MOBILE TECHNOLOGIES INTO TEACHING

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Abstract - This paper aims to investigate Saudi Arabian science teachers' perceptions about using mobile technologies for teaching their students in secondary school. A mixed-methods approach was used with both quantitative and qualitative data. Ninety-four teachers were responded with questioner and five teachers were interviewed. The quantitative data were analysed via SPSS, whereas the qualitative data were analysed thematically. The results indicated that there is a positive attitude amongst the teachers to implement mobile technologies in the classroom, further enhancing communication and learning at any time. Teachers seek to gain more knowledge about mobile technologies as a method to enhance learning and teaching.

Keywords - Mobile Teaching

I. INTRODUCTION

In recent years, the rapid progress of technology has meant that the use of many different mobile technologies has increased exponentially. These technologies have become increasingly popular for teaching and include mobile phones, personal digital assistants (PDAs) and tablets. The implementation of these devices into the educational environment has not only provided new teaching methods for educators but has also offered secondary school students a new way to engage with learning in an interactive environment. The use of mobile technology in the classroom has numerous benefits for students and can be used to provide a flipped-teaching method that provides seamless learning. According to Hwang, Lai and Wang (2015), teaching can be 'flipped' with mobile seamless learning (MSL) as the integration of mobile technology features means that teaching can be produced at any time, while it also encourages a more collaborative approach with students, which is characterised by critical thinking and improved communication. The current study's central motivation is to investigate the implementation of mobile technologies in Saudi Arabia, specifically for teaching science in secondary schools by addressing the following questions:

1. What are the perceptions of Saudi Arabian secondary school teachers about the use of mobile technologies for teaching science?
2. If they are used, in what way are mobile technologies currently used by science teachers in secondary schools in Saudi Arabia?
3. What are the benefits for students and teachers of using mobile technologies to teach science in Saudi Arabian secondary schools?

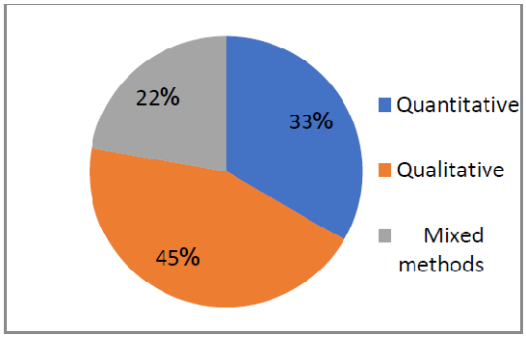
II. PREVIOUS LITERATURE REVIEW

Table1 illustrates relating studies about implementing mobile technologies into teaching and learning. Different theories were used in the studies, such as constructivism, connectivism and motivation. Also, many frameworks were driven many of these studies, such as the Viable Systems Model (VSM), which was created by Stafford Beer. Trongtortam (2019) used VSM, which is used as a model to understand organisational structure and redesign, and it supports the idea of complexity management as well as known the management cybernetics theory description models that are suitable for the complex system of organisation. Amhag's study (2017) used a theoretical concept of mobile-assisted seamless learning (MSL), which assisted designing learning in six dimensions in their descriptions and designs of actual learning: 1) formal and informal learning, 2) personal and social learning, 3) learning across time, 4) learning across locations, 5) ubiquitous knowledge access and 6) physical and digital spaces. Pullen, Swabey, Abadooz and Sing (2015) used the unified theory of acceptance and the use of technology (UTAUT) to investigate pre-service teachers' behavioural intentions and level of acceptance of using mobile devices for their learning at one Malaysian university.

N	Author(s) and year	Sample	country
1	Trongtortam (2019)	Teachers & school manager	Thailand
2	Amhag (2017)	40 students	Sweden
3	Ekanayake & Wishart (2015)	18Teachers (5 M & 13F)	Sir Lanka
4	Kim, Kim & Choi (2016)	30 secondary teachers	South Korea
5	Chiu &Churchill (2016)	62 Teachers	Hong Kong
6	Pullen et al (2015)	100 teachers in university	Malaysia
7	Herrington et al (2009)	15 IT and PD personnel	Australia
8	Anuar Mohd et al (2014)	10 Teachers	Malaysia
9	Wang (2016)	56 Students	China

Table1 List of studies

The pie chart1 illustrates the methodology of the reviewed articles that are relevant to the current study. Most of the studies used the qualitative method at 45%, 33% used quantitative methods and a minority used mixed methods with only 22%.



