

DEVELOPMENT OF INDICATORS FOR LEARNING MANAGEMENT COMPETENCIES OF STUDENTS OF PHYSICAL EDUCATION TEACHING CAREER IN THE 4.0 ERA

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Abstract

The research was conducted in three phases. The 1st phase aimed to study the indicators for learning management competencies of students of physical education teaching career in the 4.0 era. An in-depth interview was used as an instrument to collect data from 5 key informants selected by purposive selection. Data obtained were analyzed using analytic induction. The 2nd phase aimed to develop indicators for learning management competencies of students of physical education teaching career in the 4.0 era, using Delphi Technique. Key informants are 17 experts selected by purposive selection. An open-ended questionnaire and rating scale questionnaire were used to conclude a resolution from the findings and to determine factors of indicators for learning management competencies of students of physical education teaching career in the 4.0 era to ensure they are harmonious and accurate. The 3rd phase aimed to examine goodness of fit of indicators for learning management competencies of students of physical education teaching career in the 4.0 era. The sample in the research consisted of 600 teachers and students of Faculty of Education from 51 government universities and autonomous universities that offer physical education curriculum. A rating scale questionnaire was used as an instrument for the data collection and the confirmatory factor analysis was performed. **The results found that** 1) indicators for learning management competencies of students of physical education teaching career comprise 5 aspects, namely, knowledge, skills, desirable characteristics, usage of media, innovation and technologies for learning management, and measurement & evaluation, 2) indicators for learning management competencies of students of physical education teaching career comprise 5 aspects and 60 factors. All factors were consistent, 3) the factor model fit the empirical data, considered from relative Chi-square was 1.08 meaning the model fits the data well, GFI (Goodness of Fit Index) was 0.98 meaning the model fits the data well, AGFI (Adjusted Goodness of Fit Index) was 0.66 meaning the model fits the data moderately, and RMSEA was 0.08 meaning the model fits the data moderately. Therefore, null hypothesis was accepted that the research model was consistent with the empirical data.

Keywords: Development of indicator, learning management competencies, Professional physical education, 4.0 era

INTRODUCTION

Amidst the trend of the rapid changes in the economy, the society, the technology, and cross-border information flows, such changes have effects on education unavoidably. Technological advancement makes learning models, and how to seek knowledge modified from the traditional education model in which knowledge was transmitted only from teachers to students to self-learning that students can search for and create a body of knowledge by themselves increasingly. These changes are challenging for new generation teachers to manage knowledge to be effective for student development. Therefore, the teachers need to have the competency development to be in line with such changes so that they will be able to work, or perform professional activities for teachers in an efficient manner according to the organizational

expectations at school level, the education service area level, and Ministry of Education level. Competency is defined as behaviors formed by knowledge, skill, ability, and individual characteristics that enable a person works successfully and achieve organizational goals or it can be said that competency refers to personalities that enable individuals to create work performance that meets determined criteria and be able to have the responsibility at work better than others. In other words, the competency is the work behavior resulting from the knowledge, the skills, the abilities, and other behaviors making one's performance more outstanding than performance of other colleagues in an organization. Thus, the teacher competencies are the combination of knowledge, skills, attitudes, values, and personal characteristics that enable teachers to act professionally and appropriately in accordance with the education organizations in an era of education reform. According to the previous situation of learning management, it was found that the teacher professional competencies needed the considerable development. It has been said that the teacher development is based on the consideration of changing the social context and development of the teacher competencies. Owing to rapid changing of social situations at present, teachers need to improve themselves to have higher competencies. However, previous teacher development in Thailand encountered some problems. Some research results confirmed that the teacher development was not efficient due to a limited budget, development that did not meet teachers' needs, and a lack of follow-up and evaluation of the development (Japakiya, 2018).

