

The Academic Performance and 21st Century Teaching Strategies of BPEd Pre-Service Teachers

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ABSTRACT The study investigated the teaching practices of Bachelor of Physical Education (BPEd) pre-service teachers in relation to 21st century instructional strategies and their academic performance. Employing a descriptive-correlational research design, the study included 45 BPEd pre-service teachers from the College of Education at Isabela State University, Echague, Isabela, Philippines, who were enrolled during the second semester of the 2022-2023 academic year. Data were gathered using a structured, adapted survey questionnaire and analysed through descriptive statistics and Pearson correlation. The findings indicate that respondents demonstrated fair to satisfactory academic performance and consistently practiced all eight domains of 21st century teaching strategies including collaboration, communication, critical thinking, creativity and innovation, media use, information skills, cross-cultural understanding, and learner-centred learning. Notably, only creativity and innovation exhibited a significant positive relationship with academic performance. These results suggest that fostering creativity and innovation may enhance students' capacity to connect theoretical knowledge with practical learning experiences, thereby supporting academic achievement.

INTRODUCTION

The landscape of teacher education in the 21st century continues to evolve in response to globalisation, rapid technological advancements, and changing learner expectations. These transformations require educators to move beyond traditional teacher-centred approaches toward innovative pedagogies that promote critical thinking, creativity, communication, collaboration, and digital competence. Consequently, Higher Education Institutions (HEIs) have a crucial responsibility in preparing future educators who can effectively integrate these competencies into their instructional practices. In the Philippine context, this responsibility is further reinforced by the Commission on Higher Education's (CHED) promotion of an outcomes-based education (OBE) framework, which emphasises learner-centred teaching and the development of meaningful competencies among future professionals (Annan-Brew et al. 2024). Thus, teacher education programs must ensure that pre-service teachers not only acquire strong content knowledge but also develop the pedagogical skills necessary to thrive in complex and technology-driven learning environments.

Academic performance remains a fundamental indicator of student learning and educational achievement, reflecting the extent to which learn-

ers acquire, understand, and apply knowledge and skills gained through instruction. Contemporary research highlights those instructional practices emphasising active engagement, critical thinking, creativity, and collaborative learning contribute positively to academic achievement (Batdi et al. 2024; Ramos-Vallecillo et al. 2024). Conversely, traditional lecture-based approaches often offer limited opportunities for students to engage in higher-order thinking and to apply their learning in authentic contexts. Despite educational policies advocating transformative, learner-centred pedagogies, a gap often exists between the pedagogical frameworks introduced during teacher preparation and their actual implementation in classroom practice. Addressing this gap is particularly important for pre-service teachers, whose professional identities and instructional competencies are still developing.

The concept of 21st century teaching and learning emphasises learner-centred approaches that cultivate collaboration, problem-solving abilities, adaptability, creativity, and digital literacy. These competencies are widely recognised as essential for success in contemporary educational settings and future workplaces (Allayarova 2025; Takona 2025). Therefore, it is imperative that pre-service teachers develop these competencies, as they are expected to transform theoretical knowledge into

innovative, relevant, and meaningful classroom experiences (Sathasivam et al. 2024). This expectation is particularly significant in the field of Physical Education (PE), where effective teaching requires integrating the cognitive, psychomotor, and affective learning domains. Modern PE instruction demands that future teachers create engaging learning environments, incorporate technological tools, promote student autonomy, and facilitate holistic learner development.

Studies suggest that pre-service teachers demonstrate varying levels of preparedness for implementing 21st century pedagogical practices. Existing literature indicates that academic achievement may influence the development and application of these competencies. For instance, Duangngern et al. (2025) reported that while pre-service teachers demonstrated creativity and adaptability in unfamiliar educational contexts, their communication and critical thinking competencies required further enhancement. Similarly, Milkova et al. (2025) found that students with higher academic achievement exhibited greater proficiency in utilising media and technology, suggesting a stronger capacity to adopt emerging pedagogical approaches. Furthermore, creativity has been identified as a supportive component of teaching effectiveness, suggesting that strong academic engagement may contribute to pre-service teachers' confidence, flexibility, and innovation in instructional practice. Hence, academic performance should not be viewed solely as a measure of cognitive achievement but also as a potential factor that supports the development and application of effective 21st century teaching strategies.

