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TEACHERS' PERSPECTIVE ON INTEL CLASSMATE PC AS AN INSTRUCTIONAL TOOL

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Abstract

The debate over the integration of technology in education has become more focused on the ways in which education can contend with new technologies. Numerous research has pointed to the effectiveness of various technologies in improving educational practices and outcomes which has shifted the focus from the "whether" to "how". Nevertheless, the rapid development of new technologies may leave educational institutions ponder on the "how" issue. One laptop per child initiatives are one of the latest trends in the integration of new technologies in educational contexts. The current study investigates teachers' perspective at Alhofaz Academy, in Jordan, regarding their attempt to replace the traditional textbook with Intel Classmate PCs. The study utilized a questionnaire to capture teachers' perspectives on the school's implementation of the initiative and its impact on students' three learning domains: cognitive, affective, and psychomotor. The findings of the study showed that despite the positive attitudes teachers held towards the Classmate, they criticized the school's approach of adopting and implementing the initiative.

Keywords: Instructional technology, Classmate PC, ICT in developing countries

Introduction

Technology is becoming ubiquitous and prevalent in students' lives. In education, there is a growing consensus that technology can enhance the quality teaching and learning. Accumulating literature from many parts of the world indicate that educational technologies can indeed improve students' learning and outcomes (Afshari, Bakar, Luan, & Siraj, 2012; Crook, 1991; Earle, 2002; Fullan, 2000; Hyun, 2005; Odhabi, 2007). Thus, the debate is now more focused on the ways in which education can contend with new technologies (Fullan, 2000). However, "how" to contend with new technologies is becoming an elusive question (Fullan, 2000). Understandably, new technologies require time to be integrated effectively in

education. The chalkboard, argues Shade (1999), needed many years to be realized for their potentials by teachers for whole-group instruction. However, the rapid technological development often pressure educational institutions to make hasty decisions to adopt new technologies despite the lack of evidence on their potentials to improve pedagogy.

Despite their pedagogical potentials, the decision to adopt instructional technologies can be influenced by various parties. Vendors, parents, society, and governments might pressure educational institutions to adopt new technologies. In addition, school leaders may adopt new technologies in order to show their schools as modern. Furthermore, the fierce competition among vendors and companies to increase their shares in the education market can add to that pressure. Therefore, earlier studies warned of technology integration driven by faddism, that is by following what is popular or promoted in the market as a remedy for educational problems (Anderson, 1997; Bradshaw, 2002; Lewis, 1998). Responding passively to the pressure has often caused education systems to adopt and then abandon initiatives without even giving the newly adopted ones fair trials (Maddux & Cummings, 2004).

One laptop per child initiatives

As the PC market in the developed world becomes more saturated, large and global companies search for of new markets and avenues. Education sector in the developing world has great business potentials for such companies which make them compete to increase their shares (Abuhmaid, 2009). Therefore, large and global companies “race to wire up the poor” in the developing world (Declan, May 2007). The "digital gap" has long been a pretext for corporations from the developed world to go into developing countries to provide aid, technology, and expertise in order to bridge the digital gap.

Several initiatives worldwide have been focusing on providing each student with a laptop. In the developed world, the initiative aims to provide each student with a laptop to provide one-to-one learning opportunities for each student. Due to the economic status of students in developed world, obtaining standard laptops is something most students can achieve. Governments in the developed world usually launch initiatives to support students’ acquisition of personal computers and laptops. On the other hand, large companies have created specifically designed low-cost laptops for the world's poor children. The idea behind these low-cost laptops is that they may improve students’ learning outcomes and educational prospects for students in developing countries (Hansen et al., 2012).

Classmate and One Laptop per Child (OLPC) initiatives are the key players in providing poor students in the developing countries with laptops.

