Original Article

Technological competencies in the education of undergraduate students in sports education

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ABSTRACT

Educational systems have significantly evolved over the last two decades because of technology applications and Internet services. Students' technical and technological competencies (TC) determine a portion of this development's effect on their learning progression. They must be able to effectively utilize educational technology and interactive electronic resources. Therefore, the current study first aimed to assess the extent to which physical education students in Egypt and Saudi Arabia obtain these competencies based on the International Society of Technology in Education (ISTE) standards. In addition, the study aimed to determine the differences between physical education students in Egypt and Saudi Arabia in these competencies. Study methods: The study included 657 participants selected from physical education students in Egypt ($n = 348$) and Saudi Arabia ($n = 309$). The data collection tools included an electronic questionnaire evaluated by ten experts, containing 35 items that represent educational technology competencies within seven ISTE-defined criteria. Results: By calculating the sum of the actual responses for each standard and calculating the maximum total score for the questionnaire, it was found that the percentage of students' TC significantly varied, ranging between 60 to 75%. In addition, significant differences were found between the groups possessing these technologies and TC ($p < .05$, $\eta^2p = 0.00$).

Keywords: Physical education, Technological competencies, Sports education, Students, Children.

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INTRODUCTION

Over the past few years, with the quickening pace of life and the spread of globalization, the reliance on higher education institutions for disseminating technological knowledge has increased. Currently, technology is the most crucial factor in determining a country's competitiveness in industry, agriculture, and education. Therefore, the acquisition and development of technology is an entry point for countries and governments to accelerate the rates of innovation and a key to boosting productivity and wealth (Escueta, Quan, Nickow, & Oreopoulos, 2017; Huggins & Izushi, 2007). In the middle eastern region, particularly in Egypt and the Kingdom of Saudi Arabia, laws in the field of education and other laws emphasize the state's commitment to nurture, encourage and develop knowledge and scientific and technological research activities. Consequently, universities have established faculties and scientific departments specializing in marketing and innovation support.

The fundamental regulations of these faculties and departments included special legal provisions pertaining to the connections between scientific research and education. As a result, institutions of higher education encourage students to participate in targeted education activities to benefit from innovative technological applications in research and teaching. Higher education institutions must implement numerous mechanisms for innovation, transfer of knowledge, and commercialization of technology through educational and human development institutions, promotion of development and culture of society, and promotion of innovation opportunities in order to fulfil the needs of the local and international community (Ndabishibije, 2007).

Recently, international communities have agreed that the global digital agenda should include a change in the traditional educational model of educational institutions in order to meet the needs of the new "*knowledge society*". The fundamental goal of this change is to achieve the greatest degree of flexibility in education and to rely more on modern technologies to improve teaching and learning processes in formal contexts (Chais, Ganzer, & Olea, 2017).

The increasing prevalence of technology in higher education has become a significant area of interest in the current literature (Bajabaa, 2017; Ignatyeva, 2015). The use of information and communication technologies (ICTs) is a major influencing factor in teaching methods in universities, educational institutions, and vocational training institutions, including ways of obtaining and organizing information. In various forms, this includes illustrated, textual, and audio educational materials, whether using a computer or other means of communication (Azma, 2011; Hamidi, Meshkat, Rezaee, & Jafari, 2011).

The capacity of higher education institutions to fulfil their educational responsibilities in the field of educational technology applications is contingent on a number of variables, including the capacity of students and faculty to acquire educational TC, especially when the Internet infrastructure is available (Angel Alberto Valdés, José Ángel Vera, & Ernesto Alonso Carlos, 2012).

This is most evident when evaluating and monitoring the impact of the use of technological educational media in higher education, which has led to the development, improvement, and change of traditional teaching methods, as well as the improvement of teaching outcomes, and to make its procedures in line with the information age (Chen & Xia, 2012). During the past years, there have been significant shifts in the field of higher education regarding infrastructure and teaching strategies due to the COVID-19 pandemic. Students have faced new challenges with distance education processes and continuing education (Rubilar, Alveal, & Fuentes, 2017). Universities, educational bodies, and governments are now required to "*actively contribute to the introduction of a new concept to develop and support initiatives that help students acquire the* *necessary technical skills in addition to complementary educational skills such as critical thinking, cooperation, social communication with others, problem-solving, creativity, and innovation*" (Angel Alberto Valdés et al., 2012; Chen & Xia, 2012; Govtrack, 2011; Rubilar et al., 2017).

