University Students' Attitudes toward Cell-Phone Based Learning

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Abstract

Three groups of first year university students who studied Jewish concepts in a 15 week long (semester) course were exposed to three different modes of concept delivery. The first group of students received weekly lists of Jewish concepts sent via SMS messages to their cell-phones, the second group received weekly lists of identical Jewish concepts sent via email messages to their inboxes, and the third group of students received weekly snail mail lists of Jewish concepts. At the end of the semester the students in the three groups were tested on a standardized Jewish concepts achievement test and responded to a questionnaire that examined their levels of learner curiosity, learner self-efficacy and learner technological self-confidence.

Results of the study indicate no significant differences on the achievement test between students in the cell-phone delivery group, the email delivery group and the snail mail delivery group. However students in the cell-phone delivery group attained a significantly higher level of learner curiosity than their counterparts in the email delivery group who in turn exhibited a significantly higher perception of learner curiosity than students in the snail mail group. Students in the cell-phone group also had a significantly higher level of learner self-efficacy than their counterparts in the email and snail mail groups. No significant differences were found between students in the email group and those in the snail mail group on the learner self-efficacy factor. Lastly there were no significant differences in the perceptions of students in the cell-phone and email groups on the learner technological self-confidence factor. However, students in both cell-phone and email groups were significantly higher than students in the snail mail group on this factor.

Keywords: cell-phone delivery; achievement; learner curiosity; learner self-efficacy; learner technological self-confidence

Introduction

Distance learning has developed over the years to overcome the limitations of traditional face-to-face learning which necessitates the presence of the student in a formal classroom setting. Since its inception when distance learning was confined to the delivery of learning material via snail mail, landline telephone and radio broadcasts, it has progressed through delivery systems such as television broadcasts, videoconferencing and email, and at present focuses on digital delivery systems such as internet and mobile learning platforms. It should be noted that almost all of the above distance learning delivery platforms are still in use in different educational systems throughout the world (Katz & Yablon, 2003).

After the development of sophisticated third generation technology-based distance learning systems which include interactive video, internet, and mobile learning technologies, learning activity through the medium of these distance learning has been redefined to include and focus on the enhancement of student self-learning (Trentin, 1997). Technology-based distance learning offers tuition that is especially characterized by flexibility. In addition technology-based distance learning allow tutors to modify, reinforce and even model educational processes, thereby fulfilling the cognitive as well as affective needs and requirements of students (Wilson & Whitelock, 1997).

Some research studies (Katz & Yablon, 2009; 2011; 2012) have indicated that the development of mobile learning within third generation distance learning is especially suited to higher education mainly because of increased flexibility in the learning process, mainly due to the mobile learning systems that are increasingly used at present. Other studies have emphasized the importance of student activity provided for by current mobile learning systems and have indicated that the student activity variable contributes significantly to improved student achievement (Harris, 2012).

Mobile learning in general and SMS based learning in particular have advanced steadily over recent years and have become potential learning platforms at the university level. In certain areas, such as the learning of vocabulary (Katz & Yablon, 2009; 2011; 2012) and concept learning (Katz & Katz, 2011; Katz, 2013) SMS-based learning has advanced rapidly and is becoming an integral part of the learning process in many universities throughout the world. Research studies have indicated that the use of SMS as a delivery system for university learning is suitable for both cognitive and affective aims (Divitini et al., 2002; Garner et al., 2002; Prensky, 2005).

Many universities increasingly implement a variety of technology-based distance learning methodologies as viable alternatives to traditional classroom instruction. Distance learning via internet, email and cell-phones are increasingly penetrating the domain of academic learning and provide students with dramatically increased access to sources and subject matter relevant to their studies. Current technology-based distance learning is, inter alia, based on materials provided through methodologies such as internet, email and cell-phones and an ever increasing number of research studies are being conducted in order to verify the educational value of such technology-based distance learning methodologies at the university level (Harris, 2012).

Technology-based distance learning

Distance learning has developed over the years to overcome the limitations of traditional face-to-face learning which necessitates the presence of the student in a formal classroom setting. From its inception when distance learning was confined to the delivery of learning material via snail mail, landline telephone and radio broadcasts, it has progressed through delivery systems such as television broadcasts and videoconferencing and at present focuses on digital delivery systems such as internet, email and mobile learning platforms (Katz & Yablon, 2003).

Research studies have indicated that distance learning systems are perceived by students as being convenient, flexible, time saving and cost saving (Valenta et al., 2001). Interactive internet, email and mobile learning offer tuition that is especially characterized by flexibility offered to the learner. In addition the above methodologies are designed to provide platforms that enhance modification, reinforcement and even modelling of learning processes, thereby fulfilling the cognitive as well as affective needs and requirements of students (Wilson & Whitelock, 1997).

