

# Critical thinking, creativity, self-efficacy, and teaching practice in Peruvian teacher trainers<sup>1</sup>

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The relationship between dispositions towards critical thinking, creative-innovative performance, self-efficacy and teaching practice was assessed in Peruvian teacher trainers from the Amazonian region of San Martín. Direct and big relationships were found between all variables. A model that explained 42% of the variance of teaching practice is presented, where dispositions towards critical thinking and creative and innovative performance have a direct effect on teacher self-efficacy. In addition, teacher self-efficacy fully mediates the relationship between dispositions toward critical thinking, and partially mediates the relationship between creative-innovative performance and teaching practices. Likewise, results show differences according to sex, work experience, specialization and work place. It is suggested to include other actors to get a holistic view of the teachers' trainer capacities.

*Keywords:* Dispositions toward critical thinking, creative and innovative performance, teacher self-efficacy, teaching practice, teacher's trainers

## **Pensamiento crítico, creatividad, autoeficacia y práctica pedagógica en formadores de docentes peruanos**

Se evaluó la relación entre las disposiciones al pensamiento crítico, el desempeño creativo-innovador, la autoeficacia y la práctica pedagógica de formadores de docentes peruanos de la región amazónica sanmartinense. Se encontró relaciones directas y grandes. Se propone un modelo que explica el 42% de la varianza de la práctica pedagógica, donde las disposiciones al pensamiento crítico y el desempeño creativo-innovador tienen un efecto directo sobre la autoeficacia docente. Asimismo, la autoeficacia docente media totalmente la relación entre las disposiciones al pensamiento crítico, y parcialmente la relación del desempeño creativo-innovador con la práctica pedagógica. Se evidenciaron diferencias según sexo, experiencia laboral, especialidad y centro laboral. Se sugiere incluir otros actores para una mirada integral de las capacidades de los docentes formadores.

*Palabras clave:* disposiciones al pensamiento crítico, desempeño creativo-innovador, autoeficacia docente, práctica pedagógica, formadores de docentes.

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### **Pensamento crítico, criatividade, autoeficácia e prática pedagógica em formadores de docentes peruanos**

A relação entre disposições para o pensamento crítico, desempenho criativo-inovador, autoeficácia e prática pedagógica foi avaliada em formadores de professores peruanos da região amazônica de San Martín. Relações diretas e grandes foram encontradas. Apresenta-se um modelo que explica 42% da variância da prática docente, onde as disposições para o pensamento crítico e o desempenho criativo-inovador têm um efeito direto na autoeficácia do professor. Aliás, a autoeficácia medeia totalmente a relação entre as disposições para o pensamento crítico e medeia parcialmente a relação entre o desempenho criativo-inovador e a prática pedagógica. Adicionalmente, os resultados mostram diferenças segundo o sexo, experiência de trabalho, especialização e local de trabalho. Sugere-se incluir outros atores para uma visão holística das capacidades dos formadores de professores.

*Palavras-chave:* disposições para o pensamento crítico, desempenho criativo-inovador, autoeficácia docente, prática pedagógica, formadores de professores.

### **Pensée critique, créativité, auto-efficacité et pratique pédagogique chez les formateurs d'enseignants péruviens**

La relation entre dispositions à la pensée critique, performance créative-innovante, auto-efficacité et pratique pédagogique des formateurs d'enseignants péruviens de la région amazonienne de San Martín a été évaluée. Des relations directes et grands ont été trouvées. Un modèle expliquant 42% de la variance de la pratique pédagogique est présenté, où les dispositions à la pensée critique et à la performance créative-innovante ont un effet direct sur l'auto-efficacité. Également, l'auto-efficacité médie pleinement la relation entre les dispositions à la pensée critique et partiellement la relation entre la performance créative-innovante et la pratique pédagogique. Des différences ont été constatées selon sexe, expérience professionnelle, spécialité et centre de travail. Il est suggéré d'inclure d'autres acteurs pour un examen complet des capacités des formateurs.

*Mots-clés:* dispositions à la pensée critique, performance créative - innovante, auto-efficacité des enseignants, pratique pédagogique, formateurs d'enseignants.

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One of the main goals of the 2030 Agenda for Sustainable Development was to ensure free, inclusive, and quality public education (Liu, 2018). To achieve this purpose, the teacher is a key factor since different social expectations rest upon him, such as improving learning and addressing educational aims (Ab Kadir, 2017; Kú & Pool, 2017; Unesco, 2014; 2017).

Unfortunately, the teaching career in Latin America is associated with low social status. One reason for this is low-quality initial teacher training (ITT) (Unesco-OREALC, 2013). In Peru, this is evidenced in the low performance results of the 2015 nomination test, where 90.2% of teachers graduated from Institutes of Higher Pedagogical Education (IHPE) and 80.7% of teachers graduated from universities achieved minimum scores (Ministerio de Educación [Minedu], 2017), as well as the insufficient learning achievements shown in PISA 2018 (OECD, 2019). Similarly, the Educational Census Evaluation (ECE, 2016, 2018) shows that rural areas, including those of the Peruvian Amazon, show low levels of learning compared to other regions. For this reason, ITT is a priority issue for the National Education Council (CNE, 2017) and for the Regional Strategic Project on Teachers for Latin America (Unesco-OREALC, 2017).