In Egypt and Saudi Arabia, thousands of students study physical education sciences at universities. Many technical or student-related obstacles have led to either the complete cessation of the educational process or at least the difficulty of continuing the educational process at a distance in the field of physical education in Egyptian and Saudi universities. These obstacles may be related to the technical capabilities available to students and their level of competence in using these technologies. Therefore, this study aims to assess physical education students in Egypt and the Kingdom of Saudi Arabia for these competencies based on the International Society of Technology in Education (ISTE) standards.

MATERIALS AND METHODS

Procedures

A descriptive and analytical approach was used to identify the educational technology competencies that students need in faculties of Physical Education under the standards of the International Society of Technology in Education (students). A field study was conducted to determine the degree to which students possess these competencies.

Research and sample community

The research population was representative of all students at the Faculty of Physical Education in Mansoura and Saudi Arabia, and the survey sample comprised 657 students who were not included in the pre-study sample, representing the total number of responses received. This study adhered to the principles of the Helsinki Declaration. According to the instructions for the questionnaire, the respondent's response constitutes consent to participate in the study.

Data collection tools

The Educational Technology Proficiency Questionnaire contains five criteria with seven fields and 35 items as follows:

1. Empowered Learner.

Students use technology to actively select, achieve and demonstrate competency concerning their learning goals, informed by the science of learning.

2. Digital Citizen.

Students are aware of their rights, responsibilities, and opportunities for living, learning, and working in a digitally connected world. They act and create in a safe, legal, and ethical manner.

3. Knowledge Constructor.

Students use digital tools to curate a variety of resources in order to build knowledge, produce creative artworks, and provide meaningful learning experiences for themselves and others.

4. Innovative Designer.

Students use a variety of techniques in the design process to identify and solve problems by developing novel, practical, or imaginative solutions.

5. Computational Thinker.

Students develop and apply strategies to understand and implement problem-solving strategies that leverage the power of technological methods to develop and test solutions.

6. Creative Communicator.

Students communicate clearly and express themselves creatively for numerous purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.

7. Global Collaborator.

Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

Steps to design the questionnaire

Based on the objectives and questions of the research and by reviewing the criteria for measuring the efficiency of educational technology in previous studies, the researcher designed a questionnaire on the competencies of educational technology for physical education students under the standards of the International Society of Technology in Education (Students) according to the following steps:

- The researchers used the 2008 edition of the International Society of Technology in Teacher Preparation (students) to determine the technical competencies of students to present a complete document that includes indicators and performance measures for each.
- The International Society of Technology in Teacher Preparation (2008) (Students) standards consist of five sets of standards covering 20 sub-topics.
- The researchers presented these standards and their fields to 10 university professors specializing in teaching methods and educational technology to evaluate their significance and proportionality and determine the relative weights of the fields belonging to these standards.

Drafting of questionnaire items

In accordance with expert opinions on the fields of each standard, researchers drafted each field's appropriate elements clearly and precisely. A reference survey and review of previous studies and references have been conducted to formulate educational technology competencies for each field and expert opinions. Researchers were careful to form clear and comprehensible elements, avoid confusing words or biasing the response, and refrain from repeating phrases. In its initial form, the questionnaire contained 35 items and was submitted to the experts to evaluate their suitability for each field (Appendix 1).

Questionnaire correction method

Each examiner responded and based on their response, received a score of 5; 4; 3; 2; 1, respectively, from the five-point Likert scale (5 - "*very true of me*"; 4 - "*true of me to a large extent*"; 3 - "*true of me to a medium extent*"; 2 - "*true of me to a weak extent*"; 1 - "*untrue of me*").

The questionnaire in the correction phase included 35 phrases; hence, the maximum score in the questionnaire was 175, and the minimum score was 35. High scores in the questionnaire indicate a high degree of educational technology competency among students.

Questionnaire instructions

The instructions of the questionnaire are crucial factors for their application. The instructions require clarification of the purpose of the survey and its administration. The researchers were keen on developing guidelines that clarified the questions for the target group in the research. These reasons included the decision to participate, their right to the confidentiality of their responses, and the purpose of the questionnaire. The second reason is the ability to communicate with researchers with questions and their capacity to enter the correct data in the available space. This was accomplished efficiently and securely while avoiding lengthy and ambivalent communication.

