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Abstract: *The purpose of this research was to examine and compare the attitudes and perceptions of program preparation to use and integrate technology during teaching practices between pre-service physical education students from Montclair State University (MSU) (N = 187), NJ, USA and from Kibbutzim College of Education (KCE) (N = 120). Data was collected by means of a questionnaire. Of the 307 participants, 50.8% are women and 48.5% men. According to their college status, 15% were first-year (N = 47), 16% were second year (N = 49), 24% were third year (N = 74) and 45% were fourth year (N = 137). Analysis of t-tests and Mann Mann -Whitney U tests indicated a significant difference between the two institutions in (a) access to computers in college, (b) the opinion of the students about their readiness to integrate Information and Communication Technology (ICT) in education, (c) technological knowledge acquired during classes, and (d) the student's opinion of professors modeling the use of educational technologies. According to the results, MSU students have clearer knowledge on the use of specific technologies such as heart rate monitors, pedometers, and systems assessment of fitness and physical skills. Furthermore, the differences between universities did not depend on gender or race. The findings also indicated that technology integration in these programs was still in the developmental stages.*

Key words: *ITC'S, TEACHER EDUCATION, TECHNOLOGY INTEGRATION, PHYSICAL EDUCATION, UNITED STATES, ISRAEL*

Resumen: *El propósito de esta investigación fue examinar y comparar las actitudes y percepciones sobre la preparación para utilizar e integrar tecnología educativa en la práctica de la enseñanza entre estudiantes de educación física en el programa de formación de docentes en Educación Física de Montclair State University MSU) (N = 187), Nueva Jersey, EE.UU. y de Kibbutzim College (KCE) (N = 120), Tel Aviv, Israel. Los datos fueron recopilados por medio de un cuestionario. De los 307 participantes, el 50.8% son mujeres y el 48.5%, hombres. Según años de carrera, 15 % eran de primer año (N = 47), 16% de segundo año (N = 49), 24 % de tercer año (N = 74) y 45% de cuarto año (N = 137). El análisis de t-tests y Mann-Whitney U indicó que existe una diferencia significativa entre ambas instituciones en: (a) el acceso a las computadoras en la universidad, (b) la opinión de los estudiantes acerca de si están preparados para integrar las TIC en la enseñanza, (c) el conocimiento tecnológico adquirido durante las clases, y (d) la opinión del estudiante si los profesores son un ejemplo en el uso de tecnologías educativas. Según las encuestas, este hecho refleja que los estudiantes de MSU tienen conocimientos más claros sobre uso de tecnologías específicas como monitores de ritmo cardíaco, podómetros, sistemas de evaluación de la aptitud y destrezas física, etc. y que las diferencias entre las universidades no dependen del genero o de los años de carrera de los estudiantes.*

Palabras clave: *TIC, FORMACIÓN DOCENTE, INTEGRACIÓN DE TECNOLOGÍAS, EDUCACIÓN FÍSICA, ESTADOS UNIDOS, ISRAEL*

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1. Introduction

Questions such as how educational technology impacts teaching and learning, which is the best tool or technology to prompt engagement and collaboration between the students, and how to promote higher-order thinking skills have concerned the educational realm, particularly when discussing the efficacy of pre-service teacher education programs to prepare future educators to infuse the use of technologies in their practice (Kirschner & Sellinger, 2003; Pearson, 2003). According to Smerdon et al. (2000), the sense of preparedness is strongly related to the amount of professional development teachers receive. Research shows that in-service training and the use of the Internet for instructional purposes are related to teachers' confidence and feelings of being prepared to integrate technology in the classroom (Lockyer & Patterson, 2007; Settlage et al., 2004). In addition, teachers' ability to use a full range of digital learning tools contributes to students' engagement and achievement in the learning process (Shonfeld, Resta, & Yaniv, 2011). Thus, the students are likely to show positive attitudes towards technology after experiencing the use of them (LaMaster, 1998; Lim, 2005).

Preparing educators to use different technologies or tools is not the only element to support teachers to integrate Information and Communication Technologies (ICT) in the classroom. Several factors should be considered when deciding which tools to use. An important point is that the learning experience that students are expected to have should determine what tools to include in the design of the lesson. One of the major problems is that educators tend to use technology just because it is available without considering the design principles that will work to support and meet the learning expectations. The use of tools without a clear purpose could become distractive and could impede learning. Technology should be used to facilitate cognitive processing and engage students in critical, higher order thinking about the content, to support interactive, collaborative, and student-centered classrooms (Jonassen et al., 1998).

