

Students' Assessment of Teaching Practices for Creativity in Graduate Programs

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ABSTRACT

The purpose of this study was to investigate how master and doctoral students' assess the extension to which graduate education professors favor the development of creativity in the classroom. The participants were 371 students from public and private universities. It was used the Inventory of Teaching Practices for Creativity in Higher Education, originally prepared for undergraduate students and adapted to the graduate context. The study also aimed to obtain evidence of internal validity of this instrument. The Inventory was valid to measure a dimensionality of three factors: General, Encouragement of New Ideas, and Interest in Student Learning. The third factor did not present an appropriate level of reliability. The results indicated a positive evaluation of graduate students with respect to their professors, as well as significant differences regarding the students' evaluation considering type of institution and whether student works or not.

Keywords: creativity; teaching; graduate level; scale.

RESUMO – Avaliação de Estudantes quanto a Práticas Docentes para Criatividade na Pós-graduação

O objetivo deste estudo foi investigar a avaliação de mestrandos e doutorandos a respeito da extensão em que professores de pós-graduação favorecem o desenvolvimento da criatividade em sala de aula. Participaram 371 estudantes de universidade pública e particular. Utilizou-se o Inventário de Práticas Docentes para Criatividade na Educação Superior, originalmente elaborado para alunos de graduação e adaptado ao contexto da pós-graduação. Buscou-se, ainda, obter evidências de validade interna desse instrumento, em termos de sua dimensionalidade. O Inventário mostrou-se válido para aferir uma dimensionalidade de três fatores: Geral, Incentivo a Novas Ideias e Interesse pela Aprendizagem do Aluno. O terceiro fator não apresentou grau de confiabilidade adequado. Os resultados indicaram uma avaliação positiva dos pós-graduandos acerca de seus professores, bem como diferenças significativas na avaliação de estudantes, considerando o tipo de instituição e estudante trabalhador ou não.

Palavras-chave: criatividade; ensino; pós-graduação; escala.

RESUMEN – Evaluación de Estudiantes de Prácticas Docentes para la Creatividad en el Posgrado

El objetivo de este estudio fue investigar la evaluación de maestrandos y doctorandos acerca de la extensión en que profesores de posgrado favorecen el desarrollo de la creatividad en el aula. Participaron 371 estudiantes, de universidad pública y privada. Se utilizó el Inventario de Prácticas Docentes para Creatividad en la Educación Superior, originalmente elaborado para alumnos de grado y adaptado para el contexto del posgrado. Se buscó, además, obtener evidencias de validez interna de dicho instrumento. El inventario se mostró válido para medir una dimensionalidad de tres factores: General, Incentivo a Nuevas Ideas e Interés por el Aprendizaje del Alumno. El tercer factor no presentó grado de fiabilidad adecuado. Los resultados indicaron una evaluación positiva de los estudiantes de posgrado con respecto a sus profesores, así como diferencias significativas en la evaluación de estudiantes considerando el tipo de institución y estudiante trabajador o no.

Palabras clave: creatividad; enseñanza; posgrado; escala.

Economic, social and cultural arguments have been presented in defense of the promotion of creativity in different contexts of human development, education and performance. To address challenges and overcome threats, it is necessary to recognize emerging realities, anticipate consequences and formulate responses that can

turn into innovative products, ideas and connections in a way that contributes to individual and collective well-being (Csikszentmihalyi, 2006). A creative response should be new, efficient, appropriate and relevant. This requires not only personal characteristics associated with creativity, but also a psychological and social climate in which

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recognition, acceptance and encouragement of original production are valued (Beghetto & Kaufman, 2017; Kaufman & Sternberg, 2010). Csikszentmihalyi (1996) proposed a systemic model of creativity in which three interacting components are highlighted: (a) domain or body of knowledge of a specific field at a given moment in history; (b) individual who, with genetic background, experiences, personality and knowledge, produces variations in the domain; and (c) field, portrayed by specialists responsible for selecting which productions are original and valuable, and will be integrated into the domain. For this author, it is important to stimulate the individual to deepen his knowledge in a domain, to recognize in what situations an idea or product is considered creative by the field and incorporated into the culture, besides analyzing to what extent society is open to change and encourages creativity.

