

Critical Thinking Skills and Self-Efficacy Beliefs in Preservice Physical Education Teachers

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Abstract

The aim of this research is to determine the relationship between preservice physical education teachers' self-efficacy beliefs and critical thinking tendencies. For this purpose, our universe constitutes preservice physical education teachers studying at different universities in the 2018-2019 academic year. The research sample consists of 640 preservice teachers in total, 350 males and 290 females. Cities in which the preservice teachers are involved in the research and the universities where they are studying; It consists of 8 provinces: Bartın, Bolu, Çorum, Düzce, Karabük, Kastamonu, Sinop, Zonguldak. Within the scope of the research, "California Critical Thinking Scale (CCTDI)" and "Teacher Self-Efficacy Scale" were used to obtain the data collected from preservice teachers. The data collected for the purpose of the research were analyzed with the SPSS-25 statistical program. Structural equation modeling analyzes were carried out using the data collected from 640 participant groups using the AMOS-25 package program. As a result, students can be directed to earn these trends through activities aimed at gaining critical thinking skills and tendencies by rethinking physical education and sports school programs being implemented in our country. In this regard, university students can be given the opportunity to become highly critical individuals.

Keywords: physical education teachers, self-efficacy, critical thinking

1. Introduction

Teacher self-efficacy is an important factor directly affecting the quality of education (Chan, 2008). Teaching self-efficacy belief expresses teachers' beliefs that they can make positive changes on students' achievements and behaviors (Gibson & Dembo, 1984). Teaching self-efficacy beliefs are teachers' beliefs that even difficult learners and non-motivated students can participate and learn in the learning process (Tschannen-Moran & Woolfolk Hoy, 2001). Therefore, self-efficacy has been one of the important fields of study of specialists working especially in teacher education (Morgil et al., 2004). Among the factors deemed necessary for qualified, quality and conscious education and affecting this situation, teacher self-efficacy gains great importance in parallel with its responsibilities in continuous self-renewal, upgrade and development efforts. Since the concept of self-efficacy was opened for discussion by Bandura in 1977, it has been studied by associating it with many variables in different fields from development psychology, science education, mathematics to computer. Self-efficacy is defined as the ability of a person to be perceived by that person to perform a desired action (Bandura, 1986).

Bandura (1994) defines self-efficacy belief as "belief in the capacity of the individual to organize and successfully perform the necessary activity to perform a certain performance". According to Bandura (1994), self-efficacy is based on our beliefs about our abilities and is necessary to organize and demonstrate the behavior necessary to achieve our goals.

Self-efficacy is thought to consist of four sources that interact with each other. According to Bandura (1994), these sources are listed as follows:

1. Performance Achievements: The success of the individual in his works affects the reward and motivates the individual in similar behaviors in the future. Therefore, the success shown is an indicator that he will be successful in

similar works later.

2. Indirect Experiences: Seeing the success of other people can make the person himself / herself expect the success. Our expectations from ourselves stem from the experiences of other people.

3. Verbal Persuasion: The words and counseling that we can successfully demonstrate an behavior can encourage the individual and change his self-efficacy.

4. Emotional State: The physical and emotional well-being of the individual during his / her behavior increases the probability that he will attempt this behavior.

Physical education program in schools, basic, specialized, sports-specific movement skills and information specific to physical activities that students can use in life; It has been prepared in order to gain emotional social characteristics and to participate in health-saving physical activities throughout life (Temel & Avşar, 2008). Considering that the physical education teacher is an exemplary teacher in terms of gaining these goals to the student, establishing a direct relationship with the students in the movement education process, supporting the student physically, cognitively, affectively, physical (external) appearance and healthy life; Self-efficacy belief and locus of control constitute the main point in physical education teacher. At this main point; It is thought that the higher the level of self-efficacy and internal supervision of the teacher, the achievement of the mentioned goals will be successful and efficient in strengthening the ways of school management and cooperation with the families in structuring an effective and quality education process.