Learning management to develop the students in the 21st century is the education management in the modern world where the emphasis is placed on learning management that encourages the students to use their wisdom to create a body of knowledge, and the outputs valuable to society by themselves. It is the education management which focusing on learning how to learn, the learning skills, and the collaborative learning. It is the education management to develop the new generation people to have the knowledge about languages for international level communication in the era of information technology or the era of digital technology, learn how to think better and to develop characteristics of being good persons with morality and ethics and possess appropriate values to global society in the 21st century. Based on such situation, teachers need to adjust their role from being a teacher to be a coach, or a teacher who facilitates learning (Learning facilitator), consistent with learning management in today's world full of changes and inversion of innovation and technologies. As a consequence, it is essential that teachers need to change and learn how to choose technologies and innovation, including creating learning methods consistent with attention, demands, and nature of students in the digital era who have learning styles, thinking styles, and how to learn different from the past. Students in the 21st century need to be developed to have academic knowledge and understanding that promote students to have the critical thinking, and be able to communicate efficiently, learning skill and essential skills for success in life in today's world, i.e., critical thinking, problem solving, creative thinking, cognition, technology skills (technical skills), communication skills, and collaborative skill (Dechakup & Yindeesuk, 2016; Scott, 2015; Jan, 2017). It is consistent with National Education Standards B.E. 2561 (2018) that determined the desirable outcomes of education for the quality characteristics of Thai people 4.0 in 3 aspects, namely, 1) be the learners to create jobs and good quality of life, 2) be the ones who join to

create innovation for secure and sustainable society, and 3) be strong citizens for living peacefully (Office of the Education Council, 2019). From the roles and the duties of teachers associated with learning management and student development goals mentioned above, they affect the way teachers perform their duties to manage learning for the student development in the 21st century world, and it is learning management with efficient changes and inversion. Teachers are required to have knowledge and ability for learning management. Teachers are competent in learning management for student development in the 21st century. Therefore, enhancing and developing teacher competencies in learning management are important and essential.

Studying research about teacher competencies in learning management for student development found the teachers did not have the necessary competencies in learning management in terms of knowledge, understanding, attitude, and skills in learning planning and design, learning activity management, learning facilitator, media and innovation usage for learning, measurement and evaluation of learning outcomes, classroom management skills, and leadership in learning management. Besides, according to the studies, teachers used the old way for learning management, probably caused by several factors, such as teachers' lack of knowledge and understanding, negative attitude towards student-centered learning that focuses on students' active learning, as they viewed that learning approach is difficult, complicated, beyond their abilities to handle, and full of restrictions to be used in real classroom (Youngtrong, 2016; Sriwongrat & Chanruechai, 2017; Sripanya, 2017). Based on the current situation, problems and concepts about the development of teacher competencies in learning management for student development as mentioned earlier, the researcher as a teacher in Faculty of Physical Education, Thailand National Sports University, an agency have a duty to produce, and to develop the teachers, to realize the great importance and the necessity to study the factors of learning management competencies of students of physical education teaching career in the 4.0 era by analyzing and synthesizing learning management competencies of students of physical education teaching career in Thailand to develop component indicators of learning management competencies of students of physical education teaching career in Thailand for generating the quality assessment process of education management that shall meet the identity and context of the curriculum. In this regard, the research results shall contribute the important guideline to determine the indicators which shows the quality of learning management to be complete in all dimensions. Clarity is seen in determining the major goal of teaching and learning management. Understanding is created among relevant agencies to see a direction of the development of physical education teachers in teaching and learning management. Connection and integrated working can be seen in a secure and the sustainable manner for achieving higher efficiency and effectiveness of teaching and learning, and receiving acceptance of education management that is able to develop efficiency of different dimensions continuously.

Research objectives

1. To study and develop indicators for learning management competencies of students of physical education teaching career in the 4.0 era.
2. To test model consistency of indicators for learning management competencies of students of physical education teaching career in the 4.0 era.

METHODOLOGY

Research methodology

Step 1: Synthesis of indicators by using an in-depth interview.

Key informants

5 experts in curriculum management, selected by purposive sampling technique. Inclusion criteria:

1. Hold experienced in physical education curriculum management or Dean of Faculty of Education, no less than 3 years.
2. Graduated with a master's degree or higher.
3. Committee on physical health curriculum management.
4. Participants in the competency development for physical health education students or chief of teacher internship program, a bachelor's degree level.

Research instrument

Step 1: A semi structured in-depth interview. The questionnaire developed by the researcher was submitted to 5 experts to measure content validity, index of item-objective congruence (IOC). IOC of the questionnaire was 0.86.

Data analysis

Analytic induction is the interpretation to make a conclusion of data from tangible things or visible events. Several events are seen and observed before a conclusion is made. The constant of data was measured and a point about development indicators for learning management competencies of physical health education student teachers in the 4.0 era is made.

