

Can playing computer based games positively affect ICT attitudes amongst teachers? A case study of teachers experiences using educational multimedia games as teaching and learning resources in Dubai public schools.

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Abstract. The impetus for greater information communication technology (ICT) use by teachers in their classrooms is a priority for Education sectors in many countries. Research investigating the ‘level’ of ICT uptake amongst teachers and the ‘quality’ of ICT use in classrooms has identified that teachers attitudes towards technology adoption, teachers perceptions of the role of ICT in Education, and teachers perceived and actual ICT competency, affects the extent to which ICT is used in lessons. In this study conducted in Dubai public schools, the issue of teachers lack of confidence in their technology skills and teachers ICT lesson planning skills were tackled by providing teachers with training sessions focused on how to use ICT resources, in particular multimedia game based resources, for teaching and learning purposes. Results suggest a positive shift in teachers attitudes towards ICT training and ICT use in teaching. To foster technology adoption and greater ICT use by teachers within Dubai public schools it is suggested that the issues of sustainable in-service training, access to ICT and sustainable ICT technical support, be further examined.

Keywords: ICT, teachers, attitudes, in-service training, multimedia, computer games, Dubai, UAE

1. Introduction

In the past two decades, there has been a concerted push for ICT integration in education from policy makers, educators and researchers [1, 2]. This phenomenon has also been observed in the Arab world and ICT in Education policies have tended to focus more on technical aspects of technology deployment and integration rather than pedagogical support [3]. Within the UAE ICT investment costs and expectations of its learning returns have been high in relation to actual ICT use in classrooms [2, 3]. The UAE Ministry of Education is committed to the integration of ICT in its educational system and its recent Education 2020 policy explicitly identified the need for technical and pedagogical training and support to be provided to teachers in public schools.

At a school and classroom level, the use of ICT in Education appears to have created a conflict between those who have a positive attitude towards this new teaching tool and those who have a negative attitude concerning its use as a teaching tool [4]. Negative attitudes towards technology has primarily been found to arise due to teachers lack of confidence in using technology, inadequate pedagogically driven training opportunities being provided, as well as a lack of adequate technical support being available [5].

Research has shown that the primary reason for problems in education reform lies in people’s lack of understanding of the purpose of the change they feel occurring within their working environment, in this case the classroom and school [4]. The idea of ‘educational change’ or ‘educational innovation’ depends on the adjustments individuals have to make to their current practices because of the innovation [1]. So in this

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situation the adjustments that teachers have to make to their current teaching practises due to ICT use being stipulated as a desirable/mandatory requirement in their teaching.

The question of interest for successful ICT integration in schools therefore appears to rest upon whether teachers' attitudes towards ICT can be positively challenged by providing them with supported learning experiences that can then be transferred to develop lessons where ICT use is pedagogically driven and meaningfully integrated.

2. ICT and Teachers

2.1. Attitudes and its affect upon technology adoption amongst teachers

ICT use in classrooms appears to be considerably affected by teachers' attitudes [6]. Early research on technology use in education typically ignored teachers' attitudes and instead focused on the effect computers have on students' attainment, thus failing to recognise the contextual and psychological factors involved in the process of ICT integration into classrooms and curriculum [4].

Early research looking at computer technology adoption by office and administrative workers found that 'user acceptance' of new technology in turn influenced users attitudes towards this form of media which in turn affected users use of these tools [5]. Similarly in Education it has been noted that the successful use of technology in the classroom depends to a large extent on the teachers' attitudes toward these tools [4, 5].

To understand attitudes and their affect on teachers, it is important to understand that 'concerns' form a major part of attitudes. Concerns can be classified as the perceptions, attitudes, motivations, and feelings that teachers experience related to implementing an innovation, in this case; teacher training and technology integration [1]. Research findings appear to suggest that before and during any implementation of any new innovation teachers go through a series of psychological stages regarding their concerns toward the new innovation [1, 4]. Teachers concerns can be arranged in three stages, the first stage is concerns the self, the second stage concerns the management and implementation of tasks, and the third is related to concerns about the impact of the innovation on students [1].

The current consensus is that the timely identification and addressing of teachers' concerns is a crucial task if technology integration is to be successful in the classroom [5].