Ismail et al. (2010) confronted the implications of university learning and instruction using technology-based distance learning courses. They contended that technology-based distance learning has moved formal instruction in these courses from the on-site setting of the university campus to the home of the student. Learning has become significantly more flexible and content sources more accessible. Creating, sharing and knowledge capitalization are all facilitated by distance learning. Wider sources of learning are provided in technology-based distance learning courses and worldwide expertise can systematically be brought to the student's desktop.

With the rapid development of distance learning courses for use in university level education, increasingly more research studies have been conducted in an attempt to evaluate different issues related to technology-based distance learning. For example Chandra and Watters (2012) indicated that learning physics through the medium of technology-based distance learning not only enhanced students' learning outcomes, but also had a positive impact on their attitudes toward the study of physics. Ituma (2011) confirmed that a large percentage of university students who were enrolled in distance learning university courses had positive perceptions of the technology- based learning methodology and were in favour of joining additional distance learning courses that supplemented traditional face-to-face classroom instruction.

Valaitis et al. (2005) found that students who participated in technology-based distance learning courses perceived that the methodology increased their learning flexibility and enhanced their ability to process content, and provided access to valuable learning resources. Abdallah (2009) found that technology-based distance learning courses contributed to improved quality of students' learning experiences. Students reported positive attitudes toward their technology-based learning and felt that such learning should be part and parcel of standard learning practice. Delfino et al. (2010) confirmed that student teachers who participated in technology-based distance learning teacher training courses developed self-regulation of learning which provided them with the opportunity to flexibly cope with their academic assignments.

Cell-phone based delivery of learning content

One of the emerging learning strategies that has developed in technology-based distance learning in recent years and is receiving growing attention from both students and teachers is in the domain of mobile learning, and more specifically, focuses on cell-phone learning technology (Prensky, 2005). It should be noted that the use of cell-phones is multi-dimensional and cell-phone technology now provides technological possibilities including voice, text, still-camera, video, paging and geo-positioning capabilities. These tools provide a rich variety of platforms that enhance the learning process. Moreover, learning is not bound by space or time and students can choose to engage in learning without almost any limitations (Dieterle & Dede, 2006).

In many universities and other educational institutions in Europe, China, Japan and the Philippines, students already use cell-phones as learning tools. Thornton and Houser (2002, 2003) described several innovative projects using cell-phones to teach English at a Japanese university and the BBC World Service's Learning English section

offers English lessons via SMS in Francophone West Africa and China (Godwin-Jones, 2005). Cell-phone based learning projects managed by several universities worldwide have indicated the positive outcomes of such learning methods (Divitini et al., 2002; Garner et al., 2002; Seppala, 2002; Stone & Briggs, 2002). Additional studies have described language learning based on cell-phone technology (Kiernan & Aizawa, 2004; Katz & Yablon, 2009; 2011; 2012). These studies describe how vocabulary transmitted by SMS in a spaced and scheduled pattern of delivery contributed to student proficiency in English or other languages.

Research studies have been conducted to investigate students' attitudes toward the cell-phone based learning delivery process. Learner motivation, learner autonomy, learner control of the learning process, learning flexibility, learner curiosity, learner self-efficacy, learner self-confidence, and user friendliness of the cell-phone based delivery strategy are some of the major factors that have been found to contribute to the enhancement of technology-based distance learning. Mainemelis et al. (2002), Zurita and Bruce (2005), Cavus and Ibrahim (2009) as well as Katz and Yablon (2009, 2011; 2012) confirmed the association of some of the above affective variables with effective cell-phone based delivery of learning content. Studies that investigated the relationship between cell-phone based delivery of learning content learning and academic achievement (Katz & Yablon, 2009; 2011; 2012) indicated no significant differences between academic achievement attained by university students who received their learning content via cell-phone delivery and that attained by their counterparts who studied with other technology-based or traditional content delivery strategies.

In summary it may be noted that recent research studies have indicated that academic achievement (Perveen, 2010; Weng et al., 2010), learner creativity (McWilliam & Dawson, 2008; Tillander, 2011), learner flexibility (Greener, 2010; Mainemelis et al. 2002) and learner self-image (Offir & Aflalo, 2008; Renes & Strange, 2011) are issues, traits and attitudes that appear to be important in the learning process. In addition, Katz & Yablon (2009, 2011; 2012) have indicated the centrality of students' attitudes including learner motivation, learner autonomy, learning flexibility and user friendliness of the technology strategy toward cell-phone delivered learning content at the university level in Israel. Thus the current study, pays particular attention to the relationship between cell-phone learning and students' attitudes toward three additional major factors, namely learner curiosity, learner self-efficacy and learner technological self-confidence as well as to the issue of academic achievement attained by students when receiving their learning content via cell-phone based delivery.