Disciplines such as physical education are not free from these challenges. It might seem that the gymnasium would be the last place where technology would have a strong influence in curriculum and instruction. This is certainly not the case; technologies are widely used as educational tools in areas of sport, physical activity and health, but pre-service physical educators do not feel fluent or confident to integrate technology in their teaching careers (Liang et al., 2006). Physical education teachers must have an understanding about how computers and other technological devices (i.e. heart rate monitors, motion sensors, pedometers, body composition analyzers, computer-based health-management systems, etc.) contribute to the collection of data for the development of better teaching methods, to the analysis of sport skills, to the assessment of students' learning, and to the evaluation of health related physical fitness. Current certificate programs in instructional technology offered in the USA and Israel do not address all of the professional needs of physical education teachers in areas such fitness, wellness, and management of sports. Therefore, the purpose of this research was to examine and compare attitudes towards the use of computers and the perceptions of program preparation to use and integrate technology in their teaching practices between pre-service physical education students from Montclair State University (MSU), NJ, USA and from Kibbutzim College of Education (KCE) in Israel. It was expected that learning about teachers' preparation for uses of instructional technology would support the development of a professional training series and a certificate program in applied technology in exercise science and physical education.

2. Literature Review

The need to prepare teachers to implement Information and Communication Technology (ICT) into teaching and learning in teacher education programs has been stressed by the release of a set of technology standards by the U.S. National Council for Accreditation of Teacher Education (NCATE) and the International Society Technology Education (ISTE). As stated in the ISTE standards, "Effective teachers apply the National Educational Technology Standards for Students (NETS•S) as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (ISTE, 2008). A report called "Redefining Teacher Education for Digital Age Learners," delivered to the USA Congress in October 2010, provided a list of recommendations from education stakeholders for the transformation of teacher education programs (Carroll & Resta, 2010) including the use of the most current and innovative technology in teacher education programs and application of research on pedagogical practices to support teachers' technology integration in the classroom.

Projects such as the United States (U.S.) Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) initiative (Hall et al., 2006) and "Tomorrow

98" program funded by the Israel Committee of Science and Technology Education, promoted the use of technology in educational programs. According to Polly, Mims, Shepherd, and Fethi (2010), preparing teachers and pre-service teachers through individualized mentorship and creating technology-rich field experiences is associated with greater technological knowledge and skills, more use of technology in methods courses and field experiences with K-12 students. Despite these initiatives, researchers also indicated that barriers such as limited administrative support and lack of alignment between teacher education programs and K-12 schools existed and as a result, teachers were less likely to integrate ICT in teaching (Brzycki & Dudt, 2005; Fethi, 2010; Goktas et al., 2009; Polly, Mims, Shepherd, & Redmond et al., 2005).

Research conducted by Goldshtein et al. (2009) in four large colleges in Israel reported that preparation in ICT integration was very limited and did not involve new pedagogies such as Problem Based Learning (PBL), high cognitive tasks, and collaborative learning through Web2 tools. The study also indicated that most pre-service teachers who enter colleges have basic ICT skills and positive attitudes towards ICT integration in education; but teacher-training programs do not provide adequate skills and competencies to teach with technology. Pre-service teachers were exposed in their courses mostly to traditional methods of ICT integration in teaching. Innovative models of ICT integration (e.g. collaborative learning, inquiry based learning, web-based synchronous and a-synchronous distant learning) are barely used. For example, pre-service teachers have little experience in using Learning Management Systems and course websites; therefore, they are not sufficiently exposed to the advantages of learning management with technology. About half of the pre-service teachers graduate with no practical experience in ICT integration in teaching.

2.1 Technology for physical education teachers

The literature suggests that effective technology integration with specific subject matter requires teachers to apply their knowledge of curriculum content, general pedagogies, and technologies (Koehler et al., 2007). Because physical education is usually taught in a gymnasium or outdoors, it is important for teacher education programs to prepare teachers to infuse technology in a way that will support the pedagogical strategies used in those settings. Teachers need to learn and practice teaching skills in a context as similar as possible to the one they will teach in later. Physical education teachers are expected to know how computers and other technological devices can contribute to data collection for the analysis of sport skills, assessment of student learning, and evaluation of health-related physical fitness. This includes using exercise equipment to assess physical activity (e.g., accelerometers, heart rate monitors, pedometers, interactive dance machines), body composition (e.g., bioelectrical impedance devices, electronic skin-fold calipers), and movement and motor-skill performance (e.g., Dartfish). There are also a number of software packages used to record and analyze physical fitness, physical activity levels, and nutrition habits, such as TriFit, FITNESSGRAM, and Activitygram. PE Manager is another application used in physical education to track student performance via rubrics, tests, and assignments on a mobile device (Woods et al., 2008).

These expectations are reflected in educational standards such as the National Educational Technology Standards (NETS), established by the International Society for Technology in Education (ISTE), and in the physical education teacher education (PETE) standards of the National Association for Sport and Physical Education in the United States (NASPE, 2009). Bechtel (2010) explored the use of technology in a Physical Education Teacher Education (PETE) program while addressing the national standard 3, outcome 3.7 for physical education teacher education: "Teacher candidates will: Demonstrate knowledge of current technology by planning and implementing learning experiences that require students to appropriately use technology to meet lesson objectives" (NASPE, 2009, p. 6). Bechtel found that technology was not being effectively infused across the PETE program. The results of this prompted changes in the program to address the need to prepare pre-service teachers to use various forms of technology in their teaching practice. Bechtel recommended that technology be taught across the curriculum using progressive learning experiences that incorporate pedometers and heart rate monitors.