Executive steps of the search

Pre-study

The exploratory study was conducted from 10/05/2021 to 10/20/2021. The study aimed to verify the validity and reliability of the questionnaire and to assess any difficulties that may occur during application. Additionally, it aimed to confirm the validity of the internal consistency of the terms and dimensions of the standard. The proposed questionnaire was administered to an exploratory sample of 200 students in order to evaluate its scientific rigor and ensure its applicability validity. The validity of the questionnaire's internal compatibility was determined by calculating the correlation coefficient between the sum of each field's items and the total sum of the questionnaire. The Spearman’s correlation coefficient between each item's score and the total score of the questionnaire field to which it belongs (N = 200), where (r) ranged between 0.49 and 0.95. The tabular (r) value at the level of significance is .05 = 0.12.

The mean reliability coefficient for the proposed instructional technology proficiency questionnaire was found on an exploratory sample of 200 students, which included seven fields and 35 items, as shown in Appendix 2.

Main study

The basic study was conducted from 10/12/2021 to 20/12/2021, where the final version of the questionnaire was prepared using google forms and managed by sending the electronic link via phone, WhatsApp, and the Facebook Messenger application. The link was sent to 1250 students, and 657 responses were obtained.

Table 1. Mean, percentage, standard deviation, skewness, and kurtosis of the TC in education for undergraduate students in the field of sports education.

Survey fields	**Mean**		**Std. D.**	**Skewness**		**Kurtosis**	
	Statistical		Statistical	Statistical	Error	Statistical	Error
Empowered Learner	32	71%	7.50	-.532	.095	.015	.191
Digital Citizen	28	70%	6.17	-.303	.095	.365	.191
Knowledge Constructor	15	75%	3.88	-.512	.095	-.148	.191
Innovative Designer	10	66%	3.53	-.223	.095	-.834	.191
Computational Thinker	9	60%	3.56	-.114	.095	-.902	.191
Creative Communicator	14	70%	4.09	-.321	.095	-.387	.191
Global Collaborator	13	65%	4.24	-.169	.095	-.656	.191
Total questionnaire	121	69%	27.29	-.198	.095	.042	.191

Table 1 shows the percentage and relative importance as assessed through the experts' (n = 10) agreement with the specific standard of the National Standards for Educational Technology for Students (Students) (2008) that were used in the construction of the questionnaire (Bawane & Spector, 2009). Researchers accepted the fields all experts agreed upon and received a percentage of (100%).

Statistical analysis

Descriptive statistics were reported as means and standard deviations (mean ± SD) and Spearman’s correlation. Independent Sample T-Test Measures Analysis was used to detect significant differences and compare the mean of each standard between groups (students in Egypt and Saudi Arabia). Partial eta squared ($\eta^2 p$) d was calculated to assess the effect size. The statistical analysis was performed using the IBM SPSS software Statistics v21 (IBM® Corporation, Armonk, NY, USA).

RESULTS

The variation between averages and percentages of the availability of TC in the whole sample
Results are shown in Figure 1.

Calculation of the stability coefficient of the questionnaire
Table 2 indicates a moderate to strong correlation between all fields and the overall scale score where rs (n-2) ranged between = .75 and .84, *p* = .000, which indicates that the questionnaire had a high coefficient of stability. Hence, field 1 = .825, implying that only 83% of the variation in total scores was explained by field 1 in this sample.