In this sense, many scholars have examined the role of educational institutions, from early childhood education to higher education, in the training of individuals and professionals prepared to deal creatively with the impasses and problems of this millennium (Almeida, 2017; Hosseini, 2011; Kim & Hull, 2012; Martínez, 2006; Omdal & Graefe, 2017; Treffinger, Schoonover, & Selby, 2013). One theme that has been investigated concerns the extent to which pedagogical practices have favored or inhibited creativity in the educational environment. The results have revealed that creative abilities have often been blocked in both basic and higher education (Alencar, Fleith, & Pereira, 2017; Cropley, 2005; Fryer, 2007; Gibson, 2010; Jackson, Oliver, Shaw, & Wisdom, 2006; Pfeiffer & Wechsler, 2013). Most research has been conducted in the context of basic education, in contrast to the small number of studies in higher education, especially in Brazil, according to Nakano and Wechsler (2007). The research involving creativity in the university environment focuses largely on undergraduate education (Alencar & Fleith, 2010; Fadel & Wechsler, 2011; Hosseini, 2011; Jackson et al., 2006; Morais et al., 2017). Also relevant is to examining the place of creativity in *stricto sensu* graduate education. In Brazil, the National Graduation Plan 2005-2010 lists, according to Tourinho and Bastos (2010, p. 37), “the strengthening of the scientific, technological and innovation bases”. Likewise, the National Graduation Plan 2011-2020 (Coordination for the Improvement of Higher Education Personnel – CAPES, 2010) recommends the creation of “a talent training agenda to support the innovation processes of the country’s industrial park, observing future trends, in order to strengthen skills and competencies” (p. 193). Zanella (2004) advocates the need for creativity in all spheres of life, including the production of knowledge. Therefore, a great enterprise of graduate education should be “the preparation of creative researchers who contribute to the production of new knowledge clearly marked by an

ethical, political and aesthetic commitment” (p. 143). Many obstacles stand in the way of creativity development in the graduate context though. Duarte (2006) points out the conflict many master’s and doctoral students experience regarding the requirements to get the degree, turning “post-graduation into a burden to be borne for a certain time” (p. 103). Another obstacle is conformism and lack of incentive. Glaucius Oliva, former president of the National Council for Scientific and Technological Development, in an interview with *Veja* magazine, pointed out: “many of the master’s and doctoral students live in a comfort zone. They do not aim for anything very extraordinary, out of the curve ... This group follows a stable, predictable routine, and does not have great incentive to ... study abroad” (Weinberg, 2013, p. 15). According to the interviewee, it is necessary to engage students in challenging projects instead of leaving them trapped in a nineteenth-century classroom model.

Few studies have been carried out to reconcile teaching practices in post-graduation and creativity according to a search carried out in the Scielo, Pepsic, Google Academic and CAPES Journal Portal collections, using the following descriptors in Portuguese: criatividade, pós-graduação, doutorado, programa de pós-graduação, and the corresponding term in English. One of them, developed by Alencar (2002), investigated the extent to which postgraduate professors implemented creativity-enhancing practices, according to 92 students, and their assessment of their own, their professors and peers’ creativity level. The findings reveal graduate students’ positive perception of professors’ encouragement of creativity. They perceived themselves as more creative than their professors and colleagues though. Through a case study, Barreto and Martínez (2007) identified possibilities for four professors of graduate programs to turn their educational practice and academic orientation into a creative and innovative teaching-learning process. The participants acknowledged the importance of creativity in the educational context and confirmed the possibility of implementing a pedagogical practice and academic orientation based on the presuppositions of creativity. To that end, they highlighted a flexible profile for new learning, commitment to pedagogical work, interest in distinguished methods, sensitivity to students’ learning process, good relationship with students, and a pro-social stance in advisory work. In the international setting, Whitelock Faulkner and Miell (2008) conducted interviews with advisors and students to investigate the pedagogical processes involved in encouraging and supporting creativity during supervisory meetings. The findings indicated that, while formal education and monitoring contribute to the acquisition and enhancement of research skills, creative strategies should also be employed at this level of education, such as interacting with peers and advisors, playing with ideas and taking risks.