Method

Sample

The research sample consisted of 79 first year students enrolled in a 15 week semester-long elective Jewish concepts foundation course offered at one of the seven chartered universities in Israel. The students were randomly assigned to the three different research groups that were provided with lists of definitions of Jewish concepts as follows:

1. 28 students received their Jewish concepts lists via cell-phone based SMS messages.
2. 26 were sent their Jewish concepts lists via email messages to their email inboxes.
3. 25 students were sent their Jewish concepts lists by snail mail delivery.

Instruments

Two research instruments were administered to the students in this research study. A standardized 100 item Jewish concepts test was administered to the participants in order to assess students' mastery of definitions of basic Jewish concepts. The test scale ranged from 0-100, the higher grades indicating higher levels of achievement on the Jewish concepts test. The second instrument administered was a 21 item Likert scale type response questionnaire (students responded to a five point scale with 1=totally disagree and 5=totally agree) designed to examine the students' perceptions of the attitudinal research factors as follows: The first factor, learner curiosity, contained seven items (Cronbach α= 0.82), the second factor, learner self-efficacy, consisted of eight items (Cronbach α=0:86) and the third factor, learner technological self-confidence, was made up of six items (Cronbach α=0.88).

Procedure

Students who were graduates of the Israeli state secular school system and who were enrolled in the elective Jewish concepts foundations course and possessed personal cell-phones with texting capacity were eligible for participation in this study. Following the selection of the students who met the above criteria, they were randomly assigned to the three delivery platform groups. Students in the first group received Jewish concepts via cell-phone based SMS messages; those in the second group

received Jewish concepts via email messages; and those placed in the third group received Jewish concepts via snail mail.

The students in the three groups were sent weekly lists that contained concise definitions of the Jewish concepts studied in the course, each list containing definitions of 20 new Jewish concepts delivered via the respective learning strategies. Thus each of the students received definitions of 300 Jewish concepts during the 15 week long course. On completion of the course the students in the three groups were administered a standardized Jewish concepts achievement test in order to asses their level of knowledge of the 300 Jewish concepts taught in the course. In addition they were administered the attitudinal questionnaire which examined their scores on the three attitudinal research factors, namely learner curiosity, learner self-efficacy and learner technological self-confidence.

Results

The main aim of this study was to examine the efficiency and effectiveness of three different learning delivery platforms of which two were digital. Two research questions were posed: the first examined the acquisition by students of knowledge concerning Jewish concepts and the second investigated students' perceptions of attitudes connected with the three learning strategies. The mean scores of each of the attitudinal factors were standardized in order to allow for a comparison between the factor scores. Standardized means and standard deviations of students' scores on the achievement test and on the attitudinal factors are presented in Table 1.

Table 1: Standardized Mean Scores and Standard Deviations of SMS, Email and Snail Mail Groups for Achievement, Learner Curiosity, Learner Self-Efficacy and Learner Technological Self-Confidence

Group	**Learner Curiosity Factor**		**Learner Self-Efficacy Factor**		**Learner Technological Self-Confidence Factor**		**Achievement**	
	M	**S.D.**	**M**	**S.D.**	**M**	**S.D.**	**M**	**S.D.**
SMS Delivery N=28	3.55	0.24	2.85	0.42	3.84	0.46	82.62	10.71
Email Delivery N=26	3.13	0.52	2.55	0.43	3.79	0.49	82.53	11.39
Snail Mail Delivery N=25	2.93	0.51	2.50	0.41	3.48	0.41	81.97	10.32

Four one-way ANOVA tests were conducted in order to compare students' achievement and attitudes as related to the three learning delivery platforms. While there were no significant differences between students in the three groups regarding achievement scores, with students from the three groups achieving similar grades on knowledge of Jewish concepts, significant differences were found for learner curiosity [$F(2,76)=14.30$, $p<0:001$, $\eta^2=0.27$], for learner self-efficacy [$F(2,76)=5.18$, $p<0:01$, $\eta^2=0.12$] and for learner technological self-confidence [$F(2,76)=4.93$, $p<0:001$, $\eta^2=0.16$]. Post-hoc Scheffe tests were then computed to establish the level of intra-group differences. The first Scheffe test revealed that students who received concepts via SMS messages to their cell-phones attained significantly higher scores on the learner curiosity factor than students who received concepts via email messages who in turn achieved significantly higher scores than students who received their list of concepts by snail mail. The second Scheffe test indicated that students who received concepts through the medium of SMS messages to their cell-phones attained significantly higher scores on the learner self-efficacy factor than either students who received concepts via email messages or those who received their concepts by snail mail. There was no significant difference between the scores attained on this factor by students in the email and snail mail groups. The third Scheffe test confirmed that while students in the cell-phone and email delivery groups achieved significantly higher scores on the learner technological self-confidence factor than students in the snail mail group, there was no significant difference between the scores of students in the cell-phone and email delivery groups on this factor.