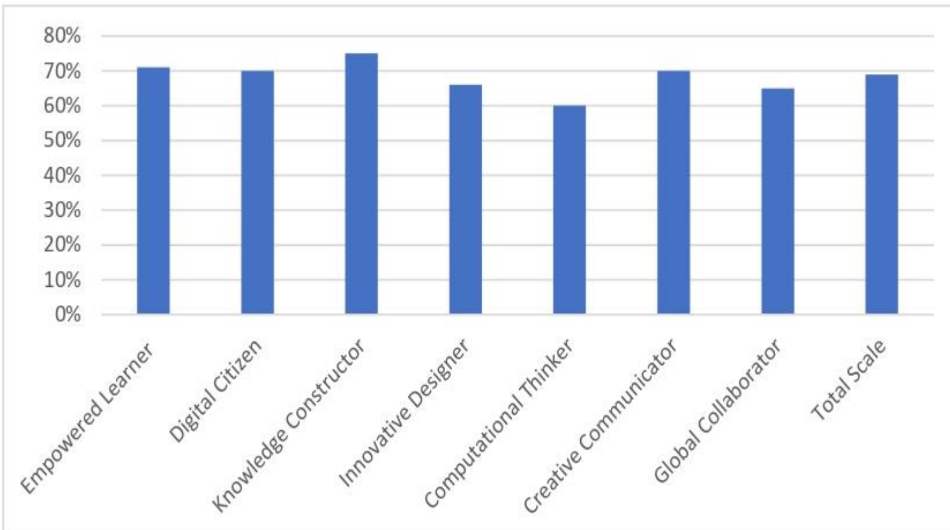

Figure 1. The variation between averages and percentages of the availability TC in education for undergraduate students in the field of sports education.

Table 2. Spearman's relationship between the questionnaire fields and the sum of the questionnaire.

All the amount	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6	Field 7	Total
Correlation coefficient	.83**	.82**	.82**	.82**	.81**	.84**	.75**	1.0
Sage (2 tails)	.00	.00	.00	.00	.00	.00	.00	.
N	656	656	656	656	656	656	656	656

Note. p < .05.

Testing the differences between the two samples (Egypt and Saudi Arabia) in the availability of TC in education for undergraduate students in the field of sports education
The result of the T-test in Table 3 indicates a significant difference between the groups in the questionnaire fields (2,4,5,6,7). It also indicates a significant difference between the groups in the sum of questionnaire t(655) ranged between 2.32 - 7.27, and *p* ranged between .00 - .02 (two tail). The results represent a different effect size, η^2p ranging between 0.18 - 0.56 for all fields; the power (1-β possible error) ranged from 0.75 - 1, which is powerful, given our target strength at 0.80, indicating a statistical power.

Table 3. Independent samples of T-test data between groups (Egypt and Saudi Arabia) (n-1 = 656, n1 = 348, n2 = 309), *p*-value, η^2p d and power (1-β possible error).

Parameters	**Groups Mean ± SD**		**Sage (2 tails)**		**η^2p**	**Power (1-β probability of error)**
	Group 1	Group 2	t	*p*-value		
Empowered Learner	32.4 ± 8.7	32.6 ± 5.93	-.13	.89	0.5	0.99
Digital Citizen	28.8 ± 7.0	27.7 ± 5	2.3	.02*	0.18	0.75
Knowledge Constructor	14.8 ± 4.2	14.3 ± 3.5	1.6	.10	0.12	0.50
Innovative Designer	10.3 ± 3.6	9.1 ± 3.4	4.5	.00*	0.44	0.99
Computational Thinker	10.1 ± 3.4	8.2 ± 3.5	7.3	.00*	0.56	1
Creative Communicator	14.1 ± 4.3	13.3 ± 3.8	2.4	.01*	0.18	0.76
Global Collaborator	13.7 ± 4.4	12.6 ± 4.0	3.4	.00*	0.26	0.95
Total questionnaire	124.2 ± 31.6	117.7 ± 21.7	3.1	.00*	0.23	0.92

Note. p < .05.

DISCUSSION

Average values, standard deviations, and percentages for the standard are presented in Table 1 & Figure 1, where the total results of the questionnaire were 121.19 ± 27.29, 69%. This result indicates that students have only 69% of the necessary technical competencies to continue the educational process.

The highest percentage for the standards was observed in field 3 (Knowledge Constructor), while the lowest was observed in field 5 (Computational Thinker), 15 ± 3.88,75%, and 9 ± 3.56, 60%, respectively—% to the nearest WHOLE number.

According to Table 1, there is a convergence in the availability of students' technical competence but at an average rate where the percentages were between 65% to 71% in each standard. This finding indicates a lack of technical qualifications in the field of physical education among university students in the sample.

Table 2 depicts the proximity of the importance of the standards to each other in interpreting the results of the questionnaire in general, $p < .05$, as Spearman's correlation, ranged between .75 and .84.

Empowered learner

It was found that 71% of students use technology to play an active role in selecting, achieving, and demonstrating competency in relation to their learning goals in accordance with the science of learning. In general, the percentage is above average, but it is low compared to what would be expected of a capable learner.

