IC-06
Finding the Utilization of Basic Information Technology for Physical Education Teachers in the 21st Century based on Factor Analysis

Rattanadda Kensri[1], and Paiboon Kiattikomol [2]
[1]Department of Innovation in Learning Management, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi,Bangkok ,Thailand
[2]Department of Innovation in Learning Management, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi,Bangkok ,Thailand
Email: rattanadda.ken@mail.kmutt.ac.th

Abstract

The purpose of the research was to find the utilization of basic information technology of physical education teachers in the 21st century. The researchers used a continuous 7-point Likert scale and the contents comprising the utilization of basic information technology of physical education teachers in the 21st century were divided into 4 aspects; daily life, research, academic service and teaching. The data were collected from 300 physical education teachers of educational institutions in Thailand using a sample random sampling. The collected data were analyzed by a factor analysis method to find the utilization of basic information technology of physical education teachers and cluster variables related to each other.

The findings of the research indicated that; on the whole, the highest value of all four aspects seemed to be the aspect of daily life that the mean was 4.02 and standard deviation was 2.28, and a number of uses were 42. When the aspect of daily life was specifically considered, it was found that the group that had the highest value was Group 1 using software packages to create media by yourself that the mean was 5.27, and the groups that had the second and third highest values were Group 2 documentation and data transmission via electronic system that the mean was 4.56 and Group 3 using technology for photography and photo retouching that the mean was 4.06, which showed the utilization of basic information technology of physical education teachers in the 21st century in the aspect of daily life.

Keywords: Information Technology, Physical Education Teachers, Factor Analysis

Introduction

In 1978, when UNESCO (UNESCO, 2019) initiated the International Charter on Physical Education and Sport. After debates on these subjects have given us an expanded understanding. And the present inadequacy in managing the substance has been realized well-informed consideration. The difficulties in the development of quality physical education due to the interwoven relationship of various developmental tasks have been investigated. When nations have attempted reform work in physical education, the environmental, cultural and economic conditions and the educational background have served both as facilitators and also barriers, which, in some cases, have made development difficult. The observation of this difficulty traces back to the works of while observing the educational development in developing countries Physical education has been a lack of suitable answers that may best predict the basic elements in the construction of Quality Physical Education and sport programmers for students. The items in this study exhibited high consistency and were regarded by professionals who originated from different backgrounds as essential criteria for the investigation of Quality Physical Education in Asia. (Walter et al., 2019) The world is currently facing a tragic situation caused by coronavirus disease. The pandemic of 2019 (COVID-19), which has affected the daily life of people around the world. On March 11, 2020, the World Health Organization declared a pandemic on social distancing from confrontation activities and Meetings until it have become a part of everyday life.

For the present discussion, when comparing a traditional physical education curriculum with the physical education in the 21st century with the advancement in information technology; in the 21st century, the physical education has changed to an education based on information technology utilization while a traditional physical education curriculum focuses on posture, real workout and exercise without information technology. And the associate courses in information technology only contain practicing typing and presentation skills. For the 21st century, the modern concepts of physical education have been begun to use information technology like heart rate monitor watches, running rate, recording workouts, and workout plan. For an education system, the virtual reality systems and digital computers are used to as the facilities to improve effectiveness and bring information technology to turn weaknesses into strengths or solve some problems of teaching methods of physical activity; that is, electronic learning and proper posture to reduce pains. The utilization of information technology in the

virtual reality systems and digital computers based on movement in physical education at that time leads to realistic characteristics of movement in real time, and when bring it to teaching practice for the learners or athletes; they can practice movement techniques and skills to have correct posture by a computer system. Teaching and learning based on information technology can help the learners to practice by themselves all the time and can simultaneously practice and improve based on the uses of virtual reality (Yongzhong & Lingfeng, 2019). To bring music, video and movie to the learners to watch and exercise while learning is to design courses for learners, check heart rate, assess the rating of perceived exertion (RPE) and enhance enjoyment of learners while exercising (Kelsey et al., 2019). For education and social changes in the 21st century, there are a lot of information technologies to be used immediately. Because of advancement and convenience of information technology, learning new things of physical education teachers and information technology innovations for education are needed to improve the teaching quality in the classroom based on learning and teaching without stress and interacting with each other via technology. However, information technology acceptance that is convenient and easy and meets the needs of users causes personal interests, and the uses of modern technology lead to the application of new technology; therefore, it is a challenging task for teachers to play the roles with the learners, especially during planning to design innovations in teaching and learning and technology to be used in the classroom conforming to the objectives of curriculum and learning (Tyler et al., 2019).The physical education curriculum has been taught in Thailand for a long time to produce physical education teachers to fill up the posts of teachers in educational institutions in Thailand. At present, the recruitment of physical education personnel has considerably decreased because the educational institutions give less priority to physical education. In addition, a course in physical education is not viewed as major subject for entrance examination.

