Journal of Sports for All and Recreation

e-ISSN: 2687-6027

Research Article

Creative Thinking and Physical Education: A Study on the Creative Thinking Tendencies of Preservice Teachers

*Aykut ŞAHİN [1] Murat ŞAKAR [2]

[1] Munzur University, Faculty of Sport Sciences; Tunceli/Türkiye
[2] Munzur University, Faculty of Sport Sciences; muratsakar@munzur.edu.tr; Tunceli/Türkiye
* *Corresponding author: Aykut Şahin; aykutsahin@munzur.edu.tr*

Check for Updates

Academic Editor: Akan Bayrakdar

Received: 06.06.2026
Accepted: 20.08.2026
Published: 30.09.2026

Citation: Şahin, A., & Şakar, M. (2026). Creative thinking and physical education: a study on the creative thinking tendencies of preservice teachers. *Journal of Sport for All and Recreation, 8*(3), 330-343.

https://doi.org/10.56639/jsar.1965137

Copyright: © 2026 by the authors. This is an open access article distributed under the terms and conditions of the Creative Commons Attribution–NonCommercial (CC BY-NC 4.0) license (https://creativecommons.org/licenses/by-nc/4.0/).

Abstract: This study was conducted to determine the creative thinking (CT) tendencies of physical education and sports (PES) teacher candidates and to analyze the effects of various demographic variables on these tendencies. The study sample consisted of 365 PES teacher candidates enrolled in the faculties of sports sciences at various state universities in Turkey. The "Marmara Creative Thinking Tendencies Scale" (MCTTS), consisting of six subscales, was used as the data collection tool in the study. The analysis results revealed that the prospective teachers' overall CT tendencies clustered at a high level (X̄=96.47). In analyses conducted by variable, a marginal difference in favor of first-year students was detected in the curiosity dimension based on class level. The most striking finding of the study was a statistically significant difference in favor of large cities (d > b) in the courage sub-dimension based on place of birth and upbringing ($p < 0.05$). In contrast, no significant differences were found in total scores or sub-dimensions based on gender or the type of sport actively practiced (individual/team). The findings indicate that the cultural capital provided by the place of residence plays a decisive role in the development of creative potential and the courage to take risks. Consequently, curriculum revisions focused on "non-linear pedagogy" and "game-based learning" are necessary in physical education faculties to support the tendencies toward courage and innovation among candidates, particularly those from rural and district backgrounds. These revisions are a strategic necessity to enhance the cognitive agility of future teachers.

Keywords: Cognitive flexibility, courage, cultural capital, sports pedagogy, creativity disposition.

1. Introduction

PES teacher candidates' tendencies toward creativity are shaped by the multidimensional interaction of innovative pedagogical approaches, the quality of teacher training processes, individual psychological dynamics, and technology-supported learning ecosystems. Contemporary educational paradigms confirm that integrating inquiry-based teaching models into the physical education context plays a catalytic role in activating the creative cognitive mechanisms of both students and future educators. Indeed, as highlighted by Dupri et al. (2021), the prerequisite for triggering students' participation in CT processes in PES classes is for teachers to adopt flexible and innovative approaches in their teaching methods as an internal inclination. This dynamic aligns directly with Özkal's (2014) conceptualization, which bridges the gap between pre-service teachers' pedagogical behaviors that foster creativity and their self-efficacy beliefs. Furthermore, this conceptualization underscores the priority of teacher quality in the construction of a creative climate.

The sustainability of this pedagogical transformation is closely linked to the epistemological beliefs and personality architecture that nurture pre-service teachers' creative teaching skills. Deng et al. (2020) argue that core personality traits, such as openness to experience and psychological resilience, directly support PES teachers in developing original and creative practices in complex educational settings. Similarly, Xiong et al. (2020) have shown that teachers'

perceptions of self-efficacy regarding creative teaching are not a static phenomenon but can be optimized through institutional and environmental support mechanisms. Therefore, the dynamic synthesis between individual character orientations and the educational context is the primary determinant of the creative performance that teacher candidates will exhibit in the face of complex pedagogical scenarios.

Curriculum designs and micro-pedagogical strategies, in turn, constitute the practical manifestations of this theoretical framework in the field. For example, the integration of kinesthetic and artistic disciplines such as creative dance into the PES curriculum simultaneously deepens candidates' creative expressions manifested through movement and their physical literacy (Ørbæk & Engelsrud, 2020). Similarly, inclusive approaches such as the *"Sports Education Model"* which centers student autonomy and democratic participation, enhance teacher candidates' intrinsic motivation and professional commitment, thereby making their creative potential visible (Tendinha et al., 2021). Indeed, while Jin and Song (2019) place the development of innovative skills at the core of quality-focused modern educational strategies, Kaplan (2019) emphasizes the necessity of teacher candidates receiving structured creativity training to translate this theoretical foundation into concrete designs.

With the era of digital transformation, technology integration and applied experiential learning are redefining the new epistemological boundaries of creativity in PES teacher education. Fouda (2016) emphasizes that e-portfolio applications based on collaboration trigger reflective thinking and peer learning among teacher candidates, thereby enriching their creative teaching repertoires. This is further supported by the study by Calderón et al. (2021), which highlights the enriching and creativity-enhancing role of blended learning approaches in teacher training programs. Ultimately, all this digital and theoretical knowledge is refined in the field through practical teaching experiences, educational competitions, and experimental workshops (Yu & Yang, 2023). It is crucial to integrate innovative pedagogies, technological tools, and practical experiences into teacher education programs as priority policies through a holistic approach. These policies will support future PES teachers in overcoming the dynamic and unpredictable teaching challenges they will face in their professional lives through creative strategies.

1.1. The Trend Toward CT in the 21st-Century Education Paradigm

The global educational landscape of the 21st century is witnessing a fundamental paradigm shift, focusing not merely on the transmission of knowledge but on how knowledge is restructured and how original solutions are devised for complex problems (Ulu-Kalin & Kumandaş-Öztürk, 2024; Suyono et al., 2025). Modern educational philosophy has evolved into a humanistic model that centers on the individual's capacity for *"self-actualization"* and *"innovation"* moving away from the homogenizing approaches inherited from the Industrial Revolution era (Şahin Zeteroğlu et al., 2012; Lamanauskas, 2023). In this transformation process, creativity is no longer positioned as a mystical talent exclusive to artists or geniuses, but rather as a strategic *"human capital"* and *"currency of the age"* that every individual can develop within appropriate pedagogical ecosystems (Tocci et al., 2022; Kell et al., 2013). Particularly in teacher education policies, creativity is recognized not merely as a teaching technique but as the most fundamental competency for a teacher to become a cognitive and social architect for students (Özgenel & Çetin, 2017; Aydeniz, 2017).