The lockdown caused by the COVID-19 pandemic is also illustrative of the significance of this percentage and its height relative to other benchmarks. Universities in Egypt and Saudi Arabia tended to rely on education systems and electronic content management such as Blackboard & Moodel (Hassan, Najib, & Hassan, 2021). In terms of establishing course objectives, this pronounced affected the number of teachers who implemented these systems' tools. Preparation of lesson plans and educational content This allowed students to organize the teaching process and attain their learning objectives. This was accompanied by a remarkable improvement in students' abilities to use technology to their advantage when interacting with educational content, on the one hand, and communication skills and interaction with teachers, on the other.

The results revealed no differences between the two research groups ($p < .05$, $\eta^2p = 0.89$, Table 3) due to the absence of a difference in the directions of applying educational technology in both environments in terms of educational goals and strategies based on the electronic content management systems used.

Digital citizen

The moderate percentage of this criterion is justified by the reality of the scientific community and the extent to which technological techniques have spread throughout societies. Despite the spread of mobile phones, tablets, computers, and smartwatches, as well as the vast number of electronic programs that make life easier in general, the impact of this development on students has not increased sufficiently, which is reflected in their compliance with local laws. This finding can be attributed to the lack of awareness sessions and training courses implemented by universities to educate students about their rights and duties and the legal implications.

A significant effect was found between groups ($p < .05$, $\eta^2p = 0.02$), effect size 0.18 (which is low), and power (1-β err prob) 0.75 (which is excellent – the target is 0.80, as depicted Table 3). The slight difference between the two groups can be attributable to the fact that Egyptian society is witnessing a remarkable development in relying on digital applications in the activities of social life in an advanced way, the spread of private training courses, and the significant number of private international universities and technological institute projects that the Egyptian government currently provides. Students, as a major component in all social fields, are affected by digital knowledge and attempt to apply it in all aspects of their personal lives.

Knowledge constructor

Students use digital tools to curate a variety of resources in order to construct knowledge, produce creative artworks, and provide meaningful learning experiences for themselves and others. The overall standard percentage was 75%. This high percentage is generally attributable to an increase in students' abilities to deal with technological techniques and hardware and software problems that arise during use. Some universities have specialized departments in technical support and assistance in the production of educational materials provided to students (Hassan, Najib, & Hassan, 2021).

Furthermore, the production of educational materials and technical support to solve hardware and software problems that arise during usage is handled by a specialized technical department, which receives feedback about their learning, improves their practices, and achieves learning goals and this was accompanied by a remarkable development in the knowledge of these educational technologies and the ability to deal with them to achieve educational objectives.

Due to the educational content design at both universities, there was no significant difference between the groups($p < .05$, $\eta^2p = 0.12$, Table 3). The learning content may not include critical or creative activities that allow students to demonstrate their ability to provide beneficial educational experiences for themselves and others or to demonstrate their creative work.

Innovative designer

Students use a variety of techniques in the design process to identify and solve problems by developing novel, beneficial, or imaginative solutions.

The overall availability of the standard was 66 %. A significant effect between groups was found ($p < .05$, $\eta^2p = 0.00$, effect size 0.44 (which is medium), and power (1-β err prob) 0.99 (which is excellent – the target is 0.80, as depicted in Table 3). Teaching strategies in the research community do not include problem-based learning activities or employ digital technologies, indicating a low rate of design, innovation, and problem-solving. Due to efforts to develop physical education colleges in Egypt and convert them into colleges accredited by the Egyptian Quality Assurance Authority, there is a slight difference between the two groups.

Computational thinker

Students develop and apply strategies to understand and implement problem-solving strategies that leverage the power of technological methods to develop and test solutions. Availability of technical proficiency for this standard among students by 60% had one of the lowest percentages ever among the standards. Before the COVID-19 pandemic, reliance on learning management systems and electronic content in the educational environment in the faculties and departments of physical education for the research community was not an integral part of the education systems. It was relatively new and exceptional in the education system in a way that it is not possible to employ the tools of the digital environment significantly to create a creative environment for communication, discussion, implementation of individual and group learning activities, research, participation, exchange of ideas, communication with experts and team management in the digital world.

In addition, there is no strategy to employ digital educational elements and applications in teaching, use the Internet in educational research, provide educational content, and receive online activities and assignments.

This low percentage may be due to a shortage in the educational software industry for the sports education field, which requires support from e-learning centres in a professional and specialized manner. The educational system in faculties and departments of physical education for the research community is based on a system that does not permit teachers to plan educational strategies. Additionally, different educational methods for student experiences and collaborative educational activities between students for the research and development of e-learning content are not implemented.