Other research on technology integration in physical education teacher preparation programs reported successful results. For example, Lim (2005) examined the effects of integrating computer technology into a physical education course on students' attitudes and competency levels towards the national technology standards and selected instructional software applications. The study revealed that overall students' technology competency improved significantly toward national technology standards and selected instructional software applications after taking the course. Also, after their participation in this course, students' attitudes toward national technology standards and selected instructional software applications changed significantly to a more positive view. Ninety-two percent of students indicated they would like to see more computer technology-integrated courses. The findings also indicated that incorporating technology for teaching and learning across the curriculum could be effective in preparing teacher education students to successfully use technology as teaching tools when they become teachers.

Therefore, the current investigation examined and compared attitudes towards the use of computers and the perceptions of program preparation to use and integrate technology during teaching practices between pre-service physical education students from Montclair State University and from Kibbutzim College of Education. Such results may shed light on the way to incorporate ICT into physical education pre-service programs in an effective way. The following research questions were addressed in this investigation:

1. What was the technology literacy level of physical education students?
2. What were their attitudes about integrating technology into teaching?
3. What were the differences between MSU and KCE students based on gender and college status?
4. What were students' attitudes towards computers, access to computers, students' perception of their preparation to integrate ICT in teaching, technology knowledge acquired during coursework, and perception of professors modeling the use of computers?

3. Methodology

3.1 Participants and Procedures

The present study was descriptive in nature. The participants in this study were Pre-service Physical Education students from Montclair State University, NJ, USA and from Kibbutzim College of Education, Israel. During the months of March and April 2011, the investigators sent an email to the students inviting them to participate in the survey. The email included a brief explanation of the study and a link to the survey page. Once the survey was submitted, the investigator exported the data to Statistical Package for the Social Sciences (SPSS) for the appropriate statistical analysis. MSU subjects completed the English version of the survey in 'surveysmonkey.com while students from KCE completed the Hebrew version of the survey in 'docs.google.com.'

3.2 Instrument

Data was collected by means of a modified questionnaire, the Pre-service Teachers' Technology Integration Instrument (PTTII, Granston, 2004). The survey focused on pre-service teachers' attitudes and perception of program preparation to use and integrate technology in their teaching and learning. The 45-item inventory assessed the following information (a) demographic background, (b) attitudes, (c) access to computers at the college, (d) preparation to teach with technologies, and (e) modeling computer use by professors.

Several independent variables were used in this study including group (MSU vs. KCE), *gender* (male and female), and *college status* (freshman, sophomore, junior, senior). The dependent variables assessed in this study included students' attitudes towards computers, access to computers at College, students' perception of their readiness to integrate ICT in teaching, technology knowledge acquired during coursework, and students' perception of professors modeling computer use.

Attitudes towards using computers was a composite variable and consisted of a 6-item subscale. Each item was rated on a 4-point scale, ranging from 1 to 4 using descriptors such as 1-Strongly Disagree, 2-Disagree, 3-Agree, and 4-Strongly Agree. *Measures of access to computers at college* (Support and Resources). Each item was rated on a 4-point scale, ranging from 1 to 4 using descriptors such as 1-Strongly Disagree, 2-Disagree, 3-Agree, and 4-Strongly Agree. *Preparation to teach with computers* included 14 items. The items were rated on a 3-point scale, ranging from 1 to 3 using descriptors such as 1-unprepared, 2-somewhat prepared, and 3-prepared. *Technology knowledge acquired during coursework* included 13 items. Each item was rated on a 4-point scale, ranging from 1 to 4 using descriptors such: 4 - All the Courses, 3 - Most of the Courses, 2 - In a few Courses, 1 - None of the Courses. *Students' perception of professors modeling computer use* included 5 items. Each item was rated on a 4-point scale, ranging from 1 to 4 using descriptors such as: 4-Strongly Disagree, 3-Disagree, 2-Agree, and 1-Strongly Agree.

Questions assessing *attitudes towards using computers*, *access to computers at college*, *preparation to teach with computers*, t*echnology knowledge acquired during coursework*, and *students' perception of professors modeling computer use* are presented in Appendix 1.