Theoretical discussions on the creative potential of teacher candidates deepen the distinction between the *"skill"* and *"disposition"* dimensions of the concept. Sungur (1997, p. 31) defines education as *"a process of cultivating individuals capable of innovation, rather than merely repeating what has been done before."* He further argues that the success of this process depends on teachers internalizing creativity as a professional identity. Tishman and Andrade (1996), on the other hand, describe CT as a state of *"readiness"* and *"willingness"* toward specific intellectual behaviors. At this point, the tendency toward CT refers to the individual's motivational and attitudinal readiness to translate their cognitive capacity into action (Özgenel & Çetin, 2017). Therefore, structuring teacher education curricula around concepts such as *"uncertainty management"* and *"creative self-efficacy"* is essential for the sustainability of modern education systems (Aslan & İnce, 2025; Xiong et al., 2020).

Metaphorical and phenomenological studies on pre-service teachers' perceptions of creativity indicate that they generally define creativity as *"producing different, extraordinary, and original works"* (Şahin Zeteroğlu et al., 2012). However, contemporary literature has shifted from a product-oriented definition of creativity to a process-oriented one. Piaget's emphasis on the *"observing mind"* and *"rejection"* highlights the dimensions of critical thinking and curiosity underlying creativity. Maslow (1959), on the other hand, notes that creativity manifests not only in concrete products but also in character traits and attitudes toward life (as cited in Sungur, 1997). In this context, future teachers must view

creativity as a dynamic mental agility; this is a prerequisite for them to demonstrate behaviors that foster creativity in their classrooms (Aslan & İnce, 2025; Özkal, 2014).

1.2. The Epistemological and Practical Role of Creativity in PES Education

Physical education offers a unique disciplinary field where creativity is manifested simultaneously at both the mental and motor (physical) levels. While traditional sports pedagogy structures lessons as the mechanical repetition of closed skills (such as the precise execution of a technical stroke), modern approaches center on the concepts of *"kinesthetic intelligence"* and *"tactical creativity"* (Alipour et al., 2023; Memmert, 2011). PES classes are, by their very nature, a dynamic problem-solving laboratory that requires decision-making under constantly changing environmental, opponent, and team constraints (Cengiz et al., 2023; Tocci et al., 2022). In this process, motor creativity is defined as the capacity to generate innovative, original, and context-appropriate solutions for a movement task (Tocci et al., 2022).

Neuropedagogical research examining the relationship between physical activity and cognitive processes demonstrates that movement education optimizes executive functions and cognitive flexibility by activating the brain's prefrontal cortex (Tocci et al., 2022). This makes creativity a *"learning outcome"* for PES teacher candidates. For example, Ørbæk and Engelsrud (2020) argue that incorporating creative dance into the PE curriculum allows students to develop their physical skills while simultaneously enabling them to express themselves uniquely through movement. Similarly, models such as the *"Sports Education Model"* and *"Understanding-Based Game Teaching"* enhance student autonomy and tactical awareness. This enables the candidate to assume the role of a facilitator and game designer rather than merely a knowledge transmitter (Tendinha et al., 2021; Alipour et al., 2023).

For PES teacher candidates, creativity in their professional lives is the ability to design effective learning environments even under limited resources—such as a lack of materials—and to adapt lesson plans on the fly to accommodate heterogeneous student groups (Saputro et al., 2023). According to research, programs known as *"disjointed motor learning"* develop students' both motor skills and imagination far more effectively than traditional methods (Büning & Lausberg, 2023). These findings demonstrate that it is vital for PES teacher candidates to become proficient in *"uncertainty management"* and *"non-linear pedagogy"* in order to raise generations with high physical literacy and cognitive agility (Rudd et al., 2021; Tocci et al., 2022).

1.3. Components of CT: MCTTS Dimensions and Professional Implications

The six core dimensions defined within the MCTTS framework represent the mental toolkit that PES teacher candidates need to build their professional identities (Özgenel & Çetin, 2017). Each of these dimensions is directly related to the dynamic nature of physical education. These are:

- Novelty Seeking: The individual's tendency to step outside routines and experiment with new ideas (Özgenel & Çetin, 2017). For PES teacher candidates, this reflects the vision of moving beyond traditional training models to integrate STEM, creative drama, or digital technologies into their lessons (Cengiz et al., 2023; Fouda, 2016).
- Courage: The capacity to take risks without fear of making mistakes and to defend one's original ideas (Özgenel & Çetin, 2017). This dimension pertains to a teacher candidate's willingness to take the risk of failure when trying out an unconventional game in the classroom and to think independently of authority pressure (Aslan & İnce, 2025; Cengiz et al., 2023).
- Self-discipline: The focus and determination required to bring the creative process to a successful conclusion (Özgenel & Çetin, 2017). This dimension, which aligns with the training discipline inherent in sports, ensures that a project or lesson design is not abandoned in the face of challenges (Saputro et al., 2023; Özenli & Yakıcı, 2025).
- Curiosity: It is the desire to question the environment, seek knowledge, and the passion for discovery (Özgenel & Çetin, 2017). In the context of PES, it encompasses a wide range of activities, from understanding why a movement is performed in a certain way to discovering the student's individual needs (Özgül, 2020; Şahin Zeteroğlu et al., 2012).
- Doubting: The tendency not to immediately accept given information, to subject it to critical scrutiny, and to seek evidence (Özgenel & Çetin, 2017). This enables candidates to challenge pedagogical taboos by asking questions such as, *"Why is this skill taught only in this way?"* (Aslan & İnce, 2025).

- Flexibility: The ability to view events from different perspectives and adapt quickly to changing circumstances (Özgenel & Çetin, 2017). It is the ability to identify a PES teacher's capacity to adjust the flow of a lesson based on immediate variables such as weather conditions, material constraints, or student motivation (Tocci et al., 2022; Alipour et al., 2023).

1.4. Research Gaps in the Literature and a Synthesis of Existing Studies

An examination of the literature on pre-service teachers' CT tendencies (2015–2025) reveals that candidates generally score *"high"* or *"above average"* (Aslan & İnce, 2025; Özenli & Yakıcı, 2025). However, beneath this general trend, there is significant inconsistency and disagreement regarding the effects of demographic variables. For example, the gender variable is one of the most debated areas in the literature. While some studies argue that female teacher candidates have higher scores in innovation seeking and flexibility, and that female exhibit behaviors that encourage creativity in their classrooms more frequently (Aslan & İnce, 2025; Özenli & Yakıcı, 2025); other studies have found no significant differences between genders (Kozikoğlu & Küçük, 2020; Özgenel & Çetin, 2017). In fact, some sports-focused studies suggest that male candidates may have an advantage in activating tactical decision-making and problem-solving networks (Cengiz et al., 2023).

The class level variable also carries similar uncertainty. Responses to the question of whether university education fosters creativity are polarized. While some studies report that fourth-year students possess a more positive perception of creativity due to their professional knowledge base (Şahin Zeteroğlu et al., 2012), others argue that first-year students score the highest and that this trend diminishes in upper-level classes due to academic pressures (Özenli & Yakıcı, 2025). This situation is discussed in the literature with the warning that *"academic standards stifle the courage to generate original ideas"* (Aslan & İnce, 2025).