Likewise, the Center for Studies on Policies and Practices in Education (CEPPE, 2013) says that the preparation of teachers' trainers is a decisive factor for the ITT but criticizes its practice. In different studies (see Ames & Uccelli, 2008; Arregui et al, 1996; Díaz, 2015; Díaz & Ñopo, 2016; Oliart, 1996) it is argued that teacher trainers have difficulties communicating concepts and do not have lesson plans, resist change, reproduce practices of copying, dictation and repetition, as well as the little complexity and depth of their class content. In the same way, pedagogical monitoring in IHPE (Minedu, 2017) showed that 68% of cases did not promote critical thinking and in 65% of cases the teacher tends to promote a process of passive and content-based participation.

Faced with this problem, educational reforms were implemented at various levels such as the Good Teaching Performance Framework (MBDD, 2012 [in Spanish]), the Teacher Trainer Career Path, the Plan

for Strengthening Teacher Capacities, and the creation of a Teacher Trainer Profile (Minedu, 2020). These reforms demand a critical and creative praxis with high expectations of teaching effectiveness to face them. This implies the consolidation of complex cognitive abilities such as critical thinking, creativity, and the sense of self-efficacy. In this context, it is necessary to study these abilities in relation to the pedagogical practice of teacher trainers who train future teachers in the Peruvian Amazon.

Critical thinking, along with problem solving and decision making, is considered a tool for the construction of knowledge and one of the essential skills for citizens of the twenty-first century (Lu & Xie, 2019). Facione et al (1995) conceptualize it as purposeful self-regulatory judgment, within the framework of cognitive processes, and it is a multidimensional construct (Miele & Wigfield, 2014) that comprises “abilities” and “dispositions” (Fung, 2017). Dispositions should be encouraged to develop good critical thinkers (Facione et al, 1995).

In the educational context, it is necessary to improve the critical thinking capacity of teachers in order to develop and articulate it in their lessons, and thus, improve this ability in students (Qing et al., 2010). To achieve this, both their capacity for critical interpellation (Janssen et al, 2019) - the moral and ethical implications and the consequences of their pedagogical practice (Larrivee, 2000) - and self-reflection must be developed, becoming critical mirrors (Brookfield, 1997). That is, the notion of critical teacher reflection is promoted in pedagogical practice (Mena-Marcos & Tillema 2006; Mena-Marcos et al., 2011) since it provides a source of knowledge construction in teaching (Conway, 2001), promotes teacher self-regulation (Singh 2008) and improves teaching (Motallebzadeh et al., 2018).

In the same way, creativity can also guide a better pedagogical practice, although this is a multifaceted and complex psychological concept (Acar et al., 2017; Mammadov et al., 2019, Runco & Beghetto, 2019). However, Duan et al. (2019) argue that creativity is recognized as the development of novel and potentially useful ideas (Amabile, 1983; Corazza, 2016), which is essential to solve problems and satisfy basic needs (Chen, 2020).

Previous studies provide a series of characteristics of the creative teacher that are part of the Creative Potential dimension (Runco, 2009) such as: (a) self-confidence, persistence and sense of humor (Horng et al., 2005); (b) takes reasonable risks and encourages unpredictable situations (Oreck, 2006); (c) is adaptable and respects the individualities of the student (Anderson, 2002); (d) is autonomous and promotes autonomy (Rinkevich, 2011; Morais & Azevedo, 2011); (e) stimulates the production of ideas and seeks new knowledge (Diakidoy & Kanari, 1999); (f) is aware of the characteristics that promote student creativity (De Souza, 2000); (g) is tolerant of ambiguity, critical of his practice, and demonstrates creative abilities (Fautley & Savage, 2007). However, the Creative Performance dimension (Runco, 2009) shows more objective and concrete criteria of creative thinking (Product and Persuasion). It refers to the generation of novel and useful ideas, and the solution to problems (Amabile, 1996; Mumford & Gustafson, 1988) that can improve pedagogical practice.

Teacher self-efficacy is a preponderant component for their pedagogical practice, since it affects motivation, attitudes, and human actions (Mlambo et al., 2020). It is a personal and significant characteristic that can explain differences in teaching practice and learning (Künsting et al., 2016). Furthermore, it is a crucial factor to improve teachers' education and promote educational reform (e.g. Ashton, 1984; Goddard et al., 2000; Scharmann & Hampton, 1995; Tschannen-Moran & Woolfolk-Hoy, 2001).

Teachers' beliefs regarding their personal efficacy for motivating and promoting learning affect the types of learning environments and the level of their students' academic progress (Bandura, 1993). Likewise, self-efficacy impacts instructional practices, individual and collective efforts among teachers, and persistence within the profession (Martin & Mulvihill, 2019). Teacher self-efficacy is one of the most prominent motivational characteristics that affect instruction quality (Burić & Kim, 2020), such as a supportive environment, effective classroom management, cognitive activation (Künsting et al., 2016) and learning outcomes (Burić & Kim, 2020; Klassen & Tze, 2014).

