (2010), also notes that case study research lends itself particularly well to mixed methods research, as multiple approaches to research design, analysis, and interpretation are possible. The mixed method design was chosen in this study for gathering data to understand the context in depth. Quantitative data regarding attitudes were collected using a survey, while qualitative data were collected through an open-ended questionnaire. During the qualitative data analyses phase, three steps for content analysis were followed; (i) theme code, (ii) code sheet, (iii) abstract data (Sarsar, 2014).

3.1. Context of the Study

The context of our study was a mobile coding course which was designed for six weeks. The mobile attitudes survey was applied as a pre-test (1st week) and post-test (6th week). The open-ended questionnaire was asked to write as a reflection paper to explain their learning experiences.

3.2. Participants

Twenty-six pre-service teachers and three peer teachers participated in this study. All of the students took these six weeks course voluntarily. Peer teachers (one sophomore, two juniors) were selected based on their experience with the course content.

4. Results

Participants were asked to explain what they thought about peer teaching. 77% of participants found that learning from their peers was fun, satisfying and more than they expected. 15% of those who found peer teaching nice however also indicated that they preferred teacher-led instruction. The rest of the participant (8%) thought that teaching should be done just by teachers.

Another question that stood out during the analysis was "How was peer teaching affected your learning?" 19% of participants reported that the peer teaching process did not affect their learning as much as they expected. On the other hand, 81% of the same group thought that it was a useful, fun, interactive and communicative process. However, 42% of participant highlighted that they did not have confidence enough to teach what they learned during the peer teaching process. Although they said that they learned the content which was delivered by peers, they evaluated their knowledge 6 out of 10.

4.1 Result of Attitude Scale towards Mobile Learning

The attitudes scale toward mobile learning survey result shows that students' attitudes increased at the end of the peer teaching (See Table 1). There might be many reasons for explaining that increasing result. One of those reasons might be the content of teaching which is coding. They used mobile devices during the coding course. Therefore it might affect their attitudes. The other reason might be the effect of peer-teaching.

Table 1. Attitude Scale towards Mobile Learning

	N	Mean	Std. Derivation	Std. Error Mean	t	df	Sig.(2 Tailed)
Pretest	26	157.00	30.783	6.037	-2.959	25	0.007*
Posttest	26	173.54	17.732	17.732			

*: $p < 0.05$

All over the world coding is seen as an important. Coding is not only seen as an essential skill to have for economic benefits but also necessary for information literacy and the benefit of society at large (Tuomi, Multisilta, Saarikoski & Suominen, 2018). In this study, the majority of participants remarked that coding was the "future" and saw it as a way to keep pace with the technological changes in the world. They also mentioned that coding was important because it was related to their professional lives. However, when asked, "Where did coding come from?" The results showed that they had many thoughts on the subject with 23% of participants having no idea of where coding came from. Nonetheless, they still believed that coding was crucially important for daily and professional lives.

4.2. Qualitative data

Participants were asked to explain what they thought about peer teaching. 77% of participants found that learning from their peers was fun, satisfying and more than they expected. 15% of those who found peer teaching nice however also indicated that they preferred teacher-led

instruction. The rest of the participant (8%) thought that teaching should be done just by teachers.

S1 "It was fun, but there were some issues on teaching..."

S2: "It made our teaching fun. It was easy to ask all the questions in my mind. Teaching is not only knowledge but also experiences. Therefore, the peer teacher shared his experiences with us. That was positive."

S4: "Although the teacher (peer teacher) made some mistakes while teaching, it was so great to have him teach us."

S5: "It was professional-ish. However, I prefer having my real teacher."

S10: "It was very relaxing, but I would like our professor to teach me. I wasn't sure whether a peer teacher teaches correctly or not. "

S11: "It was fun, but it wasn't that serious. I believe that it would be better if my professor would teach. Therefore, I would study more if my teacher taught it."

Another question that stood out during the analysis was "How was peer teaching affected your learning?" 19% of participants mentioned that the peer teaching process did not affect their learning as much as they expected. On the other hand, 81% of participants thought that it was a useful, fun, interactive and communicative process.

S1: "It was great to get help from students close to my age. I like the idea of peer teaching, and it positively affected my learning. It was also good for him (the peer teacher) to practice teaching before finishing school. "

S11: "I wasn't familiar with peer teaching before. I wish it was explained in better detail. It didn't affect my learning, but it improved my understanding of peer teaching."

S12: "It was a different experience. It was the first time I took a course from a student like me. He was ok, but I believe that teaching is to share what you know. He shared his knowledge of the material with us. It was very interactive. "

S15: "It was two-way communication. He was listening to me and answering my questions. I found that peer teaching is really effective. It was such a great opportunity."

S19: "Peer teaching is fun and effective. He wasn't perfect, but at least he knew more than what I knew. So, it makes him more knowledgeable than me. It was also easy to talk to him because he was so responsive."

S21: "Peer teaching isn't so effective for me. It was unprofessional. I wanted to learn more, but I couldn't ask him because I didn't know how much he knew."