There was a significant effect between groups ($p < .05$, $\eta^2p = 0.00$), effect size 0.56 (which is medium), and power (1-β err prob) 1 (which is excellent – the target is 0.80, Table 3). The differences between the two groups may be due to the Egyptian colleges' tendency to transfer academic courses to the electronic system according to the technical and educational specifications and re-evaluate them before implementation. The faculty member's effort and vision determine the development. Therefore, there are few examples of designing and implementing these specialized teaching techniques. If these electronic courses are available, they are not subject to careful evaluation by scientific and technical specialists of the digital content and following the objectives of those courses.

The difference between the two groups can be attributed to the presence of some pre-configured digital educational units in a ready-to-use form. However, the use of learning systems and electronic content management is in the lowest degree of use for teaching lectures, receiving assignments, and limited educational communication and communication. The programming environment can be applied in other areas with computational perspectives that effectively prepare cognitive processing by emphasizing how to think as opposed to what to think, which is essential for computational thinking (Sung, Ahn, & Black, 2017). Nevertheless, it is currently unavailable in the field of mathematics.

Creative communicator

Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals. The overall availability of the standard was 70%. A significant effect between groups was found ($p < .05$, $\eta^2p = 0.01$), effect size 0.18 (which is low), and power (1-β err prob) 0.76 (which is high – the target is 0.80 Table 3).

The limited thinking and collaborative learning activities within the educational content of students in the faculties and departments of physical education of the research community showed a low percentage of the standard in communication using digital platforms and tools for students to express themselves in a way for a variety of purposes. At the same time, there were differences between the two groups that may be due to some difference in the content that allowed Limited practice of collaborative thinking and learning activities.

The findings are consistent with some other studies that reported that creative communication is a general problem in which the standard curriculum approach seems to fall short in providing opportunities for students to develop their creative confidence, engage in creative collaboration, and learn how to communicate creatively. (Karwowski & Beghetto, 2018).

In order to develop learning and creative collaboration during student work and problem-solving, this is done by searching for new and alternative perspectives efficiently and actively, cooperating with skilled students, and building on each other's strengths to produce innovative ideas (Bandura, Freeman, & Lightsey, 1997; Baruah & Paulus, 2019; Eteläpelto & Lahti, 2008). Finally, it should be noted that students prefer to have limited opportunities to learn methods of documenting their creative work and communicating it effectively to others (Beghetto & Madison, 2022).

Therefore, suppose the educational system succeeds in providing students with the opportunity to teach them how to communicate their creative work to various audiences and receive feedback. In that case, they can develop the self-regulatory skills needed to plan, set goals realistically, manage their emotions, and improve their creative efforts. (Ivcevic Pringle & Nusbaum, 2017).

Global collaborator

Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally. In general, the standard availability percentage was 37.6%. A significant effect between groups was found ($p < .05$, $\eta^2p = 0.00$), effect size 0.26 (which is medium), and power (1-β err prob) 0.92 (which is high – the target is 0.80 Table 3).

Despite the increased availability of learning resources, students are still unable to communicate with their counterparts in other countries, participate in the investment of learning resources or cooperate in the production of scientific works at the international level, exchange information and solve common problems between universities internationally. Since these requirements do not apply to educational programs in physical education faculties and departments of the research community, and students do not have insight into the factors that allow for successful integration of technology, such as evaluation of digital tools and resources (Ertmer, 1999; Ertmer, Ottenbreit-Leftwich, & York, 2007; Salentiny & Van Eck, 2012; Tondeur et al., 2012; Yuksel, Soner, & Zahide, 2009).

Neither is digital educational content available for international student-attracting joint educational projects. These competencies have not previously been practiced or taught to students in the research community. Lastly, these results are likely consistent with the lower awareness of faculty members in the research community about the use of technology based on ISTE students in Arab universities compared to the results (Lewis, 2015), indicating that 83% of the faculty members interviewed were aware of the standards of ISTE students. The recommendations align with those of (Bajabaa, 2017), which state that physical education faculty members should be trained and assisted in modelling the effective use of technology in various tasks, projects, and lesson plans.

CONCLUSIONS

The results of the study provide a standard to assess the extent to which physical education students in Egypt and Saudi Arabia obtain technical competencies based on the standards of the International Society of Technology in Education (ISTE). The results are valuable and helpful in guiding educational planners to provide an accurate evaluation of students' skills and current status. Access to these findings will contribute to future research on TC in education.