The Classmate PC is an Intel's products while the OLPC is a spinoff of the Massachusetts Institute of Technology Media Lab. The Classmate PC is being promoted by its potential to revolutionize education through making it possible for every student to have a laptop. The One Laptop per Child (OLPC) initiative' mission is "to create educational opportunities for the world's poorest children by providing each child with a rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning." (OLPC, 2013) However, Hansen et al. (2012) argue that the usage of laptops in developing countries is likely to affect children in ways that are quite different to how they would affect children in developed countries.

However, there is no certainty that such initiatives will improve educational outcomes. The competition between vendors in this industry might fuel the debate over effectiveness of this initiative and its educational value especially for students in the developing world. For instance, Negroponte, the founder of OLPC, accused Intel of looking at the education sector in developing countries as a market and ignoring it as a human right (Einhorn, July 08, 2007) and describing the OLPC project as an "education project" not a laptop project (Odhabi, 2007).

Learning Domains

Benjamin Bloom identified three domains of the learning process: cognitive, affective, and psychomotor (Bloom, 1956). The cognitive learning domain focuses on mental skills that help the learner to know, comprehend, apply what he/she learned to a new situation, analyze, synthesize/construct and evaluate the value of ideas and materials. The affective learning domain focuses on growth in feelings or emotional skills required for receiving, responding, valuing, organizing and internalizing the values of ideas and materials. Finally, the psychomotor domain includes physical movement, coordination and use of the motor-skill areas. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution (Odhabi, 2007). The affective domain deals with emotions such as feelings, values, appreciation, enthusiasms, motivations, and attitudes. This domain consists of five levels: Receiving, Responding, Valuing, Organization and internalizing values. The psychomotor domain is concerned with objectives and outcomes related to skills such as writing, reading, drawing and performance.

Table 1: Learning domains and their components

Cognitive Domain (Knowledge)	Affective Domain (Attitude)	Psychomotor Domain (Skills)
1- Knowledge	1- Receiving	1- Perception
2- Comprehension	2- Responding	2- Set
3- Application	3- Valuing	3- Guided response
4- Analysis	4- Organization	4- Mechanism
5- Synthesis	5- Internalizing	5- Complex overt response
6- Evaluation		6- Adaptation

The purpose of the study

This paper aims to investigate teachers' perspective on Alhofaz Academy's initiative to replace its printed textbooks by Classmate PCs. The focus will be on the impact of Classmates on the three learning domains: cognitive domain, affective domain and psychomotor domain. Thus, the study will try to answer the question: "how does the Classmate PC affect students' cognitive, affective and psychomotor learning domains according to teachers Alhofaz Academy?"

Significance of the study

The one laptop per child initiatives are relatively new in education, and due to the growing adoption of schools to mobile technologies, including iPADs and Classmate PCs, research is crucial in order to guide the adoption and to make them aligned with sound educational objectives and outcomes. In Jordan, as well as many countries worldwide, a few schools have adopted various mobile technologies with minimum evidence of their educational values. As other schools are intending to follow suit, research is needed to study current experiences to provide other schools with better insight to make thoughtful decisions when they decide to adopt such technologies.

The Classmate PC initiative is being promoted worldwide as a solution without being accompanied by research to support its effectiveness as educational tool. Thus, the current study can provide decision makers with better understanding and a clearer picture for future decisions and to minimize the "trial and error" procedure.

Methodology

Participants: the research was conducted during the 2012-2013 schooling year. The sample of the study consisted of the whole population of teachers at the Alhofaz Academy which had 72 teachers (15 males and 57 females). Of the 70 questionnaires distributed, 66 (94.2%) were returned. Table 1 displays the demographic characteristics of the respondents.

Alhofaz academy had 700 students from PreK-12 who mostly come from high income families as the school was one of the leading schools in

Jordan in terms of new technologies adoption, facilities and infrastructure. The school was the first school in Jordan, and one of the first schools in the Middle East, to adopt the Classmate PC initiative as an electronic system to completely replace the printed book. Other technologies and facilities, such as interactive whiteboards and wireless internet access, are available for teachers and students.