2.2. Barriers to ICT uptake by teachers

Literature concerning the barriers to ICT use in schools suggests that teachers resist change especially when asked to use new technologies in their teaching. Mumtaz [4] highlights that teachers are often suspicious of new claims and the implementations of new ideas without proof of effectiveness [and] teachers tend to adopt a new technology when that technology helps them to do what they are currently doing better. Ertmer [7] on the other hand, argues that there are three types of barriers that are caused by teachers' beliefs and attitudes concerning ICT implementation. The first is the lack of access to technologies or training, the second concerns 'beliefs' about what is considered effective professional practice in teaching, and the third contends that teacher must find sufficient purpose and reason to be motivated to use a particular tool in his or her teaching.

However, the idea that teachers resist change as a result of their personal beliefs is questioned by researchers who suggest that the reported attitude of teachers towards ICT tells us more about what equipment the teacher has access to, what training they have had, and what sort of community they are part of, than it does about the willingness of the teacher to use ICT [1]. Dawes explains that because barriers are closely interconnected, the apparent resistance to change as a barrier is merely a symptom of other barriers to the use of ICT. Schools themselves can also be seen to be resistant to the changes needed to successfully integrate Information Communication Technologies as a result of their organizational structures and if teachers are to benefit from ICT in their work and their student's learning; the school environment needs to be supportive and in tune with the concept [8].

The British Educational Communications and Technology Agency study (BECTA) [5] also came to similar conclusions suggesting that barriers interrelate and in some cases cause each other (Figure 1).

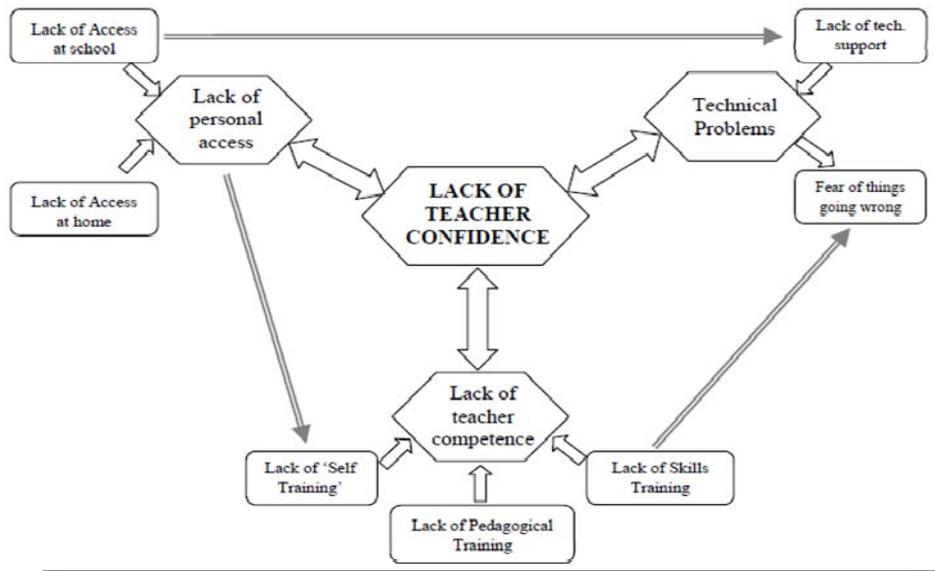


Fig.1: Relationships between Confidence barrier and other barriers (Source: Becta 2004)

2.3. The technology acceptance model for ICT

Computer systems cannot improve organizational performance if they aren't used [9]. The Technology Acceptance Model (Figure 2) places emphasis on individuals psychological tendencies and social influences, it assumes that people's actions are mostly rational and that people process the information available to them and act based on that evaluation. If beliefs and attitudes are drivers for behaviour by challenging negative beliefs, attitudes and experiences with positive experiences it should be possible to change subsequent outcome expectations and in the process change attitudes.

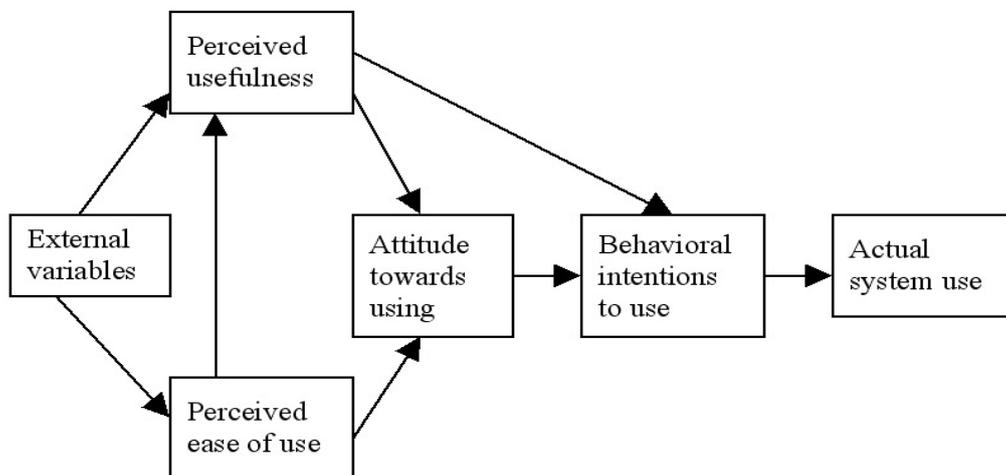


Figure2. Technology acceptance model (Davis, Bagozzi & Warshaw, 1989).

