Physical Education Students Perceived Competence in Using Technology Integration

Abstract

The purpose of the present research was to determine if physical education students feel prepared to use Technology Integration (TI) in their teaching. Forty-seven participants answered a 43-item questionnaire including multiple choice and open-ended questions. Data analysis included statistical (descriptive and ANOVA) as well as qualitative analysis (themes). Participants reported that they intend to use TI to enhance students' learning and motivation and that fitness was the most likely content area to use TI. Participants reported their intention to use TI in all grade levels. Participants also reported a high perception of competence in all seven areas measured by the Technological Pedagogical Content Knowledge instrument. Research is needed to confirm if higher education contributes to this perceived competence.

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in Using Technology Integration

In 2005, the National Association for Sport and Physical Education ([NASPE], 2005) published a revision of the guidelines for physical education (PE) teacher candidates to establish the standards for PE teachers. NASPE's revisions were made in order to meet the National Council for Accreditation of Teacher Education ([NCATE], 2005) standards that were published earlier in the same year. Technology was one of the ten standards that were developed by NASPE/ NCATE, therefore, establishing the importance of including Technology Integration in Physical Education (TIPE) as part of the Physical Education Teacher Education (PETE) curricula of universities. Within these standards, NASPE seeks to ensure that every PE teacher develops the knowledge and ability to use technology in order to enhance students' experiences and learning.

Nevertheless, the definition of technology is not clear and technology itself changes constantly. As a result, many questions related to the use of technology by PE teachers may arise when considering these guidelines. Mitchell (2006, p. 24) considers the addition of this standard as 'contentious' while raising a series of questions, including: "What is appropriate technology in which candidates should develop competence? Should all candidates implement the use of heart rate monitors or pedometers into their teaching? Should candidates use a computerized fitness program such as Fitnessgram to measure and record fitness scores?" These questions are placed in a provocative form to call attention to the reader that

although NASPE obligates every future teacher to know how to implement technology in their teaching; it is still vague as to how this should be done.

A few years later Woods, Karp, Miao, and Perlman (2008) applied a survey to investigate teachers' perceptions in TIPE. The research findings were: (1) male teachers perceived themselves as more competent in using TIPE than female teachers; (2) there was no consensus where teachers learned to use technology; (3) the three major reasons why teachers use technology in their classes were: student assessment, visual aid, and understanding individual development (pedometers and heart rate monitors that showed students' progress). The educational contribution of PETE programs did not appear to be the major contributor for using TIPE.

In the ten years since NASPE's requirement to include TIPE in teachers' practice, there has been a growing interest in developing a body of literature to support teachers in using technological tools. However, most TIPE publications do not present any empirical data, instead focusing on describing how to use specific devices in PE settings. As a result, limited research has provided evidence on how physical educators should teach with technological tools (pedagogical strategies), hindering PETE programs to develop courses that may support this need.

Objectives

The purpose of the present research was to determine if physical education students feel prepared to use TIPE in their teaching. More specifically, the research addressed the following research questions:

(i) What do physical education students understand regarding TIPE and its usefulness?

(ii) In what content areas and grade levels do PETE students intend to use TIPE in their teaching?

(iii) How do PETE students perceive their technological skills (how to use devices), pedagogical strategies (how to teach) and content knowledge when teaching with technology integration?

Methodology

Data collection

Participants answered a 43-item questionnaire including multiple choice (32 items) and open-ended questions (11 items) (See Appendix). The 32 multiple-choice items were statements where participants would position themselves according to their perception using a 5-point Likert-type scale (1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree). All statements were designed in a way that the higher the score, the higher the perceived competence was reported. The multiple-choice questions were adapted from the Schmidt et al. (2009) Technological Pedagogical Content Knowledge (TPACK) instrument. TPACK was introduced as a theoretical framework in the educational field while considering three forms of knowledge when teaching with technology integration: technological, pedagogical and content (Mishra & Koehler, 2006).

The questions needed minimal adaptations in order to substitute other academic content area terms (e.g. English, Math) for physical education terms. However, the essence of the questions was maintained. For instance, while Schmidt's questionnaire included the following question: "I have sufficient

knowledge about mathematics", the present study used the following statement: "I have sufficient knowledge about physical education".

The six open-ended questions were developed by the author in order to provide a space where participants could share their understanding of TIPE and their intention to teach with TIPE and in which grade level and content area. Lastly, participants answered five questions that related to their background in order to examine if different backgrounds suggest a difference in perceived competence in using TIPE.

Data analysis

The data analysis included statistical as well as qualitative analysis. Research questions (i) and (ii) were addressed with open-ended questions. The data analysis of these questions followed a systematic process of inductive analysis and comparison among different responses using the protocols proposed by Denzin and Lincoln (1994) and Lincoln and Guba (1985). When accumulative data confirmed the same concept, themes were generated.

Research question (iii) was answered by the 32 multiple-choice items, and as a result, two statistical analyses were conducted. First, a descriptive analysis presented an overview of students' perceived competence in each knowledge (technological, pedagogical and content) and their intersections (pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge and technological pedagogical content knowledge). Figure 1 shows all knowledge factors considered in the TPACK instrument and their connections (See Appendix). Second, an one-way Analysis of Variance (ANOVA) was conducted to

examine if there were statistical group mean differences when considering different backgrounds (gender and years in college).