Table 1: Demographic profiles of the participants (N = 167).

Demographic variables	Frequency	%
Male	24	36.4
Female	42	63.6
Age Group		
20-25	33	50.0
26-30	25	37.9
31-35	8	12.1
Teaching Subject		
Humanities	43	65.2
Science	23	34.8
Total	66	100

Instrumentation: due to the novelty of the subject, there are a few research studies which the current research can rely on. Therefore, the researcher had to extend my literature review to include computers in schools and the utilization of laptops in teaching and learning. In order to create a questionnaire consistent with the study's purpose, the three learning domains of Bloom's Taxonomy were analyzed and a questionnaire was developed.

The questionnaire consisted of 17 Likert scale items and a one open-ended question. The items were divided into three categories according to the three learning domains according to Bloom's Taxonomy. In order to get feedback on the questionnaire items, experts' feedback was sought. The questionnaire was distributed to 5 experts specialized in educational technology and curriculum and teaching methods. The feedback shaped the questionnaire' final version which had acceptable internal consistency as Cronbach's Alpha was 82.2%.

Data Analysis: for the questionnaire, descriptive analysis was utilized to make sense of the data collected. Tabulation was used to calculate means and standard deviations for each table.

For the open-ended question, thematization and categorization were the main approaches to make sense of the data collected which were integrated with the questionnaire results in order to cross-validate and gain in-depth understanding (Creswell, 2003; Tashakkori & Teddlie, 1998) of the

current issue. The findings then were compared with other studies. The data was then integrated in the discussion.

Results

Table (2) illustrates teachers' responses regarding the impact of the Classmate PC on students' cognitive domain. The average mean for this category was medium (M= 2.61). The item *"Learning with the Classmate helps students to apply what they learn to novel situations outside classrooms"* had a low mean (M= 2.39) which was the lowest for this category. However, the item *"The Classmate helps students to evaluate ideas according to their values"* scored the highest mean for the category (M=2.79), however, it was medium.

The average mean for female teachers for this category (M=3) was medium which was significantly higher the male teachers (M=2).

Table 2: Teachers' responses on the effect of the use of Classmate PC on students' cognitive domain

Item	M	SD	Gender	
			Male	Female
Learning with the Classmate helps students to recall data or information better than the printed book	2.61	.677	2	3
Learning with the Classmate helps students to better understand the content	2.62	.855	2	3
Learning with the Classmate helps students to apply what they learn to novel situations outside classrooms	2.39	.782	2	3
Learning with the Classmate helps students to separate concepts into component parts which helps them to understand and be aware of relations	2.62	.780	2	3
The Classmate helps students to construct structures from elements and parts which helps them in better understanding and forming new meanings and structures (e.g. through programs installed on the device)	2.67	.883	2	3
The Classmate helps students to evaluate ideas according to their values	2.79	.755	2	3
Average	2.61	.78	2	3

Table (2) shows teachers' responses regarding the impact of the Classmate PC on students' affective domain. The overall mean for this category was medium (M= 2.8). The item *"Learning with the Classmate helps students to better judge the behaviors and values"* and the item *"Learning with the Classmate improves students attention and makes him/her aware of stimuli in the learning environment"* were the highest among all survey items (M= 2.91). This category showed the highest average mean (M= 2.8) compared with the other two categories.

The average mean for female teachers for this category (M=3) was medium but higher than male teachers which was low (M=2.4).

