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Received: 24.02.2020 Accepted: 11.05.2020

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## Divergent thinking of students in the field of education at a university in Lima

### Abstract

*The search to favor the development of creative thinking in students is an arduous and complex task that guides the possibility of implementing and operating it. Therefore, the objective of this research was to describe the levels of divergent thinking of students in the specialty of education at a university in Lima. The study was of a quantitative, descriptive level and non-experimental design approach. The population was made up of 200 students. An instrument was developed and applied to measure emergent thinking, validated and reliable (Cronbach's Alpha =, 894). It was determined that 61% have an average level of divergent thinking, with originality being predominant ( $\beta =, 407$ ). It is concluded that, to improve their level of divergent thinking, they must be flexible about thinking and originality.*

**Keywords:** divergent thinking, fluency, flexibility, originality.

### Introduction

The event held by UNESCO in 2019, called the 11th Youth Forum on Youth Spaces in Action, was stated to be an opportunity to showcase and discuss good practices in youth participation in the context of the Youth Space Initiative or other projects that young people have developed with the support of that organization. Likewise, they maintained that the current world needs talents both in organizations and in the educational field; characterizing it as the main problem that affects it, being observed in the educational institutions students with little

interest and rebellion; forming beings with a traditional mental approach. Being the early age the main factor for children to develop their imagination, through the happiness and freshness of their ideas, allowing their development of argumentation.

Sosa (2018) argues that thinking is divergent when there are different ways to obtain an outcome or objective, in addition, that by having several options, students or workers have the possibility of creating or designing new strategies, and thus be more efficient, since it uses fewer resources to achieve the goal set. In addition, it mentions that linear thinking is an

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important aid to divergent thinking, since it is one of the factors that allow the student or worker to evolve his development and growth of his creative and imaginative capacities. On the other hand, he mentions that all the successful companies of the 20th century will not be successful in the next one, but they promote or improve their business model, and for that it is essential that their employees have a divergent and innovative thinking. He also said that companies consider divergent thinking important to improve their products or services, but do not use it because they think that what has been won can be lost. Likewise, they believe that it is an added value for the company, but they also consider it a threat, and thus the social environment is the one that ends up stopping such thinking.

In this century it is important to emphasize divergent thinking that the capacities that students should have serve them to create and imagine. Likewise, the second decade of this century is about to end, for which reason it is fundamentally important to have other forms and characteristics for exploiting the creativity of students. Likewise, in our country there are difficulties that afflict our university students in their classrooms. The article 29 of the General Education Law (2016) mentions that Higher Education is destined to research, creation and dissemination of knowledge; to community outreach; to the achievement of high-level professional skills, in accordance with the demand and the need for sustainable development of the country. Similarly, the article 6 of the New University Act No. 30220 takes into account the training of high-quality professionals in a comprehensive manner and with a full sense of social responsibility in accordance with the country's needs.

Guzmán (2017) stated that, currently, university students in almost all universities, both public and private, suffer from difficulties in learning either through different learning styles. This dilemma lies in the fact that students only have knowledge about critical thinking and are unaware that there is another type of thinking, called divergent or lateral thinking. Due to this dissimilar situation, it is important to establish criteria by which students can improve their level of learning, since this type of thinking will allow them to create and design new ideas.

The present study is focused on the students of a Professional School of Education at a university in Lima, where it was found that these students follow the traditional method and do not contribute new or creative alternatives for the resolution of a problem, in the courses they are assigned. This makes it difficult for them to get on track, to narrow down and to persuade of multiple knowledge. Likewise, we have the lack

of training of techniques in the studies that do not help to look at the same object from different points of view. The present one is to help the students to get to discover their talents and gifts that they have strengthened in each one of them, it is for that reason, that it is of vital importance, to know how these students improve their levels of learning and, mainly, to reduce the university desertion.

## Theoretical Framework

### *Divergent thinking*

There is no doubt that the issue of creativity has generated many controversies and positions in recent decades (Ferrandíz et al., 2016; Vargas-Hernández, 2016), since it is considered one of the most socially valued psychological constructs, since it is considered to be the essential support in the field of technological and social innovation, as well as to guarantee human progress (Llamazares, Arias and Melcon, 2017). The work of promoting creativity in the classroom involves both the stimulation of active learning centred on the student (Píriz, Mallarini, & Acosta, 2018), as well as the development of qualities in creative people such as sensitivity to problems; great capacity to detect errors (critical thinking); autonomy; disbelief; a taste for challenges; among others (Píriz, 2017; Fujo, & Dida, (2019).

Guzmán (2018) conducted a study to find out whether or not there is an influence of riddles on divergent thinking. It is worth mentioning that this study found that after applying the riddle experiment to the students, divergent thinking increased from 30.0% to 70.0% on average. Carrasco (2018), conducted a study in which he found that the different categories of thinking have factors that are related to performance and learning. On the other hand, Guzmán (2017), shows that in the classrooms, activities that invite reasoning are not promoted, and if the production of creative ideas through the examination of various forms of resolutions, therefore, he concludes that students are recipients of information. Uriol (2018), proposes a didactic model based on Guilford theory to develop divergent thinking in students, where they are taught to think and take an interest in developing goals guided to strengthen mental faculties such as attention, concentration and thinking skills. The results found in most of them would prove to have advanced critical and creative thinking, and in a certain way divergent thinking. On the other hand, Pacco (2018) reaffirmed the importance of working and developing the Mathematical Game to improve and potentialize divergent thinking in students, being vast of solving problems in areas of life without the need to follow models, with the hope that, they will be divergent citizens in decision

making. These results allow us to affirm that mathematical games do significantly improve students' divergent thinking. Escobedo (2019), on the other hand, carried out an investigation in which he highlighted as insufficient the poor development of divergent thinking in students.