AUTHOR CONTRIBUTIONS

Conceptualization, A.H. and W.A.; methodology, A.H.; validation, A.H. and W.A.; formal analysis, A.H.; investigation, A.H. and W.A.; resources, A.H. and W.A.; data curation, A.H. and W.A.; writing—original draft preparation, A.H.; writing—review and editing, A.H. and W.A.; visualization, A.H. and W.A.; supervision, A.H.; project administration, A.H.; funding acquisition, A.H. and W.A. All authors have read and agreed to the published version of the manuscript.

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APPENDIX 1. Experts' opinions (n = 10) of the relative importance of various competencies in the National Educational Technology Standards for Students (2008).

Agreement with the set standard				**Standard**
Percentage Agreement	Chi-Square	Disagree	Agree	
100%	10	0	10	Students use technology to actively select, achieve and demonstrate competency concerning their learning goals, informed by the science of learning.
100%	10	0	10	Students are aware of their rights, responsibilities, and opportunities for living, learning, and working in a digitally connected world. They act and create in a safe, legal, and ethical manner.
100%	10	0	10	Students use digital tools to curate a variety of resources in order to build knowledge, produce creative artworks, and provide meaningful learning experiences for themselves and others.
100%	10	0	10	Students use a variety of techniques in the design process to identify and solve problems by developing novel, practical, or imaginative solutions.
100%	10	0	10	Students develop and apply strategies to understand and implement problem-solving strategies that leverage the power of technological methods to develop and test solutions.
100%	10	0	10	Students communicate clearly and express themselves creatively for numerous purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.
100%	10	0	10	Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

Appendix 1 shows the percentage and relative importance as rated by the experts' agreement with the stetted standard about the National Educational Technology Standards for Students (2008) that that were used in building the questionnaire (n = 10). The researchers accepted the fields agreed upon by all the experts, which got a percentage of (100%).

APPENDIX 2. Questionnaire items.

Role/Criterion/ Indicator/ Adequacy		1	2	3	4	5
1.1 Capable learner	1. Students use technology to actively select, achieve and demonstrate competency concerning their learning goals, informed by the science of learning.					
	1-1a: Clarify and define personal learning goals, develop strategies that leverage technology to achieve them, and reflect on the learning process itself to improve learning outcomes					
	1. I set my own learning goals in the course and worked to achieve them.					
	2. I use technology in my learning and achieve my learning goals.					
	1.1.b: Build networks and customize their learning environments in ways that support the learning process.					
	3. I design a social media group to discuss educational topics.					
	4. I use a range of my internet services to serve the learning side of my courses.					
	1.1.c: Use technology to obtain feedback that teaches and improves their practices and to demonstrate their learning in several ways.					
	5. I use the technology to get feedback that helps me learn and feel my educational performance.					
	6. I use technology to show off the level of education you have achieved.					
	1-1-d: Understand the basic concepts of technological processes, demonstrate the ability to select, use and troubleshoot existing technologies and troubleshoot and be able to transfer their knowledge to explore emerging technologies.					
	7. I am fluent in basic computer and mobile skills, which include dealing with the files I need in my learning.					
	8. I explore new educational technologies and use them in my learning.					
	9. Choose the right technique to learn and overcome the technical problems that come my way.					
1.2 Digital Citizen	2. Students are aware of their rights, responsibilities, and opportunities for living, learning, and working in a digitally connected world. They act and create in a safe, legal, and ethical manner.					
	1.2.a: Develop and manage their digital identity, reputation, and perception of the continuity of their actions in the digital world.					
	10. I manage my digital identity with the ability of various digital applications and ensure their confidentiality.					
	11. I freely share personal digital information in the digital space without restrictions.					
	12. I use digital proof of reliability apps.					
	1.2.b: I ensure positive, safe, legal, and ethical behavior when using technology, including social interactions over the Internet or networked devices.					
	13. I have a positive and ethical attitude when using technology, including interacting with others via social media.					
	14. Ensure safe and legal use when using social media and networked devices.					
	1.2.c: Demonstrate understanding and respect for the rights and obligations to use and share IP.					
	15. I use unlicensed educational digital apps and share them with colleagues.					
	1.2.d: Manage their personal data to maintain digital privacy and security and are aware of the data collection technology used to track online navigation.					
	16. I Manage and successfully adjusted my personal data to maintain digital privacy and security.					
	17. Learn about the technological methods used to collect data and are used to track online navigation.					
1.3 Knowledge Builder	3. Students use digital tools to curate a variety of resources in order to build knowledge, produce creative artworks, and provide meaningful learning experiences for themselves and others.					