Considering the evidence, the aforementioned factors are associated with pedagogical practice. That is, they are related to the set of actions that make up the daily work of teachers, exercised through subjective interrelations with students, based on certain training purposes (Barron, 2015; Garcia et al., 2008; Martínez, 2012). This practice is influenced by the knowledge, conceptions, and beliefs of teachers (Barron, 2015), their motivations (Cid et al., 2013), their cognitive levels (Hanushek et al., 2014) and their commitment to the development of teaching skills, characteristic of an ideal teacher (Huang, 2015).

It is important to notice that the educational reform success depends on the teachers and his/her capabilities to change their pedagogical practice (Luyten & Bazo, 2019; Fischer et al., 2020). Therefore, this study aims to establish the relationship between the Dispositions towards Critical Thinking, Creative-Innovative Performance and Self-efficacy, with the pedagogical practice.

## **Method**

### ***Participants***

The sample consisted of 112 tenured and assistant teacher trainers from different provinces of the Amazonian region of San Martín, in Peru. 62.5% were men and 37.5% women, with an age range of 27 to 70 years old ( $M = 48.15$ ;  $SD = 9.96$ ). 42.9% of them reported that their work center was in Tarapoto, 9.8% in Rioja, 16.1% in Moyobamba, 10.7% in Lamas, 8.9% in Juanjui, 7.1% in Picota and 4.5% in Uchiza. 83% were oriented to letters and 17% to numbers. Regarding their work experience, 16.1% were in the range of 1 to 3 years of experience, and 62.5% have a range of experience greater than 13 years. 55.4% of teacher trainers had their initial training in state universities and 38.3% in public IHPE, with a reduced percentage of 6.3% in private universities. Regarding academic level, 40.2% had a Bachelor's degree, 43.8% had a Master's degree and 14.4% had a Ph.D. 52.7% of them were Assistant teachers and 57.1% reported having jobs outside of academia.

Sampling was intentional, because individuals who had the possibility of being part of the sample were selected (Hernández et al., 2014). The inclusion criteria were the following: belonging to active public higher education institutions, licensed or in the process of licensing, in urban-rural sectors of San Martín. It is important to mention that cases with recent loss of a family member or affected by COVID-19 were excluded.

### *Measures*

The UF-EMI [University of Florida-Engagement-Cognitive Maturity-Innovativeness] scale (Irani et al, 2007) was used to assess Disposition towards critical thinking. This scale comprises 26 items and evaluates 3 sub-factors: Engagement, Cognitive Maturity, and Innovativeness. The measure considers the Likert scale format with scores from 1 to 5, where 1 represents Totally disagree and 5 is Totally agree. Each individual can obtain a score ranging from 26 to 130 points.

The adaptation of the scale included the double translation from English to Spanish. The translated version was submitted to content validity ( $N = 6$ ), determining the relevance of the items and the quality of the translation into Spanish. In addition, psychometric studies were carried out in order to establish the level of construct validity and reliability, as well as the norms for the population to be studied. Validity was calculated with Aiken's  $V$  coefficient (Escurra, 1988). The results show that the UF-EMI has a Aiken's  $V$  coefficient of .88, which is very acceptable. The reliability by internal consistency presented a very adequate total value ( $\alpha = .93$ ). Likewise, the sub-factors presented the following values: (1) Engagement,  $\alpha = .88$ ; (2) Cognitive Maturity,  $\alpha = .77$  and (3) Innovativeness,  $\alpha = .80$ . Likewise, the corrected element-total correlations obtained scores between .34 and .74 ( $<.30$ ).

To evaluate Creative-Innovative Performance, the Creative-Innovative Behavior scale (CIB) (Bayona & Blumen, 2019) was used. This instrument comprises 15 items distributed in 2 factors: Idea generation and Idea implementation. The measure was developed with a scale that ranges from 1 to 7, where 1 is Totally disagree and 7 is Totally agree.

The total score is obtained from the sum of the items of each factor. Each individual can obtain scores ranging from 15 to 105 points.

This scale was constructed and validated in Peru by Bayona and Blumen (2019), obtaining a KMO of .93, and a significant Bartlett's test, with a two-factor solution that explains 64.79% of the variance. The first factor, "idea generation", consists of 10 items (58.57% of the explained variance;  $\alpha = .93$ ), while the second factor, called "idea implementation", consists of 5 items (6.22% of the explained variance;  $\alpha = .93$ ). Internal consistency showed a Cronbach's alpha coefficient of .95. For this study, the internal consistency reliability was performed based on a single factor given the high correlation between the dimensions, obtaining an  $\alpha = .95$ . Likewise, the corrected element-total correlations obtained scores between .52 and .86 ( $<.30$ ).