In Brazil, the increasing number of graduate programs has been pointed out in government statistics. According to the National Graduation Plan (PNPG) 2011-2020 (CAPES, 2010), between 2004 and 2009, there was an increase of 35.9% in master's degree courses and 34.4% in doctoral studies; and in the last 30 years (between 1976 and 2009), an increase of 370.3% in master's programs and 685.6% in doctoral programs. Consequently, the number of students enrolled also grew. It is expected that the number of master's students will increase by 25% and that of doctoral students by 60.84% until 2020 (CAPES, 2017). Although there are changes in the graduate scenario in Brazil, studies on the influence of pedagogical practices on the creative performance of master's and doctoral students are limited. Moreover, according to Alencar and Fleith (2014), there is a lack of standardized instruments that aim to evaluate the extent to which higher education professors present behaviors and practices that stimulate creativity in the classroom. Silva and Nakano (2012), in a review of the literature on creativity in the educational environment, identified the Inventory of Barriers to Personal Creativity, the Torrance Creative Thinking Test, a checklist of barriers to the promotion of creativity in the classroom and the Climate Scale for Creativity in the Classroom (for 4th, 5th and 6th grade students) as the most frequently used research tools. No instruments with evidence of validity were mentioned that focus on teaching practices that promote creativity. To provide higher education institutions and graduate program with empirical data could assist them to design and implement pedagogical strategies and educational policies that favor students' creativity. In this sense, in this study, we aimed to investigate how master's and doctoral students assess the extent to which graduate professors favor the development of creativity in the classroom. We also aimed to obtain evidence of internal validity for the Inventory of Teaching Practices for Creativity in Higher Education, originally designed for undergraduate students and adapted to the graduate context, in terms of its dimensionality.

Method

Participants

In total, 371 graduate students participated in the study, 230 of whom were master's (62%) and 136 doctoral students (36.7%). Five students (1.3%) did not inform which course level they were enrolled in. Of the total, 150 (40.4%) were male and 220 (59.3%) female. One (0.3%) participant included another option. Among the students, 251 (67.7%) regularly attended graduate programs at a public and 120 (32.3%) at a private institution. The students were enrolled in courses from different knowledge areas, being 224 (60.4%) Humanities, 60 (16.2%) Exact Sciences, and 87 (23.4%) Life Sciences. The definition of these three major areas was inspired by

the classification of the Scientific-Technical Council of Higher Education (CAPES, 2013). Two hundred twenty-three (60.1%) students were in the first semester and 138 (37.2%) were students from the 2nd to the 8th semester. Ten (2.7%) did not answer the question. One hundred and forty-four (38.8%) were grantees, while 227 (61.2%) did not receive scholarships. Two hundred and twelve (57.1%) worked, 46 (12.4%) were on leave to study, 107 (22.8%) did not work, and 6 (1.6%) did not answer. The participants' mean age was 34 years, ranging from 22 to 66 years. The Exact Sciences students were the youngest group, with a mean age of 28 years, followed by the Life Sciences with a mean age of 33 years, and the oldest students in Humanities, with a mean age of 35 years. A convenience sample was used in this study.

Instrument

In this study, the Inventory of Teaching Practices for Creativity in Higher Education (Alencar & Fleith, 2014) was adjusted for the graduate context. The original version was prepared for undergraduate students. The original instrument, with 37 items, evaluates four factors that were generated through exploratory factor analysis. Factor 1, called Encouragement of New Ideas, includes 14 items related to the professors' stimulation of cognitive abilities and affective characteristics associated to the students' creativity. Factor 2, Climate for Expression of Ideas, includes six items that relate to the professors' attitude of respect and acceptance of the students' ideas. The third factor, Assessment and Teaching Method, includes five items related to teaching practices favorable to the development of creative expression. Factor 4, named Interest in Student Learning, includes 12 items involving strategies and teaching resources that motivate the student to learn creatively. The alpha reliability coefficients range from 0.72 to 0.93.

