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Technology-Supported Teaching: Technological Progress or a Sham?

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Abstract: This study examined the extent of faculty's use of various technology-supported features in their teaching practice, involving syllabi, exercises, presentations, required reading materials, supplementary reading materials, examples of exams from previous years, electronic notice board, links to film clips, and other tools that enhance the convenience of technology-supported teaching. The findings of this study indicate that faculty make limited use of technological tools. Differences in use were found by age, tenure, gender, and faculty: Age of faculty has a positive effect on the use of the digital system for required reading and video-taped lessons, while faculty tenure has a negative effect on the use of the digital system for required reading materials. Male faculty use the video-taped lesson system more frequently than their female counterparts. Female faculty use the system more frequently than male faculty for required reading and elective reading materials. Faculty in the Humanities use the system to upload required reading more frequently than faculty in the other two faculties, while lecturers in the Faculty of Engineering use to system to upload examples of exams more frequently than their counterparts in the other two faculties. Faculty noted that they found no technological tool that reflects pedagogical thinking that benefits the students. Faculty use these digital tools as technical rather than pedagogical aids. Based on the recognition that these new technological tools will create a paradigmatic change in teaching, efforts should be invested to developed, disseminate, and assimilate new pedagogies that are compatible with these new educational technologies.

Keywords: *Teaching-supported teaching, teaching, technology.*

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Introduction

Computer-mediated learning is a term that sounds good but includes some challenges. The term "computer-mediated learning" gives a sense of technological progress and efficiency. In practice, its effectiveness is at best doubtful (Tzuman, 2009).

At first glance, computer-mediated teaching seems like a magical solution. It includes saving money for copying materials, convenient service for students who can study anywhere anytime, upgrading the institution's image as one that helps students advance in a rapidly developing technological era (Nachmias et al., 2000). These premises do not stand the test of reality and are not compatible with the research experience on introducing learning through technology in learning organizations as well as academic institutions (Tzuman, 2009).

Clark (1994) writes critically, "*The factor that affects learning is not the technology rather the teaching method. Technology is only the means: In order to know whether learning is effective, it is necessary to examine the learning method rather than the technology used to implement the learning method*" (p. 21). In addition, *Computer-mediated learning and teaching*, edited by Davidovitch (2014), brings together the best research by Israeli scholars on the complex issues concerning the new relationships between students and knowledge. The collected studies address the influence of computer-mediated technologies on learning and cognition, the necessary changes in pedagogy and development of the teaching staff, technology distribution and assimilation, and issues concerning the design of computer-mediated learning environments. The book offers a wide range of recommendations for developing new pedagogies that make optimal use of new technologies for teaching and learning.

However, computer-mediated teaching requires time and effort, not only in the design of the materials but also to update them, otherwise the materials will quickly become irrelevant.

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The success of computer-mediated teaching depends on three skills (at minimum): (a) subject knowledge; (b) pedagogic knowledge; and (c) familiarity with the organization's technology and its potential (Davidovitch, 2014). Most lecturers do not have all types of skills. In practice, in most cases they have only two of the three types of skills.

The 5-stage model of use of learning technologies proposed by Coben (1986) is also applicable to the developments in computer-mediated teaching in recent years:

1. Enthusiasm with the new technology as a potential solution to all the system's problems.
2. Academic studies confirm (or allegedly confirm) that the technology is indeed effective.
3. The technology fails in the field.
4. Other studies depict incomplete and unsatisfactory implementation in the field.
5. Technology operators (the teachers) are criticized for objecting to the change and effectively preventing implementation.

According to Coben (1986), new technology fails for several reasons: When new technology is not implemented with the understanding that the teachers are the most efficient means of learning, a new technology may try to circumvent teachers and produce a "teacher-proof" means of learning. Studies show that it is precisely the "low-tech" means of learning (e.g., chalkboard, chalk, textbooks) that are most effective. These traditional means of learning are effective due to their simplicity, low cost, mobility, and flexible usage, as well as the teacher's ability to use them to teach by creating a dialogue with learners.

For lecturers in higher education, represents additional work rather than convenience. Aside from incidents where lecturers have a special need or interest in technology, in most cases they will prefer traditional teaching over the operation of technology, which is occasionally perceived as a type of penalty and waste of time, a disruptive factor with no benefits. Lecturers are suspicious about the "deceptive" sense of high tech that accompanies new learning technologies.