A scale of Teaching Self-efficacy towards Teaching Thinking Skills was used, known as TSTS [Teachers' Self-efficacy towards Teaching Thinking Skills Scale] (Dilekli & Tezci, 2018). The TSTS was constructed with 20 items distributed in 3 sub-factors: Academic Competence, Practice and Design. The items were written in a 5-point Likert-type format, where 1 represents Strongly disagree and 5 represents Strongly agree. The total score is obtained from the sum of the results of each factor and ranges from 20 to 100 points.

For the purposes of adapting the scale, a double translation process was carried out. Likewise, validity and reliability measurements were performed to establish the psychometric properties of the instrument. The translated version was submitted to content validity ( $N = 6$ ), determining the relevance of the items and the quality of the translation into Spanish. Validity was calculated with Aiken's V coefficient (Escurra, 1988). The results show that the scale had an Aiken's V coefficient of .91, which is very acceptable. The reliability by internal consistency presented a very adequate score ( $\alpha = .94$ ). Also, the corrected element-total correlations obtained scores between .42 and .76 ( $<.30$ ). The 3 factors presented the following values: (1) Academic Competence,  $\alpha = .93$ ; (2) Practice,  $\alpha = .85$ , and (3) Design,  $\alpha = .68$ .

Similarly, Pedagogical Practice was assessed through the Teachers' Teaching Thinking Skills Practice Scale [TTTP] (Dilekli & Tezci,



2019). It comprises 21 items distributed according to 4 sub-factors: Effectiveness of Teaching Thinking, Loyalty to the curriculum, Teacher Dependence and Encouraging Thinking. This instrument constitutes a 5-point Likert scale, where 1 is "Never" and 5 is "Always". The total score is obtained by reversing the scores of items 11, 12, 13, 14, 15, 16, 17, 18. Then, the sum of the answers given in each factor is made, so the scores go from 21 to 105.

For the adaptation of the scale, a double translation process was carried out. Likewise, the validity and reliability were verified. The translated version was submitted to content validity ( $n = 6$ ), determining the relevance of the items and the quality of the translation into Spanish. Content validity was calculated with Aiken's  $V$  coefficient (Escurra, 1988). The results showed an Aiken's  $V$  coefficient of .86, which was very acceptable. The reliability by internal consistency presented an acceptable total value ( $\alpha = .66$ ). In addition, the corrected item-total correlations obtained scores between -.11 and .51. The inverted items had the lowest scores (items 18, 11 and 17). Final reliability test resulted in an acceptable value ( $\alpha = .72$ ). Likewise, the 3 dimensions presented the following values: (1) Effectiveness of Teaching Thinking,  $\alpha = .86$ ; (2) Loyalty to Curriculum,  $\alpha = .56$ ; (3) Teacher Dependence,  $\alpha = .70$ , and (4) Encouraging Thinking,  $\alpha = .66$ .

To collect complementary information to characterize the sample, a Sociodemographic questionnaire was used, which included the following questions about the participants: age, sex, academic degree, type of initial higher education institution, work experience, specialty and work center.

### ***Procedure***

First, the corresponding permissions were requested from the authors of the CIB, TSTS and TTTP tests. The UF-EMI scale is free to use. Then, contact was made with the authorities of the higher education institutions in San Martín in order to explain the objectives of the study, its confidentiality and the agreement for the return of results in general. The collection of information was carried out by telephone

since the global pandemic by COVID 19 significantly affected San Martín. Thus, the faculty directory was requested to contact the teacher trainers and the corresponding recorded authorization was requested. Subsequently, the informed consent was recorded by telephone with the heads of the IHPE and the dean of the faculty of education.

Then, a pilot test of the four instruments was carried out with 12 teachers from higher education institutions to receive comments on the writing, format, application, and refinement of the application protocol. Next, the teachers were contacted to coordinate the time and date for the application of the instruments. During these calls, as well as during the application of the tests, the teachers were explained about the objective of the research and emphasis was placed on free, voluntary, and confidential participation, guaranteeing respect for their autonomy. Then, the recording of the informed consent was requested.

The measures were applied individually according to the telephone meetings agreed by the participants. Data collection took a total of approximately 30 minutes, per section: 7 minutes for reading the informed consent, the sociodemographic record and the respective explanations, 8 minutes for the UF-EMI, 4 minutes for the CCI, 5 minutes for the TSTS and 6 minutes for the TTTP. In no case were the participants benefited financially or were the results returned individually.

### ***Data Analysis***

SPSS 23 and Amos Graphics 21 were used. Descriptive statistics were used to establish the levels of the variables in the sample. Then, normality analyzes were performed with the Kolmogorov-Smirnov test, obtaining significant p-values in three of the variables. Nevertheless, the skewness and kurtosis statistics were reviewed for each variable, whose values showed indicators of normal distribution. Therefore, parametric inferential tests were used.

Subsequently, independent-samples T tests were used to determine if differences existed in the scores for the variables based on initial training, sex, work experience, specialty, and work center. Then, the relationship

between the variables were evaluated with Pearson correlation tests. Next, a linear regression analysis was performed to estimate the effect of the variables studied on pedagogical practice. Finally, a path analysis model was carried out with teacher self-efficacy as a mediating variable.