Role/Criterion/ Indicator/ Adequacy		1	2	3	4	5
	1.3.a: Plan and use effective search strategies to locate information and other resources for their intellectual or creative endeavors.					
	18. I use various digital search tools to easily locate and access educational information to achieve educational goals and stand out among my colleagues.					
	1.3.b: Assess the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.					
	19. I accurately determine the importance of the information, educational media, and data I get from the Internet for learning objectives.					
	1.3.c: Systems information from digital resources using a variety of tools and methods to create subjective output that shows meaningful links or conclusions.					
	20. I organize the obtained information from digital sources using a variety of tools and methods to link and infer from that information.					
	1-3-D: Build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.					
	21. I use the technology to explore sports-related issues and problems and follow answers and solutions.					
1-4 Innovative designer	4. Students use a variety of techniques in the design process to identify and solve problems by developing novel, practical, or imaginative solutions.					
	1.4.a: Know and use a thoughtful design process to generate ideas, test theories, create innovative artworks or solve real problems.					
	22. I can use digital applications to design and generate ideas in my field and solve problems.					
	23. I can use digital apps to test some hands-on experiences in my field.					
	1.4.b: Selecting and using digital tools to plan and manage the design process that takes into account design constraints and calculated risks.					
	24. I can use digital applications to design some practical training and educational modules in my field of specialization.					
1-5 Computer thinker	5. Students develop and apply strategies to understand and implement problem-solving strategies that leverage the power of technological methods to develop and test solutions.					
	1.5.a Formulate appropriate problem definitions for methods with the help of technology, such as data analysis, abstract models, and computational thinking in exploration and finding solutions.					
	25. I use data analysis and computational thinking applications to formulate a problem and explore and find solutions.					
	1.5.b Collect data or identify relevant data sets, use digital tools to analyze it, and represent data in different ways to facilitate problem-solving and decision-making.					
	26. I can use digital tools to collect, analyze and represent data in different ways to facilitate problem-solving and decision-making.					
	1.5.c Break down problems into parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.					
	27. I use digital applications to break down problems into parts, extract basic information, and develop models to facilitate problem-solving.					
1.6 Creative Communication	6. Students communicate clearly and express themselves creatively for numerous purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.					
	1.6.A Selecting appropriate platforms and tools to achieve the desired objectives of their establishment or communication.					

Role/Criterion/ Indicator/ Adequacy		1	2	3	4	5
	28. I can use choose the appropriate educational digital platforms and tools to achieve the goals of their use.					
	1.6.b Create original works, responsibly repurpose digital resources, or integrate them into new creations.					
	29. I can use digital resources in my learning responsibly and achieve creative work in my specialty.					
	1.6.c: Communicate complex ideas clearly and effectively through the creation or use of a variety of digital objects such as visualizations, models, or simulations.					
	30. I can use a variety of digital tools, such as images, models, or simulations, to communicate difficult scientific ideas clearly and effectively.					
	1.6.d: Publish or present content that personalizes the message and means to the intended audiences.					
	31. I can co-deliver useful content related to discussions on educational topics across my colleagues' learning groups.					
1.7 Global collaborator	7. Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.					
	1.7.a: Use digital tools to communicate with learners from different backgrounds and cultures, engaging with them in ways that expand mutual understanding and learning.					
	32. I can use digital communication tools to communicate with and collaborate with faculty and students in ways that expand mutual understanding and learning.					
	1.7.b: Use collaborative team applications to work with others, including peers, experts, or community members, to examine issues and problems from multiple perspectives.					
	33. I can use collaborative techniques to work with students, faculty, experts, or community members to discuss issues related to sports or discipline.					
	1.7.c: Contribute constructively to project teams with different roles and responsibilities to work effectively towards a common goal.					
	34. I participate in sports or volunteer teams and assume different roles and responsibilities to work effectively within or outside the university or internationally.					
	1.7.d: Explore local and global issues and use collaborative techniques to work with others to explore solutions.					
	35. I can use collaborative techniques to identify local and global issues and work with students and faculty to explore solutions.					