The higher the level of competence beliefs, the higher the level of effort, stamina and negativity are seen to be high. Self-efficacy beliefs are expressed to affect the degree of stress and the work-related tension (Gülebağlan, 2003).

While it is expected from the education process to socialize the individuals in order to adapt to the norms, values and institutions of the society in which they live, at the same time, it provides them with some features such as knowing what, why and how to learn, producing new information, transferring the knowledge learned to new areas, criticizing, questioning, and defying against limitations (Kepenekçi, 2000).

Critical thinking is an information-based reasoning process. A critical thinker is aware of why and how he thinks, as well as other people's thinking processes (Doğanay & Ünal, 2006).

Individuals who have the ability to think critically, develop alternative perspectives, make effective decisions, become aware of undisclosed thoughts and be open, be independent, be aware of prejudices, search for different expressions of thoughts, capture the difference between proven facts and allegations, individuals who have many features such as testing the reliability of the resources (Seferoğlu and Akbıyık, 2006).

An important purpose of questioning is to assist students in teaching how to compare, parse, and generalize (Savage and Armstrong, 2000). Questioning is seen as a process in which problems or questions are created and students try to solve problems or find answers during the course (Wood, 2003). According to Maiorana (1992), critical thinking is achieving understanding and evaluating different perspectives. In his article entitled "Critical Thinking", Ennis (1985) describes critical thinking in the form of "making accurate evaluations about situations or problems, thinking creatively and reasonably with which we focus on deciding what we believe or do," and expresses the characteristics of critical thinking as follows:

“Searching for clear, understandable expressions of thesis and questions, investigating the causes, trying to have sufficient information, using and citing reliable sources, taking into account (considering) all situations, keeping the thought about the main point, keeping in mind the main theme, searching for different options, being open-minded, able to take the correct attitude or change when it is enough to make evidence and reasons, to research as much as the subject allows, to handle the parts of the complex in a regular manner, to use all critical thinking skills, to be sensitive to the feelings and knowledge levels of others ”. According to Demirel (2000), who stated that critical thinking, which has the above-mentioned characteristics, is based on the skills and tendencies of acquiring, evaluating and using information effectively, there are five basic dimensions of critical thinking:

Consistency: Critical thinker should be able to eliminate contradictions in thought.

Combination: Critical thinking should be able to handle all aspects of thought.

Applicability: The person should be able to apply what they understand by adding their experiences to a model.

Competence: A critical thinker should be able to sit firmly on his experiences and results.

Ability to Communicate: A person thinking critically should be able to convey what he understands in an understandable way by combining what he thinks.

Today, individuals are expected to have many qualifications in order to become an “information society”. These characteristics are stated as individuals' ability to know and apply trends such as researcher, inquisitive, creative and critical thinking (Güven & Kürüm, 2006). Thinking is defined as the mental product formed as a result of these processes with the process of analyzing, comparing and comparing information and generating other thoughts in order to reach a certain conclusion (MEB, 2016). It can be said that this mental product is constantly changing and developing as a peculiar quality to people.

It would not be wrong to say that there are situations in which critical thinking, mistakes and biases are beneficial for the nature of man. In particular, the lack of information in uncertainty institutions encountered and the time limitation, the shortcuts used, errors and biases that are often necessary to make decisions together with this uncertainty make them compatible. According to many researchers, such a mechanism is not only adaptive but also cognitively a feature that we bring ready (Tobena, A., Marks, I, and Dar, R. 1999). According to Beyer (1985), although there are many definitions of critical thinking, almost all of these definitions emphasize the ability / tendency to obtain, evaluate and use information effectively. Therefore, it is easier for an individual who can use critical thinking effectively to effectively evaluate the alternative solutions he / she has obtained through creative thinking in the solution of interpersonal problems, and to distinguish the alternatives that are likely to work, and their burning decreases. This situation can be seen as a factor that increases success in solving critical thinking problem (Kenç, 2004).