To adapt to the graduate context, we present the instrument to a research group in creativity, consisting of professors and graduate students, to be adapted to the context of graduate education. Two items have been added to the scale: (a) they are flexible to the presentation of diverging ideas, and (b) give students the freedom to choose how academic papers are presented. According to the judges, flexibility and autonomy are characteristics associated with creativity that are essential for the work of masters and doctoral students. Subsequently, six graduate students in psychology answered the adapted version. They were asked to analyze the instrument and make suggestions for its improvement. The recommendations were: to merge items written positively and negatively, to report to the group of professors and not to the advisor, to present only the extremes of the scale - totally disagree and totally agree. We incorporate these suggestions into the instrument because (a) the scale would become more attractive to be answered, (b) they decrease the likelihood of missing data, and (c) the

students would not feel constrained in evaluating their own advisor. Also Examples of items are: [My master's / doctorate professors ...] encourage students to analyze different aspects of a problem; make the student perceive and know diverging points of view on the same problem or research subject; value the students' original ideas; give the students a chance to disagree from their point of view; encourage student autonomy; provide time for students to think and develop new ideas; offer students limited alternatives regarding the work to be done; provide a broad bibliography on the topics covered; and have positive expectations regarding student performance. The master's and doctoral students answer each of the items on a five-point scale that ranges from *totally disagree* to *totally agree*.

Procedures

After approval of the project by a Research Ethics Committee, the primary author contacted directors, coordinators and/or professors in order to request collaboration in the study. In the classes in which the professor agreed to collaborate, the instrument was administered in groups, which took approximately 15 to 20 minutes after the distribution and signing of the Free and Informed Consent Form. The study participants were assured of the confidentiality of their responses. A scientific initiation grantee, a doctoral student in psychology, and the primary author administered the instrument in graduate classes.

Data analysis

Aiming to analyze the factorial structure of the psychological instrument investigated, confirmatory factor analysis was applied using the WLSMV (Weighted least square mean and variance) estimator, using Mplus 7 software (Muthén & Muthén, 1998-2014). The use of the WLSMV estimator was based on the fact that the participants' responses to the psychological instrument items presented a non-normal distribution. The confirmatory factor analysis employed involved a confirmatory strategy, testing the theoretical model underlying the psychological tool, defining the presence of four first-order factors, as well as the theoretically postulated relationship between the four factors and the instrument items. After the confirmatory testing strategy of the original model, we carried out exploratory strategies in the confirmatory factor analysis, aiming to inspect the factorial structure of the tool and to reach a solution with satisfactory fit. These strategies will be described in detail in the results section. In order to analyze the fit of the analyzed models, we used the root mean square error of approximation (RMSEA) index, the comparative fit index (CFI: Bentler, 1990), and the Tucker-Lewis Index (TLI: Schumacker &

Lomax, 2004). It was considered a model with good fit if the RMSEA index of the data was equal to or lower than .05 (Browne & Cudeck, 1993) and CFI and TLI indices equal to or higher than .95 (Schumacker & Lomax, 2004). Fit indices were considered unacceptable when the model's CFI and TLI were lower than .90 or when RMSEA indices were equal to or higher than .10. In order to ascertain the reliability of the factors obtained, we used a composite reliability instead of Cronbach's alpha, as the latter does not include the factor loadings within the estimated reliability calculations of a psychological instrument's scores. Composite reliability is calculated as follows:

$$\text{composite reliability} = \frac{(\sum \text{betas})^2}{(\sum \text{betas})^2 + \sum \text{errors}}$$

The operation $(\sum \text{betas})^2$ refers to the square of the sum of all betas of a given latent variable in relation to the observable variables associated with this latent variable. In turn, the operation $(\sum \text{errors})$ refers to the sum of the errors, that is, the sum of the part of the variance of the observable variables not explained by the given latent variable (Fornell & Larcker, 1981). As in Cronbach's alpha, a cut-off point of .70 is also suggested when using composite reliability (Hair, Black, Babin, Anderson, & Tatham, 2009). After selecting the final model, we used the factorial scores of the dimensions of this model with acceptable composite reliability, in order to check for differences among groups of students regarding their assessment of the teaching practices that promote creativity in higher education, considering the variables gender (male and female²), type of graduate program (master's or doctorate), grantee (yes or no), working student (yes or no), type of institution (public or private), and graduate course area (Humanities, Exact Sciences and Life Sciences) for the sake of comparison. To compare the groups, we chose the Cohen's d, using the effect size package in statistical software R (Torchiano, 2017). This software classified effect sizes in qualitative terms. Coefficients around .20 are classified as small effect sizes, around .50 as medians, and above .80 large effects.