The validity of the instrument was demonstrated by theoretical support from relevant literature. The review of literature was conducted to determine the significant dimensions closely related to the concept of educational technology. The reliability of the scale was assessed through a coefficient alpha analysis, which provides an index of internal consistency. The reliability of the subscales was .*528 for attitudes towards using computers,* .792 for *students' perception of professors modeling computer use*, .775 for *access to computers at college*, .810 for *technology knowledge acquired during coursework* coursework, and .866 for *preparation to teach with computers.*

3.3 Data Analysis

A total of 307 complete responses were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive analyses were performed on all dependent variables items. Descriptive statistics are presented in Table 1. Data analysis showed that for MSU there is significant skewness and kurtosis for all dependent variables indicating that MSU data are not normally distributed and the sample size for MSU is a lot larger than the sample size for KCE. In addition, Levene's test for homogeneity of variance was significant for all dependent variables. This suggests that the variance for MSU is different to the variance for KCE so ANOVA tests may not be appropriate. Because the results of the two-way analysis of variance indicated non-significant interactions between institutions and gender, independent samples t tests with equal variances not assumed were used to compare differences between institutions and between gender on the variables related to attitudes towards computers, access to computers at the college, technology knowledge acquired during coursework, and perception of professors modeling computer use by professors. The t-tests results are presented in Tables 2, 4, 5, 6, 7, and 8. One-way ANOVAs were used to compare College Status differences on the dependent variables concerning attitudes towards computers, access to computers at the college, technology knowledge acquired during coursework, and perception of professors modeling computer use by professors. Mann-Whitney U tests were conducted to examine differences between institutions and between gender on the students' preparation to teach with computers. A Kruskal-Wallis test was conducted on the perception of preparation to integrate ICT in teaching. A Chi Square test was conducted in order to examine the relationship between students' attitudes towards the use of computers and perceptions of program preparation to use and integrate technology in their teaching practices.

4. Findings

Frequency and percentage data of the responses indicated that 187 participants were from MSU and 120 respondents were from KCE. Forty eight percent of the 307 participants were male, 51% were females, and 1% did not report their gender. Forty nine percent of the respondents were less than 24 years old. Most of students at MSU were seniors and juniors (83%) while students from KCE were mainly freshmen, sophomores and juniors (82%).

Table 1

Descriptive Statistics for MSU and KCE

Variables	N	Montclair N = 187	Kibbutzim N = 120
Gender			
Male	149	118	31
Female	156	67	89
College Status			
Freshman	47	8	39
Sophomore	49	23	26
Junior	74	41	33
Senior	137	115	22

4.1 Differences in between academic institutions

The t-test results indicated that MSU students ($\bar{X}$ = 2.96) were likely to have a better attitude towards using computers [$t(305) = 1.84$ $\underline{p} < .10$] than students from KCE ($\bar{X}$ = 2.88. Specific results regarding attitudes towards using computers are presented in more detail in Table 2.

Table 2

Attitudes towards using computers

Variables	Institutions	N	$\bar{X}$	SD	*t*	Sig
I believe computers can improve the quality of learning that takes place in schools.	Montclair	187	3.33	.620	.087	.931
	Kibbutzim	120	3.33	.676		
Students who have access to computers are more likely to do better than those who do not.	Montclair	187	3.01	.664	2.783	.006**
	Kibbutzim	120	2.77	.867		
Computers are important learning tools.	Montclair	185	3.28	.505	-3.008	.003**
	Kibbutzim	120	3.48	.648		
I feel frustrated when I have to use a computer.	Montclair	184	3.09	.824	1.180	.239
	Kibbutzim	120	3.21	.909		
Having computers in my class would enhance my teaching	Montclair	183	2.96	.662	5.396	.000***
	Kibbutzim	119	2.47	.900		
I enjoy working with computer	Montclair	186	3.12	.607	1.864	.063
	Kibbutzim	120	2.98	.783		
Using technology is not suitable to teaching in my areas of expertise	Montclair	187	2.18	.766	-.924	.356
	Kibbutzim	120	2.27	.932		

Note: 1 – Strongly Disagree, 2 – Disagree, 3 - Agree, 4 – Strongly Agree

Significant: *p < 0.05, **p < 0.01, ***p < 0.001

According to the t-test results, students from KCE ($\bar{X}$ = 3.61) were likely to have more access to computers at college [$t(300) = -3.088$ $p < .01$] than MSU students ($\bar{X}$ = 3.45). Specific results regarding access to computers are presented in more detail in Table 3.

Table 3

Access to Computers at College

Variables	University	N	$\bar{X}$	SD	*t*	Sig
When I need it I have access to a computer lab at my college.	Montclair	184	3.38	.642	-1.869	.140
	Kibbutzim	119	3.52	.636		
If I want to use computers to complete class assignments, I can use the computers in the lab.	Montclair	186	3.34	.622	2.154	.032*
	Kibbutzim	118	3.18	.791		
I have access to the Internet at home.	Montclair	187	3.58	.557	-6.501	.000**
	Kibbutzim	119	3.92	.358		
When I need it I have access to a computer at home.	Montclair	187	3.58	.546	-5.386	.000**
	Kibbutzim	119	3.87	.430		

Note: 1 – Strongly Disagree, 2 – Disagree, 3 - Agree, 4 – Strongly Agree

Significant: *p < 0.05, **p < 0.001

The t-test results indicated that MSU students ($\bar{X}$ = 2.25) were more likely to acquire technology knowledge during coursework [$t(305) = -10.679$, $p < .001$] than students from KCE ($\bar{X}$ = 1.74). Specific results regarding technology knowledge acquired during coursework to teach with computers are presented in more detail in Table 4.