The tight bond within the fields of cognitive, affective and psychomotor learning, which are at the core of physical education and sports education institutions, makes critical thinking an indispensable element for these departments (Gillespie & Culpan, 2000). Critical thinking skills, which are dealt with in Physical Education lesson, are seen as the basic element of curriculum especially (Chen & Cone, 2003).

Countries that are capable of raising individuals with the skills (problem solving, critical and logical thinking and belonging) and features (criticizing, questioning, analyzing events in depth, having a broad perspective, problem solving ability and creative), today and in the future than other countries in competition. In addition, it is important that the teachers who will raise individuals with these characteristics have these features and develop themselves in this direction.

Considering the administrative process, the teachers and administrators who will graduate from the universities providing sports education should also have some qualities such as critical thinking, problem solving, logical thinking, using high imagination and creativity.

McBride (1992) defines critical thinking in physical education as “reflective thinking used to make defensive and logical decisions about a movement”. Therefore, the necessity of interacting with movement-oriented activities and cognitive difficulties makes critical thinking in the field of physical education extremely important (McBride Cleland, 1998). In physical education, the intense relationship between cognitive, affective and psychomotor domains makes critical thinking an indispensable component for physical education programs (Gillespie and Culpan, 2000).

In our country, critical thinking, creative thinking, problem solving, which is the primary target of physical education teaching programs, whose main purpose is to contribute to the physical, psychological, cognitive and social development of the individual, to participate in lifelong physical activities, and by learning by living and progressively, cognitive skills that require high level thinking, such as decision making. Although the time allocated to physical education lessons differs in primary and high school education programs, critical thinking skills become part of the curriculum and the aim of the physical education lesson unites in common (MEB, 2007).

Unfortunately, students cannot be expected to acquire and use their critical thinking skills on their own. From this point of view, the role of physical education teachers is crucial.

The students' acquiring and developing these skills can be provided with the help of education and instruction that will be applied by the teacher (Chen & Cone, 2003). Teachers should be willing to encourage and develop critical thinking by creating the cognitive dissonance needed. At the same time, he should give up the responsibility of analyzing, evaluating and giving direct feedback to the student; instead, it should offer students opportunities to question and encourage students to collaborate amongst themselves to improve critical thinking. If students are expected to be individuals who can think critically effectively, firstly, teachers should be models to students as individuals with critical thinking disposition and skills (McBride, 1992; Loughran, 2002; McBride & Cleland, 1998).

2. Method

2.1 Research Method

In the research, it was sought to determine the relationship between preservice teachers' self-efficacy beliefs and critical thinking tendencies. The research conducted in the context of this purpose is a correlational research. Correlational research method provides the opportunity to explain the relationships between variables and predict the results (Fraenkel, Wallen, and Hyun, 2012). Within the framework of the correlational research model, it is aimed to establish a structural equation modeling consisting of observed and latent variables to investigate predictive relationships. The representation of the structural model is given in Figure 1 and the representation of the measurement model is given in Figure 2.

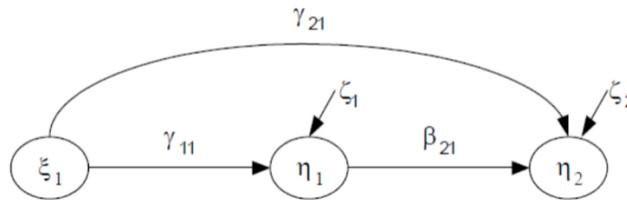


Figure 1. Structural Equation Modeling

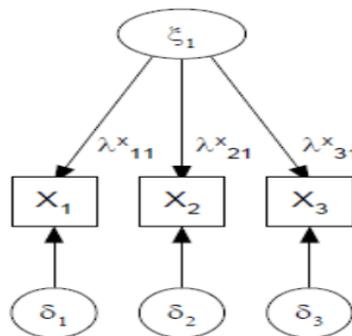


Figure 2. Measurement Model

The graphic representation of the structural equation modeling based on research hypotheses is given in Figure-3.