However, 42% of participant highlighted that they did not have enough confidence to teach what they learned during the peer teaching process. Although participants said that they learned the content, which was delivered by peers, they evaluated their knowledge 6 out of 10.

All over the world coding is seen as an important. In this study, the majority of participants remarked that coding was the "future" and saw it as a way to keep pace with the technological changes in the world. They also mentioned that coding was important because it was related to their professional lives.

S1: "The future=coding."

S2: "It is necessary to know how computer and machine languages work to have the most up-to-date technologies of our time. This is like a foreign visitor knowing the language of the country he or she is visiting. I really know how important it is to speak a language. Coding is a language that helps communicate with different machines. That is why we should master the language of coding; we need to communicate with computers and machines."

S4: "It is important for me to learn coding to develop my professional life."

S11: "Coding has become a part of our lives now. Technology is evolving very quickly, and we must learn to code to keep pace with this movement."

S17: "Coding is useful for the future and also for jobs in the future."

S23: "Coding is going to be the basis of the future."

However, when asked, "Where did coding come from?" the results showed that students had many thoughts on the subject with 23% of participants not having any idea of the origins of coding. Nonetheless, they still believed that coding was critically important for their daily and professional lives.

S2: "Coding comes from doing something that hasn't been done before."

S5: "It came from thinking. When people start to think, they also start to code."

S14: "I think coding is a high level of mathematics. It might come out with the smallest, simple electronic tool."

S16: "It is a way for information to be shaped from the past to the present day."

S21: "There is a mathematical logarithm in life. People start to think about it to solve it, and I think coding has developed that way."

S25: "We can see what is written on the computer and the computer, with coding, can also understand us."

Participants were asked to explain how coding is important for their daily lives. The results showed that coding was important in their daily lives because they believed that coding to be related to many things around them.

S3: "Every program we use every day is the product of coding."

S4: "Yes, it is important. For example, coding is used in some advertisements, games, and movies."

S7: "It is important because we have the most innovative things from simple approaches such as coding."

S8: "Sure, it is important. Almost everything we use in our daily lives is closely related to coding."

S19: "...definitely important. It is going to be my job in the future"

S20: "It is important in my daily life to help better understand problems and find better solutions."

S25: "Coding, as a piece of knowledge, is important in program writing, so it is important in my daily life because it is my profession."

5. Conclusions

In this study, we explored, students' perceptions towards a peer-to-peer teaching model, which promotes the notion of students learning from each other, as a way of promoting student-centered pedagogies. While there are numerous benefits to these approaches (Hake, 1998;

Sokoloff, 1997; Wampold et al.,1998), it is worth noting that this approach may not be suitable in every culture. As our data indicate, the role of the teacher is still superior in some cultures, where students prefer to learn from their teachers instead of each other.

Peer teaching is related to many different variables of learning, such as who is teaching, what the peer teacher is teaching and how well the culture accepts peer teaching. Those variables might affect the quality of the teaching and the learning process. During the study, students had some concerns regarding professional teaching and peer teaching. This might be a cultural response to peer teaching. As a cultural aspect, students' views on peer learning may be that peer teaching is not as effective as professional teaching. The perspective is supported in the literature where findings about challenges to peer teaching have include issues of relationships that student must navigate between teacher and other students when they are engaged in a peer teaching exercise (Abbot, Graf, & Chatfield, 2018).

On the other hand, peer teaching was stated as a fun, learning experience by the peer teachers. The course topic for peer teaching, coding, was one of the favorite topics for peer teachers. Consequently, they were enthusiastic about learning to code. Also, this fascinating topic might encourage them to join as a peer teacher. The result of Attitude Scale towards Mobile Learning also demonstrates that students' attitudes toward mobile learning were positively increased. The results of the study suggest that peer teaching is considered a fun experience, which may improve the entire teaching process and attitudes toward mobile learning.

Conversely, peer teaching was considered by some participants to be less professional than professional teaching. The majority of participants mentioned that peer teaching was a useful, fun, interactive and communicative experience. Therefore, it is essential to design a teaching process which considers other factors that may affect learning such as culture, students' expectations, and students' needs.

Recommendations for Further Studies

In this study, we explored, students' perceptions towards a peer-to-peer teaching model, which promotes the notion of students learning from each other, as a way of promoting student-centered pedagogies. This study explored the perception of coding being taught using the peer to peer teaching method. While we believe that our paper contributes to the literature on the role of culture in peer teaching, we see areas of potential further investigation. Chiefly, we believe that there is a need for larger studies that further takes into account a student's cultural background and their perspectives on peer teaching. Such a study can be conducted along the Hofstede (2011) cultural dimensions or using other cultural models. Other studies could also design interventions using cultural frameworks such as the Young (2008) Culture Based Model to explore whether designing a lesson with culture in mind, can make a difference for the peer teacher and those being taught. Ultimately, what we are calling for is further investigations that take into account the important aspect of culture, particularly because culture as a foundation of experience is also a foundation of learning.

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