Step 2: Determination of indicator by using Delphi technique.

Key informants in step 2 were 17 experts, purposively selected from experts who have knowledge and experience in curriculum management from government education organizations, divided into 3 groups as follow:

1. A group of 7 experts in teaching and learning management in Faculty of Physical Education.
 - 1.1 Persons take charge of the curriculum.

- 1.2 Persons graduated with a master's degree or higher.
2. A group of 5 faculty administrators or executives of agencies equivalent to government educational institutions that offer undergraduate physical education curriculum.
 - 2.1 Faculty administrators or executives of agencies equivalent to government educational institutions that offer undergraduate physical education curriculum.
 - 2.2 Persons those who hold the experiences in teacher internship program, no less than 3 years;
 - 2.3 Persons graduated with a master's degree or higher.
3. A group of 5 stakeholders
 - 3.1 Persons those who hold the experiences experience, a director level or
 - 3.2 Persons those who hold the experiences experience in being mentors of student teachers, no less than 5 years.

Research instruments

The 1st round: Open-ended questionnaire for research using Delphi technique. 2. The 2nd round and the 3rd round: Rating scale questionnaire for research using Delphi technique. Research methodology – The data obtained from the step 1 were used to develop a guideline for preparing questions. The developed open-ended questionnaire was measured content validity to find index of item-objective congruence (IOC) by 5 experts. Questions with IOC at the 0.86 level were selected to ask 17 experts. The experts considered the data consistency by using Delphi technique for the 2nd round and the 3rd round to conclude a resolution from the findings and determine factors of indicators for learning management competencies of students of physical education teaching career in the 4.0 era to ensure they are in harmony and accurate.

Data analysis

1. The median calculated from answers of the group of experts was interpreted according to the criteria determined by the researcher:

The median of 4.51 and greater means the group of experts agrees with that message at the highest level.

The median ranged 3.51-4.50 means the group of experts agree with that message at a high level.

The median ranged 2.51-3.50 means the group of experts agree with that message at a moderate level.

The median ranged 1.51-2.50 mean the group of experts agree with that message at a low level.

The median ranged 1.00-1.50 means the group of experts agree with that message at the lowest level.

2. Interquartile range is simply calculated as the difference (range) between the third quartile and the first quartile (Q3-Q1). Messages have interquartile range 1.50 or below showing that there is consistency in the opinions of the experts. Messages have interquartile range above 1.50 showing that there is inconsistency in the opinions of the experts.

Step 3: Testing the quality and appropriateness of indicators for learning management competencies of students of physical education teaching career in the 4.0 era by using confirmatory factor analysis (CFA).

Research sample

The research sample in the step 3 were comprised of the permanent teachers of the government educational institutions that offered the physical education curriculum and relevant persons. A large sample size was required for the analysis conducted in this step, based on a rule of thumb (Hair et al., 2010) and (Schumacker & Lomax, 2010) suggesting that in factor analysis, the sample to variable ratio should be at least 10:1. In this research, there were 60 indicators. Therefore, the size of sample consisted of 600 persons selected by cluster sampling technique as follow:

1. There are 12 government universities and autonomous universities that offer the Physical education curriculum and 7 institutions were randomly selected consisting of 35 permanent lecturers and 49 students, a total of 84 persons.
2. Thailand National Sports University offers the Physical education curriculum in 17 campuses; 15 campuses were randomly selected. The sample consisted of 75 permanent lecturers and 105 students, a total of 180 persons.
3. There are 29 Rajabhat Universities offer the Physical education curriculum, 26 universities were randomly selected. The sample consisted of 130 permanent lecturers and 182 students, a total of 312 persons.

Protection of the rights of key informants

In this research, the researcher significantly took participant consent into consideration. The sample (research participants) having characteristics that meet the research objectives were selected only. The researcher sought ethical approval for the research conducted in humans from research ethics committee. The ethics committee permission certificate number is TNSU-EDU 020/2565. All participants were informed conditions and they voluntarily participated in the research. The researcher described the details about the research to all participants and gave a consent form to participants to sign their names. The process of obtaining consent from volunteers or representatives was carried out with legitimacy.