Specifically within the field of PES, the impact of the sport discipline the candidate actively engages in (individual or team sports) on the sub-dimensions of creativity has not yet been sufficiently elucidated. While it is hypothesized that team sports foster collaboration-based problem-solving and tactical flexibility, whereas individual sports enhance self-discipline and focus (Özgenel & Çetin, 2017), comprehensive analyses are needed regarding the interaction of these hypotheses with multi-layered demographic variables. Additionally, the *"cultural capital"* derived from the participant's place of birth and upbringing, and its relationship with dimensions of courage and innovation-seeking, stands out as a significant research gap in the Turkish sample (Özgül, 2020; Suyono et al., 2025).

1.5. Problem Statement and Research Objective

Physical education and sports science education aims to cultivate students into leaders capable of making cognitively agile decisions. However, the current literature's failure to address the CT profiles of physical education teacher candidates within the intersectionality of demographic variables (gender, discipline, grade level, place of residence) poses a risk to the pedagogical future of this field. This study aims to fill this gap by conducting an in-depth analysis of future PES teachers' profiles within the MCTTS framework, specifically examining their levels of self-discipline, innovation-seeking, courage, curiosity, skepticism, and flexibility.

The primary objective of this study is to identify the CT tendencies of PES teacher candidates and to reveal how these tendencies vary according to variables such as gender, grade level, active sports discipline, and place of birth and upbringing. The study not only seeks to identify the current levels of creativity among candidates but also aims to develop more flexible and effective teacher training strategies that support creativity for sports science faculties, based on the findings. It is expected that the data obtained will provide a theoretical foundation for closing the *"creativity-behavior gap"* in educational curricula and contribute original value to the literature.

2. Materials and Methods

2.1. Research Model

This study was conducted to identify the CT tendencies of prospective PES teachers and to examine whether these tendencies vary according to various demographic variables. The study was designed using a descriptive survey model, which aims to describe a past or current situation as it exists. Additionally, the correlational survey model was used to examine the relationships between the subdimensions of prospective teachers' CT tendencies and their relationships with demographic variables. Correlational studies make it possible to determine the existence or degree of variation between variables and to make predictions based on these relationships (Karasar, 2020; Büyüköztürk et al., 2010).

2.2. Research Group

The population of the study consists of students enrolled in PES teacher education programs at universities in Turkey. The sample comprises 365 prospective PES teachers enrolled at four different state universities (Adıyaman University, Fırat University, İnönü University, and Munzur University) during the 2025–2026 academic year, selected via convenience sampling—a type of purposive sampling method. The convenience sampling method was chosen because it offers the researcher time and cost savings and facilitates access to participants (Büyüköztürk et al., 2010; Patton, 2015). Voluntary participation was the basis for including participants in the study, and prior to the data collection process, participants were provided with the necessary information regarding the purpose of the study and data confidentiality.

The sample size of the study (N=365) was evaluated in terms of the power and reliability of the statistical analyses to be conducted. In quantitative research and studies employing scale-based multivariate analyses (t-test, ANOVA, etc.), a sample size exceeding 300 is considered a statistically *"good"* and *"sufficient"* criterion (Comrey & Lee, 1992; George & Mallery, 2016; Tabachnick & Fidell, 2013). In this regard, it can be stated that the 365 participants reached provide a sufficient sample size for the study's statistical analysis, subscale comparisons, and representativeness of the population.

Table 1. Frequency and Percentage Distributions of Pre-service Teachers' Demographic Characteristics

Variables	Categories	f	%
Gender	Female	159	43.6
	Male	206	56.4
	Total	365	100.0
Grade Level	1st Grade	120	32.9
	2nd Grade	98	26.8
	3rd Grade	63	17.3
	4th Grade	84	23.0
	Total	365	100.0
Sport	Individual	156	42.7
	Team	209	57.3
	Total	365	100.0
Place of Birth and Upbringing	Village/Town	63	17.3
	County	100	27.4
	City	113	31.0
	Metropolitan	89	24.4
	Total	365	100.0

The distribution results regarding the demographic characteristics of the PES teacher candidates participating in the study are presented in Table 1. Male teacher candidates (f=206) constitute 56.4% of the participants, while female teacher candidates (f=159) constitute 43.6%. When examining the grade level variable, it was determined that 32.9% (n=120) of the sample were in the first grade, 26.8% (n=98) in the second grade, 17.3% (n=63) in the third grade, and 23.0% (n=84) in the fourth grade. Looking at the distribution of sports disciplines in which the teacher candidates are actively involved, it was observed that 57.3% (n=209) participate in team sports, while 42.7% (n=156) engage in individual sports. Finally, based on the characteristics of the participants' places of birth and upbringing, the highest proportion (31.0%) was found among candidates who grew up in city centers (f=113), followed by those in districts (27.4%, f=100), 24.4% in metropolitan areas (f=89), and 17.3% in villages/towns (f=63).

2.3. Data Collection Tools

A two-part form was used as the data collection tool.

2.3.1. Demographic Information Form

Developed by the researcher, this form consists of a total of 4 questions aimed at determining the demographic characteristics of teacher candidates, such as gender, grade level, active sport discipline, and the settlement where they were born and raised.

2.3.2. MCTTS

The scale, developed by Özgenel and Çetin (2017), consists of 25 items structured on a 5-point Likert scale (1: Never, 5: Always). The scale comprises a total of six subscales: self-discipline (5 items), novelty seeking (8 items), courage (4 items), curiosity (3 items), doubting (2 items), and flexibility (3 items). The lowest possible score on the scale is 25, and the highest is 125. High scores on the scale indicate that the individual has a strong CT tendency. In the scale's original form, the Cronbach's Alpha reliability coefficient was reported as 0.87. In the analyses conducted within the scope of this study, the scale's overall reliability coefficient was calculated as 0.93.

2.4. Data Collection Process

Data were collected from teacher candidates enrolled at the specified universities via [online / in-person] survey forms. Prior to the study, participants were assured that the forms would be filled out anonymously, that the data collected would be used solely for scientific purposes, and that no personal identification information would be requested. Participants were given sufficient time to complete the forms.

2.5. Statistical Analysis

To determine the suitability of the data obtained in the study for analysis and whether it followed a normal distribution, the arithmetic mean, median, standard deviation, skewness, and kurtosis values were examined and presented in Table 2.