Table 2: Teachers' responses on the effect of the use of Classmate PC on students' affective domain

Item	M	SD	Gender	
			Male	Female
Learning with the Classmate improves students attention and makes him/her aware of stimuli in the learning environment (e.g. better attention and following discussions)	2.91	.872	3	3
Learning with the Classmate helps students participate effectively in the learning process	2.53	.863	2	3
Learning with the Classmate helps students better judge the behaviors and values (e.g. honesty, helping other, respect)	2.91	.739	3	3
Learning with the Classmate helps students set priorities in order to deal with situations effectively by comparing, analyzing and finding relations	2.79	2.657	2	3
The Classmate helps students develop value system which controls their behaviors	2.88	.668	2	3
Average	2.8	1.159	2.4	3

Table (4) illustrates teachers' responses in regard to the impact of the Classroom PC on students' cognitive learning domain. The overall mean for this category was medium (M= 2.4). The two items *"Learning with the Classmate improves students' preparedness in the learning environment"* and *"Learning with the Classmate helps students to achieve competency level of complex skills"* scored the highest mean (M= 2.52) for this category. However, the item *"Learning with the Classmate helps students to develop simple level of complex skills"* was the lowest in all survey items (M= 2.23)

The average mean for female teachers for this category (M=2.6) was medium and higher than male teachers (M=2) which was low.

Table 4: Teachers' responses on the effect of the use of Classmate PC on students' psychomotor domain

Item	M	SD	Gender	
			Male	Female
Learning with the Classmate improves students' awareness of and dealing with learning subjects	2.41	.859	2	3
Learning with the Classmate improves students' preparedness (psychologically and/or physiologically) in the learning environment	2.52	.827	2	3
Learning with the Classmate helps students develop simple level of complex skills (e.g. imitation and trial and error)	2.23	.800	2	2
Learning with the Classmate helps students develop an acceptable (intermediate) level of complex skills (to perform with confidence and proficiency)	2.29	.739	2	2
Learning with the Classmate helps students achieve competency level of complex skills (to perform accurately with speed and confidence)	2.52	.916	2	3
Learning with the Classmate helps students develop advanced skills and implement them according to different situations	2.45	.748	2	3
Average	2.4	.814	2	2.6

Discussion

The overall rating of teachers to the Classmate PC was medium pointing to the uncertainty from the teachers' point of view regarding the value and potentials of the devices in students' three learning domains. This might be related to the novelty of the initiative which was in its first year. However, teachers also pointed to flaws in the approach in which the initiative was being implemented in the school which might influence their ratings.

As the school adopted a "revolutionary" rather than an "evolutionary" approach in integrating the Classmate PC into the school, teachers were left with only one choice "to adopt it in their teaching". However, learning with technology is accumulative in the sense that teachers and students build on their experiences with the technology in order to utilize it for teaching and learning subjects. So, considering that the school was newly established and the whole experience with the classmate was still experimenting, chaos was expected before the experience settles and teachers and students focus on the benefits of the technology. Stages of adoption of innovations have been explored at the level of individual teachers by Apple Computers of Tomorrow (ACOT) (Apple Computer, 2007). The "entry" stage of technology adoption as identified by the study should be considered carefully in order to protect the fragile nature of the educational context (Dwyer, Ringstaff, & Sandholtz, 1991; Sandholtz, Ringstaff, & Dwyer, 1997). Therefore, a more "protective" approach can be more adequate in this case.

Thirty three (50%) of participating teachers in the current study were under 25 years old which means that they are more likely to be familiar with the computer and using it. Accordingly, none of the teachers refused the technology itself, rather, they were mostly skeptical and critics of the approach itself. So, as teachers expressed their enthusiasm regarding the whole initiative, they also asked for better services in terms of training, support, faster maintenance processes, and gradual implementation.