The external variables characterize outside influences on teachers. Research shows that there are a number of factors affecting people's perceived ease of use in using ICT (Table 1) [10]

Positive factors	Negative factors
regular use and experience of ICT outside the classroom	difficulties in using software/hardware
ownership of a computer	need more technical support

confidence in using ICT	not enough time to use ICT
easy to control the class	is too expensive to use regularly
easy to think of new lesson ideas	insufficient access to the resources
can get help and advice from colleagues	restricts the content of the lessons

Table 1: Positive and negative factors affecting perceived ease of use (Cox, Preston & Cox, 1999)

In order for teachers to adopt or use ICT, teachers also need to see the necessity of making such changes and how this affects their practice and student's learning. There are several factors identified which contribute to teachers' perceived usefulness of ICT (Table 2).

Positive factors	Negative factors
makes my lessons more interesting	makes my lessons more difficult
makes my lessons more diverse	makes my lessons less fun
has improved the presentation of materials for my lessons	reduces pupils' motivation
gives me more prestige	impairs pupils' learning
makes my administration more efficient	restricts the content of the lessons
gives me more confidence	is not enjoyable
makes the lessons more fun	takes up too much time
enhances my career prospects	is counter-productive due to insufficient technical resources
helps me to discuss teaching ideas	Spend more time in meetings

Table 2: Positive and negative factors influencing perceived usefulness (Cox, Preston & Cox, 1999)

3. Improving teachers confidence and experiences with technology: Using computer games as educational tools

The impression of much of the mass media is of computer game playing as an activity that offers little or no pedagogic value [11]. Research does however suggest that gaming in its various forms can motivate and interest learners increase the retention of subject material and improve reasoning skills and higher order thinking [12]. The use of a game format for instruction does not however always result in an effective learning environment, as there are several variables involved in creating a successful learning tool. The format should be intrinsically motivating, appropriately challenging, as well as offering elements of curiosity, fantasy and control [13]. An activity which is intrinsically motivating is one in which a learner engages in for its own sake, without any external reward or punishment [12]. Research suggests that activities which engage the learner lead to a more thorough knowledge of the subject knowledge at a surface and conceptual level as well as a greater sustained interest in the instructional content [14]. In addition to providing practice and sustaining learner interest, game formats provide opportunities for learners to engage in successful play that require critical thinking, problem solving skills and cognitive learning strategies [15]. These strategies include: organisational strategies (self evaluating, and self monitoring), memory strategies (grouping, imagery, and structured review), and compensatory strategies (understanding the processes involved in making logical, calculated guesses [16]. Game playing is known to be enjoyable and there is a wide variety

of educational games now available freely online and commercially available for purchase. One possible way of dealing with teachers confidence issues could be to let them 'play' with these games in order to assess their own knowledge, see what facilities and options are available in game format as well as deciding on formats they as learners like and also their opinions of these games as educational resources.

4. The Study

4.1. The schools

Four single sex public schools in Dubai were randomly selected from the Knowledge and Human Development Agency's (KHDA) list of approved public schools (two cycle one schools and two cycle two schools). One class from each school was selected by the respective Principal to participate in the study.

4.2. The teachers

The four teachers that participated in the study had no experience working with technology in their classrooms. Teachers' perceptions of the available ICT resources available to them and their ICT skills were generally negative. All four teachers described a 'desire' to use technology more in their teaching but felt 'apprehensive' and ill equipped to introduce and incorporate ICT into their teaching. An ICT Skills Audit questionnaire was administered to each teacher in order to identify their ICT skills and to help design a suitable training programme. The questionnaire consisted of 42 questions and covered topics such as Hardware, File Management, Software, Internet and Email. The questionnaire sought to assess teachers' actual experience with technology in general as well as their confidence in their knowledge and ability to use technology effectively within the classroom.