Table 2. Results of the Normality and Reliability Analysis of MCTTS General and Subscale Scores

Variables / Subdimensions	N	$\bar{X}$	SS	Skewness	Kurtosis	Cronbach's Alpha
Self-discipline	365	19.12	3.68	-0.82	0.95	0.78
Novelty seeking	365	30.57	5.23	-0.70	1.18	0.84
Courage	365	15.11	2.99	-0.48	0.32	0.70
Curiosity	365	11.98	2.03	-0.72	0.93	0.60
Doubting	365	7.71	1.57	-0.83	1.12	0.60
Flexibility	365	11.94	2.24	-0.93	0.91	0.70
MCTTS Total Score	365	96.46	15.29	-0.82	1.53	0.93

An examination of Table 2 reveals that skewness and kurtosis coefficients are considered the primary measures for assessing the normality of data in large samples. The analysis revealed that the skewness coefficients for the MCTTS total score and all subscales ranged from -0.48 to -0.93, while the kurtosis coefficients ranged from 0.32 to 1.53. In the literature, skewness and kurtosis values falling between -1.5 and +1.5 are considered strong evidence that the data exhibit a normal distribution (George & Mallery, 2016; Tabachnick & Fidell, 2013).

For the scale as a whole and its subscales, Cronbach's alpha internal consistency coefficients were found to range from 0.60 to 0.93. While the literature generally requires a reliability coefficient of 0.70 or higher, it is noted that values around 0.60 are also acceptable for subscales with a small number of items (Hair et al., 2010).

Based on these findings, it was determined that the data are normally distributed and possess sufficient reliability for analysis. For the differentiation analyses to be conducted based on demographic variables, it was decided to use the Independent Samples t-Test and One-Way Analysis of Variance (ANOVA) from among the parametric test methods.

2.6. Ethical Approval

The Non-Interventional Research Ethics Committee of Munzur University unanimously decided, via its decision dated January 30, 2025, and numbered E-30603717-050.04-2500007878, that the research complies with ethical principles. Within the scope of the study, participants were provided with the necessary information about the study, voluntary participation was the basis, and informed consent was obtained from the participants. The confidentiality of participants' personal information was protected, and the data collected was used solely for scientific purposes.

3. Results

In this section of the study, the results of the analyses based on the responses of PES teacher candidates regarding their CT tendencies are presented in tables. Descriptive statistical analyses, including arithmetic mean ($\bar{X}$) and standard deviation (SD) values, were conducted to determine the general level of CT tendencies among the PES teacher candidates included in the study, their participation in sub-dimensions, and the weights of their responses to scale items (Table 3).

Table 3. Descriptive Statistical Results Regarding the Total, Sub-Dimension, and Prominent Item Scores of the CT Tendencies Scale for Teacher Candidates

Variables and Items	N	Lowest	Highest	$\bar{X}$	SD
Self-Discipline Subscale	365	5.00	25.00	19.13	3.68
Novelty Seeking Sub-Dimension	365	8.00	40.00	30.58	5.23
Courage Sub-Dimension	365	4.00	20.00	15.12	2.99
Curiosity Sub-Dimension	365	3.00	15.00	11.99	2.04
Doubting Sub-Dimension	365	2.00	10.00	7.71	1.58
Flexibility Sub-Dimension	365	3.00	15.00	11.94	2.25
MCTTS TOTAL SCORE	365	25.00	125.00	96.47	15.30
Items with the Highest Scores:					
m10 “I enjoy engaging with events, situations, or tasks that pique my curiosity or interest”	365	1.00	5.00	4.14	0.91
m13 “I know my strengths and weaknesses.”	365	1.00	5.00	4.09	0.91
m3 “I feel a sense of responsibility to address the issue or incident that has arisen.”	365	1.00	5.00	4.01	0.93
Items with the Lowest Scores:					
m19 “I connect unrelated concepts or ideas for a new purpose.”	365	1.00	5.0	3.54	1.0
m23 “I don’t act hastily when making decisions about problems or situations.”	365	1.00	5.00	3.65	1.02
m25 “I’m not afraid to make mistakes.”	365	1.00	5.00	3.67	1.10

The results of the descriptive statistical analysis conducted on the total, sub-dimensions, and prominent items of the MCTTS for PES teacher candidates are presented in Table 3.

The mean total score obtained by participants on the scale was determined as $\bar{X}$=96.47 ± 15.30. Considering the scale’s maximum score (125.00) , it can be stated that PES teacher candidates’ CT tendencies generally cluster at a high level. When evaluated by subscales, it is noteworthy that teacher candidates exhibited the highest alignment in the “Seeking Novelty” ($\bar{X}$ = 30.58 ± 5.23) subscale and the relatively lowest alignment in the “Doubting” ($\bar{X}$ = 7.71 ± 1.58) subscale. The study found that the scale item with the highest response rate (highest score) among teacher candidates was item m10 ($\bar{X}$ = 4.14 ± 0.91).

This item was followed, in order, by item m13 ($\bar{X}$ = 4.09 ± 0.91) and item m3 ($\bar{X}$ = 4.01 ± 0.93). These high mean scores indicate that teacher candidates strongly embrace certain cognitive and behavioral tendencies that form the basis of the CT action. In contrast, it was determined that the item where teacher candidates were most hesitant and gave the relatively lowest mean score was item m19 ($\bar{X}$ = 3.54 ± 1.00).

The other items at the bottom of the list were, in order, items coded as m23 ($\bar{X}$=3.65 ± 1.02) and m25 ($\bar{X}$=3.67 ± 1.10). Notably, the fact that even the items for which teacher candidates gave the lowest scores were above the theoretical midpoint (3.00) on the 5-point Likert scale is another indication that the candidates’ overall perceptions of CT exhibit a consistently positive trend.

After determining the general levels of CT tendencies among PES teacher candidates, the study examined whether these tendencies differed according to various demographic characteristics.

In this context, an independent samples t-test was first applied to determine whether there was a statistically significant difference in the teacher candidates’ MCTTS total and subscale scores based on the gender variable (Table 4).

Table 4. Results of the t-Test for Teacher Candidates' CT Tendencies According to the Gender Variable

Scale and Subdimensions	Gender	N	X̄	SD	t	p
Self-discipline	Female	159	18.70	3.75	-1.943	0.053
	Male	206	19.46	3.60		
Novelty seeking	Female	159	30.30	5.20	-0.885	0.376
	Male	206	30.79	5.26		
Courage	Female	159	14.73	3.26	-2.175	0.030*
	Male	206	15.41	2.74		
Curiosity	Female	159	11.84	2.09	-1.205	0.229
	Male	206	12.10	2.00		
Doubting	Female	159	7.50	1.73	-2.184	0.030*
	Male	206	7.87	1.44		
Flexibility	Female	159	11.70	2.42	-1.832	0.068
	Male	206	12.13	2.09		
MCTTS Total	Female	159	94.78	16.02	-1.856	0.064
	Male	206	97.77	14.62		

**p<0.05*

According to the analysis results, it was found that there was a statistically significant difference based on gender in the subscales of courage [t=–2.175; p<0.05] and doubt [t=–2.184; p<0.05] of pre-service teachers' CT tendencies. Upon examining the arithmetic mean values, it was observed that male teacher candidates' tendencies toward both courage (X̄=15.41) and skepticism (X̄=7.87) were higher than those of female teacher candidates' tendencies toward courage (X̄=14.73) and skepticism (X̄=7.50). In contrast, no statistically significant differences were found based on the gender variable in the scale's subscales of self-discipline, novelty seeking, curiosity, and flexibility, as well as in the total MCTTS scores [t=–1.856; p>0.05]. An independent samples t-test was conducted to determine whether the CT tendencies and their subscales of the PES teacher candidates participating in the study showed a statistically significant difference based on the sport discipline they actively engage in (individual sports and team sports) (Table 5).