## Results

The descriptive analysis of the variables is presented in table 1. In all cases, the general scores were above the theoretical mean of the scales: the dispositions toward critical thinking ( $M = 65$ ), creative performance ( $M = 52.5$ ), teaching self-efficacy ( $M = 50$ ) and the general scores of pedagogical practices ( $M = 45$ ).

**Table 1**

*Descriptive analysis*

	<i>M</i>	<i>SD</i>	Range	Min	Max	Skewness	Kurtosis
Dispositions toward C.T.	112.24	9.67	40	90	130	.06	-.85
Engagement	47.88	4.35	18	37	55	-.12	-.63
Cognitive Maturity	33.71	3.16	12	28	40	.26	-.75
Innovativeness	30.65	2.98	12	23	35	-.26	-1.00
Creative Performance	86.85	14.18	62	43	105	-1.25	1.19
Teachers' Self-efficacy	85.25	8.21	37	63	100	-.17	-.34
Design	17.27	1.66	6	14	20	.06	-.78
Practice	34.87	3.16	15	25	40	-.19	-.43
Academic Competence	33.12	4.11	20	20	40	-.31	.21
Pedagogical Practice	64.25	6.15	32	49	81	.22	.13
Effectiveness of T. T	37.61	4.71	21	24	45	-.53	-.06
Loyalty to Curriculum	10.39	2.32	14	6	20	1.32	3.12
Teacher Dependence	3.88	1.70	8	2	10	.85	.44
Encouraging Thinking	12.38	1.85	9	6	15	-.51	.38

*Sex:* Significant differences were found on Teaching Self-efficacy ( $t(110) = 3.02, p < .00$ ) and Pedagogical Practice ( $t(110) = 2.18, p < .03$ ). Analysis showed that Male teachers ( $M = 87; SD = 7.19$ ) scored higher on teaching Self-efficacy than female teachers ( $M = 82.33; SD = 9.04$ ). Also, Male teachers ( $M = 65.21; SD = 5.79$ ) showed higher scores on Pedagogical Practice than female teachers ( $M = 62.64; SD = 6.48$ ).

*Work experience:* Significant differences were found on Dispositions towards Critical Thinking ( $t(39.79) = -2.50, p < .02$ ), Creative-Innovative Performance ( $t(86) = -2.20, p < .03$ ), Teaching Self-efficacy ( $t(40.23) = -3.02, p < .00$ ) and Pedagogical Practice ( $t(86) = -2.46, p < .02$ ). More experienced teachers ( $M = 112.77; SD = 10.22$ ) showed higher scores on Dispositions towards critical thinking than the less experienced ones ( $M = 107.78; SD = 6.72$ ). Also, more experienced teachers ( $M = 87.93; SD = 14.75$ ) scored higher on Creative-Innovative performance than the less experienced ones ( $M = 79.39; SD = 14.42$ ). Likewise, more experienced teachers ( $M = 86.27; SD = 8.49$ ) showed higher scores on self-efficacy than the less experienced teachers ( $M = 81.28; SD = 5.53$ ). Finally, more experienced teachers ( $M = 65.43; SD = 6.21$ ) scored higher on Pedagogical Practice than the less experienced ones ( $M = 61.50; SD = 5.29$ ).

*Specialization:* Significant differences were found in Creative-Innovative Performance ( $t(41.53) = -2.35, p < .02$ ), Teaching Self-efficacy ( $t(36.40) = -3.12, p < .00$ ) and Pedagogical Practice ( $t(110) = -2.44, p < .02$ ). Teachers with a specialty in numbers ( $M = 91.84; SD = 8.93$ ) showed higher scores on Creative-Innovative than teachers with a specialty in letters ( $M = 85.83; SD = 14.86$ ). Likewise, teachers with a specialty in numbers ( $M = 89.32; SD = 5.68$ ) showed higher scores on self-efficacy than teachers with a specialty in letters ( $M = 84.42; SD = 8.42$ ). Finally, teachers with a specialty in numbers ( $M = 67.32; SD = 6.85$ ) showed higher scores on pedagogical practice than teachers with a specialty in letters ( $M = 63.62; SD = 5.85$ ).

*Work place:* Significant differences were found in Creative-Innovative Performance ( $t(69.94) = -2.44, p < .02$ ), Teaching Self-efficacy ( $t(110) = -2.61, p < .01$ ) and Pedagogical Practice ( $t(110) = -2.31, p < .02$ ). IHPE teachers ( $M = 89.60; SD = 11.63$ ) scored higher on creative-innovative performance than university teachers ( $M = 82.59; SD =$

16.66). In addition, IHPE teachers ( $M_f = 86.84$ ;  $SD = 7.44$ ) showed higher scores than teachers from the university ( $M = 82.80$ ;  $SD = 8.81$ ). Finally, IHPE teachers ( $M = 65.31$ ;  $SD = 5.59$ ) showed higher scores on Pedagogical Practice than university teachers ( $M = 62.61$ ;  $SD = 6.68$ ).