In the field of Physical Education, contemporary teaching strategies and professional preparation increasingly emphasise developing pedagogical content knowledge that integrates motor skill development, student engagement, inclusive practices, and effective classroom management. Recent developments in PE pedagogy highlight student-centred approaches such as game-based learning, tactical games approaches, flipped classroom strategies, and technology-enhanced instruction, which have been associated with increased learner motivation, improved decision-making, and enhanced learning outcomes (Ali et al. 2025; Martín-Rodríguez and Madrigal-Cerezo 2025). Within pre-service teacher education, experiential learning opportunities, including micro-teaching, reflec-

tive practice, and supervised field experiences, play a significant role in developing instructional decision-making and the ability to modify teaching strategies according to diverse learner needs (Iliasova et al. 2025). Moreover, the integration of innovative pedagogical models and digital technologies has been recognised as essential in enhancing assessment practices, skill acquisition, and student participation in PE, further emphasising the need for continuous pedagogical innovation among future educators (Karaiskos et al. 2024; Marcelino 2025).

Despite the growing body of literature on 21st century teaching strategies, limited attention has been paid to their relationship to academic performance, particularly in the Philippine teacher education context. Existing studies have predominantly focused on general education and STEM-related disciplines, with comparatively few investigations of Bachelor of Physical Education (BPEd) programs. This gap restricts a comprehensive understanding of how BPEd student teachers develop and implement 21st century teaching practices and how these practices relate to their academic achievement. Examining this relationship may provide empirical evidence that can guide curriculum enhancement, instructional improvement, and professional preparation in advance.

Consequently, this study aims to determine the academic performance of Bachelor of Physical Education (BPEd) student teachers and examine its relationship with their implementation of 21st century teaching strategies. Specifically, the study seeks to assess the academic performance of BPEd student teachers, determine the extent to which they employ 21st century teaching strategies, and identify which domains of these strategies significantly correlate with academic performance. The findings of this study are expected to advance teacher education by providing evidence-based insights to inform pedagogical training, curriculum development, and higher education policies aimed at strengthening the preparation of future Physical Education teachers in the Philippines.

Objectives of the Study

This study aims to assess the academic performance of BPEd student teachers, determine the extent to which they employ 21st century teaching strategies across the eight competency domains,

and examine which of these teaching strategies are significantly correlated with their academic performance.

Specifically, it aims to:

1. Determine the academic performance levels of BPED student teachers.
2. Assess the extent to which BPED student teachers employ 21st century teaching strategies across the eight competency domains.
3. Examine which of these 21st century teaching strategies show a significant correlation with the academic performance of BPED student teachers.

METHODOLOGY

A descriptive-correlational research design was employed in this study to examine the relationship between the use of 21st century teaching methods and the academic performance of BPED pre-service teachers. This research design was deemed appropriate because it enabled the study to systematically describe the extent to which various 21st century teaching methods were used and to determine whether a significant association existed between these practices and the respondents' academic performance. The descriptive component of the study focused on identifying and describing the 21st century teaching methods most frequently applied by the respondents, as well as assessing their corresponding levels of academic performance. Meanwhile, the correlational component examined the nature and significance of the relationship between the utilisation of these teaching methods and academic achievement.

A total enumeration sampling technique was employed in this study, wherein all 45 fourth-year Bachelor of Physical Education (BPED) pre-service teachers enrolled during the second semester of the school year 2022-2023 at the College of Education, Isabela State University, Echague, Isabela, Philippines, were included as respondents. This sampling approach ensured the complete representation of the target population and facilitated the collection of comprehensive data regarding their experiences and perceptions of the implementation of teaching methods in actual classroom settings.

Data collection was conducted using a structured survey questionnaire adapted from Adzra' ai et al. (2019) to suit the local academic context and the study's specific objectives. The instrument

assessed the extent of BPED pre-service teachers' utilisation of 21st century teaching approaches across eight dimensions of creativity and innovation, critical thinking, communication, collaboration, information literacy, media literacy, technology utilisation, and cross-cultural competence. Responses were measured on a four-point Likert scale to assess the level of practice for each teaching approach. In addition, data on the respondents' academic performance were collected through their General Weighted Average (GWA), which served as the measure of their academic achievement. Prior to its administration, the questionnaire underwent expert validation, yielding a Content Validity Index (CVI) of 0.91, indicating excellent content validity. A pilot test was conducted, and the reliability analysis yielded a Cronbach's alpha of 0.88, with subscale coefficients ranging from 0.83 to 0.90, indicating good internal consistency.