Table 5. Results of the t-test for Teacher Candidates' Physical Education Orientation Trends According to the Sport Discipline Variable

Scale and Subdimensions	Sport	N	X̄	SS	t	p
Self-discipline	Individual	156	19.19	3.63	0.256	0.798
	Team	209	19.09	3.72		
Novelty seeking	Individual	156	31.03	5.07	1.413	0.158
	Team	209	30.24	5.34		
Courage	Individual	156	15.20	3.00	0.461	0.645
	Team	209	15.05	2.99		
Curiosity	Individual	156	12.05	2.05	0.504	0.615
	Team	209	11.94	2.03		
Doubting	Individual	156	7.69	1.59	-0.276	0.783
	Team	209	7.73	1.57		
Flexibility	Individual	156	11.93	2.38	-0.095	0.924
	Team	209	11.95	2.15		
MCTTS Total	Individual	156	97.08	15.20	0.659	0.510
	Team	209	96.01	15.39		

Upon examining the analysis results, no statistically significant difference was found in the prospective teachers' total MCTTS scores [t=0.659; p>0.05] based on the variable of the sport they actively participate in. Similarly, it was found that the scores obtained from the scale's subdimensions of self-discipline, novelty seeking, courage, curiosity, skepticism, and flexibility did not show a significant difference based on whether the teacher candidates were involved in individual or team sports (p>0.05). This finding indicates that the CT tendencies of PES teacher candidates involved in individual and team sports are at similar levels. A one-way analysis of variance (ANOVA) was conducted to determine whether there was a statistically significant difference in the CT tendencies and their sub-dimensions of the

PES teacher candidates participating in the study based on the variable of the grade level they were enrolled in (1st grade, 2nd grade, 3rd grade, and 4th grade) (Table 6).

Table 6. Results of the One-Way Analysis of Variance (ANOVA) for Teacher Candidates' CT Tendencies According to the Grade Level Variable

Scale and Subdimensions	Grade Level	N	X̄	Ss	F	p	Tukey
Self-discipline	(a) 1st Grade	120	19.59	3.71	1.092	0.352	—
	(b) 2nd Grade	98	18.99	3.53			
	(c) 3rd Grade	63	18.63	4.02			
	(d) 4th Grade	84	19.00	3.54			
Novelty seeking	(a) 1st Grade	120	31.22	5.50	0.960	0.411	—
	(b) 2nd Grade	98	30.22	5.03			
	(c) 3rd Grade	63	30.06	5.25			
	(d) 4th Grade	84	30.46	5.06			
Courage	(a) 1st Grade	120	15.34	3.17	0.369	0.775	—
	(b) 2nd Grade	98	15.03	2.85			
	(c) 3rd Grade	63	15.06	2.89			
	(d) 4th Grade	84	14.93	2.99			
Curiosity	(a) 1st Grade	120	12.35	1.95	3.167	0.025*	a > b
	(b) 2nd Grade	98	11.64	2.08			
	(c) 3rd Grade	63	12.24	1.92			
	(d) 4th Grade	84	11.69	2.12			
Doubting	(a) 1st Grade	120	7.78	1.70	0.442	0.723	—
	(b) 2nd Grade	98	7.81	1.49			
	(c) 3rd Grade	63	7.57	1.78			
	(d) 4th Grade	84	7.62	1.34			
Flexibility	(a) 1st Grade	120	12.23	2.31	1.157	0.326	—
	(b) 2nd Grade	98	11.89	2.23			
	(c) 3rd Grade	63	11.84	2.07			
	(d) 4th Grade	84	11.67	2.28			
MCTTS Total	(a) 1st Grade	120	98.51	15.80	1.066	0.363	—
	(b) 2nd Grade	98	95.58	14.36			
	(c) 3rd Grade	63	95.41	15.60			
	(d) 4th Grade	84	95.37	15.38			

*$p<0.05$

Upon examining the analysis results, no statistically significant difference was found in the prospective teachers' total MCTTS scores or their scores on the subdimensions of self-discipline, novelty seeking, courage, skepticism, and flexibility based on the grade level they were teaching ($p > 0.05$). In contrast, it was found that the scores obtained from the curiosity subscale of the scale differed statistically significantly according to the teacher candidates' grade levels [$F=3.167$; $p<0.05$].

Upon examining the Tukey HSD multiple comparison analysis conducted to determine which groups accounted for this significant difference, it was found that the difference showed a borderline trend of significance ($p=0.051$) between first-year and second-year students. Upon examining the arithmetic means of the classes, it was observed that the curiosity tendencies of teacher candidates in the first class ($\bar{X}=12.35$) were higher than those of candidates in the second class ($\bar{X}=11.64$), and that the significant difference in the Curiosity dimension stemmed from this situation (a > b).

A one-way analysis of variance (ANOVA) was conducted to determine whether the CT tendencies and their sub-dimensions of the PES teacher candidates comprising the research group showed a statistically significant difference based on the variable of the place where they were born and raised (village/town, district, city, and metropolis) (Table 7).

Table 7. Results of the One-Way Analysis of Variance (ANOVA) for Teacher Candidates' CT Tendencies According to the Place of Birth and Upbringing Variable

Scale and Subdimensions	Place of Residence	N	X̄	Ss	F	p	Tukey
Self-discipline	(a) Village/Town	63	19.14	3.87	0.497	0.684	—
	(b) District	100	18.89	4.11			
	(c) City	113	19.03	3.52			
	(d) Metropolitan City	89	19.52	3.24			
Novelty seeking	(a) Village/Town	63	30.21	5.74	1.718	0.163	—
	(b) District	100	29.76	5.73			
	(c) City	113	30.90	4.99			
	(d) Metropolitan City	89	31.35	4.46			
Courage	(a) Village/Town	63	15.00	2.94	2.682	0.047*	d > b
	(b) County	100	14.67	3.05			
	(c) City	113	14.99	3.03			
	(d) Metropolitan City	89	15.85	2.81			
Curiosity	(a) Village/Town	63	11.83	2.43	0.649	0.584	—
	(b) District	100	12.01	2.03			
	(c) City	113	11.88	2.02			
	(d) Metropolitan City	89	12.22	1.75			
Doubting	(a) Village/Town	63	7.83	1.52	0.427	0.734	—
	(b) County	100	7.57	1.69			
	(c) City	113	7.73	1.67			
	(d) Metropolitan City	89	7.78	1.38			
Flexibility	(a) Village/Town	63	11.97	2.21	0.510	0.676	—
	(b) County	100	11.77	2.34			
	(c) City	113	11.90	2.41			
	(d) Metropolitan City	89	12.17	1.94			
MCTTS Total	(a) Village/Town	63	95.97	16.74	1.228	0.299	—
	(b) District	100	94.67	16.25			
	(c) City	113	96.42	15.19			
	(d) Metropolitan City	89	98.89	13.04			