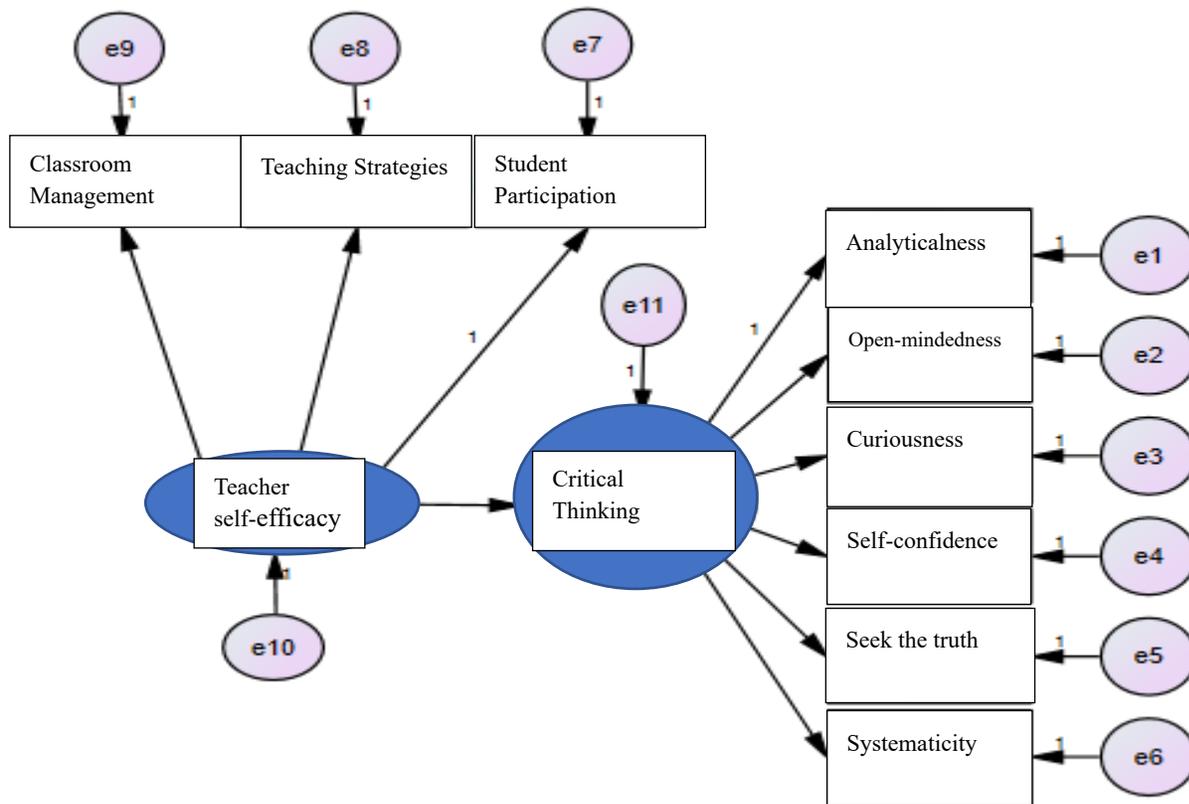


Figure 3. Graphical Representation of Preservice Teachers' Self-Efficacy Levels and the Relationship Between Critical Thinking Trends

2.2 Participants

640 preservice physical education teachers (54.7% (350) are male and 45.3% (290) are female) studying at different universities participated in the research. The cities where the preservice teachers are involved in the research and the universities where they are educated are; It consists of 8 provinces including Bartın, Bolu, Çorum, Düzce, Karabük, Kastamonu, Sinop, Zonguldak and the number of preservice teachers studying at universities in each province is 12.5% (80) students per province. When the distribution of preservice teachers' high school types examined, 38.4% (246) are general high school graduates, 31.6% (202) Anatolian and science high school graduates and 30.0% (192) vocational high school graduates.

2.3 Data Collection Tool

Within the scope of the research, "California Critical Thinking Scale (CCTDI)" and "Teacher Self-Efficacy Scale" were used to obtain the data collected from preservice teachers.