For data analysis, the mean and weighted mean were used to assess the extent of BPED pre-service teachers' use of 21st century teaching approaches across the identified dimensions. Subsequently, the Pearson Product-Moment Correlation Coefficient (Pearson's *r*) was employed to examine the strength and direction of the relationship between the utilisation of these teaching approaches and the respondents' academic performance, as reflected in their General Weighted Average (GWA). All statistical analyses were performed using SPSS software, with a significance level of 0.05 to assess the statistical significance of relationships among the study variables. The study adhered to ethical research standards. Participation was voluntary, informed consent was obtained, and respondents' confidentiality and anonymity were ensured.

RESULTS

Academic Performance

The academic performance of the BPED student teachers as measured by their General Weighted Average (GWA) is presented in Table 1. The findings reveal a mean GWA of 2.18, with scores ranging from 1.50 to 2.69. Based on the institutional grading interpretation, the respondents' overall academic performance falls within the "Fair to Satisfactory" category.

The obtained mean suggests that the BPED student teachers demonstrate an acceptable level

Table 1: Academic performance of the respondents

<i>Variable</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Interpretation</i>
Academic performance	1.50	2.69	2.18	Fair to satisfactory

of academic achievement in their teacher education program. Furthermore, the range of GWA scores indicates variation in respondents' academic performance, reflecting individual differences in learning outcomes and academic attainment. Nevertheless, the results show that all respondents maintained grades within a satisfactory academic range, indicating consistent performance across the group.

Overall, the findings suggest that the BPEd student teachers possess the necessary academic foundation expected of pre-service educators. Their satisfactory academic standing reflects their ability to meet the program's academic requirements, which may support the development of pedagogical knowledge, professional competencies, and readiness for future teaching responsibilities.

21st Century Teaching Strategies

The results indicate that BPEd student teachers consistently demonstrate high engagement with 21st century teaching strategies across the eight identified domains. Overall, the composite mean of 3.58, interpreted as "Strongly Practiced", suggests that the respondents are highly proficient in applying contemporary pedagogical approaches that emphasise learner-centred instruction, collaboration, and technology integration.

As shown in Table 2, the highest mean was observed for Students Possess Social and Cross-Cultural Skills ($M = 3.64$), followed closely by Students Are Creative and Innovative ($M = 3.62$). These findings imply that the respondents fre-

quently design and implement learning activities that encourage cooperation among students, foster cultural awareness, and promote creativity and innovation. In addition, Promoting Communication and Collaboration ($M = 3.61$) and Students Possess Critical Thinking Skills and Problem-Solving Skills ($M = 3.57$) further indicate that interactive teaching strategies and higher-order thinking skills are strongly embedded in their instructional practices.

Moreover, Students Possess Information Skills ($M = 3.59$) and Students Possess Skills to Produce and Use Media Creatively ($M = 3.58$) reflect a solid ability among the respondents to integrate information literacy and creative media use in their teaching. These competencies are essential for equipping learners with the skills needed in a digitally driven, knowledge-based society.

On the other hand, the lowest mean scores, though still interpreted as "Strongly Practiced", were observed in Use of Media and Multi-Channel Technology ($M = 3.53$) and Learners Participate in Creating Builders or Producers ($M = 3.55$). These results suggest that while the respondents are generally competent in utilising technology and implementing production-based learning activities, these areas may still benefit from further enhancement to fully maximise their classroom application.

Thus, the findings reveal that the BPEd student teachers exhibit strong proficiency in 21st century teaching strategies, particularly in collaboration, communication, creativity, and cross-cultural competence, while still showing room for improvement in integrating more advanced technologies and in learner-centered production activities.