RESULTS

1. The researcher studied relevant the documents and research which found that the competencies students of physical education teaching career include the ability, the skills, the expertise. Teaching process is an important strategy to develop them to become the teachers based on promotion, support, and assistance from lecturers who transfer

knowledge. Improvement of teaching and learning to be effective, self-practice and duty performance of teachers in educational institutions to ensure teachers are able to perform their duties to the fullest capacity in accordance with professional standards for teachers so as to develop students to have quality that meets the national goals of education and to achieve school objectives efficiently. Competencies of students necessary to learning management offer self-preparation and academic knowledge. The research conceptual framework comprised (1) knowledge, (2) skills, (3) desirable characteristics, (4) usage of media, innovation & technologies for learning management, and (5) measurement & evaluation.

2. In-depth interview consisted of 5 key informants, i.e. two deans of Faculty of Education, one lecturer in charge of the curriculum, and two stakeholders. It can be concluded as (1) knowledge – 16 minor topics, (2) skills – 15 minor topics, (3) desirable characteristics – 15 minor topics, (4) usage of media, innovation & technologies for learning management – 6 minor topics, (5) measurement & evaluation – 8 minor topics.
3. The test of quality and appropriateness of indicators for learning management competencies of students of physical education teaching career in the 4.0 era by using confirmatory factor analysis (CFA).

Table 1: Bartlett's test of Sphericity and Kaiser-Mayer-Olkin Measures of Sampling Adequacy (MSA) of the model developing indicators for learning management competencies of students of physical education teaching career in the 4.0

Bartlett's test of Sphericity	p	Kaiser-Mayer-Olkin Measures of Sampling Adequacy (MSA)
19544.631	.000	0.964

From Table 1, the analysis result found Kaiser-Mayer-Olkin Measures of Sampling Adequacy (MSA) was 0.96, and Bartlett's test of Sphericity was 19544.631 with statistical significance ($p = .00$), appropriate to factor analysis with criteria of excellence. Therefore, it can be used to analyze all factors.

The model developing indicators for learning management competencies of students of physical education teaching career in the 4.0 era was presented in order to test the success indicators for learning management competencies of students of physical education teaching career in the 4.0 era using maximum likelihood (ML) method. Significant statistics used to test consistency of indicators to empirical data included 60 indicators. The model is in the form of the first order confirmatory factor analysis. Confirmatory factor analysis results of indicators for learning management competencies of students of physical education teaching career found the model fit the empirical data, considered from considered from relative Chi-square was 1.08 meaning the model fits the data well, GFI (Goodness of Fit Index) was 0.98 meaning the model fits the data well, AGFI (Adjusted Goodness of Fit Index) was 0.66 meaning the model fits the data moderately, and RMSEA was 0.08 meaning the model fits the data moderately. Therefore, the null hypothesis was accepted that the research model was consistent with the empirical data.

Table 2: Correlation coefficient among factors of indicators for learning management competencies of students of physical education teaching career in the 4.0 era

Factors	KMS	SKS	ABS	TNS	MAES
KMS	1				
SKS	0.87**	1			
ABS	0.73**	0.80**	1		
TNS	0.73**	0.74**	0.84**	1	
MAES	0.74**	0.78**	0.86**	0.93**	1

** $p < .01$

Table 2 showed the confirmatory factor analysis results of indicator for learning management competencies of students of physical education teaching career in the 4.0 era. All factor loadings were positive with statistical significance level of 0.01.

Table 3: Confirmatory factor analysis of indicators for learning management competencies of students of physical education teaching career in the 4.0 era