Nowadays, the students who graduated with a Bachelor's degree in Physical Education start working as a freelancer like freelance sports coaches, exercise instructors at the institutions or private organizations, professional athletes and bodyguards, while some of them decided to pursue further studies in physical education and related fields and some decided to continue their studies in different fields. It can be said that, in the 21st century, the society, economy and technology have dramatically changed all the time and new diseases have severely emerged like COVID-19 that the people cannot maintain their old ways of life and are becoming increasingly dependent on information technology in teaching and learning to adapt to the 21st century, and also meet the increased competition and increase the possibility of surviving. The traditional teaching methods of physical activity cannot help the graduates to improve competencies and enough abilities for life and careers (Katerina & Vassilis, 2020). The utilization of basic information technology of physical education teachers is becoming necessary in the 21st century for various types of competencies and abilities. In addition, the use of information technology for teaching and learning of physical education teachers in the 21st century is to develop competencies and abilities by era and completely maintain the identity of physical education.

Purposes

1) The researchers' intents were to investigate the utilization of basic information technology of physical education teachers in the 21st century, find basic information technology actually used by physical education teachers

2) To find factors from questionnaires consisting of 280 questions that the utilization of basic information technology of physical education teachers in the 21st century was divided into 4 aspects; daily life, research, academic service and teaching.

Research Methodology

1. population and sample

Population of this research was physical education teachers in educational institutions in Thailand. Identifying the size of population and sample in the research was based on a technique called factor analysis of Comrey and Lee or a rule of thumb, which comprised at least a proportion of 3 (items) to 1 (component). In the research, it contained 70 components that were equal to 210 samples, therefore; it can be said that the sample size that the researchers collected the data was 300 samples (Theodoros, 2018). Three hundred physical education teachers were randomly selected to be the sample group for collecting data.

2. Research Instrument

The researchers designed the questionnaires from research reports and brought data of basic information technology of physical education teachers to the experts to check or test the content validity of questionnaires to compute the index of item-objective congruence. The experts consisted of two information technology experts and three physical education experts. The analysis result of the index of item-objective congruence of 5 experts

had a reliability of 0.98. The questionnaires to analyze the components of the utilization of basic information technology of physical education teachers in the 21st century based on synthesizing documents that were appropriate for physical education teachers comprised 280 indicators in 4 aspects or elements; daily life – 70 components, research – 70 components, academic service – 70 components and teaching – 70 components. The questionnaires contained personal information and checklist based on continuous 7-point Likert scale; that is, 6.51-7.00 – every time, 5.01-6.00 – frequently, 4.51-5.00 – sometimes, 3.51-4.50 – sometimes, 3.01-3.00 – occasionally, 2.01-3.00 – rarely, 0.51-2.00 – rarely, 0-0.5 – never. Validity testing of research instruments used to measure content validity by five experts by means of content validity ratio (CVR) according to the formula of Lawshe (Waraporn et al., 1975 cited in Lawshe, 2019). stated that in case of validity testing of research instruments by five experts, the content validity ratio values that were acceptable were 0.98 and above. From validity testing of research instruments and following the advice of experts, it was found that the content validity ratio values of all questions were 1.00 according to reliability rules, and the value of index of item-objective congruence and the value of the reliability were equal, which the questionnaires were tested

3. Data Analysis

After obtaining 300 questionnaires, the researchers analyzed data to find factors by means of exploratory factor analysis (EFA), principal components analysis, and orthogonal rotation based on Varimax (Katerina & Vassilis , 2020). to analyze to monitor relevant components as follows: 1. statistics data of information affecting respondents, 2. finding the mean, 3. calculating the standard deviation, 4. calculating the factors affecting the needs of basic information technology of physical education teachers, 5. the value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy from the research that was 0.825, the value of Bartlett's Test of Sphericity that was .01, and the Pearson correlation coefficient of observed variables to evaluate the appropriateness by means of factor analysis, 6. the value of Bartlett's Test of Sphericity, and 7. the Pearson correlation coefficient of observed variables to evaluate the appropriateness for confirmatory factor analysis.

Results

The researchers find basic information technology actually used by physical education teachers that analyzed data

from 300 from all 310 usable questionnaires returned that were 100% and performed exploratory factor analysis (EFA) with the sample to calculate the utilization of basic information technology of physical education teachers in the 21st century based on factor analysis divided into 4 aspects; daily life, research, academic service and teaching comprising the values of clustering components related to each other, mean and standard deviation as shown in Table 1.

Table 1 The results of data analysis of clustering components related to each other affecting the utilization of basic information technology of physical education teachers in the 21st century.