The results of the questionnaire found all four teachers reported having 'limited experience' or 'no experience' on each of the topic areas they were surveyed on (Hardware, File Management, Software, Internet and Email). Furthermore all of the teachers reported having 'little confidence' or 'no confidence' in their knowledge of technology and in their ability to use technology effectively in the classroom.

4.3. Introducing technology to increase teachers confidence

All teachers were enrolled onto an International Computer Driving License course in order to develop their ICT technical and practical skills. In order to address their concerns regarding their noted lack of confidence in their ability to use technology in the classrooms training sessions were organized with the teachers to assist them develop a lesson that would be dealing with the issue of diet and physical activity awareness amongst students as part of a Healthy Schools initiative. All of the teachers in the group were interested in the subject area of 'nutrition education' and perceived this as an important educational subject for their students.

Group training sessions were established and teachers were required to meet once a week for two hours. Within the early training sessions the subject of pedagogically driven ICT use in classrooms was discussed by the researcher and the four teachers were encouraged to peruse the internet looking for useful web sites and games that dealt with the subject of nutrition education that they felt would be suitable for their students. Teachers were asked to engage with the sites they found interesting, play with any interactive games they came across and to make notes on all 'interesting material they came across' so that they could provide the group with feedback at the end of the session regarding their experiences and thoughts on resources as teaching materials. All teachers were required to keep a portfolio of their training sessions in order to assist them find suitable ICT resources that they felt they could use with their students. On the teachers fifth training session, the teachers were introduced to HotPotatoes. HotPotatoes is a free web authoring software that enables users to create interactive multiple choice, short answer, jumbled sentence, crossword, matching/ordering and gap fill exercises in an electronic format that can be distributed on a CD ROM, over a network, or via a web page on the World Wide Web. A HotPotatoe visual guide was provided to each teacher to assist the in authoring the software to design their own game. Teachers were encouraged to 'experiment' with HotPotatoe and to keep searching the internet for suitable material and resources for their respective lessons on the subject of healthy eating and physical activity behaviours. Technical support was

provided by the researcher during the training sessions. In week eight teachers were asked to complete another skills audit in order to ascertain their thoughts, beliefs and preferences about ICT usage.

The teachers were not forced to choose a single resource but instead surveyed available material freely available on the internet. A lesson aimed at promoting greater health awareness amongst students was developed by each teacher over the course of the training programme and was delivered to their students in week twelve. Each of the teachers utilized several different ICT resources from online games to downloadable fact and work sheets. Two of the teachers had developed their own quizzes using Hot Potatoes.

4.4. Results

Eight weeks after the first skills audit, another questionnaire was administered to teachers in order to ascertain their thoughts, attitudes, beliefs and preferences about ICT usage after they had received some training. The survey consisted of 49 items that covered three themes; Training (Table 3), Use (Table 4) and Opinions (Table 5). Teachers' responses to the 49 items were recorded using a three point scale; Agreed, Disagreed or Neither agree nor disagree.

Table 3 demonstrates that teachers were very receptive and positive to the idea of ICT training. Furthermore the teachers clearly noted the connection between ICT training and its relationship to their teaching practice.

#	Training statements	Agree	Neither	Disagree
1	I'd like to know more about ICT	4		
2	I know the basics of ICT but that is all.	1		3
3	I have the appropriate skills to use it effectively.	3		1
4	I am interested in learning more about using ICT.	4		
5	I need to develop my skills and knowledge for professional development.	4		
6	I feel I should develop my skills to keep up to date with developments in teaching.	4		
7	I need to develop my skills and knowledge for the students' benefit.	4		
8	I'm interested and training seems to be available.	4		
9	I would like to develop my skills and knowledge in ICT as everyone else is.	4		
10	ICT training is a priority for me.	4		
11	I feel ICT training is appropriate to my teaching.	4		
12	I find training courses in ICT useful.	4		
13	I really want to know more about developing my skills in ICT.	4		
		93.5%		6.5%

Table 3: ICT Survey: Training statements

Table 4 presents teachers opinions concerning their ICT use. The findings suggest that the teachers opinions of ICT use in their teaching are positive, they feel more confident in using the technology for finding resources for teaching purpose, feel it can assist students in their learning, as well as assist them in organising their work. Items 15, 20 and 21 suggest that the 'fear' factor associated with teaching with computing technology appears to have subsided (item 20), and that making mistakes is part of the learning process (item 3).