**p<0.05*

Upon examining the analysis results, no statistically significant differences were found in the prospective teachers' total MCTTS scores or their scores on the subscales of self-discipline, novelty seeking, curiosity, skepticism, and flexibility based on the place where they were born and raised (p>0.05). The lack of statistically significant differences across most subscales based on the place of residence may be attributed to the structural and regional homogeneity of the universities where the data were collected. Since these institutions share similar academic and socio-cultural environments, the prospective teachers within the sample may exhibit relatively uniform cognitive and behavioral tendencies. In contrast, it was found that the scores obtained from the scale's courage subscale differed statistically significantly according to the variable of the location where the teacher candidates were born and raised [F=2.682; p<0.05]. As a result of the Tukey HSD multiple comparison analysis conducted to determine which groups accounted for this significant difference, it was determined that the difference was statistically significant in favor of metropolitan cities compared to districts (p=0.033). Upon examining the arithmetic mean values, it was observed that the courage tendency scores of teacher candidates who were born and raised in metropolitan cities (X̄=15.85) were significantly higher than those of candidates raised in district centers (X̄=14.67) (d > b).

4. Discussion

The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted. The findings of the study indicate that the overall mean score for CT tendencies among PES teacher candidates is 96.47 (± 15.30) and that this value clusters at a high level when the scale's ceiling score is considered. This finding is consistent with similar studies in the literature. For example, studies by Aslan and İnce (2025) and Özenli and Yakıcı (2025) also reported that teacher candidates' CT profiles were above the moderate level and high. Similarly, Kozikoğlu and Küçük (2020) identified teachers' CT tendencies as being at a high level. Specifically within

the field of PES, Yıldız et al. (2011) reported that PES students have strong perceptions of creativity. This high score can be interpreted as the requirements for *"uncertainty management"* and *"tactical flexibility,"* inherent in sports education, positively influencing the candidates' mental preparation processes (Alipour et al., 2023; Cengiz et al., 2023).

Upon examining item-level analyses, the highest participation was observed in the items *"I enjoy engaging with events, situations, or tasks that intrigue me or capture my interest"* (m10), *"I am aware of my own strengths and weaknesses"* (m13), and *"I feel a sense of responsibility to address emerging problems or events"* (m3). This high tendency in the curiosity dimension (m3 and m10) supports theoretical approaches that argue creativity is directly linked to *"a uniquely human power"* and a passion for discovery (Şahin Zeteroğlu et al., 2012). Additionally, the emphasis on self-awareness in item m13 aligns with *"metacognitive"* competencies, which indicate the ability of creative individuals to objectively assess their own capabilities (Saputro et al., 2023). However, it is noteworthy that the relatively lowest scores were concentrated in the items *"I relate unrelated concepts or ideas for a new purpose"* (m19), *"I do not act hastily when making decisions regarding problems or situations"* (m23), and *"I am not afraid of making mistakes"* (m25). This situation brings to mind the concept of *the "creativity-behavior gap"* discussed in the literature (Aslan & İnce, 2025). Although the participants generally perceive themselves as creative, it can be said that they struggle with emotional barriers such as the fear of making mistakes (m25) and higher-order cognitive processes such as synthesizing different ideas (m19). As noted by Şahin Zeteroğlu et al. (2012), traditional and authoritarian educational environments can trigger the fear of making mistakes, thereby suppressing *the "courage to generate original ideas*."

One of the most striking findings of the study is that male teacher candidates scored significantly higher than female candidates on the sub-dimensions of courage and skepticism. This finding diverges from the general trend in the literature suggesting *"no gender differences"* (Kozikoğlu & Küçük, 2020; Özenli & Yakıcı, 2025). However, it aligns with some studies specific to sports science. Cengiz et al. (2023) noted that male candidates may be more proactive in activating networks related to tactical decision-making and rule-based problem-solving. This difference in the courage dimension may stem from the traditional *"risk-taking"* expectations within sports culture exerting a more intense socialization pressure on male individuals (Cengiz et al., 2023).

Another finding—that men scored higher on the *"skepticism"* dimension—may reflect their more questioning attitude toward critically evaluating established pedagogical knowledge and asking, *"Why is this skill taught only in this way?"* (Aslan & İnce, 2025). However, this situation can be explained by the ongoing debate that female candidates demonstrate their creativity in a more emotional and relational dimension as *"fostering behavior,"* whereas men are more focused on *"cognitive risk-taking"* (courage) (Aslan & İnce, 2025). As noted in some meta-analyses in the literature, while male candidates tend to be more dominant in visual-spatial and motor creativity domains, socio-cultural factors play a decisive role in the motivation to transform this potential into a CT tendency.

In analyses conducted according to grade level, it was found that first-year students demonstrated a significant advantage over second-year students in the curiosity dimension (1st Year > 2nd Year). This finding aligns with literature warnings that the desire to explore and academic excitement at the beginning of university education may wane due to the intense academic workload, exam stress, and professional anxieties encountered in later years of education (Amabile, 1996; Özenli & Yakıcı, 2025). In the study conducted by Özenli and Yakıcı (2025), the higher creativity scores of first-year students compared to upperclassmen were interpreted as suggesting that academic standards may suppress the courage to generate original ideas over time.

When considered within the context of the PES curriculum, the first-grade students' *"curiosity about movement"* and *"excitement about discovering new sports"* may have entered a temporary lull upon encountering the more technical and rule-focused lessons in the second grade (Rudd et al., 2021). However, this situation contradicts the thesis in the literature *that "creativity increases with seniority"* (Kozikoğlu & Küçük, 2020). This discrepancy can be explained by the fact that the first-graders in our sample possess *"new generation (Generation Z)"* characteristics and have a higher speed of accessing information via digital tools (a curiosity trigger) (Suyono et al., 2025).

The most striking finding of the study is that candidates who were born and raised in a metropolis scored significantly higher on the courage subscale compared to those raised in district centers (Metropolis > District). This finding demonstrates that creativity and courage are not merely individual traits but structures shaped by *"social capital"* and *the "ecological environment"* (Saputro et al., 2023). The rich cultural infrastructure, access to a wide variety of sports, and social heterogeneity in metropolitan cities provide an ecosystem that nurtures an individual's tendency to *"be different"* and *"take risks"* (courage) (Özgül, 2020).