2.3.1 California Critical Thinking Scale (CCTDI)

The California Critical Thinking Tendency Scale emerged in 1990 as a result of the Delphi project organized by the American Philosophical Association. The scale has 7 sub-scales that are theoretically determined and tested psychometrically, but the scoring system consisting of the total of these scales is used to determine the critical thinking disposition. While the internal consistency coefficients (alpha) of the California Critical Thinking Tendency Scale subscales ranged from .60 to .78, the internal consistency coefficient of the scale was found to be .90 (Kökdemir, 2003). The adaptation study of the scale into Turkish was done by Kökdemir (2003) on 913 students. As a result of item total score correlation and principal components analysis, the scale was reduced from 75 items to 51 items and 7 factors to 6 factors. While the internal consistency coefficients (alpha) for the sub-factors of the new scale ranged from .61 to .78, the internal consistency coefficient of the scale was found to be .88. The total variance

explained by the scale was found to be 36.13%. The fit index values of the measurement model of the six-factor structure of the California critical thinking disposition scale are shown in Table-2.

Table 2. Fit Index Values for the California Critical Thinking Scale Measurement Model

Fit Indices	Structural Equation Modeling	Perfect Fit	Acceptable Fit	Results
$\chi^2 / (df)$	40,57/(9)=4,51	$0 \leq \chi^2 \leq 3$	$3 < \chi^2 \leq 5$	Acceptable Fit
RMSEA	0.074	$0 \leq RMSEA \leq 0,05$	$0,05 < RMSEA \leq 0,08$	Acceptable Fit
TLI/NNFI	0.97	$0,97 \leq TLI \leq 1,00$	$0,95 \leq TLI < 0,97$	Perfect Fit
CFI	0.98	$0,97 \leq CFI \leq 1,00$	$0,95 \leq CFI < 0,97$	Perfect Fit
NFI	0.98	$0,95 \leq NFI \leq 1,00$	$0,90 \leq NFI < 0,95$	Perfect Fit
AGFI	0,95	$0,90 \leq AGFI \leq 1,00$	$0,85 \leq AGFI < 0,90$	Perfect Fit
GFI	0,98	$0,95 \leq GFI \leq 1,00$	$0,90 \leq GFI < 0,95$	Perfect Fit

Considering the Table-2, when looking at the fit index values of the 1st Level 6 factor measurement model related to the critical thinking tendencies of preservice teacher, this value was calculated as 4.51 and since the value was less than 5, the acceptable fit was It appears to have an index (Byrne, 2013). Looking at the RMSEA fit index, it has an acceptable fit index with a value of 0.074. When TLI / NNFI, CFI, NFI, AGFI and GFI values are examined, it is seen that it has a perfect fit index value (Schermelleh-Engel, Moosbrugger & Müller, 2003). According to the data collected from preservice teachers in general, it is seen that when the fit index values of the measurement model established on California critical thinking scale are examined, the model is verified.

2.3.2 Teacher Self-efficacy Scale

In the study, data related to the self-efficacy of prospective teachers were collected by the “Teacher Self-Efficacy Scale” prepared by Tschannen-Moran and Hoy (2001). The Turkish adaptation of the scale was performed by Çapa, Çakıroğlu and Sarıkaya (2005). The scale includes 24 items in 9-point Likert type. The scale was developed as three sub-factors and 8 items were named as “Self-Efficacy for Student Participation”, 8 items were named as “Self-Efficacy for Teaching Strategies” and 8 items were “Self-Efficacy for Classroom Management”. The fit index values of the measurement model of the three-factor structure of the teacher self-efficacy scale are shown in Table-3.