Table 4
Technology knowledge acquired during coursework

Variables	University	N	$\bar{X}$	*SD*	*t*	Sig
Using technology to communicate and collaborate with peers and faculty (e.g., discussion forums, e-mail)	Montclair	187	2.98	.707	-2.605	.01*
	Kibbutzim	119	2.73	.989		
Using technology to submit (e.g. email, internet site)	Montclair	187	2.95	.666	3.217	.001**
	Kibbutzim	120	2.66	.845		
Using technology for class presentations	Montclair	185	2.81	.653	3.744	.000**
	Kibbutzim	117	2.47	.836	-	
Developing pages with WIKI	Montclair	185	1.48	.660	.404	.687
	Kibbutzim	115	1.44	.691		
Building an Internet site or a blog	Montclair	187	1.82	.621	10.054	.000**
	Kibbutzim	118	1.21	.431		
Participating in a Synchronous online meeting (i.e. Elluminate)	Montclair	186	1.60	.660	.300	.764
	Kibbutzim	117	1.58	.545		
Creating or using a digital portfolio	Montclair	184	1.80	.692	7.322	.000**
	Kibbutzim	111	1.27	.538		
Using technology to develop lessons plans for my student teaching experience	Montclair	186	2.75	.807	4.448	.000**
	Kibbutzim	118	2.28	.960		
Using technology to prepare handouts, quizzes, etc. for my students	Montclair	185	2.63	.791	7.047	.000**
	Kibbutzim	118	1.92	.944		
Using technology to teach a lesson	Montclair	187	2.63	.746	6.830	.000**
	Kibbutzim	114	1.96	.931		
Using content-specific software tools - Heart Rate Monitors	Montclair	187	2.13	.744	8.908	.000**
	Kibbutzim	120	1.35	.752		
Using content-specific assessment software - PE Manager	Montclair	185	1.86	.767	9.659	.000**
	Kibbutzim	117	1.15	.502		
Using content-specific assessment software – FITNESSGRAM	Montclair	186	2.02	.697	12.126	.000**
	Kibbutzim	116	1.16	.527		

Note: 4 - All the Courses, 3 - Most of the Courses, 2 - In a few Courses, 1 - None of the Courses.
Significant: *p < 0.01, **p < 0.001

The t-test results indicated that MSU students ($\bar{X}$ = 2.90) were more likely to perceive that professors model computer use in the classroom [$t(216) = 5.768$ $p < .001$] than students from KCE ($\bar{X}$ = 2.55). Specific results regarding modeling computer use are presented in more detail in Table 5.

Table 5

Modeling Computer Use (by professors)

Variables	University	N	$\bar{X}$	*SD*	*t*	*Sig*
My professors model technology use in their classes.	Montclair	186	3.03	.519	3.302	.00*
	Kibbutzim	118	2.75	.816		
My professors use technology as teaching tools.	Montclair	186	3.09	.533	1.327	.186
	Kibbutzim	118	2.98	.728		
My professors show us how to teach with technology	Montclair	186	2.81	.667	8.929	.000**
	Kibbutzim	117	2.07	.763		
My professors display a positive attitude towards computers and its impact on learning	Montclair	186	3.03	.583	1.511	.132
	Kibbutzim	118	2.91	.728		
My professors conduct lessons online	Montclair	186	2.56	.749	5.510	.000**
	Kibbutzim	118	2.07	.792		

Note: 1 – Strongly Disagree, 2 – Disagree, 3 - Agree, 4 – Strongly Agree

Significant: *p < 0.01, **p < 0.001

A Mann-Whitney U test was conducted to examine differences between institutions in the students' preparation to teach with computers. From this data it can be concluded that there is a statistically significant difference between the MSU and KCE students preparation to teach with computers ($U = 4779.000$, $p < .000$). It can be further concluded that MSU students were likely to be more prepared to teach with computers than students from KCE. Specific results regarding preparation to teach with computers are presented in more detail in Table 6.