### ***Relationship between study variables***

Significant correlations were found between the studied variables that fluctuated between small ( $.10 \leq r \leq .29$ ), moderate ( $.30 \leq r \leq .49$ ) and large ( $r \geq .50$ ), according to Cohen's criteria (1988). Particularly, Dispositions towards critical thinking presented a direct and large relationship with pedagogical practice ( $r = .50$ ,  $p < .01$ ). Likewise, a direct and large relationship ( $r = .62$ ,  $p < .01$ ) was found between creative performance and pedagogical practice. In addition, a direct and large relationship was found between teacher self-efficacy and pedagogical practice ( $r = .52$ ,  $p < .01$ ) (see Table 2).

### ***Effect of Dispositions to Critical Thinking, Creative Performance and Teacher Self-Efficacy in Pedagogical Practice***

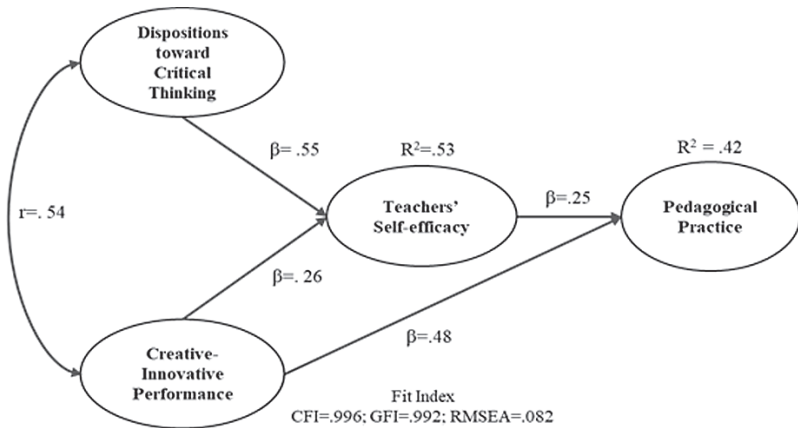
Linear regression analysis showed Dispositions towards Critical Thinking ( $\beta = .50$ ;  $p < .01$ ), Creative-Innovative Performance ( $\beta = .62$ ;  $p < .01$ ), and Teaching Self-Efficacy ( $\beta = .52$ ;  $p < .01$ ) had a direct effect on Pedagogical Practice. However, when Teaching Self-Efficacy was added to the regression model, the effect of Dispositions toward Critical Thinking was no longer significant.

Given this, a path analysis model where Teacher Self-efficacy acts as a mediating variable between Dispositions toward Critical Thinking and Pedagogical Practice was proposed. The proposed model showed good fit indices (CFI = .996; GFI = .992; RMSEA = .082). Dispositions towards Critical Thinking ( $\beta = .55$ ;  $p < .01$ ) and Innovative Creative Performance ( $\beta = .26$ ;  $p < .01$ ) had a direct effect on Teacher Self-Efficacy ( $R^2 = .53$ ). Likewise, Self-efficacy fully mediated the relationship between Dispositions to critical thinking, and partially mediated the relationship of Creative-Innovative Performance with Pedagogical Practice. The model explained 42% of Pedagogical Practice variance (see Figure 1).

**Table 2**

*Correlations between the study variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13
Dispositions toward Critical Thinking													
Engagement	.96**												
Cognitive Maturity	.88**	.76**											
Innovativeness	.91**	.84**	.70**										
Creative Performance	.54**	.53**	.39**	.56**									
Teachers' Self-efficacy	.69**	.69**	.58**	.62**	.56**								
Design	.54**	.55**	.42**	.49**	.48**	.84**							
Practice	.69**	.67**	.59**	.62**	.54**	.92**	.71**						
Academic Competence	.64**	.63**	.54**	.57**	.50**	.95**	.73**	.79**					
Pedagogical Practice	.50**	.54**	.37**	.44**	.62**	.52**	.47**	.51**	.46**				
Effectiveness of T. T	.60**	.62**	.46**	.56**	.71**	.70**	.58**	.64**	.66**	.83**			
Loyalty to Curriculum	-.04	.02	-.10	-.03	.01	-.18	-.05	-.14	-.22*	.40**	-.06		
Teacher Dependence	-.24**	-.21*	-.19*	-.29**	-.22*	-.21*	-.15	-.18	-.22*	.19*	-.24*	.44**	
Encouraging Thinking	.39**	.38**	.38**	.33**	.45**	.36**	.28**	.38**	.32**	.54**	.49**	-.19*	-.23*



*Figure 1.* Study model

## Discussion

Teaching thinking skills practices are a set of actions that comprise the daily work of teachers, exercised through subjective interrelationships, based on training purposes and directed towards developing critical thinking, problem solving, creativity and decision making (Barron, 2015; García et al., 2008; Martínez, 2012). These practices also demands thinking skills in teachers, which help to enhance and turn them into a transformative process.