Group	A Number of question	$\bar{x}$	SD	Frequency Interpretation
Daily Life	42	4.02	2.28	usually
Teaching	40	3.80	2.37	sometimes
Academic Service	46	3.59	2.44	sometimes
Research	44	3.49	2.44	sometimes
A total of 4 groups	172	3.70	2.38	sometimes

From Table 1 consisting of 280 questions that the utilization of basic information technology of physical education teachers in the 21st century was divided into 4 aspects; daily life, research, academic service and teaching. ; the results of data analysis of clustering components related to each other affecting the utilization of basic information technology of physical education teachers in the 21st century, it was found that daily life was the aspect that most affected the needs (M = 4.02, SD = 2.28). The aspects affected the needs with the mean arranged in descending order were the aspect of teaching (M = 3.80, SD = 2.37), academic service (M = 3.59, SD = 2.44), and research (M = 3.49, SD = 2.44) respectively.

The results of data analysis of 5 groups of sub-components from the aspect of daily life, it was found that factor extraction contained 5 groups: Group 1 – using software packages to create media by yourself consisting of 7 factors affecting the utilization of basic information technology of physical education teachers in daily life (M = 5.27, SD = 2.05) at the high level of needs, Group 2 documentation and data transmission via electronic system containing 5 factors (M = 4.56, SD = 2.25) at the high level of needs, and Group 3 – using technology for photography and photo retouching comprising 3 factors (M = 4.06, SD = 2.25) at the moderate level of needs.

The utilization of basic information technology of physical education teachers in Group 1 using software packages to create media by yourself in daily life, it was found that all 7 factors affecting the utilization of basic information technology of physical education teachers were at the high level (M = 5.27, SD = 2.05), and the question that had the highest level was finding data on the internet by Google Chrome (M = 6.06, SD = 1.62), and 6 questions were at the high level. ,Group 2 – documentation and data transmission via electronic system in daily life, it was found that all 5 factors affecting the utilization of basic information technology of physical education teachers were at the high level (M = 4.56, SD = 2.22) ,Group 3 – using technology for photography and photo retouching in daily life, it was found that it contained three factors affecting the utilization of basic information technology of physical education teachers (M = 4.06, SD = 2.25) that two questions were at the high level and one question was at the moderate level. The question of using animation technology (or a short video) that can show many different movements or techniques through YouTube was at the high level.

Discussion

The findings of the research indicated that; in terms of finding the components of the utilization of basic information technology of physical education teachers in the 21st century in 4 aspects, it was found that the aspects that had the highest level arranged in descending order were daily life, research, academic service, and teaching respectively.

After factor extraction of 280 factors to find the values of necessity of physical education teachers who mostly used basic information technology, it was found that the results of Group 1 – using software packages to create media by yourself in daily life corresponded to the plan and policy of the Ministry of Education (2017) in terms of the National Education Action Plan (2017-2036) in communications, information and media literacy, and computing and ICT literacy (Ministry of Education , 2017). was Group 1 using software packages to create media by yourself and Group 3 Using technology for photography and photo retouching in daily life corresponded to each other, which the research of (Thongchai , 2018) ,(Federation of Indian Chambers of Commerce & Industry FICCI **,** 2018) stated that for physical education teacher preparation in the 21st century, it was essential for changing learning skills based on using information technology increasingly by era to improve physical education teachers' skills with various types of competencies and abilities, including adapting to skills, learning and daily life. They stated that digital technology in learning and teaching and physical education may be viewed incompatible because physical education mostly promoted exercises (Federation of Indian Chambers of Commerce & Industry FICCI **,** 2018), but when evolution of technology and educational advancement were used as the contexts, they helped to increase the importance of physical education in daily life. In terms of developing strategies of producing teachers in the 21st century (Thongchai P. , 2018), the utilization of basic information technology increasingly became necessary (Rotjana,2018) to produce physical education teachers together with the traditional method to develop their competence to lead to different careers in physical education such as technology for heart rate monitors and monitoring device to concentrate on physical activities through electronic devices together with computer, tablet, smartphone and digital watch to record statistics and develop teaching and learning, including physical fitness of learners and teachers (Panu , 2016) , (Preeyaporn , 2017). However, technology capability can help physical education teachers to improve themselves and teaching quality corresponding to education in the 21st century to lead to both direct and indirect benefits for the learners. Group 2 using documentation and data transmission via electronic system in daily life to the plan and policy of the Ministry of Education (2017) and basic skill in the 21st century used to communicate. The skills in the 21st century used to communicate with each other around the world (Chad et al, 2019) and develop the country to Thailand 4.0 focusing on documentation and data transmission via networks across the globe.