Table 6

Differences between institutions in preparation to integrate technology

Variables	Institutions	N	Mean Rank	U	Sig
Use technology to plan a lesson unit	Montclair	187	162.95	9173.000	.005*
	Kibbutzim	118	137.24		
Use technology to teach with computers	Montclair	187	176.94	6742.500	.000**
	Kibbutzim	119	116.66		
Use different technology resources and teaching materials	Montclair	187	169.18	7820.500	.000**
	Kibbutzim	117	125.84		
Use Web publishing software (e.g., DreamWeaver, FrontPage).	Montclair	186	177.31	6545.000	.000**
	Kibbutzim	119	115.00		
Use Presentation software (e.g., PowerPoint).	Montclair	184	169.62	7706.000	.000**
	Kibbutzim	119	124.76		
Use Web browsers (e.g., Internet Explorer, Netscape Navigator).	Montclair	187	161.40	9462.500	.006*
	Kibbutzim	118	139.69		
Use other technologies to communicate and collaborate with peers and faculty (e.g., chat rooms, discussion boards).	Montclair	187	153.14	11059.000	.917
	Kibbutzim	119	154.07		
Use Online databases (e.g., ERIC Online).	Montclair	186	171.61	6862.000	.000**
	Kibbutzim	115	117.67		
Use Web search engines (e.g., Google, Yahoo)	Montclair	185	153.46	10829.000	.752
	Kibbutzim	119	151.00		

Use Heart Rate Monitors	Montclair	186	171.50	7253.500	.000**
	Kibbutzim	117	121.00		
Use Pedometers	Montclair	187	182.39	5537.500	.000**
	Kibbutzim	118	106.43		
Use Assessment software - PE Manager	Montclair	187	181.41	5907.500	.000**
	Kibbutzim	119	109.64		
Use Assessment software - FITNESSGRAM	Montclair	187	189.94	4312.500	.000**
	Kibbutzim	119	96.24		

Note: Significant: *p < 0.01, **p < 0.001

4.2 Differences between males and females

According to t-test results, it can be concluded that male students ($\bar{X}$ = 2.87) were more likely to perceive that professors modeled computer use in the classroom [*t*(292) = 3.356 p < .01] than female students ($\bar{X}$ = 2.67). Regarding technology knowledge acquired during coursework, male students ($\bar{X}$ = 2.12) were likely to feel that they acquired more knowledge during coursework than female students ($\bar{X}$ = 1.99), [*t*(299) = 2.492 p < .05]. Specific results regarding perception of professors modeling computer use in the classroom and knowledge acquired during coursework are presented in more detail in Tables 7 and 8.

Table 7

Technology Knowledge Acquired during Coursework

Variables	Gender	N	$\bar{X}$	*SD*	*t*	Sig
Using technology to communicate and collaborate with peers and faculty (e.g., discussion forums, e-mail)	Male	149	2.87	.759	-.323	.747
	Female	155	2.90	.906		
Using technology to submit (e.g. email, internet site)	Male	149	2.79	.690	-1.002	.317
	Female	156	2.88	.806		
Using technology for class presentations	Male	147	2.69	.670	.392	.695
	Female	153	2.65	.806		
Developing pages with WIKI	Male	148	1.55	.732	2.071	.039*
	Female	150	1.39	.600		
Building an Internet site or a blog	Male	148	1.72	.637	3.836	.000***
	Female	155	1.45	.594		
Participating in a Synchronous online meeting (i.e. Elluminate)	Male	148	1.63	.673	.927	.354
	Female	153	1.56	.560		
Creating or using a digital portfolio	Male	144	1.75	.684	3.731	.000***
	Female	149	1.46	.663		
Using technology to develop a lessons plans for my student teaching experience	Male	148	2.51	.795	-.942	.347
	Female	154	2.61	.986		
Using technology to prepare handouts, quizzes, etc. for my students	Male	146	2.44	.788	1.472	.142
	Female	155	2.28	1.024		

Using technology to teach a lesson	Male	148	2.40	.839	.534	.594
	Female	151	2.34	.917		
Using content-specific software tools - Heart Rate Monitors	Male	149	1.92	.721	1.991	.047*
	Female	156	1.73	.925		
Using content-specific assessment software - PE Manager	Male	147	1.75	.766	3.786	.000***
	Female	153	1.42	.714		
Using content-specific assessment software - FITNESSGRAM	Male	147	1.83	.725	3.182	.002**
	Female	153	1.56	.769		

Note: 4 - All the Courses, 3 - Most of the Courses, 2 - In a few Courses, 1 - None of the Courses. Significant: *p < 0.01, **p < 0.001

Table 8

Perception of professors modeling computer use

Variables	Gender	N	$\bar{X}$	*SD*	*t*	Sig
My professors model technology use in their classes.	Male	149	2.95	.543	.670	.504
	Female	153	2.90	.762		
My professors use technology as teaching tools.	Male	149	3.02	.500	-.640	.523
	Female	153	3.07	.713		
My professors show us how to teach with technology	Male	148	2.72	.698	4.500	.000***
	Female	153	2.33	.826		
My professors display a positive attitude towards computers and its impact on learning	Male	149	3.09	.544	2.989	.003**
	Female	153	2.87	.714		
My professors conduct lessons online	Male	149	2.58	.737	4.406	.000***
	Female	153	2.18	.815		

Note: 1 – Strongly Disagree, 2 – Disagree, 3 - Agree, 4 – Strongly Agree Significant: *p < 0.001

A Mann-Whitney U test was conducted to evaluate differences between male and female students' preparation to teach with computers. From the results it can be concluded that there is a statistically significant difference between the male and female students preparation to teach with computers (U = 8866.000, p < .000). It can be further concluded that male students ($\bar{X}$ = 2.25) were likely to be more prepared to teach with computers than female students from KCE ($\bar{X}$ = 2.08).