Table 2: The 21st century teaching strategies being used by the BPEd student teachers

<i>Strategies</i>	<i>Mean</i>	<i>Interpretation</i>
Students Possess Social and Cross-Cultural Skills	3.64	Strongly practiced
Learners Participate in Creating Builders or Producers	3.55	Strongly practiced
Students are Creative and Innovative	3.62	Strongly practiced
Students Possess Critical Thinking Skills and Problem-Solving Skills	3.57	Strongly practiced
Promoting Communication and Collaboration	3.61	Strongly practiced
Students Possess Information Skills	3.59	Strongly practiced
Students Possess Skills to Produce and Use Media Creatively	3.58	Strongly practiced
Use of Media, Multi-Channel Technology	3.53	Strongly practiced
Overall Mean	3.58	Strongly Practiced

Relationship Between Academic Performance and 21st Century Teaching Strategies

The relationship between BPED student teachers' academic performance and their utilisation of 21st century teaching approach domains is shown in Table 3. Overall, most domains show no significant relationship with academic performance, with *r*-values ranging from 0.09 to 0.20 and corresponding *p*-values ranging from 0.09 to 0.43, all of which are not statistically significant ($p > .05$). Specifically, Students Possess Social and Cross-Cultural Skills ($r = 0.18$, $p = 0.12$), Learners Participate in Creating Builders or Producers ($r = 0.18$, $p = 0.12$), Students Possess Critical Thinking and Problem-Solving Skills ($r = 0.15$, $p = 0.21$), Promoting Communication and Collaboration ($r = 0.18$, $p = 0.12$), Students Possess Information Skills ($r = 0.20$, $p = 0.09$), Students Possess Skills to Produce and Use Media Creatively ($r = 0.09$, $p = 0.43$), and Use of Media and Multi-Channel Technology ($r = 0.15$, $p = 0.19$). These findings indicate that these domains do not have a meaningful direct relationship with students' General Weighted Average (GWA).

Among all the domains, only "Students are Creative and Innovative" shows a statistically significant relationship with academic performance ($r = 0.25$, $p = 0.03$), suggesting a low but meaningful positive association. This implies that student teachers who demonstrate higher levels of creativity and innovation in their teaching approaches tend to have slightly better academic performance. However, the strength of the relationship remains weak, indicating that while creativity and innovation may contribute to academic success, they are not strong predictors on their own.

In essence, the results suggest that among the 21st century teaching strategies employed by BPED

pre-service teachers, only creativity and innovation demonstrate a significant relationship with academic performance. This indicates that pre-service teachers who exhibit greater creativity and innovation in their instructional practices tend to achieve better academic outcomes. The findings highlight the importance of strengthening creative lesson planning, innovative teaching methods, and problem-solving opportunities within teacher education programs to further enhance both instructional competencies and academic achievement.

DISCUSSION

The results indicate that BPED student teachers demonstrate fair to satisfactory academic performance, suggesting adequate attainment of program competencies but not a high level of academic distinction. This pattern suggests that respondents generally meet the minimum standards expected in teacher education programs. However, their achievement levels may indicate moderate cognitive performance rather than advanced mastery of pedagogical knowledge and professional competencies. Such a distribution is consistent with competency-based teacher education systems, where structured curricula, standardised grading schemes, and performance-aligned assessments often produce clustered outcomes within average to satisfactory ranges rather than wide differentiation at higher performance levels.

This finding aligns with Cojorn (2024) and Saleem (2025), who observed that structured curricular frameworks, continuous assessment practices, and competency-based evaluation systems tend to yield generally satisfactory academic outcomes among pre-service teachers. Both scholars empha-

Table 3: Relationship of academic performance and teaching strategies of the BPED student teachers

21 st century teaching strategies domains	Academic performance		
	<i>r</i> -value	<i>p</i> -value	Interpretation
Students Possess Social and Cross-Cultural Skills	0.18	0.12	Not significant
Learners Participate in Creating Builders or Producers	0.18	0.12	Not significant
Students are Creative and Innovative	0.25	0.03*	Significant
Students Possess Critical Thinking and Problem-Solving Skills	0.15	0.21	Not significant
Promoting Communication and Collaboration	0.18	0.12	Not significant
Students Possess Information Skills	0.20	0.09	Not significant
Students Possess Skills to Produce and Use Media Creatively	0.09	0.43	Not significant
Use of Media and Multi-Channel Technology	0.15	0.19	Not significant