Even if students are required to use computer-mediated means, the lecturer often does not know whether the student understood the material and what he understood, as in most cases there are no measures for assessing understanding. Even if there is a test based on the computer-mediated teaching (through exercises) at the end of the course, students will not always make the effort to take it themselves. Students may ask "the student who knows" to take the test and give them the answers. All the rest will use these answers and consider the task done.

It is not clear that the future academic study experience will differ from the traditional university experience. Therefore we must plan and prepare in order to maintain a competitive edge in a growing market. Maintaining an edge in a computer-mediated market requires much more than simply "planting" materials in a website or transferring materials from a regular learning environment to an online environment that allows distance learning. Effective use of the new technologies available to us requires the development of specific pedagogies (Nachmias et al, 2000). The adoption of computer-mediated teaching and learning requires an organizational culture that supports the integration of new technologies and helps lecturers understand its benefits and acquire the necessary skills. Not all organizations have such a culture.

In this study we examined faculty's use of various features of technology-supported teaching tools, faculty opinions on the barriers that prevent them from using these tools more extensively, and the factors that might create more convenient opportunities for them to use technology-supported tools in their teaching practice. Based on previous studies (e.g., Davidovitch, 2014, Hinz et al., 2017), we also examined whether use is a function of faculty's age, tenure, gender, and faculty affiliation.

Based on a review of literature (e.g., Davidovitch, 2014, Hinz et al., 2017), our research hypotheses were:

- H1. Age positively affects usage of the system for posting required reading assignments.
- H2. Age positively affects uploading recordings of lessons to the system.
- H3. Seniority negatively affects usage of the system for posting required reading assignments.
- H4. Males use the system to upload recordings of lessons to the system more than do females.
- H5. Females use the system for posting required reading assignments more than do males.
- H6. Females use the system for posting elective reading assignments more than do males.
- H7. Lecturers in the Faculty of Social Sciences and Humanities use the system for posting required reading assignments more than do instructors in other faculties.
- H8. Lecturers in the Faculty of Engineering post sample exams on the system more than do lecturers in other faculties.

Methodology

Measurement Tool

Optimizing performance is a key issue for business organizations (Eckhaus, 2011, 2017; Eckhaus, Klein, & Kantor, 2017; Eckhaus, Kogan, & Pearlman, 2013), as well as in the academia (Davidovitch & Eckhaus, 2018a, 2018b). Using technology often facilitates the achievement of this target. Researchers often employ technological means to detect real-time problems in organizations (Eckhaus & Sheaffer, 2018c; Eckhaus, Taussig, & Ben-Hador, 2018; Klein & Eckhaus, 2017), however, in this study we analyze lecturers' opinions and attitudes toward the use of technology as a teaching aid.

A questionnaire was used for data collection. Lecturers responded to questions on their use of the various elements of an online teaching system on a Likert-type scale from 1 (*I do not use this element*) to 5 (*I use this element a lot*), and completed demographic items (Hazan, 2008).

Sample

The questionnaires were distributed online to the senior faculty members of Ariel University on Google Docs. 112 completed questionnaires were returned to the researchers (47.2% female). Respondents' ages were 33-39 (6.4%), 40-49 (46.8%), and 50+ (46.8%).

Analysis

We used Structural Equation Modeling (SEM) to test the model's goodness-of-fit (Eckhaus & Sheaffer, 2018a, 2018b). Model fit was estimated using CFI, TLI, RMSEA, NFI, and minimum discrepancy divided by their degrees of freedom (CMIN / DF). Values of CFI, and TLI close to .95 or higher are indication of good fit, and above .9 is considered acceptable (Hinz et al., 2017); the ratio CMIN / DF should be as small as possible (typical value of lower than 3 is considered a good fit); and RMSEA should be .06 or smaller (Hu & Bentler, 1999).

The model included the following variables, which represented various elements of the online teaching system and other information on the lecturers: *ARC1* (required reading assignments), *ARC2* (elective reading assignments), *EXA* (examples of exams from previous years), *REC* (recorded lessons), *AGE*, *GEN* (gender, coded as 1= male, 0 = female), *SEN* (seniority, the number of years teaching in the university), *SOC* (affiliated with the Faculty of Social Sciences and Humanities), *ENG* (affiliated with the Faculty of Engineering / Faculty of Natural Sciences /School of Architecture), and *HEA* (affiliated with the Faculty of Health).

Results

Spearman's correlations, means, and STD are presented in Table 1. Table 2 highlights the mean use of each element of the online teaching system by gender and affiliation. The model and the results are illustrated in Figure 1.

Table 1. Correlation Matrix, Means and SD of the Research Variables.