In contrast, the more homogeneous and traditional social structures in district or rural centers may suppress candidates' courage to step outside routines. As emphasized by Şahin Zeteroğlu et al. (2012), restrictive and overly structured environments stifle creativity. However, free and supportive environments trigger courage. The experience of *"coping with uncertainty"* brought about by growing up in a metropolis may directly influence the courage displayed by a PES teacher candidate when trying an unconventional game in the field or thinking independently of authority pressure (Özgenel & Çetin, 2017; Cengiz et al., 2023). When this situation is linked to *the "constraint-focused approach"* in physical education, it clearly demonstrates how environmental constraints (location) shape the candidate's mental set (Tocci et al., 2022).

Limitations

As a quantitative study, the results of this research have certain methodological limitations. First, the study is limited to participants selected through convenient sampling from specific state universities in Turkey. This limits the generalizability of the findings to all sports science faculties. Second, data were collected via the MCTTS based on *"self-report."* It should not be forgotten that there may be a creativity-behavior gap between the candidates' self-reporting of being *"creative"* on the scale and their actual behavior in the field. Finally, since the research was conducted using a cross-sectional design, the differences between grade levels reflect the current situation rather than a developmental process.

5. Conclusion

This study revealed that PES teacher candidates generally exhibit high levels of CT tendencies; however, this potential is significantly influenced by demographic and ecological variables. The study's findings indicate that male candidates are more prominent in the dimensions of courage and critical inquiry (doubting), that the cultural capital derived from growing up in a metropolis is a decisive factor in professional risk-taking (courage) skills, and that the sense of curiosity developed in the early years of academic education requires preservation in subsequent stages. From the perspective of PES teacher training policies, creativity should be positioned as a form of "professional capital" that ensures the teacher's cognitive agility and their role as a social architect.

In PES curricula at faculties, greater emphasis should be placed on *"non-linear pedagogy"* and *"game-based learning"* approaches to minimize candidates' *"fear of making mistakes"* (m25) (Tendinha et al., 2021). To support the *"courage"* and *"pursuit of innovation"* dimensions of teacher candidates, particularly those from rural and district centers, orientation programs and CT workshops that enhance social and cultural capital should be organized during the first years of university. *"Design Thinking"* models should be integrated into courses such as community service applications to develop candidates' ability to generate original solutions with limited resources (m19) (Cengiz et al., 2023).

Longitudinal studies should be conducted to track changes in students' creative tendencies from their first year of university through the early years of their professional careers (Ørbæk and Engelsrud, 2020). Findings of *"high creativity"* obtained through quantitative scales should be supported by qualitative observation and video analysis methods and compared with candidates' actual *"creative lesson delivery"* performance in the classroom (triangulation) (Tocci et al., 2022). The impact of new-generation tools such as digital creativity and exergames (active video games) on PES candidates' flexibility and pursuit of innovation should be examined (Saputro et al., 2023).

Author Contributions: *Conceptualization, A.Ş. and M.Ş.; methodology, A.Ş.; software, A.Ş.; validation, A.Ş. and M.Ş.; formal analysis, A.Ş.; investigation, A.Ş.; resources, A.Ş.; data curation, A.Ş.; writing—original draft preparation, A.Ş.; writing—review and editing, A.Ş.; visualization, A.Ş.; supervision, M.Ş. All authors have read and agreed to the published version of the manuscript.*

Funding: *This research received no external funding.*

Institutional Review Board Statement: *The study was conducted in accordance with the Declaration of Helsinki, and approved by the Non-Interventional Research Ethics Committee of Munzur University (protocol code E-30603717-050.04-2500007878 and date of approval: January 30, 2025).*

Informed Consent Statement: *Informed consent was obtained from all subjects involved in the study.*

Data Availability Statement: *The data presented in this study are available on reasonable request from the corresponding author.*

Acknowledgments: *The authors would like to thank all participants who voluntarily contributed to this study.*

Conflicts of Interest: *The authors declare no conflict of interest.*

Abbreviations

PES	Physical Education and Sports
CT	Creative Thinking
MCTTS	Marmara Creative Thinking Tendencies Scale
SD	Standard Deviation

References

Alipour, Z., Shamsipour Dehkordi, P., & Entezari, M. (2023). The effect of games based on divergent and convergent thinking on motor competence and creativity in children aged 7-8 years. *Acta Gymnica, 53,* Article e2023.003. https://doi.org/10.5507/ag.2023.003

Amabile, T.M. (1996). *Creativity In Context: Update To The Social Psychology Of Creativity* (1st ed.). Routledge. https://doi.org/10.4324/9780429501234

Aslan, B., & İnce, M. (2025). Teachers' creative thinking tendencies and their creativity-fostering classroom practices in STEM education. *Problems of Education in the 21st Century, 83*(4), 461-479. https://doi.org/10.33225/pec/25.83.461

Aydeniz, M. (2017). *Eğitim sistemimiz ve 21. yüzyıl hayalimiz: 2045 hedeflerine ilerlerken, Türkiye için STEM odaklı ekonomik bir yol haritası* [Politika raporu]. University of Tennessee, Knoxville.

Büning, C. & Lausberg, H. (2023), Divergent Motor Learning Programs Improve Motor and Figural Creativity in University Sports Students. *J Creat Behav, 57*, 661-673. https://doi.org/10.1002/jocb.609

Büyüköztürk, Ş., Kılıç Çakmak, E., Erkan Akgün, Ö., Karadeniz, Ş. & Demirel, F. (2010). *Bilimsel araştırma yöntemleri*. Ankara: Pegem Akademi. https://doi.org/10.14527/9789944919289

Calderón, A., Scanlon, D., MacPhail, A., & Moody, B. (2021). An integrated blended learning approach for physical education teacher education programmes: teacher educators' and pre-service teachers' experiences. *Physical Education and Sport Pedagogy, 26*(6), 562–577. https://doi.org/10.1080/17408989.2020.1823961

Cengiz, C., Güler, D., Güler, Y., & Tuncel, S. (2023). The effect of design thinking on the creative thinking of physical education and sports teachers. *African Educational Research Journal, 11*(1), 56-63. https://doi.org/10.30918/AERJ.111.23.009

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Lawrence Erlbaum Associates. https://doi.org/10.4324/9781315827506

Deng, Q., Zheng, B., & Chen, J. (2020). The relationship between personality traits, resilience, school support, and creative teaching in higher school physical education teachers. *Frontiers in Psychology, 11*. https://doi.org/10.3389/fpsyg.2020.568906

Dupri., Nazirun, N., & Candra, O. (2021). Creative thinking learning of physical education: Can be enhanced using discovery learning model?. *Journal Sport Area, 6*(1), 29-36. https://doi.org/10.25299/sportarea.2021.vol6(1).5690

Fouda, F. A. (2016). The Potential of Collaborative E-Portfolios for Enhancing the Creative Teaching Skills of Pre-Service Business Education Teachers. *International Journal of Technology Diffusion (IJTD), 7*(1), 1-19. https://doi.org/10.4018/IJTD.2016010101

George, D., & Mallery, P. (2016). *IBM SPSS statistics 23 step by step: A simple guide and reference* (14th ed.). Routledge.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson.