The results show that there is a positive and significant relationship between dispositions to critical thinking and pedagogical practice. These results agree with Janssen et al. (2019), who argued that teachers must be critical thinkers in order to develop critical thinking and integrate it into their lessons. That is, dispositions toward critical thinking would provide the teacher with a set of attitudes, intellectual virtues, or mental habits, which describe the way in which an individual reasons, discusses and makes decisions (Facione et al., 1995; Perkins et al., 1993). In this way, these can accompany the design and implementation of

strategies and activities considered a priori. Likewise, these dispositions include motivational factors to address problems and make decisions in their field of action (Facione et al, 2000), which contribute to a proactive pedagogical practice to teach to a) compare and construct, b) classify data, c) determine parts and their relationship, d) determine the reliability of sources, and e) use evidence for causal explanation, prediction and conditional reasoning (Dilekli, 2019).

A significant relationship between creative-innovative performance and pedagogical practice was also found., Creativity is recognized as the development of novel and potentially useful ideas (Amabile, 1983; Corazza, 2016), and is essential to solve problems and satisfy human needs (Chen, 2020). Teachers are seekers and collectors of ideas by nature, particularly ideas that can be useful in their practice (Smith & Smith, 2010). Likewise, teachers engage in creative performance when planning and improvising lessons to meet the needs, interests and abilities of their students while adjusting to the formal curriculum and available resources at the same time (Rejskind, 2000; Richards, 2007 cited in Bramwell et al., 2011). Also, the creative teacher has a talent for stimulating students to a) produce ideas, b) seek new knowledge, and c) play an active role in defining troublesome topics (Diakidoy & Kanari, 1999; Fryer, 1996 cited in Morais and Azevedo, 2011).

The significant relationship found between Teacher Self-efficacy and pedagogical practice was previously reported by Dilekli and Tezci (2016). This relationship is explained because the design of learning environments that lead to the development of cognitive competences is largely based on the talents and self-efficacy of the teacher (Bandura, 1997). That is, teachers' beliefs about their self-efficacy to motivate and promote learning affect the types of learning environments they create and the level of student academic progress (Bandura, 1993). In addition, this can impact instructional practices, individual and collective efforts among teachers, and persistence within the profession (Martin & Mulvihill, 2019) to develop practices that stimulate thinking skills. Therefore, teacher self-efficacy is one of the most prominent motivational characteristics that affects the quality of their instruction (Burić



& Kim, 2020) such as the supportive climate in the classroom, effective classroom management and cognitive activation (Künsting et al. al., 2016) and learning outcomes (Burić & Kim, 2020; Klassen & Tze, 2014).

Based on this empirical evidence and its theoretical support, we developed a causal model. The results of the path analysis showed that (a) teacher self-efficacy fully mediated the relationship between dispositions to critical thinking and pedagogical practice, (b) teacher self-efficacy partially mediated the relationship between creative-innovative performance and pedagogical practice, and (c) that the model found explained 42% of the variance of pedagogical practice. Then, it can be assumed that both the teachers' dispositions towards critical thinking and their creative-innovative performance contribute to magnify their sense of self-efficacy, and this in turn contributes to the exercise of pedagogical practice.

In the proposed model, a large relationship is evidenced between Dispositions towards critical thinking and creative-innovative performance, which coincides with the assumptions of Wechsler et al., (2018). Furthermore, Lipman (2003) considers that thinking is intrinsically critical and creative, because there are phases in which we generate creative solutions or use strategies, followed by stages that require evaluation and decision-making about the course of actions. Also, Halpern (2006) asserts that both critical and creative thinking are complementary processes, but not identical.

Likewise, the model explains that both dispositions towards critical thinking and creative-innovative performance explain Pedagogical Practice through the mediation of the teaching self-efficacy. This shows that feelings of efficiency regarding academic competence to prepare, plan and organize class activities contribute to the improvement of pedagogical actions to promote thinking skills in the classroom. Eghtesadi and Jeddi (2019) also presented a model where self-efficacy was the best predictor of success in pedagogical practice, especially for designing and using instructional strategies, rather than critical thinking. However, both predictors were significantly related to

success in pedagogical practice. In this line, Cansoy and Türkoglu (2017) presented a model where critical thinking was a predictor of teacher self-efficacy. It is argued that as their critical thinking and problem-solving skills increase, they will become more interested in the problems at their institution and will seek different ways to solve them, try different teaching methods, and think critically about their work. This way, teachers will be able to obtain successful experiences and their beliefs of self-efficacy will change positively.

On the other hand, studies affirm that the creative teacher demonstrates self-confidence to be different, be persistent, and take reasonable risks to promote unpredictable situations in the classroom (Horng et al., 2005; Oreck, 2006). However, it is worth highlighting the effect of creative-innovative performance on pedagogical practice. This effect is like the one found by Davidovitch and Milgram (2006), where creative thinking was an important predictor of the effectiveness of pedagogical practice in higher education teachers. It is argued that generation of ideas is an important step in developing solutions during the teacher's daily practice. In the case of creative-innovative performance, it would be assumed that the key is focused on teaching behavior, which starts from generating new practices, products, and procedures, which can later be implemented in the classroom.