Teachers asked for a more gradual approach in the diffusion of such a revolutionary ideas. One teacher cited: "I am with the Classmate PC but to be used partially during the class or a few times during the week" (31F1A). Another teacher wrote:

"I prefer using the Classmate initially in certain classes under the supervision of experts, two classes every month then 3 classes in the next month and so on. Doing so, both teachers and students learn how to use it under the supervision of the supervisor so they get to know the weaknesses instead of making the whole year becomes experimentation" (12F3A)

The implementation stage of new initiatives is different from the initiation and decision-making stages. That is, despite precautions and preparation, the school was stuck in several situations with practical issues. One teacher wrote: "The Classmate experience is excellent, it is good but in practice it is very different" (31F1A). Some teachers did not know how to use the Classmate properly as "some teachers [were] not able to monitor students during the class." (18M1A) as all devices are connected to the main server, so teachers are required to monitor students' activities. Some students also did not know how to send and receive files during the class which slowed their progress and follow-up to the teacher (9F2B, 14M3B, 16M2A).

While other teachers complained about the slow speed of Classmate and the internet (7F1A, 8F1A, 9F2B, 11F1A, 14M3B, 17M3B). Furthermore, there was a complaint about the slow process of repairing broken devices (13M1B, 14M3B, 17M3B) especially that "each class has one or two students who need their devices to be repaired" (13M1B). One teacher pointed to another problem related to the parents' lack of knowledge on how to use the Classmate which makes them unable to help and monitor students' learning with it.

Issues related to the reliability of the technology itself and to the preparation of teachers to use it productively can be a determinant of its success. Therefore, when teachers faced issues related to the technology itself, some of them questioned the whole approach as replacing the textbook completely with the Classmate. One teacher indicated that

The Classmate is good when it's used properly. But the [traditional] textbook cannot be replaced, because the device is slow and ineffective and it distracts the student to a large extent." (7F1A).

The most complained about problem was the device's battery (11F1A, 11F1A, 14M3B, 17M3B). Thus, the devices usually run out of battery which affected student performance during the class. One teacher complained: "when I ask students to start up their devices, only 12 students out of the 20 in the class have their own and out of the 12 there are devices which are either not charged or connected to the main server" (31F1A). Another teacher indicated that "…the device is not ready, and students suffer from various problems when they use it" (27F1B).

When teachers and students face technological issues when they use educational technology, the issue becomes twofold; the technology on one hand and its integration on the other. Apparently, technical issues can affect teaching and learning during the class as these issues can certainly interrupt the learning process in classrooms when they emerge. Therefore, the literature pointed to a significant positive correlation between the reliable technology and the progress of its implementation in educational contexts (Abuhmaid, 2011; Byrom, 2001).

Conclusion

The current study focused on the experience of one school, Alhofaz Academy, in its adoption of the Classmate PC initiative to replace the traditional textbook. The focus was on teachers' experiences with the device in classrooms and its impact on students' three learning domains: cognitive, affective, and psychomotor.

It became clear that the Classmate has promising potentials for the educational context as none of the teachers refused it as a technology per se. However, teachers criticized the school's approach in adopting the initiative and the lack of supporting factors. Some teachers asked for better services and support for students to make the most of their experiences with the device in terms of technical support and faster Internet connection. The technical issues, appeared to interfere with and undermine the promising benefits of the Classmate PC.

In conclusion, the approach in which an educational institution adopts a new technology can determine its success. In addition, the fragility of the educational context requires better and more cautious approach in which certain measures are taken into account in order to avoid experimenting.

Recommendations

Further research is needed to determine the effect of Classroom PC in particular stages of learning and subjects as well as conducting longitudinal studies to reveal how teachers and students develop their relations and understandings of the new technology. In addition, research is needed to compare experiences with Classmate PC from different schools in order to

illustrate best practices. Further studies might also be conducted to determine why female teachers were more positive about the Classmate PC than male teachers. In addition, as the current study was conducted during the first year of implementing the Classmate PC project at Alhofaz Academy, follow-up research is needed to determine how teachers' perspectives and attitudes evolve over time.

Limitations

The current study was conducted in one school in Jordan which was implementing the Classmate PC initiative. As such, the results of the study cannot be generalized or applied to another context. However, other schools in Jordan and elsewhere can benefit from the findings of the study to make their own decisions when they decide to adopt this technology.

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