Jin, Y., & Song, P. (2019, June). Exploration on implementing quality-oriented education in physics teaching in university. In *2nd International Seminar on Education Research and Social Science (ISERSS 2019)* (pp. 590-593). Atlantis Press. https://doi.org/10.2991/iserss-19.2019.235

Kaplan, D. (2019) Creativity in Education: Teaching for Creativity Development. *Psychology*, 10, 140-147. https://doi.org/10.4236/psych.2019.102012

Karasar, N. (2020). *Bilimsel araştırma yöntemi.* Ankara: Nobel Yayın.

Kell, H. J., Lubinski, D., & Benbow, C. P. (2013). Who rises to the top? Early indicators. *Psychological science*, *24*(5), 648–659. https://doi.org/10.1177/0956797612457784

Kozikoğlu, İ., & Küçük, B. A. (2020). The Investigation of the Relationship between Teachers' Creative Thinking Tendencies and Individual Innovativeness Characteristics. *Journal of Education and Future, 17*, 25-37. https://doi.org/10.30786/jef.437852

Lamanauskas, V. (2023). Ugdymas kaip ateities žmogaus kūrimas: keletas štrichų [Education as creation of a future human: A few lines]. *Education Policy, Management and Quality, 15*(1), 4-7. https://doi.org/10.48127/spvk-epmq/23.15.04

Maslow, A. H. (1959). Cognition of being in the peak experiences. *The Journal of Genetic Psychology*, *94*(1), 43-66. https://doi.org/10.1080/00221325.1959.10532434

Memmert, D. (2011). Sports and creativity. In *Encyclopedia of creativity* (pp. 373-378). Academic Press. https://doi.org/10.1016/b978-0-12-375038-9.00207-7

Ørbæk, T., & Engelsrud, G. (2021). Teaching creative dance in school – a case study from physical education in Norway. *Research in Dance Education*, *22*(3), 321–335. https://doi.org/10.1080/14647893.2020.1798396

Özenli T. & Yakıcı, H.B. (2025). Examination of Relations Between Creative Thinking Dispositions, Psychological Flexibility and Self-Compassion Levels of Special Education Teacher Candidates. *Ahmet Keleşoğlu Faculty of Education Journal (AKEF), 7*(2), 133-146. https://doi.org/10.38151/akef.2025.154

Özgenel, M., & Çetin, M. (2017). Marmara yaratıcı düşünme eğilimleri ölçeğinin geliştirilmesi: Geçerlik ve güvenirlik çalışması. *Marmara Üniversitesi Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi, 46*(46), 113-132. https://doi.org/10.15285/maruaebd.335087

Özgül, F. (2020). Are critical thinking tendencies of the physical education teacher candidates differ from mathematics and literature? *International Journal of Sports and Physical Education (IJSPE), 6*(4), 16-21. https://doi.org/10.20431/2454-6380.0604004

Özkal, N. (2014). Relationships between teachers creativity fostering behaviors and their self-efficacy beliefs. *Educational Research and Reviews, 9*(18), 724-733. https://doi.org/10.5897/err2014.1816

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.

Rudd, J., Renshaw, I., Savelsbergh, G. J., Chow, J. Y., Roberts, W., Newcombe, D., & Davids, K. (2021). *Nonlinear pedagogy and the athletics skills model: The importance of play in supporting physical literacy.* Routledge. https://doi.org/10.4324/9781003025375

Saputro, I. N., Mahfud, T., Sari, A. I., & Sukatiman, S. (2023). Promoting creative professional behavior of future educators: The role of social capital, motivation and self-efficacy. *Integration of Education, 27*(3), 390-402. https://doi.org/10.15507/1991-9468.112.027.202303.390-402

Sungur, N. (1997). *Yaratıcı düşünce.* Evrim Yayınevi.

Suyono, S., Tukiran, T., & Yuliaturosida, E. (2025). Exploring project-based learning for enhancing creative thinking in high schools: A bibliometric analysis and literature review. *Educational Process: International Journal, 18*, e2025480. https://doi.org/10.22521/edupij.2025.17.480

Şahin Zeteroğlu, E., Doğan, Y., ve Taner Derman, M. (2012). Determining the opinions of preschool and primary school teacher candidates on creativity and metaphorical perception. *Educational Sciences: Theory & Practice, 12*(4), 3135-3152.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Tendinha, R., Alves, M. D., Freitas, T., Appleton, G., Gonçalves, L., Ihle, A., Gouveia, É. R., & Marques, A. (2021). Impact of Sports Education Model in Physical Education on Students' Motivation: A Systematic Review. *Children*, *8*(7), 588. https://doi.org/10.3390/children8070588

Tishman, S., & Andrade, A. (1996). *Thinking dispositions: A review of current theories, practices, and issues*. Project Zero, Harvard University.

Tocci, N., Scibinetti, P., Mazzoli, E., Mavilidi, M. F., Masci, I., Schmidt, M., ve Pesce, C. (2022). Giving ideas some legs or legs some ideas? Children's motor creativity is enhanced by physical activity enrichment: Direct and mediated paths. *Frontiers in Psychology, 13,* Article 806065. https://doi.org/10.3389/fpsyg.2022.806065

Ulu-Kalin, Ö., & Kumandaş-Öztürk, H. (2024). Classification of Higher-Order Thinking Skills of the Teachers Based on Institution, Seniority, and Branch with Discriminant Analysis. *Behavioral Sciences*, *14*(8), 626. https://doi.org/10.3390/bs14080626

Xiong, Y., Xi-yang, S., Xue-qian, L., Wang, P., & Zheng, B. (2020). The influence of self-efficacy and work input on physical education teachers' creative teaching. *Frontiers in Psychology, 10.* https://doi.org/10.3389/fpsyg.2019.02856

Yıldız, L., Zırhlıoğlu, G., Yalçınkaya, M., & Güven, Ş. (2011). Beden eğitimi öğretmen adaylarının yaratıcılık ve problem çözme becerileri. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi, 8*(özel), 18-36. https://izlik.org/JA48JD26UK

Yu, Y., & Yang, Y. (2023). Factors Affecting Teaching Ability of Physical Education Teacher Trainees and Development Strategies. *Curriculum and Teaching Methodology, 6*(3), 108-114. https://doi.org/10.23977/curtm.2023.060320

Disclaimer/Publisher's Note: Statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of JSAR and/or the editor(s). JSAR and/or the editor(s) do not accept any liability arising from any ideas, methods, instructions or products referred to in the content.