Results

Initially, we tested the model with four correlated factors. The model determined that the Encouragement of New Ideas factor loaded items 1 to 10, 12, 15, 18, 20 and 21; while the Climate for the Expression of Ideas factor loaded items 11, 14, 16, 34, 35, 37 and 38; the Factor Assessment and Teaching Method loaded items 13, 17, 19, 27, 30 and 39; and the Interest in Student Learning

² It was not possible to create a third group of variable gender because there was only one student in this group.

factor loaded items 22 to 26, 28, 29, 31 to 33, 36 and 38. This model ($\chi^2[695]=2019.28$; CFI=.931; TLI=.927; RMSEA=.072, 90% CI=.068 to .075) showed an acceptable fit index. That would be a reason not to reject it. Nevertheless, the model showed a covariance matrix of latent variables not defined positively, with correlations superior to 1 among latent variables. This condition demonstrated that the model did not converge and that the number of factors advocated by the model is excessive. Cases where the correlation exceeds 1 between latent variables tend to indicate that these variables tend to be a single variable. Correlations higher than 1.0 were found between Assessment and Teaching Method and Climate for the Expression of Ideas, as well as between Assessment and Teaching Method and Interest in Student Learning. The lowest correlation found between the factors was 0.874 between Climate for Expression of Ideas and Encouragement of New Ideas, while the remaining coefficients were higher than .908.

Considering that the result found showed the inadequacy of the original model and that, apparently, the number of factors recommended by the theory was excessive, due to the fact that some showed a correlation higher than 1, we used an exploratory strategy to elaborate some alternative models, looking for a solution that presents good fit to the data and could better clarify the structure of the psychological instrument analyzed. As the analysis results of the original model showed the presence of very high correlations between the factors, an alternative model tested was the one-dimensional model, where all items of the instrument would be explained by a single factor. This model did not present a good fit to the data, but an acceptable fit ($\chi^2[702]=2190.98$, CFI=.923, TLI=.918, RMSEA=.076, 90% CI=.072 to .079). Although acceptable, the one-dimensional model presents a lower fit than the original model in both CFI and RMSEA, and the difference between the chi-squares and degrees of freedom of both models is statistically significant (χ^2 of 2190.98 minus χ^2 of 2019.28 and 702 degrees of freedom minus 695, totaling differences of 171.7 for χ^2 and 7 degrees of freedom, indicating $p \leq .00001$).

In this sense, the analysis could be concluded by indicating the acceptability of the one-factor model to explain the factorial structure. As indicated, however, the alternative model loses in fit compared to the original model, which presented problems due to excess factors (correlations superior to 1 between the factors that tend to support this interpretation). As specific factors advocated by the original model may not be inadequate, but only a few, a series of models containing the presence of a general factor loading all instrument items and one of the factors of the original model were analyzed. The general factor and the specific factor were orthogonalized to determine whether, after this procedure, the specific factor would maintain some variance or if all the

variance of the specific factor would be absorbed by the general factor, so that the specific factor would not survive, through the presence of null or negative variance in this factor. Thus, we analyzed an alternative model that determined the presence of a General factor as well as the Encouragement to New Ideas factor. This model presented an acceptable level of fit ($\chi^2[687]=1982.74$, CFI=.933, TLI=.927, RMSEA=.071, 90% CI=.068 to .075), similar to the original model in terms of fit indices and demonstrating its superiority to the original model based on the difference between the chi-squares and degrees of freedom (36.54 chi-squares and 8 degrees of freedom of difference between the models, with $p=.00014$). When the model is superior to the original model, in terms of the difference of chi-squares and degrees of freedom between the models, the alternative model with the General factor orthogonalized to the Encouragement of New Ideas factor is clearly superior to the alternative model of the one-dimensional factor, as this had shown to be inferior to the original model, in terms of the difference between the chi-squares and degrees of freedom of these models.