Pie Chart1. Methodology Of previous studies

The previous studies that were reviewed detected an improvement in performance, motivation, attitude towards implementing mobile technologies in teaching and learning. Trongtortam (2019) indicated that Mobile Learning Technologies can improve the effectiveness of teaching as well as students' enthusiasm and motivation. Amhag (2017) concluded that students appreciated the ability to 'learn anytime and anywhere' and noted the advantages of peer support, which is available through mobile learning. Ekanayake and Wishart (2015) found that as professional development for teachers was provided separately in planning and reviewing workshops, they were starting to change their attitudes towards the use of mobile phones in teaching and in sharing knowledge and skills relating to mobile phone applications in science. Kim, Kim and Choi (2016) found that flipped classrooms have a positive impact on pre-service teachers' understanding of mobile learning, which can help students to be more confident learners.

Chiu and Churchill (2016) found that adoption significantly improved the levels of anxiety about, but not attitude towards teaching with, mobile devices in both groups and that gaining familiarity and experience using mobile devices in their teaching gradually reduced their anxiety levels. Furthermore, the changes in attitude towards teaching with mobile devices were not significant between the two groups.

Pullen, Swabey, Abadooz and Sing (2015) concluded that there is a significant and positive relationship between performance expectancy and the acceptance of using mobile devices for learning by pre-service teachers on one hand and between social influence and the acceptance of using mobile learning on the other. Herrington, Herrington, Mantei, Olney and Ferry (2009) found that teachers had implemented the learning tasks (with the appropriate resources, support and assessment items) and uploaded descriptions of pedagogies to the project website, and they were familiar with the devices into their classes by the time. One set (25) of each device was used in this phase to ensure specific affordances were available to the students as they completed a task. Each device was implemented four times (two times x two semesters with a handover week mid-semester), and each implementation tested a different pedagogical strategy with a different teacher and discipline area. Furthermore, they described the pedagogy of each project and uploaded it to the project website.

Anuar, Esther, Wah and Kamarulzaman (2014) stated that gaming elements and virtual reality (VR) will help teachers to capture and engage the attention of special needs students.

Wang (2016) concluded that students improved their Chinese performance; however, it was noticeable that the learners who used the CMACC system showed better motivation in terms of self-directed preview learning, while those who only learned with traditional textbooks tended to be more passive. In sum, the mobile-assisted learning system added value by providing the learners with opportunities to achieve anytime and anywhere in a flipped-learning classroom. The integration of ubiquitous mobile learning technology and the flipped classroom strategy can be viewed as a critical factor leading to students achieving self-regulated learning.

III. THEORETICAL APPROACH

The study paradigm describes how new knowledge is gained and interpreted. Positivism, post-positivism, critical theory and constructivism (interpretivism) are the main paradigms (Taber, 2019). Therefore, constructivism is applicable as it recognises the possibilities of multiple interpretations of the same phenomenon.

A systematic inquiry could be an investigation intended to acquire new knowledge based on scientific methods popularly named as the inductive and deductive approaches (Allen, 2017). In terms of education, inductive research is the process of introducing general statements depending on a number of individual observations, but deduction follows a formal condition: 'if …, then…'. Consequently, this study follows a deductive approach because it seeks to investigate and explain mobile technology usage by science teachers in Saudi Arabia in a classroom. Consequently, ontology and epistemology of the current study. It is obviously the ontology of this study addresses critical realism view and objectivism. On the other hand, the epistemological position engages with both quantitative and qualitative. It is initially deductive, starting from general knowledge to more specific.

IV. AIM AND METHODS

The key aim of this study is to explore the perceptions of Saudi Arabian science teachers regarding using mobile technologies for teaching, and

it will present an in-depth investigation of specific issues as follows:

1. The perceptions of Saudi Arabian secon-dary school science teachers concerning the use of mobile technologies.
2. The extent to which Saudi Arabian sec-ondary school science teachers currently use mobile technologies.
3. Saudi Arabian secondary school sci-ence teachers' opinions on the expected benefits of using mobile technologies in teaching at secondary schools.