4.3 Association between preparation to integrate technology and knowledge acquired during coursework

A chi-square test of independence was performed to examine the association between preparation to integrate technology and knowledge acquired during coursework. The association between these variables was significant [x^2 (6, N = 306) = 71.634, p <0.001]. The knowledge acquired during coursework affects the students' preparation to integrate technology. Students from both institutions, who feel more prepared or somewhat prepared to integrate technology, were more likely to indicate that they acquired more knowledge during some of the courses.

4.4 Differences between freshmen, sophomores, juniors, and seniors

One-way analysis of variance showed a statistical significant difference between freshman, sophomore, junior, and senior's *perception of technology knowledge acquired during coursework* [F (3, 306) = 15.493, p< 0.001]. According to the post hoc results, freshmen ($\bar{x}$= 3.1293, *SD* = .42561) students were less likely to perceive that they acquire technology knowledge than juniors ($\bar{x}$= 2.8212, *SD* = 0.51) and seniors ($\bar{x}$= 2.7675, *SD* = 0.41. No statistical differences were found between college status on modeling, attitudes, and access.

A Kruskal-Wallis test was conducted to evaluate differences among the *college status* (freshman, sophomore, junior, senior) with regard to perception of preparation to teach with computers. There was a statistically significant difference between the students' perception [x^2 (3, N = 306 = 28.552, P = 0.001)] with a mean rank of 103.35 for freshmen, 134.48 for sophomores, 150.22 for juniors, and 178.92 for seniors.

5. Discussion

This study compared the perceptions of technology integration in teacher preparation programs and the perception of computer proficiency pre-service physical education in a group of students from the USA and Israel. The results of this investigation provide information about ways to incorporate ICT into physical education pre-service programs in an effective way. Learning about teachers' preparation of uses of instructional technology should support the development of professional workshops for in-service physical education teachers.

Overall, the students in this study indicated that they basically use technology to create instructional materials (e.g., handouts, tests, etc.), to gather information for planning lessons and for administrative record keeping, and to communicate with colleagues and other professionals. One the other hand, the students reported very little usage of technology for building a website or a blog, editing pages with WIKI, participating in a synchronous online meetings (e.g., Elluminate), creating or using a digital portfolio, and using content-specific software tools such as heart rate monitors, PE manager, and FITNESSGRAM. This finding suggests that the students do not meet the national standard 3, outcome 3.7 for physical education teacher education: "Teacher candidates will: Demonstrate knowledge of current technology by planning and implementing learning experiences that require students to appropriately use technology to meet lesson objectives" (NASPE, 2009, p. 6).

The data also indicated gender differences; males in this study were more likely to feel that the courses in their program prepared them to use technology and that the professors modeled the use of technology in class. These results support other research in which males have more positive attitudes towards the use of computers (Pektas & Erkip, 2006) and pointed out that male teachers and students consistently perceived that their ICT skills are stronger when compared with the views of female teachers and students (Lofstrom & Nevgi, 2007). Other studies also indicated that males are more comfortable with technology and had more experience using computers than females (Durndell, 1996; Matthews & Guarino, 2000). The findings also show a significant difference between freshmen and sophomores, juniors, and seniors in acquiring knowledge. These results are not surprising considering that first year students did not experience as many courses and instructors as students in later years.

In addition, students from MSU were more likely to use technology to develop lesson plans and to teach lessons than students from KCE. These findings are also consistent when comparing students' preparedness to integrate technology in their class. MSU students indicated that they feel more prepared to use technology than KCE students. MSU students also tend to be more familiar with the use of content-specific software such as FITNESSGRAM, PE Manager, and heart rate monitors. These results could be explained by the fact that some of these technologies are taught across the MSU PETE program.

The association between preparation to integrate technology and knowledge acquired during coursework was significant for students in both institutions. These results are similar to those of LaMaster (1998) who revealed that when students are trained to use technologies they feel comfortable, productive, and at ease using the computer technologies. This is because the sense of preparedness is strongly related to the amount of professional development teachers received (Smerdon et al., 2000). Research shows that in-service training on computer use and the Internet for instructional purposes is related to teacher’s confidence and feelings of being prepared to integrate technology in the classroom (Settlage et al., 2004) and it is likely to have a positive impact on the technology practices by teachers in classroom (Lockyer & Patterson, 2007).

Although attitudes towards using computers were not high, MSU students’ showed more positive attitudes than KCE students. These results might be explained as a result of the program emphasis on computer usage and of the faculty experiences and attitude towards the use of technology. For example, instructors from KCE are familiar with the use of the Internet and digital communication but do not use Web2 tools such as WIKI, blogs, digital portfolio and online teaching. Therefore, lack of teacher modeling as shown in Table 5 might influence their attitude towards the use of computers. Bay and Lehman (2003) claim that students do not use computers in their class because they have not seen their instructors modeling the use of computers.