Data from San Martín is scarcely studied, and even though this research was guided by some studies that highlighted the differential features of the sample (for example, Unesco-Minedu, 2017; Díaz & Ñopo, 2016), there is still the need to be studied in depth. Regarding the dispositions to critical thinking, the most striking differences were the ones based on years of experience. It is assumed that teachers with more years of experience would have developed mental attitudes or skills to engage with reasoning, discussion of topics, and decision-making over time. That is, it is possible that critical thinking increases with age, with experiences and not only with university education (Huber & Kuncel, 2016).

Similarly, differences were found on creative-innovative performance. For example, IHPE teacher trainers show greater ability to

generate new ideas and apply them in everyday work situations than university teacher trainers. This may be linked to the theoretical nature of university teaching (Unesco-Minedu, 2017). In addition, the teacher trainers who had specialties in numbers had a better creative-innovative performance than those specialized in letters. Polya (1962) cited by Mann (2006) explains that mathematical knowledge such as know-how implies the ability to solve problems that require independence, judgment, originality, and creativity. Also, the years of experience seem to determine differences in the creativity of the teacher trainers. Agnoli et al. (2019) argue that mastery experience, acquired over several years of work, is crucial to exploit individual creative potential in order to be successful in different forms of creativity and exerts a direct influence on creative achievement and originality.

In addition, differences were found on teacher self-efficacy. Male teachers trainers have a higher sense of effectiveness in promoting classroom thinking skills than female teacher trainers, which is consistent with Klassen and Chiu (2010). They found that female teachers have lower self-efficacy, especially regarding classroom management. Based on initial training, IHPEs teacher trainers show a greater sense of self-efficacy than university teacher trainers. This can be explained by the intensification of pedagogical practice training, which according to Unesco-Minedu (2017) is a characteristic of initial training in IHPE, along with continuous training, which is related to teacher self-efficacy according to Li et al. (2019). Also, teacher trainers with specialties in numbers and older teacher trainers feel more efficient in their work to develop thinking skills. On the one hand, Khanshan and Yousefi (2020) explain that there is a significant impact of the type of discipline on self-efficacy based on the rigor of the career, its prestige and place in society, as well as the ease for its development in higher education institutions and the personal characteristics of those who practice them. On the other hand, Lee et al. (2013) and Lazarides et al. (2018) found that, as the number of years worked increased, teacher's self-efficacy also increased, since the experience would reinforce their beliefs of teaching competence.

The findings show that male teacher trainers report having a pedagogical practice that is more oriented towards the development of thinking skills. This can be explained by the level of self-efficacy shown by male teachers, which could affect their pedagogical actions (Dilekli & Tezci, 2016; Klassen & Chiu, 2010). Previous studies show that female teachers predominate in pedagogical practices (i.e., Islahi & Nasreen, 2013; Tašner et al., 2017); however, these referred to high school samples. Apparently, the unfavorable social context for women may have an effect on the recognition of her pedagogical practice.

Likewise, IHPE trainers had better scores than university trainers. This may be because these teacher trainers have a greater mastery of the practice (Unesco-Minedu, 2017), and this may benefit the implementation of pedagogical strategies or actions in a better way. In addition, teacher trainers with a specialty in numbers and with more years of experience show better scores in pedagogical practice. These results, too, may be affected by a higher sense of efficacy.

The limitations of this study were associated with the following factors: (a) the reduced sample of the population under study, due the context of the COVID-19 pandemic; (b) the limited experience of teachers with online surveys, which influenced the use of telephone surveys; (c) the social desirability regarding the studied variables, as well as the time of their application, could have generated automatic responses in the participants; and (d) the answers given to the self-reports could be biased by the beliefs of the participants.

Nevertheless, the proposed model helps to visualize the effect of other intervening factors in pedagogical practice, such as critical thinking and creativity. These capacities should be consolidated in the initial training of future teachers. Furthermore, a suggestion is raised to make the development of critical thinking capacities a fundamental and transverse axis to the curriculum, as well as its incorporation in the plans to strengthen the teacher trainer career. A suggestion is made to further develop this line of research, including a bigger sample of participants, as well as researching school directors and IHPE, in order to collect information that allows a comprehensive view of all the actors in

the field. Likewise, it is suggested to incorporate a measure of classroom observation in future studies, as well as measures of critical thinking skills and brainstorming exercises to measure creativity to control for the subjectivity of the participants.

This study provides evidence on the relationship between dispositions to critical thinking, creative-innovative behavior, teaching self-efficacy and pedagogical practice, which can help develop pedagogical strategies that promote thinking skills. In this way, it is confirmed that teaching self-efficacy is a factor of significant influence on the behavior of teachers in the classroom and on the effort they put into it (Dilekli & Tezci, 2016; Klassen et al., 2009; Klassen & Tze, 2014; Künsting et al., 2016; Poulou et al., 2018).

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