Factor	Indicators	Factor Loading				R ²⁰
		b	B	SE	t	
KMS	1. Analyze workload to plan systematic problem solving.	2.17	0.66	0.12	17.92 **	0.44
	2. Set work goals in every semester.	0.55	0.77	0.03	21.95**	0.59
	3. Determine action plans and learning management plans procedurally.	0.53	0.82	0.02	24.21**	0.67
	4. Be attentive to acquire additional knowledge about learning management. .	0.71	0.77	0.03	22.12**	0.59
	5. Be creative to develop learning management.	0.64	0.80	0.03	23.23**	0.64
	6. Seek knowledge about new careers for self-development.	0.70	0.76	0.03	21.84**	0.58
	7. Collect, synthesize, and categorize data and knowledge and improve knowledge to be up-to-date.	0.60	0.80	0.03	23.44**	0.64
	8. Create a body of knowledge and innovation to develop learning management, organizations, and careers.	0.79	0.81	0.03	23.74**	0.65
	9. Acquire knowledge, be determined, and strive for opportunities for self-development through various methods, such as attending meetings/seminars.	0.69	0.78	0.03	22.60**	0.61
	10. Improve work performance in response to demands of students, parents, and communities.	0.68	0.79	0.03	22.74**	0.62
	11. Be knowledgeable and have good English language skills.	0.74	0.73	0.04	20.55**	0.54
	12. Have knowledge about educational institution curriculum, basic curriculum, and learning strand in health and physical education.	0.76	0.76	0.03	21.67**	0.58
	13. Be able to magnify knowledge outcomes and skills or work performance to society.	0.65	0.77	0.03	21.96**	0.59

	14. Be able to apply existing knowledge and skills to learning management.	0.80	0.78	0.04	22.62**	0.61
	15. Be able to pass on real life work experience to other people.	0.54	0.78	0.02	22.32**	0.60
	16. Have knowledge and ability in the process of research and learning management of physical education innovation.	0.65	0.77	0.03	22.02**	0.59
SKS	1. Share knowledge with other people for self-development and career development.	0.67	0.77	0.03	21.93**	0.59
	2. Work with other people according to the scope of roles and duties assigned.	0.73	0.76	0.03	21.81**	0.58
	3. Build good relationship in working with other people.	0.51	0.75	0.02	21.08**	0.56
	4. Magnify outcomes by creating learning networks.	0.58	0.75	0.03	21.09**	0.56
	5. Provide consultation and advice. Supervise and pass on knowledge and career experience to other people.	0.51	0.76	0.02	21.76**	0.58
	6. Assist and support colleagues to achieve common goals and success.	0.74	0.80	0.03	23.28**	0.64
	7. Honor, respect, admire, and encourage colleagues at the right time.	0.60	0.78	0.03	22.62**	0.61
	8. Support and participate in professional ethics development activities.	0.74	0.81	0.03	23.57**	0.65
	9. Join colleagues to create teamwork culture in educational institutions.	0.72	0.83	0.03	24.64**	0.69
	10. Share/listen to opinions and experiences among networks and work teams.	0.56	0.77	0.03	22.04**	0.59
	11. Share/listen to opinions and experiences within work teams. Emphasis is placed on services based on successful performance of work.	0.60	0.81	0.03	23.78**	0.66
	12. Perform existing roles and responsibilities.	0.54	0.76	0.03	21.81**	0.58
	13. Perform the role of leader/follower when working with other people appropriately and occasionally.	0.53	0.77	0.02	22.06**	0.59
	14. Have skills in working with others/group of persons efficiently inside and outside educational institutions and in situations.	0.43	0.63	0.03	16.99**	0.40
	15. Listen to opinions and experiences shared from colleagues.	0.50	0.71	0.03	19.77**	0.51
ABS	1. Self- sacrifice and self-dedications for career benefits and be a good member of professional organizations.	0.75	0.84	0.03	25.38**	0.71
	2. Have emotional self-control ability. Be able to inhibit emotions and behaviors and promote behaviors accepted by society.	0.63	0.86	0.02	26.09**	0.74
	3. Have self-adaptation ability to organizational culture in an appropriate manner.	0.70	0.83	0.03	24.78**	0.69
	4. Be a role model in promoting other people to	0.84	0.87	0.03	26.51**	0.75