Evidence from this study also suggests that neither teacher-training program provides adequate skills and competencies to teach with technology in the classroom. These findings also show that pre-service teachers are exposed in their courses mostly to traditional methods of ICT integration in teaching and innovative models of ICT such as collaborative learning and web-based synchronous and a-synchronous distant learning are barely used. These results reflect the emphasis that teacher education curriculum places on disciplinary courses rather than incorporating ICT courses (Golgshtein et al., 2009) to prepare pre-service teachers to integrate technology in teaching.

An interesting finding shows that despite the fact that students from KCE perceived getting higher access to computers in their college as compared to students from MSU, they feel less prepared to use technology than students from MSU. If the assumption is that easy access to computers leads to higher usage, the results of this study do not support this statement. This is not surprising and it is consistent with previous research that shows that installing equipment without modeling and instructing the users won't bring them to use technology properly for teaching and learning.

6. Conclusion

In general, the results of this study indicate that pre-service students from MSU and KCE have poor training in the use of ICT for teaching purposes. Nonetheless, the findings of this study must be interpreted within the context of inherent limitations, mainly from two dimensions. First, the majority of MSU students were seniors and juniors while students from KCE were mainly freshmen, sophomores and juniors. In addition, more male students were from MSU and more females from KCE. Taking these facts into account an initial argument might suggest that the differences between students were more likely to be influenced by the gender and college lever differences rather than by the differences between institutions. Future research should consider using a representative sample for both institutions in terms of gender, age, and college status.

These findings should encourage physical education pre-service programs to seek effective ways for preparing high quality physical teachers to meet the technological challenges in the classroom. In essence, the need resides in redirecting the educational strategies and to adopt new educational models to teach to integrate technology that links the main components that intervene in the educational process. This includes the knowledge on the relations among the most appropriate technology (T) and the most effective teaching (P) to make the educational contents (C) more accessible to the students (Mishra & Koehler, 2006). The idea is that in order to optimize technology-based models of teaching and learning, teachers should be able to apply the content knowledge in a pedagogically sound way that is adaptable to the characteristics of students and the educational context (e.g., the gymnasium). The key challenge is to prepare educators to effectively and efficiently incorporate technological features into the teaching and learning process. Basically educators need to make connections between the purpose of the educational technology and the learning outcome expected. Other recommendations include reviewing the Physical Education curriculum for each program to address the pedagogical uses of discipline specific technologies and developing a digital environment appropriate to pre-service physical education students.

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APPENDIX 1

Attitude Towards Computers

I believe computers can improve the quality of learning that takes place in schools.
Students who have access to computers are more likely to do better than those who do not.
Computers are important learning tools.
I feel frustrated when I have to use a computer.
Having computers in my class would enhance my teaching
I enjoy working with a computer
Using ICT is not suitable to teaching in my areas of expertise

Access to Computers at College (Support and Resources)

When I need it I have access to a computer lab at my college.
If I want to use computers to complete class assignments, I can use the computers in the lab.
I have access to the Internet at home.
When I need it I have access to a computer at home.

Technology-related skills and knowledge acquired in your coursework

Using technology to communicate and collaborate with peers and faculty (e.g., discussion forums, e-mail)
Using technology to submit (e.g. email, internet site)
Using technology for class presentations
Developing pages with WIKI
Building an Internet site or a blog
Participating in a Synchronous online meeting (i.e. Elluminate)
Creating or using a digital portfolio
Using EXCEL to solve problems
Using technology to develop a lesson plan for my student teaching experience
Using technology to prepare handouts, quizzes, etc. for my students
Using technology to teach a lesson
Using content-specific software tools - Heart Rate Monitors
Using content-specific assessment software - PE Manager
Using content-specific assessment software - FITNESSGRAM

Preparation to Teach with Computers - Ability to use ICT in school

Use technology to plan a lesson unit
Use technology to teach with computers
Use different technology resources and teaching materials
Use Web publishing software (e.g., DreamWeaver, FrontPage).
Use Presentation software (e.g., PowerPoint).
Use Web browsers (e.g., Internet Explorer, Netscape Navigator).
Use E-mail to communicate and collaborate with peers and faculty
Use other technologies to communicate and collaborate with peers and faculty (e.g., chat rooms, discussion boards).
Use Online databases (e.g., ERIC Online).
Use Web search engines (e.g., Google, Yahoo)
Use Heart Rate Monitors
Use Pedometers
Use Assessment software - PE Manager
Use Assessment software – FITNESSGRAM

Modeling Computer Use (by professors).

My professors model technology use in their classes.
My professors use technology as teaching tools.
My professors show us how to teach with technology
My professors display a positive attitude towards computers and its impact on learning
My professors conduct lessons online