Participants and setting

All declared Physical Education students (from freshmen to graduate level) nationwide were considered potential participants for this study. The researcher identified 20 physical education teacher education (PETE) programs from around the United States. Initially, the study had targeted to reach at least one PETE program from each region of the United States (New England, Mid-Atlantic, South, South-West, Mid-West, West, West Coast and Non-Continuous) however, due to the very low response rate, ultimately, only two regions were included at this stage of the study. The participants in this study included 47 college students (27 male, 20 female) from three different American universities (two from the Midwest region and one from the South region). In order to invite students to participate in the study, two different directions were taken: inviting students to complete the questionnaire online or inviting students to complete a hard copy of the questionnaire.

Results

The results of this research are presented in accordance with the two types of data analysis. First, the qualitative data findings are presented while seeking to answer research questions (i) and (ii). Second, findings from the quantitative data is presented while seeking to answer research question (iii).

PE students' understanding about TIPE

When trying to explain technology integration, 3 common themes emerged from students' answers: (i) TIPE must use a technology device and/or software to teach a PE class; (ii) Fitness related devices and activities were the most mentioned; (iii) TIPE was credited for enhancing student's learning and interest.

When trying to explain the usefulness of technology integration 3 common themes emerged from students' answers: (i) TIPE can be useful, but students acknowledged the need of a pedagogical strategy; (ii) Technology is considered part of our culture, hence it is considered motivational to teach with TIPE, (iii) K-12 students will be able to link physical activity practice with results achieved. Table 1 (See Appendix) presents quotes to exemplify each theme.

Content areas and grade levels where PE students intend to use TIPE

When considering the usefulness of TIPE in elementary school, more than 69% of students reported an intention to use TIPE when teaching this grade level. Table 2 presents further details on these findings (See Appendix). Two themes were generated when considering the reasons why they would teach this grade level: (i) enhance learning, and (ii) enhance motivation due to the technology culture. Fitness was considered the most likely content area that they would teach with TIPE.

When considering the usefulness of TIPE in middle school, more than 90% of students reported an intention to use TIPE when teaching this grade level. Table 3 presents further details on these findings (See Appendix). Two themes were generated when considering the reasons why they would teach this grade level: (i) enhance learning, and (ii) enhance motivation. Once again, fitness was considered the most likely content area that they would teach with TIPE as it was claimed that

technology may establish a link between physical activities and enhancing fitness levels.

When considering the usefulness of TIPE in high school, more than 95% of students reported an intention to use TIPE when teaching this grade level. Table 4 presents further details on these findings (See Appendix). Two themes were generated when considering the reasons why they would teach this grade level: (i) enhance physical activity monitoring, and (ii) support students who wish to maintain a healthy lifestyle after school is over. Fitness was mainly the only content area mentioned by students.

Physical education students' perceived competence to teach with TIPE

The mean score of each factor showed that undergraduate PE students presented a high self-perception of competence for each factor and the low standard deviation showed that there was a small variance among participants: Technological Knowledge ($M = 3.84$, $SD = .53$); Content Knowledge ($M = 4.38$, $SD = .66$); Pedagogical Knowledge ($M = 4.24$, $SD = .60$); Pedagogical Content Knowledge ($M = 4.18$, $SD = .60$); Technological Content Knowledge ($M = 3.96$, $SD = .96$); Technological Pedagogical Knowledge ($M = 3.94$, $SD = .67$); Technological Pedagogical Content Knowledge ($M = 4.09$, $SD = .67$). Table 5 presents the number of valid answers for each factor (See Appendix).

A one-way ANOVA determined that the score reported for Pedagogical Knowledge for female students was significantly higher than male students, $F(1.40) = 5.55$, $p < .05$. There was no significant difference for the remaining six factors

when comparing gender differences. Table 6 and Table 7 present details of gender score differences for each of the seven factors (see Appendix).

A one-way ANOVA determined that the scores reported for Pedagogical Knowledge presented a significant difference when comparing all four groups (Sophomore, Junior, Senior and Graduate), $F(3.38) = 3.03$, $p < .05$. A one-way ANOVA also determined that the scores reported for Pedagogical Content Knowledge presented a significant difference when comparing all four groups (Sophomore, Junior, Senior and Graduate), $F(3.38) = 3.31$, $p < .05$.

There was no significant difference for the remaining five factors when comparing students from different years in college. Table 8 and Table 9 present details of years in college score differences for each of the seven factors (see Appendix).

Conclusion

It has been ten years since NASPE (2005) published a revision of the guidelines for PE teacher candidates, including TIPE as a main component in PETE programs. In 'technological years' this can be considered a very long time; nevertheless, ten years is a very brief time for the development of an academic area and for its full incorporation in many PETE programs. One year after NASPE's revisions, Liang, Walls, Hicks, and Clayton (2006) conducted research to analyze how preservice PE student-teachers felt about implementing technology integration effectively. The study's results showed that PE student-teachers at that time felt they had minimal to no computer basic skills (42%), felt they had minimal to no general preparation (62%) and they felt they had little to no preparation to teach

using technology (83%). Currently, students in this study have shown they feel very confident in all seven factors analyzed by the TPACK instrument, moreover they have reported a desire to use TIPE in all grade levels, although there seems to be a significant emphasis on Fitness. More research is needed to confirm if this improvement is also reported in other PETE programs and if higher education is contributing to this progress or if it has been mainly gained from other experiences.

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