Conclusions

The researchers analyzed data to find significant factors of the utilization of basic information technology of physical education teachers in the 21st century divided into 4 aspects; daily life, research, academic service and teaching. From the results, it was found that the daily life aspect most associated with the utilization of basic information technology of physical education teachers was Group 1 – using software packages to create media by yourself in daily life that had the factors affecting the utilization of basic information technology of physical education teachers and Group 3 – using technology for photography and photo retouching. From the research, to improve the skill for the utilization of basic information technology serving physical education teachers' needs, including physical education standards accurately, factor analysis was used as a technique to find the utilization of basic information technology of physical education teachers in the 21st century, and apply the results of the research to the development of learning packages or present the utilization of basic information technology to physical education teachers

References

Unesco's 'International Charter of Physical Education and Sport'. (1982). [Article]. *International Social Science Journal*, *34*(92), 303. Retrieved 29 January, 2019, from https://en.unesco.org/sites/default/files/sporte.pdf

(FICCI), F. o. I. C. o. C. a. I. (2018). *University of the Future Bringing Education 4.0*. Retrieve May 1, 2020, from https://ficci.in/spdocument/23043/higher-education-ficci-Report.pdf

Goad, T., Towner, B., Jones, E., & Bulger, S. (2019). Instructional Tools for Online Physical Education: Using Mobile Technologies to Enhance Learning. *Journal of Physical Education, Recreation & Dance*, *90*(6), 40-47. http://dx.doi.org/10.1080/07303084.2019.1614118

GULSIRIRAT, P. (2017). *DEVELOPMENT OF PHYSICAL EDUCATION TRAINING PROGRAM: INTEGRATING ASEAN KNOWLEDGE FOR ELEMENTARY PHYSICAL EDUCATION TEACHERS* Doctor of Education Program in Health Education and Physical Education, Srinakharinwirot University.2017]. http://thesis.swu.ac.th/swudis/Hea_Phy_Ed/Preeyaporn_G.pdf

Higginson, K., Barney, D., Prusak, K., & Wilkinson, C. (2019). The Effect of Music- and Video-Distraction on High School Physical Education Student Exercise Intensity. *Physical Educator*, *76*(4), 907-925. https://doi.org/10.18666/TPE-2019-V76-I4-8903

Ho, W. K. Y., Ahmed, M. D., Khoo, S., Tan, C. H., Dehkordi, M. R., Gallardo, M., Lee, K., Yamaguchi, Y., Tao, Y., & Shu, C. (2019). Towards developing and validating Quality Physical Education in schools-The Asian physical education professionals' voice. *PloS one*, *14*(8), e0218158. https://doi.org/10.1371/journal.pone.0218158

Killian, C. M., Kinder, C. J., & Mays Woods, A. (2019). Digital Instruction in Physical Education: An Avenue for Advocacy: Column Editor: K. Andrew R. Richards. *Strategies (08924562)*, *32*(5), 39-41. https://doi.org/10.1080/08924562.2019.1637182

Kyriazos, T. A. (2018). Applied Psychometrics: Sample Size and Sample Power Considerations in Factor Analysis (EFA, CFA) and SEM in General [article in journal/newspaper]. *Psychology; volume 09, issue 08, page 2207-2230; ISSN 2152-7180 2152-7199*. https://doi.org/10.4236/psych.2018.98126

Mouratidou, K., & Barkoukis, V. (2018). Greek Physical Education Teachers' Gender Biases in Learning and Teaching. *The Physical Educator*, *75*(2), 210. https://doi.org/10.18666/TPE-2018-V75-I2-7105

Phucharoen, T. (2016). *Competency of PE Teachers in the 21st Century* Doctor of Education Program in Health Education and Physical Education, Srinakharinwirot University. 2016]. http://thesis.swu.ac.th/swudis/Hea_Phy_Ed/Thongchat_P.pdf

Sriwisut, P. (2016). *Administration Model Development of Sport Center for Excellence, Institute of Physical Education* Doctor of Education Program in Health Education and Physical Education,Srinakharinwirot University,2016.]. http://thesis.swu.ac.th/swudis/Hea_Phy_Ed/Panu_S.pdf

Waraporn Noosomton, S. N. W. a. N. P. (2019). The Confirmatory Factor Analysis of Employee's Career Adaptability by the Competing Model Analysis [article in journal/newspaper]. *Journal of Behavioral Science for Development; Vol 11 No 1 (2019): January 2019, Pages 53-70.*

Yongzhong, Y., & Lingfeng, M. (2019). Physical Education Motion Correction System Based on Virtual Reality Technology [Article]. *International Journal of Emerging Technologies in Learning*, *14*(13), 105-116. https://doi.org/10.3991/ijet.v14i13.10710