	behave in accordance with the principles of morality and professional ethic for teacher and develop to be accepted.					
	5. Follow the principles of managerial competency to gain success at work.	0.60	0.86	0.02	26.09**	0.74
	6. Be friendly to students, colleagues, and service receiver.	0.76	0.87	0.03	26.62**	0.75
	7. Perform the roles and duties appropriate to situation.	0.67	0.85	0.03	25.85**	0.73
	8. Be generous, helpful, and do no harm to other people.	0.64	0.86	0.02	26.44**	0.75
	9. Protect one's own rights and benefits and do not violate the rights of others.	0.67	0.86	0.03	26.29**	0.74
	10. Live a life by following the philosophy of sufficiency economy appropriate to household financial status.	0.70	0.85	0.03	25.54**	0.72
	11. Accept consequences from performing duties and seek guidelines for solving problems or obstacles.	0.64	0.85	0.02	25.55**	0.72
	12. Perform the roles and duties and strive for career advancement.	0.67	0.84	0.03	25.49**	0.71
	13. Be able to magnify knowledge outcomes and skills or work performance to society.	0.63	0.86	0.02	26.45**	0.75
	14. Adhere to professional ideology, protect honor and dignity of the profession.	0.82	0.87	0.03	26.63**	0.75
	15. Follow the rule, regulations, and good culture of organizations.	0.56	0.70	0.03	19.42**	0.49
TNS	1. Be able to seek knowledge, learning skills, use various media and technologies to promote learning.	0.67	0.82	0.03	23.97**	0.67
	2. Be able to bring new online social media like YouTube, Wikipedia, Facebook, Line, etc. to supplement learning management.	0.50	0.83	0.02	24.47**	0.69
	3. Be able to choose technologies consistent with learning objectives.	0.68	0.87	0.03	26.31**	0.75
	4. Be able to create an opportunity for students to access technological media, instruments or quality learning sources.	0.88	0.84	0.04	24.90**	0.70
	5. Be able to use knowledge about computer and internet for student development.	0.72	0.84	0.03	24.98**	0.70
	6. Be able to produce efficient and appropriate instructional media.	0.49	0.80	0.02	23.19**	0.64
MAE S	1. Be able to design various methods of measurement & evaluation suitable for learning activities.	0.66	0.86	0.03	26.40**	0.75
	2. Be able to bring evaluation results to promote or improve students' learning.	0.65	0.90	0.02	127.95**	0.80
	3. Be able to measure and evaluate students	0.67	0.87	0.02	26.82**	0.76

	through a variety of methods.					
	4. Be able to make a measurement & evaluation tool suitable for learning content and learning management.	0.71	0.89	0.03	27.46**	0.78
	5. Be able to determine suitable criteria for measurement & evaluation.	0.76	0.89	0.03	27.65**	0.70
	6. Be able to explore knowledge and skills about learning measurement & evaluation.	0.70	0.89	0.03	27.91**	0.80
	7. Be able to monitor or evaluate learning outcome by using online communication tools.	0.70	0.87	0.03	26.73**	0.76
	8. Be able to measure and evaluate physical education learning outcomes efficiently.	1.08	0.77	0.05	22.31**	0.60

** $p < .01$

From Table 3, factor loading analysis, it was found that all factor loadings were positive with statistical significance level of 0.01.

Table 4: Goodness of fit index in confirmatory factor analysis for indicators for learning management competencies of students of physical education teaching career in the 4.0 era

Fit Indicators	Perfect Fit	Acceptable fit	Study Finding	Result
relative χ^2	< 2.00	2.00-5.00	2.04	Acceptable fit
GFI	$\leq .95$	0.90-0.94	0.68	Acceptable fit
AGFI	$\leq .95$	0.90-0.94	0.66	Acceptable fit
NFI	$\leq .95$	0.90-0.94	0.97	Perfect fit
CFI	$\leq .95$	0.90-0.94	0.98	Perfect fit
RMSEA	< 0.05	0.05-0.08	0.00	Perfect fit

The confirmatory factor analysis (second order) of indicators for learning management competencies of students of physical education teaching career found χ^2 , 2.04 (chi-square (χ^2) = 545.04; (probability- [p-value] = 0.000); degree of freedom (df) = 271); goodness of fit index (GFI) = 0.91; adjusted goodness of fit index (AGFI) = 0.66; normed fit index (NFI) = 0.97; comparative fit index (CFI) = 0.98, and root mean square error of approximation (RMSEA) = 0.00. Therefore, it was accepted that the research model fit the empirical data.

Table 5: Construct reliability (pc) and Average variance extracted (pv)

Latent variable	Construct reliability (pc)	Average variance extracted (pv)
KMS	0.65	0.87
SKS	0.50	0.72
ABS	0.56	0.83
TNS	0.49	0.84
MAES	0.73	0.92

From Table 5, it was found that knowledge factor had high construct reliability (pc=0.65) and described variance of factor variables by 87.00%. Skill factor had high construct reliability (pc=0.50) and described variance of factor variables by 72.00%. Desirable characteristic factor had high construct reliability (pc=0.56) and described variance of factor variables by 83.00%.