	Use statements	Agree	Neither	Disagree
14	I use it effectively myself and I know how to teach the pupils to use it.	3	1	
15	I prefer using it on my own when no-one is around to see me make mistakes.	1		3
16	I find it easy to select appropriate ICT resources for my teaching.	4		
17	I feel supported in my use of ICT.	4		

18	ICT encourages pupils to work together collaboratively	3	1	
19	Computers don't scare me.	4		
20	I can cope with all the ICT jargon.			4
21	Systems are slow; it would be quicker to use a book.			4
22	I can always find something relevant for my students.	4		
23	I need to use ICT in my teaching.	4		
24	I think it's necessary.	4		
25	ICT helps me find plenty of relevant information for my teaching	4		
26	I manage information more effectively because of ICT.	4		
27	It makes my work easier.	3	1	
28	ICT helps pupils acquire new knowledge effectively.	3	1	
29	It cuts down my preparation time	4		
30	ICT helps me communicate with colleagues.	3		1
		90.3%	6.5%	3.2%

Table 4: ICT Survey: Use Statements

Table 5 presents teachers' opinions on ICT and reflect teachers' interest in technology and its place in their professional teaching practice in their classrooms.

	Opinion statements	Agree	Neither	Disagree
31	I find it helpful for non-work related tasks.	3	1	
32	The pace of technology is too fast for me.		1	3
33	ICT distracts students from the subject material.			4
34	I'm interested as I suppose I should be.	4		
35	I'm interested and have the time.	4		
36	I'm interested and have access.	4		
37	I feel my skills and knowledge in ICT are adequate to teach with	4		
38	I've got information overload.	1	1	2
39	I find using ICT time consuming.	2	1	1
40	Pupils can get distracted by all the technology.	3	1	
41	I don't feel lost in the information age.	4		
42	I need ICT skills to progress in the profession.	4		
43	I need to learn about ICT.	4		
44	I am interested personally and developing my skills and knowledge in ICT is appropriate to my teaching.	4		
45	I can do fine without it.			4
46	I'm glad it was invented.	4		
47	My school has a positive attitude to ICT use.	4		
48	It seems to motivate the students to learn.	4		
49	ICT swamps students with information.	1		3
		71%	6.5%	22.5%

Table 5: ICT Survey: Opinion Statements

Teachers' opinions of ICT on this part of the questionnaire (Table 5) suggest an understanding of balance of good ICT-based subject content and learning activities against overwhelming the learner with too much ICT-based information that is distracting. There is also an acknowledgement that ICT development is perceived as an important part of teachers' professional development and that the teachers within this limited sample felt their school was positive in its attitude towards ICT use.

5. Discussion

The results of this study demonstrate that providing teachers with training and positive learning experiences can positively affect their attitudes towards ICT training and ICT use in their lessons. Follow up feedback from the teachers suggested that they had found the training useful, enjoyed the lesson they had delivered and would appreciate further mentoring in developing their ICT skills and resources further.

In spite of the investments in schools and the diverse initiatives taken by various governments, ICT uptake has been disappointingly slow [4, 10]. Much of the focus of ICT integration in education has focused on the tool rather than the actual users [17]. The present study demonstrates that the training needs of teachers cannot be overlooked when developing initiatives aimed at changing teaching and learning practises in schools and classrooms.

An approach that favours equipping teachers with solely technical skills such as the ICDL appears to operate on a premise that the mere exposure to ICT is insufficient to ensure that learning occurs [8]. Research shows that teachers need to have more than a technical framework within which to structure the use of ICT in teaching and learning. There is a clear understanding by teachers that ICT can be beneficial to their learners but that the use of technology must not be solely mandated to the development of technical skills in students but instead used in a pedagogically meaningful manner within the given subject area. Mumtaz [4] highlights that the most important factors are ‘teachers beliefs regarding what should be taught in the curricula (content) and the way in which their subjects should be taught (pedagogy).’ Teachers tend not to change their teaching styles when introducing ICT but instead modify their existing practice to incorporate the new use technology [1]. The present research demonstrates that if the focus can be kept on the teaching objectives, rather than on the technology itself as a goal, ICT can serve as a personal and professional enabling and empowering tool.

6. Conclusion

The small sample size makes it difficult to offer any generalisations concerning robustness of the observed results. This study does however highlight that with weekly in-house training that was structured around two firm principles, to increase teachers confidence with technology and to allow teachers to develop lessons that utilised ICT resources to be pedagogically meaningful for their learners and where they (the teachers) felt confident and happy with the ICT they were using in their classroom resulted in positive learning experiences in the teachers and positive attitudes to further ICT training and use in their lessons. This study is far from conclusive but highlights the need for further research to be conducted assessing how best to assist teachers develop their ICT skills in order to enable greater ICT use in government schools in Dubai.

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