The researcher believes that the mixed-methods approach assists educators in presenting a deep understanding of the research topic and connecting the research topic with the exact design, theory and methodology. In the mixed-methods sequential explanatory design, the research methodology began with a quantitative method followed by a qualitative method. The quantitative data were collected via a questionnaire that was designed by Trongtortam (2019) because the research context of this work as the focus of both studies is similar. Furthermore, the reliability and validity have been tested. The qualitative data were then collected from teachers via a semi-structured interview, which asked three main question: 1. Have you used mobile technologies in teaching? If yes, 2. How have the mobile technologies been used in teaching? 3. What are the benefits of using mobile technologies for teaching?
The population of this study was male science teachers in secondary schools in Saudi Arabia. Science includes chemistry, mathematics, biology, physics and computer science. The sample of the study was 100 teachers in quantitative methods and five teachers in qualitative method.

V. ANYLYSING AND RESULTS

A quantitative analysis was con-ducted using IBM SPSS statistical software version 25. Ninety-four in 100 teachers re-sponded to the questionnaire, whereas five teachers were interviewed, and then a qualita-tive analysis was conducted using thematic analysis. Then following results were founds:

1. According to table2, 74 in 94 teach-ers had experience of implementing mobile technologies into their teaching, 40 of them in urban schools and 34 in rural schools.

Place of school	Do you have experience		Total
	Yes	No	
Urban	40	9	49
Rural	34	11	45
Total	74	20	94

Table2 Place of teachers' school

2. There is a strong relationship be-tween the age range and experience of mobile tech-nologies, which obviously in cross table correlation that 5 in 7 teachers had no experience of using mobile technologies in teaching.
3. Different kinds of mobile facilities that be used through mobile technologies. The vast majority of teachers used electronic books (87.7%) and videos (80.8%) on mobile phones. However, few teachers use mobile technology for audio clips, games and multimedia. However, no one uses it for sounds (MP3).
4. Many teachers used applications, such as 'YouTube', and designed their lessons by themselves using applications such as 'Final cut pro'.
5. The many benefits of using technology in teaching, such as saving time, interacting, visually communicating and adding new types of learning enhances the flipped classroom. Mobile technology can assist students with reviewing lessons by themselves with 93.4% of the overall respondents. Fifty-two teachers responded that it increases communication between students and teachers with 68%.
6. Seventy-six teachers had a positive attitude towards implementing mobile technologies into their teaching with 80.9%.

VI. DISCUSSION AND LIMITATION

One result of the current study is enhanced learning/reviewing lessons at home with 93.4%, which corresponds with Amhag's (2017), Kim et al.'s (2016) and Wang's (2016) results. That means reviewing class at home enhancing learning at any time and anywhere. In the same context, the current study showed that teachers had a positive attitude towards implementing mobile technologies into their teaching. The result matches Ekanayake and Wishart's (2015) result, which is changing their attitudes towards the use of mobile phones in teaching and in sharing knowledge and skills relating to mobile phone applications in science teaching and learning. The current study found that only eight teachers used mobile technology games applications for teaching, which partly differs from Anuar, Esther, Wah and Kamarulzaman's (2014) statement that gaming elements help teachers to capture and engage the attention of special needs students. Almost half of the teachers responded that mobile technologies can improve the effectiveness of teaching, and this study comes almost with Trongtortam (2019). There are many limitations of the current study. The most important one is that mobile technologies cannot be used in the classroom between students in Saudi Arabia. So, teachers consider that mobile technologies distributed them in their classes. Furthermore, thirty-four teachers had a lack of training and guidance.

VII. CONCLUSION

Mobile technologies, such as PDAs and tablets, have contributed to ubiquitous and lifelong learning. Many sites were used by teachers, such as YouTube and eBooks. Many benefits have been discovered thanks to the incorporation of mobile technologies into teaching. These are a few examples of such benefits: a reduction of time and faster communication between students and teachers. Teachers in Saudi Arabia need more training courses in the field to empower them to use mobile technology in the classroom, with a focus on teachers who do not have any experience in technology.

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