Table 3. Fit Index Values of the Measurement Model Related to Teacher Self-Efficacy Scale

Fit Indices	Structural Equation Modeling	Perfect Fit	Acceptable Fit	Results
$\chi^2 / (df)$	28,74/(6)=4,79	$0 \leq \chi^2 \leq 3$	$3 < \chi^2 \leq 5$	Acceptable Fit
RMSEA	0.077	$0 \leq RMSEA \leq 0,05$	$0,05 < RMSEA \leq 0,08$	Acceptable Fit
TLI/NNFI	0.97	$0,97 \leq TLI \leq 1,00$	$0,95 \leq TLI < 0,97$	Perfect Fit
CFI	0.97	$0,97 \leq CFI \leq 1,00$	$0,95 \leq CFI < 0,97$	Perfect Fit
NFI	0.97	$0,95 \leq NFI \leq 1,00$	$0,90 \leq NFI < 0,95$	Perfect Fit
AGFI	0,94	$0,90 \leq AGFI \leq 1,00$	$0,85 \leq AGFI < 0,90$	Perfect Fit
GFI	0,96	$0,95 \leq GFI \leq 1,00$	$0,90 \leq GFI < 0,95$	Perfect Fit

Considering the Table-3, when the compliance index values of the 1st Level 3-factor measurement model established regarding the teacher self-efficacy levels of the preservice teacher are analyzed, the $\chi^2 / (df)$ value is calculated as 4.79 and it is less than 5, so the acceptable fit index is it appears to have (Byrne, 2013). Looking at the RMSEA fit index, it has an acceptable fit index with a value of 0.077. When TLI / NNFI, CFI, NFI, AGFI and GFI values are examined, it is seen that it has a perfect fit index value (Schermelleh-Engel, Moosbrugger & Müller, 2003). According to the data collected from preservice teachers in general, it is seen that the model is verified when the fit index values of the measurement model established on the teacher self-efficacy scale are examined.

2.4 Data Analysis

The data collected in accordance with the purpose of the research were processed in the SPSS-25 statistics program. After the lost data of the data were examined, the mahalobis distances of the data distribution were examined. No inappropriate data was found. Structural equation modeling analyzes were carried out using the data collected from 640 participant groups using the AMOS-25 package program. Within the scope of the research, the criteria determined by Schermelleh-Engel, Moosbrugger and Müller (2003) and Byrne (2013) were taken into consideration in order to evaluate the goodness of fit indices related to measurement and structural models obtained as a result of structural equation modeling.

3. Findings

Findings regarding the structural equation model of the relationship between preservice teachers' self-efficacy levels and critical thinking skills:

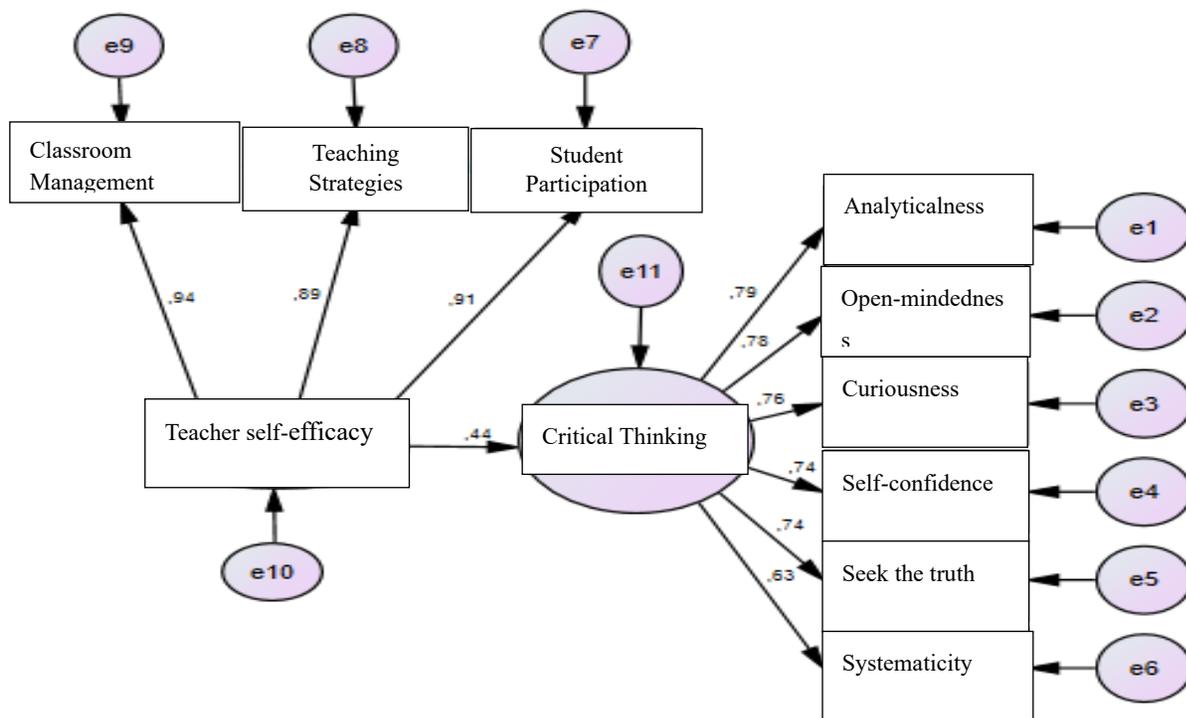


Figure 4. Structural Equation Model for the Relationship Between Preservice Teachers’ Self-efficacy Levels and Critical Thinking Tendencies

It is seen that the p value, which is the significance value of t statistical values of all the ways of structural equation model established to reveal the relationship between teacher self-efficacy and critical thinking tendencies given in Figure-4, is meaningful at 0.01 level, that is, all the ways established in the model are defined. The fit index values related to the structural equation model established with the data obtained from preservice teachers are shown in Table-4.

Table 4. Fit Index Values Regarding the Structural Equation Model Established with the Data of Preservice Teachers

Fit Indices	Structural Equation Modeling	Perfect Fit	Acceptable Fit	Results
$\chi^2 / (df)$	87,92/(26)=3,38	$0 \leq \chi^2 \leq 3$	$3 < \chi^2 \leq 5$	Acceptable Fit
RMSEA	0.061	$0 \leq RMSEA \leq 0,05$	$0,05 < RMSEA \leq 0,08$	Acceptable Fit
TLI/NNFI	0.97	$0,97 \leq TLI \leq 1,00$	$0,95 \leq TLI < 0,97$	Perfect Fit
CFI	0.98	$0,97 \leq CFI \leq 1,00$	$0,95 \leq CFI < 0,97$	Perfect Fit
NFI	0.97	$0,95 \leq NFI \leq 1,00$	$0,90 \leq NFI < 0,95$	Perfect Fit
AGFI	0.95	$0,90 \leq AGFI \leq 1,00$	$0,85 \leq AGFI < 0,90$	Perfect Fit
GFI	0.97	$0,95 \leq GFI \leq 1,00$	$0,90 \leq GFI < 0,95$	Perfect Fit

When Table-4 is examined, $\chi^2 / (df)$ value is calculated as 3.38 and it is seen that it has an acceptable fit index since it is less than 5 (Byrne, 2013). Looking at the RMSEA fit index, it has an acceptable fit index with a value of 0.061. When TLI / NNFI, CFI, NFI, AGFI and GFI values are examined, it is seen that it has a perfect fit index value (Schermelleh-Engel, Moosbrugger, & Müller, 2003). When the fit index values of the structural equation model established with the data collected from preservice teacher in general are examined, it is seen that the model is confirmed. Findings regarding the established structural equation model can be seen in Table-5.