	<i>ARC1</i>	<i>ARC2</i>	<i>EXA</i>	<i>REC</i>	<i>AGE</i>	<i>GEN</i>	<i>SEN</i>	<i>SOC</i>	<i>ENG</i>	<i>HEA</i>
<i>ARC1</i>	1									
<i>ARC2</i>	.74***	1								
<i>EXA</i>	-.22*	.01	1							
<i>REC</i>	-.08	.07	.25**	1						
<i>AGE</i>	.09	.04	-.09	.32**	1					
<i>GEN</i>	-.35***	-.24*	.15	.26**	-.15	1				
<i>SEN</i>	.03	.09	.05	.13	.66***	-.10	1			
<i>SOC</i>	.40***	.21*	-.27*	-.03	-.07	-.23*	.03	1		
<i>ENG</i>	-.44***	-.25*	.39***	.08	-.03	.45***	.004	-.78***	1	
<i>HEA</i>	.07	.05	-.20	-.09	.15	-.34**	-.05	-.32**	-.34***	1
Mean	3.07	2.68	2.88	1.46	51.87	.53	14.82	.43	.45	.12
SD	1.56	1.49	1.77	1.13	12.20	.50	13.05	.50	.50	.33

* $p < .05$, ** $p < .01$, *** $p < .001$

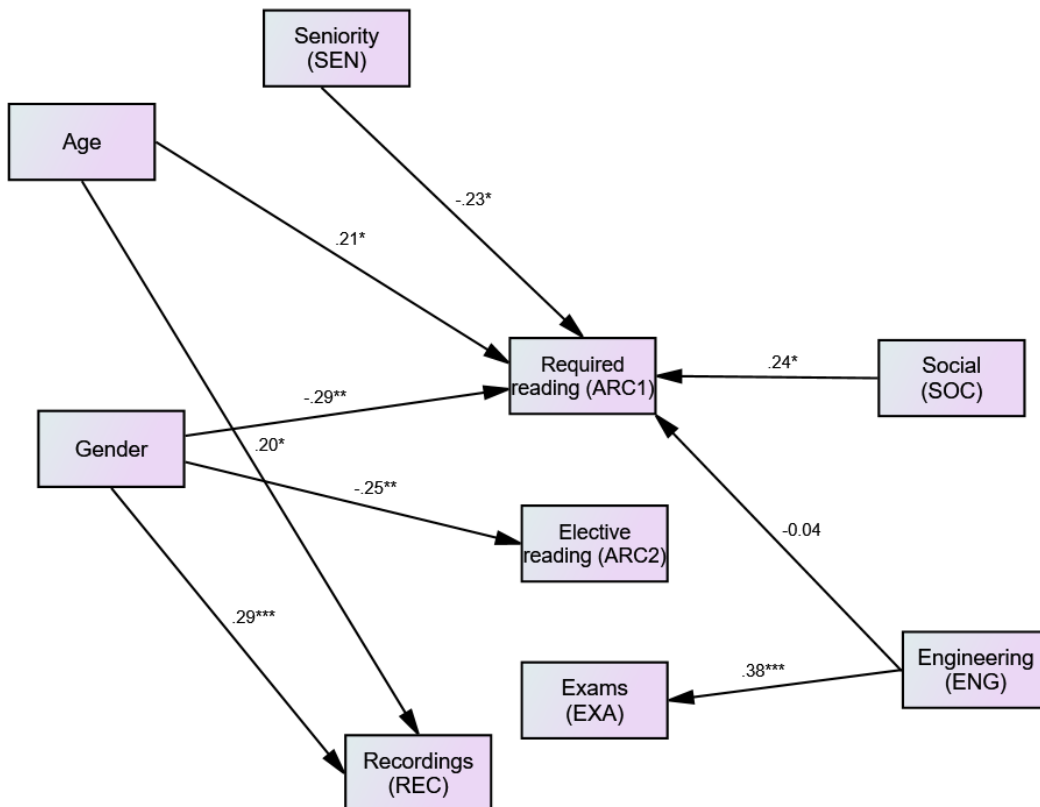
From Table 1 we observe that all correlations are below .8, thus the risk for multicollinearity is low.