Note. * $p < .05$ indicates a statistically significant relationship

size that sustained monitoring, task-based assessment, and standardised performance criteria promote consistency in academic achievement across cohorts. However, Iqbal and Ali (2024) present a critical counterpoint, arguing that academic grades alone are insufficient indicators of teaching competence because they do not adequately capture higher-order professional attributes such as reflective practice, instructional adaptability, classroom management, and context-sensitive decision-making. When these perspectives are compared, it becomes evident that satisfactory academic performance may indicate procedural compliance with program requirements but does not necessarily reflect holistic teaching effectiveness. Accordingly, the present findings highlight the limitation of relying exclusively on academic performance as a proxy for professional readiness in teacher education.

The findings further reveal that BPEd student teachers demonstrate strong and consistent utilisation of 21st century teaching strategies, particularly in collaboration, communication, creativity, critical thinking, and cross-cultural competence. This indicates that respondents are being effectively exposed to learner-centred and constructivist pedagogical paradigms that emphasise active engagement, social interaction, and meaningful knowledge construction. The result is consistent with contemporary educational frameworks that position 21st century competencies as essential for preparing teachers to function effectively in diverse, digitalised, and rapidly evolving learning environments.

Nevertheless, this result requires careful interpretation. While high levels of reported strategy use suggest positive program outcomes, such findings may be influenced by curriculum emphasis, assessment alignment, and the tendency of self-report measures to overestimate actual practice. Repeated exposure to 21st century learning concepts may strengthen conceptual understanding without necessarily ensuring consistent application in real classroom settings. This interpretation is supported by DeCuir (2024), who found that teacher candidates often express confidence in learner-centred approaches but encounter difficulty when applying these in technology-enhanced instruction. Similarly, Jahan (2024) reported that although pre-service teachers recognise the importance of 21st century competencies, many still struggle to integrate digital tools effectively into their

teaching practice. While both studies confirm the growing presence of 21st century pedagogies in teacher education, they also emphasise persistent challenges in classroom implementation. Taken together, these insights suggest that the present findings may reflect strong conceptual preparedness, while actual instructional enactment, particularly in technology-rich environments, may remain uneven. This highlights a continuing gap between theory and practice in teacher preparation programs.

The correlation analysis indicates no significant relationship between BPEd student teachers' academic performance and their use of 21st century teaching approach domains. This suggests that the extent of implementing strategies such as collaboration, communication, critical thinking, creativity, and technology integration does not directly correspond to variations in students' General Weighted Average (GWA). This finding implies that although these teaching approaches are widely recognised in educational literature for promoting active learning and holistic skill development, their influence may not be reflected in conventional measures of academic performance. As noted by Brandt and Lorie (2024), traditional assessment systems tend to emphasise content mastery and procedural knowledge rather than broader competencies such as creativity, collaboration, and problem-solving. In this context, the absence of a significant relationship suggests a possible disconnect between 21st century pedagogical practices and standardised academic grading, in which the benefits of such strategies may be more evident in skill development and long-term learner competencies than in immediate academic outcomes.

A notable exception is observed in innovation-related instructional practices, which show a significant relationship with academic performance. This suggests that innovative pedagogical approaches may play a more direct role in improving measurable academic outcomes by fostering cognitive engagement, supporting deeper conceptual understanding, and promoting the use of applied knowledge. Adhikari et al. (2025) support this interpretation by emphasising that innovation-oriented learning environments encourage higher-order thinking and sustained intellectual engagement. Similarly, Bunkaew (2025) highlights that creative and problem-based instructional strategies enhance learners' ability to transfer knowledge

across contexts and perform effectively in academic tasks. These studies suggest that innovation operates as a pedagogical bridge between learning experiences and academic achievement. It is therefore reasonable to infer that innovation-related practices may exert a stronger influence on academic performance because they integrate conceptual understanding, practical application, and critical thinking within a single instructional framework.