Proceeding with the analysis of the general factor with the specific factors, we also analyzed the model with the General factor orthogonalized to the factor Climate for the Expression of Ideas. This model did not converge because the Climate for Idea Expression factor presented zero variance, showing that this factor is totally absorbed, in its variance, by the general factor. Next, the model was analyzed with the General factor orthogonalized to the Factor Assessment and Teaching Method. This model presented the same problem as the previous one, indicating no convergence because the factor Method presented negative variance (-0.023). The same conclusion drawn for the previous model applies to the latter model. Finally, the model with the General factor orthogonalized to the factor Interest in Student Learning presented convergence and acceptable fit ($\chi^2[690]=2107.67$; CFI=.926; TLI=.921; RMSEA=.074; 90% CI=.071 to .078), indicating that it might be relevant to test a model that incorporates both the presence of the general factor and the specific factors Encouragement of New Ideas and Interest in Student Learning. Thus, this model was analyzed, with all three factors orthogonalized to each other. The model presented an acceptable fit ($\chi^2[678]=1936.96$, CFI=.935, TLI=.929, RMSEA=.071, 90% CI=.067 to .074), with CFI, TLI and RMSEA indices very similar to the model with the General factor orthogonalized to the Encouragement of New Ideas factor, although the model with the General factor and the factors Encouragement of New Ideas and Interest in Student Learning proved to be superior to the General factor model with Encouragement of New Ideas only, in terms of the difference between their chi-squares and degrees of freedom ($p \leq .00001$). Thus, the model used as a reference was the model with the General

factor and the specific factors Encouragement of New Ideas and Interest in Student Learning, all of them orthogonalized to each other. These three factors are supported in terms of variance. The General factor showed a variance of .436 ($p \leq 0.001$), the Encouragement of New Ideas factor .151 ($p \leq 0.001$), and the Interest in Student Learning factor .062 ($p = .017$).

To the extent that the model used as a reference, with the General factor and the specific factors Interest in Student Learning and Encouragement of New Ideas, did not present a good fit to the data, but an acceptable fit, we pursued the exploratory strategy, allowing a few additional changes in the model that were able to indicate a model with good fit to the data or close to that condition. The final model eliminated items 18 and 39 from the data analysis because they were not loaded minimally (load $\geq .30$) in any of the model factors. By the way, these items were not loaded minimally in any factor of any of the models tested. In addition, the Encouragement of New Ideas factor was allowed to carry items 28 and 29, with the correlated items 16 and 19. In summary, the changes were the elimination of the analysis of two items, the addition of two items to a specific factor, and the addition of the correlation between two items. To make the model as parsimonious as possible, all those items that presented load inferior to .10 in relation to this factor were determined as having zero load. This model presented an acceptable fit to the data, close to the good fit ($\chi^2[605] = 1574.39$, CFI = .949, TLI = .943, RMSEA = .066, 90% CI = .062 to .070). Factor variances were as follows: General factor (.424, $p \leq .001$), Interest in Student Learning (.040, $p = .078$), Encouragement of New Ideas (.132, $p \leq .001$). Note that only the Interest in Student Learning factor presented variance with $p < .05$, indicating that the null hypothesis of zero variance cannot be rejected. Nevertheless, the value of .078 is quite

close to .05 and may be considered acceptable (Ahmrein, Korner-Nievergelt, & Roth, 2017).