Table 5. Paths to the Variables Related to the Structural Equation Modeling Established

Variables	Teacher Self-efficacy		
	Direct Effect	Indirect Effect	Total Effect
Critical Thinking Tendency	0,440	---	0,440
Analyticalness	---	0,349	0,349
Open-mindedness	---	0,345	0,345
Curiousness	---	0,334	0,334
Self-confidence	---	0,325	0,325
Seek to truth	---	0,326	0,326
Systematicity	---	0,278	0,278

When Table-5 is examined, the direct effect of per-service teachers' self-efficacy levels on critical thinking tendencies was calculated as 0.44. Since the preservice teachers' self-efficacy levels do not have an indirect effect on their critical thinking tendencies, the total effect explains 0.44%, 44%. It was determined that preservice teachers' self-efficacy does not have a direct effect on the sub-factors of the critical thinking disposition scale, but it has an indirect effect on the scale in general. When these indirect effects are examined, the indirect effect of per-service teachers' self-efficacy on analyticality sub-factor is 0.35, indirect effect on open minded sub-factor is 0.35, indirect effect on curiosity is 0.33, indirect effect on self-confidence is 0, In 33, the indirect effect on seeking the truth was calculated as 0.33 and the indirect effect on systematicity as 0.28. It is seen that the sub-factor indirectly explained by preservice teachers' self-efficacy levels is analytical and the least explained sub-factor is systematic.

4. Discussion and Result

Within the scope of the research, a structural equation model has been established to reveal the relationship and effect levels between the data collected from preservice teachers studying at universities and the levels of teaching self-efficacy and critical thinking. Before constructing the structural equation model, the previously defined structures of the scales were tested with measurement models. It was concluded that the fit index values of the measurement model of the six-factor structure of California critical thinking scale were confirmed, that is, the structure of the scale was confirmed on prospective teachers used in the research.

When the verification process of the three-factor structure of the teacher self-efficacy scale on the data collected from preservice teachers was examined, it was concluded that the fit index values of the established measurement model were confirmed by showing acceptable and perfect fit.

It was concluded that the measurement models forming the model were verified before the structural equality model established using the critical thinking scale and the teacher self-efficacy scale with the data collected from the preservice teachers.

Examining the fit index values of the structural equality model, which aims to reveal the relationship between preservice teachers' self-efficacy levels and critical thinking skills, was found to be acceptable and perfectly fit, that is, the established model was confirmed.

When the effect levels of the pathways that constitute the verified structural equation model are examined, it is concluded that the preservice teachers' self-efficacy levels have a direct and meaningful effect on critical thinking tendencies and that they can explain 44% of their critical thinking tendencies. It is concluded that the variable that will explain almost half of the critical thinking tendencies of preservice teachers is teacher self-efficacy.

When the indirect effects of preservice teachers' self-efficacy levels on the sub-factors of critical thinking tendencies were examined, it was determined that the sub-factor that was the most able to explain, that is, the sub-factor that had the most impact, was the sub-factor of analyticality and that it was the least explanatory, that is, the least factor. At the same time, preservice teachers' self-efficacy levels were found to indirectly significantly affect all sub-factors.

Based on the results of the discussion, it can be said that the critical thinking levels of students studying in physical education and sports teaching programs are similar to those studying in other teaching programs as well as students studying in non-teaching programs. It is necessary to consider not only the level of knowledge but also the personality traits of preservice teachers who choose the teaching profession. A high level of lifelong learning tendency of teachers and a high tendency in motivation dimension is a significant finding in terms of teaching profession. Because, the high motivation of teachers who are involved in education and training at all times against learning is very important in fulfilling their professional duties and demonstrating effective teaching skills. In the context of these results, the teachers participating in the research suggest that they tend to keep up with the age we live in today, when the phenomenon of change is constantly being improved.

As a result of the researches, when the personality traits of those who have "Problem Solving Skill" are examined; It was seen that they had the sense of "self-confidence" and the ability to think creatively with an objective perspective (Owens, 2001; Hair, 2003). The most effective way to include applications for the development of students' self-efficacy levels and problem-solving skills is that the education services offered to students are of high quality and support for real life (Altunçekiç, Yaman, & Koray, 2005).

Students can be directed to gain these trends through activities aimed at gaining critical thinking skills and inclinations by rethinking physical education and sports school programs that are being implemented in our country. For this purpose, the methods of asking questions to develop critical thinking, which will enable them to actively participate in the course by combining theory and practice, can be applied. In this regard, university students can be given the opportunity to become highly critical individuals.

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