Table 2. Mean Use of Online Teaching Elements

		Male	Female	Humanities and Social Sciences (SOC)	Engineering, nature and architecture (ENG)	Health (HEA)
ARC1	Presentations	(57) 3.75	4.29 (51)	4.13 (38)	3.78 (40)	4.64 (11)
	Movies recordings	(57) 2.40	2.35 (51)	2.45 (38)	2.20 (40)	2.73 (11)
	Required reading assignments	2.60 (57)	(50) 3.66	3.81 (37)	2.35 (40)	3.36 (11)
ARC2	Elective reading assignments	2.37 (57)	(50) 3.12	3.03 (37)	2.25 (40)	2.91 (11)
	simulations	(56) 1.61	(51) 1.47	(38) 1.45	1.77 (40)	(11) 1.45
	Forum messages	(56) 3.25	(51) 3.67	(38) 3.39	3.59 (39)	(11) 3.82
	Syllabus	(57) 4.46	(50) 4.78	(38) 4.79	4.45 (40)	(11) 4.91
	Exercises	(57) 3.68	(51) 3.80	(38) 3.58	4.05 (40)	(11) 3.73
EXA	Previous year exams	3.12 (57)	(50) 2.60	2.42 (38)	3.72 (40)	2 (10)
REC	Recorded lessons	1.75 (56)	(51) 1.14	1.38 (37)	1.62 (40)	1.36 (11)
	Participation in tutorials	(56) 2.04	2.08 (49)	(38) 1.97	2.11 (38)	(11) 1.91

* Number of respondents in parenthesis.

Table 2 shows a very low rate of use of all elements investigated. Only two elements have a mean use rate higher than 3.5. This low usage attests to the underuse of the system and its capabilities. Researchers could utilize the system more than they currently do.



*p < .05 **p < .01. ***p < .001

Figure 1. Results of the research model, including significance and beta values.

The hypothesized model showed a very good fit: CMIN/DF = .122 ($p > .05$), CFI = .98, TLI = .97, RMSEA = .44.

The hypothesis that affiliation with the Faculty of Engineering / Faculty of Natural Sciences / School of Architecture affects the use of the system for posing required reading assignments (H9) was not supported, and no difference in the use of this element was evident when comparing the use of faculty affiliated with Faculty of Engineering / Faculty of Natural Sciences / School of Architecture or with the Faculty of Health. The remaining hypotheses were supported. Older faculty use the system more frequently to post required reading assignments (H1) and recorded lessons REC (H2). On the other hand, seniority negatively affected the use of the system for posting required reading assignments (H3). Gender positively affects REC (H4), Gender negatively affects ARC1 and (H5) and ARC2 (H6). Lecturers from the Faculty of Social Sciences and Humanities use the system more frequently than other lecturers for posting required reading assignments (H7), but lecturers from the Faculty of Engineering / Faculty of Natural Sciences / School of Architecture use the system more frequently than others to post examples of previous year exams (H8).

Conclusion and Discussion

In this study, we examined the extent of faculty's use of various elements of the online digital teaching system at Ariel University and whether individual factors such as age, tenure, gender and faculty affiliation affect faculty's use of new teaching technologies. The findings of this study indicate that, overall, faculty make limited use of technological tools, although usage varied by age, tenure, gender, and affiliation.

The study offers a consistent picture: Faculty consider technologies such as course websites as digital directories. In open-ended questions, faculty noted that they found no technological tool that reflects pedagogical thinking that benefits the students. Faculty use the new technology-mediated functions as technical rather than pedagogical aids.

Most institutional studies on digitization focus on the number of courses taught, number of participating students, and the success of online teaching, yet hardly address how technology-supported teaching can be leveraged to enhance teaching and learning, and how online and digital aspects of these new tools can be incorporated to improve course contents or other pedagogical aspects of teaching such as interactions between teachers and students.

Based on the recognition that these new technological tools will create a paradigmatic change in teaching, efforts should be invested to develop, disseminate, and assimilate new pedagogies that are compatible with these new educational technologies. If we wish to improve the performance of the teaching faculty, we must reinforce the pedagogical facets of the new technological tools, and develop programs that incorporate these new tools as integral elements of the teaching practice rather than external technical aids to the teaching and learning process. We believe that computers and other technologies (including video lessons) will never replace teachers, and yet, teachers who master the pedagogical aspects of technological tools and incorporate them in their teaching practice will be able to enhance the quality of their teaching and their students' learning, and such teachers will certainly replace teachers who will fail to do so.

The findings of this study supports the findings of previous studies (Davidovitch, 2014; Nachmias, 2000), and underlines the trend of the importance of the human factor in instruction and education. Technology may be important and effective, however, even in the end of the second decade of the twenty-first century, there is no substitute for the human factor.

Following the results of this study, we recommend that more resources for help and guidance for the users should be provided in order to implement new technologies. Introduction of new technologies may also represent an opportunity to include students, which may assist in the process.

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