Table 1 presents the factor loading of the model factors in relation to the items of the psychological instrument. As shown in this table, the General factor loads all items of the instrument well, with a mean of .67 ($SD = .11$) and a minimum loading of .41. The Interest in Student Learning factor has an average loading of .26 ($SD = .11$), showing a minimum factor loading of .13. The Encouragement of New Ideas factor presents an average factor loading of .35 ($SD = .13$), with a minimum factor loading of .15. It is worth noting that the factor loadings of the specific factors are usually much smaller than the loadings of the General factor, as all factors are orthogonalized to each other. In this sense, the factor loadings of the specific factors in the items no longer receive any influence from the General factor, that is, these factor loadings are completely "clean" of the influence of this factor. There is a high composite reliability for the General factor (.969), an acceptable composite reliability for the Encouragement of New Ideas factor (.666) and an unacceptable reliability for the Interest in Student Learning factor (.337), indicating that it is valid but not valid reliable in terms of its factor scores. Table 2 shows the effect sizes, comparing several groups regarding the students' assessment of the General factor and the Encouragement of New Ideas factor. The lower and upper ranges indicate the effect sizes with a 95% confidence interval. Values indicating the same signal between the two intervals, whether negative or positive, show that the effect size obtained is statistically significant at the level of $p \leq .05$. The findings revealed that the graduate students' assessment of the extent to which graduate professors favor the development of creativity in the classroom was positive, considering that the average in the General factor was 3.82 ($SD = .65$) on a scale ranging from 1 to 5.

Table 1
Factors Loadings with Respect to the Items of the Instrument, Considering the General Factor and Specific Factors

Items	General Factor	Interest in Student Learning	Encouragement of New Ideas
I1	0,65		0,36
I2	0,61		0,50
I3	0,62		0,60
I4	0,59		0,52
I5	0,69		0,46
I6	0,70		0,25
I7	0,70		0,37
I8	0,60		0,33
I9	0,41		0,16
I10	0,66		0,31
I11	0,65		0,41
I12	0,77		0,15
I13	0,73		
I14	0,79		

Table 1 (continuation)
 Factors Loadings with Respect to the Items of the Instrument, Considering the General Factor and Specific Factors

Items	General Factor	Interest in Student Learning	Encouragement of New Ideas
I15	0,66		0,23
I16	0,77		
I17	0,65		
I19	0,75		
I20	0,77		
I21	0,75		0,26
I22	0,68	0,20	
I23	0,71	0,17	
I24	0,57	0,38	
I25	0,84	0,19	
I26	0,43	0,13	
I27	0,41		
I28	0,48		0,38
I29	0,72		0,33
I30	0,65		
I31	0,77		
I32	0,77	0,40	
I33	0,76	0,34	
I34	0,81		
I35	0,82		
I36	0,75		
I37	0,67		
I38	0,60		

Table 2
 Effect Size (Cohen's *d*) of Groups Comparison with Respect to Students' Assessment of General Factor and Encouragement of New Ideas Factor

Comparisons	Factors	Cohen's <i>d</i>	Inferior Interval	Superior Interval
Male vs. female	general	.02	-.19	.22
	new ideas	.15	-.05	.36
master vs. doctoral student	general	.12	-.09	.33
	new ideas	.00	-.21	.22
grantee (yes vs. no)	general	.14	.07	.35
	new ideas	-.06	.15	-.27
working student (yes vs. no)	general	.23	.00	.47
	new ideas	-.05	.18	-.28
public vs. private institution	general	-.31	-.09	-.53
	new ideas	-.04	.18	-.26
areas (Humanities vs. Exact Sciences)	general	-.01	-.30	.27
	new ideas	-.23	.05	-.52
areas (Humanities vs. Life Sciences)	general	.17	-.08	.42
	new ideas	.22	-.03	.47
areas (Life Sciences vs. Exact Sciences)	general	.17	-.16	.50
	new ideas	.00	-.33	.33

The results indicate a statistically significant difference, with $p < .05$, only in the General factor, and only in the comparison between working and non-working students and in the comparison between public and private institutions. This can be seen in the confidence intervals of the effect sizes of these comparisons, which maintain the same sign both in the lower and in the upper range. The positive coefficient of .23 indicates a small difference (effect size classified as small) in favor of working students compared to non-working students, indicating that the former assesses the teaching practices for creativity slightly more favorably (small difference) than the latter. In turn, the coefficient of -.31 indicates a negative sign in the comparison between the public and the private institutions. The negative value means that the difference is favorable to the second group in relation to the first group, taken as a reference. In other words, the value of -.31 indicates that the students from the private institution assess the teaching practices for creativity slightly more favorably than the students from the public institution. Nevertheless, this difference is also small. In short, working students and students affiliated with the private institution obtain slightly higher assessment coefficients than the non-working students and students from the public institution, respectively, regarding teaching practices for creativity and the encouragement of new ideas.