In essence, the findings indicate that the relationship between 21st century teaching strategies and academic performance is generally limited, as most domains did not demonstrate a significant association with BPEd student teachers' General Weighted Average (GWA). This suggests that competencies in communication, collaboration, critical thinking, creativity, and technology integration may not directly influence academic grades when evaluated by conventional assessment systems. However, innovation-related instructional practices emerged as the only domain with a significant relationship with academic performance, indicating that the application of innovative and authentic learning approaches may have a greater potential to enhance academic achievement. This implies that instructional practices that promote creativity, problem-solving, and the practical application of knowledge may serve as a stronger link between 21st century teaching competencies and measurable academic outcomes. Therefore, the relationship between 21st century teaching strategies and academic performance appears to depend on the specific pedagogical domain, with innovation-related practices demonstrating the most meaningful influence on students' academic achievement.

CONCLUSION

This study examined the academic performance levels of BPEd student teachers, the extent of their use of 21st century teaching strategies across eight competency domains, and the relationship between these strategies and their academic performance. Findings indicate that respondents demonstrate fair to satisfactory academic performance, reflecting adequate, though not exceptional, mastery of program competencies. This suggests that while they meet the minimum requirements of their teacher education program, their performance generally reflects a moderate level of cognitive proficiency, as

measured by standardised and competency-based assessment systems.

The results also show consistent use of 21st century teaching strategies across all domains, including collaboration, communication, creativity, critical thinking, and cross-cultural competence, indicating strong engagement with learner-centred pedagogies. However, the depth of application, particularly in technology-enhanced instruction, remains limited, suggesting a gap between conceptual understanding and sustained practice. Correlation analysis further reveals that most strategy domains have no significant relationships with academic performance, except for innovation-related practices. This implies that 21st century skills support learning processes, only creative and applied pedagogies are strongly linked to measurable academic outcomes.

RECOMMENDATIONS

In light of the study's conclusions, several recommendations are proposed to enhance the teaching efficacy and academic success of Bachelor of Physical Education (BPEd) pre-service teachers. Teacher education programs should strengthen curriculum components that promote creativity and innovation, particularly through structured, hands-on, and project-based learning experiences. These approaches can help pre-service teachers move beyond theoretical understanding and develop stronger capacity to apply 21st century teaching strategies in authentic classroom contexts. Strengthening innovation-focused instruction is especially important given its strong association with academic performance.

In addition, continuous professional development programs should be established to enhance pre-service teachers' competencies in technology integration, digital pedagogy, and media-rich instruction, addressing the observed gap in sustained technology use. This will ensure alignment with the demands of modern educational environments and improve instructional adaptability. Furthermore, faculty mentors and supervising teachers should consistently model effective 21st century teaching practices during practicum experiences, including reflective teaching and collaborative learning approaches. Such mentorship is essential in bridging the gap between conceptual knowledge and actual classroom implementation, there-

by strengthening both pedagogical competence and academic outcomes.

LIMITATIONS

This study has several limitations that should be considered in interpreting the findings. First, the relatively small sample size of 45 BPED pre-service teachers from a single institution limits the generalisability of the results to other contexts, institutions, and academic disciplines. Second, the use of self-report questionnaires may have introduced response bias, as participants may have overestimated or underestimated their use of 21st century teaching strategies and related competencies. In addition, academic performance was measured solely by grades, which may not fully capture the broader, more complex nature of pedagogical competence, instructional readiness, and professional development. Furthermore, the descriptive-correlational design of the study only allows for the identification of relationships between variables and does not establish cause-and-effect conclusions. Future research should consider using larger and more diverse samples from multiple institutions to improve generalisability. It is also recommended that researchers explore the application of 21st century teaching strategies in actual teaching practice and their impact on professional growth in authentic classroom settings. The inclusion of qualitative methods, such as interviews and classroom observations, may also provide richer, more in-depth insights into the experiences, challenges, and enabling factors involved in implementing innovative pedagogies. Overall, these improvements would contribute to a more comprehensive understanding of 21st century teaching strategies and strengthen evidence-based practices in physical education teacher education.