Usage of media, innovation and technologies for learning management factor had high construct reliability ($\alpha = 0.49$) and described variance of factor variables by 84.00%, measurement & evaluation factor had high construct reliability ($\alpha = 0.73$), and described variance of factor variables by 73.00%.

DISCUSSION

Indicators for learning management competencies of students of physical education teaching career in the 4.0 era were developed by the researcher through key informants who have knowledge and experiences in learning management. Factor analysis was performed to test quality and appropriateness of the factors of indicators for learning management competencies of students of physical education teaching career in the 4.0 era by using confirmatory factor analysis. It was found that the model fit the empirical data at a moderate level, showing 5 factors and 60 indicators in total. The indicators for learning management competencies of students of physical education teaching career in the 4.0 era comprised 5 factors as (1) knowledge, (2) skills, (3) desirable characteristics, (4) usage of media, innovation and technologies in learning management, (5) measurement and evaluation. To ensure accuracy and some research questions may not be clear, the model fit the empirical data at a moderate level. The following is the discussion of research results for each learning management competency indicator of students of physical education teaching career in the 4.0 era according to a particular order of the importance of factors:

Knowledge

Learning management competency indicators regarding knowledge of students of physical education teaching career: Be able to analyze workload to plan systematic problem solving, set work goals in every semester, determine action plans and learning management plans procedurally, be attentive to acquire additional knowledge about learning management., be creative to develop learning management. 6. Seek knowledge about new careers for self-development., be able to collect, synthesize, and categorize data and knowledge and improve knowledge to be up-to-date, consistent with Yosrikhun saying that the operations carried out to ensure a curriculum is efficient and achievable consist of persons related to curriculum management, i.e. educational administrators, assistant education administrators, academic department. Instructors are be able to create knowledge and innovation to develop learning management, organizations and career. Be able to acquire knowledge, be determined, and strive for opportunities for self-development through various methods, such as attending meetings/seminars and improve work performance (Yosrikhun, 2013). MeralSeker said that effects of situation-based teaching on awareness of language learners and self-regulation language learning strategy to respond to demands of learners, parents, and communities required knowledge and good English skills. Besides, students must have knowledge about educational institution curriculum, basic curriculum, and learning strand in health and physical education, be able to magnify knowledge outcomes and skills or work performance to society, be able to apply existing knowledge and skills to learning management, be able to pass on real life work experience to other people, and have knowledge and ability in the process of research

and learning management of physical education innovation (MeralSeker, 2016).

Skills

Learning management competency indicators regarding skills of students of physical education teaching career: Students are able to share knowledge with other people to develop themselves, work performance, and work with other people according to the roles and duties assigned. It is in line of Brouwer and Jansen. The results indicated that the ability to share knowledge is an important attribute that students develop in learning communities (LCs), enabling them to succeed in their education and careers. (Brouwer & Jansen, 2019). Sooksai mentioned that the development of teachers of physical education in the 21st century required explicit policies, systems supporting training and development and instructional management. However, not only external support, teachers of physical education themselves need to develop themselves to become teachers of physical education in the 21st century. They need to adapt themselves to ongoing changes and have skills and well-rounded abilities on the basis of morality and patience so as to promote students to have creativity, being able to create knowledge from self-learning. Besides, they have to create students to have life skills and work in accordance with changing social context, build good relationship while working with others. Be able to magnify outcomes by creating learning networks, provide consultation and advice, pass on knowledge and career experience to other people, assist and support colleagues to achieve common goals and success, honor, respect, admire, and encourage colleagues at the right time, support and participate in professional ethics development activities, join colleagues to create teamwork culture in educational institutions, share/listen to opinions and experiences among networks and work teams, share/listen to opinions and experiences within work teams. Emphasis is placed on services based on successful performance of work. Be able to perform existing roles and responsibilities, perform the role of leader/follower when working with other people appropriately and occasionally, have skills in working with others/group of persons efficiently inside and outside educational institutions and in situations, listen to opinions and experiences shared from colleagues (Sooksai, 2018). This is consistent with a study conducted by Markmee on scenario in primary school administration in Thailand and found that in order to promote and support general administration, the following should be carried out: Recruit students in the area in the first place, participate with all organization in educational management, encourage students to have public mind and get close to communities efficiently inside and outside educational institutions and in various situations, share information with and listen to opinions and experiences from colleagues. All of these enable students of private vocational schools have qualifications that meet labor market (Markmee, 2018).