Discussion

The results obtained especially through the confirmatory factor analysis reveal the partial adequacy of the instrument for use in the context of graduate education, either for the purpose of research or mapping of the conducts and teaching practices that favor or inhibit the development and expression of students' creative abilities. Based on the data obtained, we concluded that the instrument is an appropriate measure of one General factor and one specific factor (Encouragement of New Ideas). The other specific factor (Interest in Student Learning), however, although valid, is not reliable, and its component items need review and further expansion. The factors Climate for the Expression of Ideas and Assessment and Teaching Method were not maintained in the model with better fit. On the other hand, considering that the General factor was orthogonalized in relation to the specific factors, we raised the hypothesis that the factors Climate for Expression of Ideas and Assessment and Teaching Method were incorporated by the General factor. In this sense, it is recommended the use of the instrument considering the General factor and the specific factor Encouragement of New Ideas. Creativity is not the result of personal characteristics only, but also of psychological and social climate in which new ideas are valued and favored (Beghetto & Kaufman, 2017; Kaufman & Sternberg, 2010).

The results revealed differences in the public and private students' assessment of teaching practices for creativity in the context of graduate studies. The extensive history of graduate studies in the public research institution investigated in this study – around four decades – cannot be ignored, which, over many decades, has permitted the development of essential researcher skills, such as critical thinking and autonomy, compared to the operating period of the private institution's graduate programs, most of which began in the second half of the 1990s. Differences between working and non-working students were also evidenced in this research. While 78.3% of the students from the private institution worked, this percentage was lower (48.2%) at the public institution. These data reveal a possible interdependence between the variables educational institution and working student or not. Graduate students who studied at a private university and worked evaluated the teaching practices that promoted creativity more positively in relation to public students who did not work. The conditions for the completion of a graduate course at a public university, most of the time, require the student to have time available beyond classes, so as to attend meetings with his/her advisor's research group and other activities of the program he is affiliated with, participate in and present papers during Brazilian and international scientific events. In that sense, it is more challenging for this master's or doctoral student to study and work at the same time. In the case of the private institution in which we collected the data, it seems possible to reconcile study and work activities, perhaps because the extra classroom demands are more limited. For example, the student is not always required to submit manuscripts to publication or to participate in research group meetings on a regular basis. However, it is important to highlight that there are striking differences between private institutions themselves, some of which are quite traditional and have an excellent body of researchers, while others have begun to include graduate studies more recently. Distinct profiles of private institutions should be considered in future studies.

Final Considerations

The positive assessment of the extent to which professors favor the development of creativity in the classroom by the study participants supports findings from prior studies involving both graduate (Alencar, 2002; Barreto & Martínez, 2006) and undergraduate students (Alencar & Fleith, 2014). This leads us to conclude that creativity is gradually taking up space on the pedagogical agendas of Brazilian higher education institutions and strengthening the education of creative researchers who can contribute to innovative knowledge production in the country. However, it is important to highlight that there are still many obstacles to creativity to be overcome.

in this educational level. In a study conducted by Fleith (2019), for example, both students and professors have indicated institutional barriers for the promotion of creative thinking, such as the evaluation of graduate programs, publication model in magazines, bureaucracy to carry out projects, and lack of articulation between theory and practice. These factors need to be addressed in future studies. As limitations of the study, we can mention the convenience sample, the participation of only one public and one private higher education institution, the imbalance in the number of participants per study area and in the number of participants considering the semester in which they are enrolled. The academic experience of those completing graduate programs is more diverse and broader than those who are in the beginning.

As suggestions for future studies, it is recommended (a) to expand the sample size, including several public and private universities from different regions of Brazil; (b) to analyze differences between first-semester students, students who have reached the middle, and those at the end of the course; (c) to collect data considering graduate programs, from public institutions and private institutions, with distinct levels of excellence. A larger number of items in the factor Interest in Student Learning is also suggested in order to increase its reliability level of reliability. Finally, qualitative studies, involving both classroom observation and case studies, including professors and students whom their peers consider as highly creative, could offer further elements to understand the phenomenon of creativity in graduate education.

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