REFERENCES

- Adhikari S, Sigdel S, Shrestha SK, Basnet HB 2025. Implications of curriculum in promoting critical thinking, creativity and innovation among learners. *Education and Development*, 34(1): 85-96.
- Adzra'ai A, Sueb R, Dalim S 2019. Trainee teachers' readiness towards 21st century teaching practices. *Asian Journal of University Education*, 15(1): 1-12.
- Ali N, Ahmad TA, Yao W, Shahzada G, Li S 2025. Exploring teaching strategies in Physical Education: A cross-national review of practices in China and Pakistan. *Journal of Pakistan-China Studies (JPCS)*, 6(1): 25-42.
- Allayarova SU 2025. Transformation in 21st century education: digital pedagogy and learner-centered teaching trends. *International Journal of Social Science & Interdisciplinary Research*, 14(06): 132-146.
- Annan Brew RK, Ezugwu IJ, Surman SH, Dadzie J 2024. Enhancing pre service teacher effectiveness: Integration of 21st century skills during off campus teaching experiences. *European Journal Of Education*, 59(4): e12737.
- Batdi V, Elaldi S, Özçelik C, Semerci N, Özkaya ÖM 2024. Evaluation of the effectiveness of critical thinking training on critical thinking skills and academic achievement by using mixed-meta method. *Review of Education*, 12(3): e70001.
- Brandt WC, Lorie W 2024. *Measuring Student Success Skills: A Review of the Literature on Analytical Thinking*. Dover, NH, USA: National Center for the Improvement of Educational Assessment.
- Bunkaew U 2025. The effects of using problem-based learning to promote innovative thinking skills. *International Journal of Industrial Education and Technology*, 7(2): 14-26.
- Cojorn K 2024. A collaborative professional development and its impact on teachers' ability to foster higher order thinking. *Journal of Education and Learning (EduLearn)*, 18(2): 561-569.
- DeCuir R 2024. *Exploring Pre-Service Teachers' Experiences with Emerging Technologies in Secondary Education: A Phenomenological Study*. Doctoral Thesis, Unpublished. Louisiana, USA: Louisiana State University and Agricultural & Mechanical College.
- Duangngern P, Wannapipat W, Srikoorn S, Kwangmuang P 2025. Enhancing critical and creative thinking capabilities in pre-service teacher education: Digital integration and pedagogical innovation in Thailand's Next Normal Era. *Educational Process: International Journal*, 15(2): 1-22.
- Iliasova L, Nekrasova I, Mena J, Estrada-Molina O 2025. Microteaching on pre-service teachers' education: Literature review. *Frontiers in Education*, 10: 1-10.
- Iqbal MZ, Ali MQ 2024. Improving practicum outcomes: Common errors and reflective practices of future educators. *Journal of Policy Options*, 7(2): 20-28.
- Jahan M 2024. Assessing core competencies of pre-service teachers in the context of 21st century skills. *Journal of Teachers and Teacher Education*, 1(1): 8-11.
- Karaiskos L, Sotiras MN, Antonopoulou P, Gdonteli K 2024. The impact of training and professional development on physical education teacher self-efficacy. *Journal of Physical Education and Sport*, 24(11): 2022-2033.
- Marcelino R 2025. Beyond winning in physical education: The role of continuing professional development in fostering a learning focused climate. *British Educational Research Journal*, 51(5): 2474-2490.
- Martín-Rodríguez A, Madrigal-Cerezo R 2025. Technology-enhanced pedagogy in physical education: Bridging engagement, learning, and lifelong activity. *Education Sciences*, 15(4): 1-31.
- Milkova E, Moldoveanu M, Krcil T 2025. Sustainable education through information and communication technology: A case study on enhancing digital competence and academic performance of social science higher education students. *Sustainability*, 17(10): 1-20.

- Ramos-Vallecillo N, Murillo-Ligorred V, Lozano-Blasco R 2024. University students' achievement of meaningful learning through participation in thinking routines. *European Journal of Investigation in Health, Psychology and Education*, 14(4): 1012-1027.
- Saleem A 2025. Evaluation of pedagogical competencies of pre-service teachers in the teacher education program at university level. *The Critical Review of Social Sciences Studies*, 3(4): 1605-1617.
- Sathasivam RV, Abdullah MNS, Abd Rauf RA 2024. Theory-practice divide: Pre-service teachers' application of pedagogical knowledge during teaching practicum. *Pertanika Journal of Social Sciences & Humanities*, 32(1): 69-86.
- Takona JP 2025. Conceptualizing learner-focused pedagogy: Approaches to instruction and learning outcomes. *Journal of Research in Education and Pedagogy*, 2(4): 487-507.

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