Desirable characteristics

Learning management competency indicators regarding desirable characteristics: Self-sacrifice and self-dedications for career benefits and be a good member of professional organizations. Have emotional self-control ability. Be able to inhibit emotions and behaviors and promote behaviors accepted by society. Have self-adaptation ability to organizational culture in an appropriate manner. Be a role model in promoting other people to behave in accordance with the principles of morality and professional ethic for teacher and develop to be

accepted. These are consistent with a study conducted by Theeratith finding that desirable characteristics of ASEAN citizens were teamwork and leadership attitude, consistent with the theory on desirable characteristics of Thai children and youth in the 21st century (Theeratith, 2013) mentioned in the study conducted by Wichienpan and Chansook that desirable characteristics of Thai children and youth in the 21st century are critical thinking, possess Thainess, self-responsibility and responsibility for others, divide the roles and duties within a team in an efficient manner, good learning skills for application, bring knowledge to create innovation for problem solving, adhere to morality and ethics, follow the principles of managerial competency to gain success at work, be friendly to learners, colleagues, and service receivers, perform the roles and duties appropriate to situation, be generous, helpful, and do no harm to other people, protect one's own rights and benefits and do not violate the rights of others, live a life by following the philosophy of sufficiency economy appropriate to household financial status, accept consequences from performing duties and seek guidelines for solving problems or obstacles, perform the roles and duties and strive for career advancement adhere to professional ideology, protect honor and dignity of the profession, be honest, punctual, make a spending plan and use resources economically, follow the rule, regulations, and good culture of organizations (Wichienpan & Chansook, 2013).

Usage of media, innovation and technologies in learning management

Learning management competency indicators regarding usage of media, innovation and technologies for learning management of students of physical education teaching career: Be able to seek knowledge, learning skills, use various media and technologies to promote learning. According to Plan Ceibal (2020): Future scenarios for technology and education. The findings suggest that problems and challenges presented by new technological innovations in education are not solved by more technology. "Finally, we consider an approach such as this could work as a framework to help develop public education and technology policies in other countries." Be able to bring new online social media like YouTube, Wikipedia, Facebook, Line, etc. to supplement learning management, consistent with Naresh who conducted a study on E-learning, a new way of teaching and learning in modern education, which grew rapidly in the past two decades in education sector. Universities and schools started to offer online curriculum to respond to students' demands (Naresh, 2015). It is consistent with learning objectives in being able to create an opportunity for students to access technological media, instruments or quality learning sources. 5. Be able to use knowledge about computer and internet for student development and be able to produce efficient and appropriate instructional media.

Measurement and evaluation

Learning management competency indicators regarding measurement and evaluation: Be able to design various methods of measurement & evaluation suitable for learning activities. It is in line of Tra and Dieu. The studies showed that competency-based assessment improvement had generated a much greater impact on students' achievements on standardized tests than other forms of educational activities (Tra and Dieu, 2021). Jan et al. conducted a study on administrators' perceptions of physical education teacher evaluation. The study aimed to develop a better understanding of school administrators' perceptions of teacher evaluation

systems, specific to physical education. Be able to bring evaluation results to promote or improve students' learning. Be able to measure and evaluate students through a variety of methods. Be able to make a measurement & evaluation tool suitable for learning content and learning management. Be able to determine suitable criteria for measurement & evaluation. Be able to explore knowledge and skills about learning measurement & evaluation. Be able to monitor or evaluate learning outcome by using online communication tools. Be able to measure and evaluate physical education learning outcomes efficiently (Jan et.al, 2017).

Suggestions for the future research

1. The indicators for learning management competencies of students of physical education teaching career in the 4.0 era may have more than five factors if anticipate with another research lens.
2. From limitations, such as times and budget may affect the result in this research, the next future could be fulfilling the aspect of unknown recover by having more applications of data collection method, and sample size.
3. The future studies can reassess, and expanding the theory, framework, or model which could be find the new evidence for solving this research problems.

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