Discussion

Results of the statistical analyses of the data collected in this study indicate that none of the three delivery platforms, namely delivery of the lists of Jewish concepts throughout the semester long course via SMS messages to students' cell-phones, delivery to students' email inboxes and delivery to students via snail mail, had any significant advantage regarding academic achievement of students on the standardized Jewish concepts test. Students who studied via all three strategies attained similar grades on the test. Thus it appears that achievement is a factor that does not distinguish between delivery strategies with measured achievement outcomes. This result confirms those indicated in a number of research studies that confirmed that, on the whole, different delivery platforms do not significantly contribute to differential academic achievement (Katz & Yablon, 2009; 2011; 2012).

However, the findings of the study indicate that the different delivery strategies employed in the present study to provide weekly lists of Jewish concepts to the students are associated with significantly differential levels of learner curiosity, learner self-efficacy and learner technological self-confidence. Scores attained by students on the attitudinal research factors, after receiving lists of Jewish concepts delivered via the three delivery strategies, confirm that SMS messaging to cell-phones is associated more significantly to students' learner curiosity and learner self-efficacy that either email message or snail mail delivery. The contribution of email messages, although less significant than that of the SMS to cell-phones strategy, also contributed more significantly to students' learner curiosity and learner self-efficacy than lists received by snail mail. In addition, the SMS messages of lists of Jewish concepts sent to students' cell-phones as well as lists sent to students' email inboxes made a significantly higher impact on students' attitudes toward learner technological self-confidence than lists of concepts sent to students via snail mail. Although there is no statistically significant difference between students' attitudinal levels associated with learner technological self-confidence after receiving lists of Jewish concepts via cell-phone or email delivery systems, the students' mean perception of their learner technological self-confidence is higher than the mean perception of students who experienced the email delivery system. However, it appears that because SMS messages to students' cell-phones as well as lists sent to students' email inboxes may be identified as technologically oriented delivery strategies, they have a more significant impact on learner technological self-confidence than lists of concepts sent to students via snail mail.

It appears that learner curiosity is the most potent of the research factors and most significantly distinguishes between students who studied by way of the three learning strategies. Cell-phone based SMS strategy appears to be most significantly related to the learner curiosity of students toward the learning process, followed by the more moderate level of learner curiosity of those who used email learning delivery, who in turn have a comparatively higher level of learner curiosity than students who studied by the snail mail learning strategy.

The results of the present study indicate the potential of SMS messaging to cell-phones of relevant subject matter as a positive delivery platform as it relates to learner curiosity, learner self-efficacy and learner technological self-confidence. It should be noted that the significant attitudinal findings do not correlate with higher academic achievement when the three delivery platforms are compared. Further studies need to be conducted so as to further explore the possible relationship between academic

achievements on the one hand and students' attitudes toward learner curiosity, learner self-efficacy and learner technological self-confidence on the other.

From a pedagogical point of view it appears that, in general terms, cell-phone-based delivery of learning content leads to more significantly positive attitudes of students than email or snail mail delivery with learner curiosity perceived as the central factor that best distinguishes between the three delivery strategies studied in the present research.

Conclusion

In conclusion it may be stated that the results of the present study indicate that, while the three delivery platforms used in the study to provide students with weekly lists of Jewish concepts were no different from each other in promoting students' academic achievement, the relative advantages of cell-phone based SMS messages most positively enhanced learner curiosity, learner self-efficacy and learner technological self-confidence of students. The results of the present study regarding the relationship between the delivery of subject matter at the university level via SMS messages sent to students' cell-phones and students' levels of learner curiosity, learner self-efficacy' learner technological self-confidence add to the findings of other research studies that indicated the significance of the cell-phone delivery platform of learning content for students' levels of learner motivation, learner autonomy, learner control of the learning process, learning flexibility and user friendliness of the technology strategy (following Divitini et al., 2002; Garner et al., 2002; Seppala, 2002; Stone & Briggs, 2002; Thornton & Houser, 2002; 2003; Katz & Yablon, 2009; 2011; 2012) These studies indicated that cell-phone based delivery systems can be offered as a positive alternate technology-based delivery system of relevant subject matter when compared to other technology-based learning strategies that utilize expensive and sophisticated infrastructures. University educational systems in all societies, whatever their technological infrastructure, can profit immeasurably from the use of SMS to cell-phone learning content delivery in relevant university subjects and courses.

More accessible technology and improved pedagogy need to be developed in order to enhance the use of cell-phones in routine learning at the university level but it seems clear that the mass incorporation of cell-phones in institutions of higher education is a distinct possibility in the foreseeable future.

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