## Methodology

### Type of study

The present research is framed in the positivist paradigm, using the hypothetical-deductive method, being of descriptive level, non-experimental design and cross-sectional.

In the study, the survey technique was used, with the purpose of knowing the characteristics of the divergent thinking of the students of the professional school of education of a University of Lima. To this end, the instrument called 'Escala de motivación académica estudiantil' (EMA) was used, whose authors are David Max Olivares Álvarez and Paola Maritza Oroza Choquetilla of the Centro de Estudios Transdisciplinarios de Bolivia; which was modified by Gabriela Amanda Balabarca Poves. This questionnaire consists of 40 reagents under the Likert scale, to gather information on the criteria of 'Fluidity', 'Flexibility' and 'Originality' of the variable 'Complex thought'. In addition, the instrument was subjected to expert judgment and the respective reliability analysis is shown in Table 1.

**Table 1.**  
*Reliability of the instrument for measuring divergent thinking*

Cronbach's Alpha elements	N° of
,894	20

### Population and sample

The population consisted of 200 students from the Professional School of Education of a University of Lima. We worked with a sample of 132 students from the aforementioned Professional School, which was estimated by simple or stratified random probability sampling.

## Results

### Descriptive analysis

#### a) Analysis of divergent thinking

Of the 100 university students interviewed, 61% consider themselves to have a 'Medium' level of divergent thinking, 38% a 'High' level and only 1% consider themselves to have a 'Low' level, according to the data shown in Table 2.

**Table 2.**  
*Descriptive analysis of the levels of divergent thinking*

Levels	Frecuency	Percentage
Low	1	1,0
Medium	61	61,0
High	38	38,0
Total	100	100,0

#### a) Analysis of the Fluidity Dimension

Of the 100 university students interviewed, 80% considered themselves to have a 'Medium' level of fluency in divergent thinking, while 18% said they had a 'High' level and only 2% considered themselves to have a 'Low' level according to the data in Table 3.

**Table 3.**  
*Descriptive analysis of the levels of the fluency dimension*

Levels	Frecuency	Percentage
Low	2	2,0
Medium	80	80,0
High	18	18,0
Total	100	100,0

#### a) Analysis of the Flexibility Dimension

Of the 100 university students interviewed, 67% considered themselves to have a 'Medium' level for the Flexibility of Divergent Thinking dimension, while 32% said they were at the 'High' level and only 1.0% considered themselves to have a 'Low' level as shown in Table 4.

**Table 4.**  
*Descriptive analysis of the levels of the Flexibility Dimension*

Levels	Frecuency	Percentage
Low	1	1,0
Medium	67	67,0
High	32	32,0
Total	100	100,0

#### a) Analysis of the originality dimension

Of the 100 university students interviewed, 52% considered to have a 'Medium' level for the Originality of Divergent Thinking dimension, while 43% considered to be at a 'High' level and only 5.0% considered to have a 'Low' level as shown in Table 5.

**Table 5.**  
*Descriptive analysis of the levels of the Originality dimension*

Levels	Frecuency	Percentage
Low	5	5,0
Medium	52	52,0
High	43	43,0
Total	100	100,0

**Inferential analysis**

Table 6 shows that the values for all dimensions with significance (ff) less than 5%, so they are all subject to the regression model. Likewise, it was observed that the originality dimension ( $\beta = ,407$ ) is the one that has the

greatest weight or impact on the divergent thinking variable; therefore, it was concluded that the predominant dimension of divergent thinking that students of the education specialty at a university in Lima have was fluidity.

**Table 6.**

*Standardized coefficients of the multivariate linear regression of divergent thinking in students of the specialty of education at a university in Lima.*

Model	Non-standardized coefficients		Standardized coefficients	Sig.	95.0% confidence interval for B	
	B	Desv. Error	Beta		Lower limit	Upper limit
(Constant)	3,553E-15	,000		,000	,000	,000
Dimension Originality	1,000	,000	<b>,407</b>	,000	1,000	1,000
Dimension Flexibility	1,000	,000	,366	,000	1,000	1,000
Dimension Fluidity	1,000	,000	,340	,000	1,000	1,000

a. Dependent variable: Divergent thinking

The data in Table 7 shows that all the indicators of the flow dimension have significance (F) less than 5%, so they all enter the regression model. Likewise, it can be seen that the naturalness indicator ( $\beta = ,653$ ) is the

one that has the greatest weight or impact on this dimension. Therefore, it is concluded that the predominant indicator of the fluidity of divergent thinking of students in the specialty of Education was naturalness.

**Table 6.**

*Standardized coefficients of the multivariate linear regression of the fluidity dimension in students of the specialty of education in a university of Lima.*

Model	Non-standardized coefficients		Standardized coefficients	Sig.	95.0% confidence interval for B	
	B	Desv. Error	Beta		Lower limit	Upper limit
(Constant)	7,105E-15	,000		1,000	,000	,000
Naturalty	1,000	,000	<b>,653</b>	,000	1,000	1,000
News Ideas	1,000	,000	,490	,000	1,000	1,000

a. Dependent variable: Dimension Fluidity

Table 8 shows that all the indicators of the flexibility dimension have significance (F) less than 5%, so it is subject to the regression model. Likewise, it was observed that the ability indicator ( $\beta = ,625$ ) is the one that has

the greatest weight or impact on this dimension. Therefore, it was accepted that the predominant indicator of the flexibility of divergent thinking of students in the field of education was ability.

**Table 8.**

*Standardized coefficients of the multivariate linear regression of the flexibility dimension in the students of the specialty of education of a university in Lima*

Model	Non-standardized coefficients		Standardized coefficients	Sig.	95.0% confidence interval for B	
	B	Desv. Error	Beta		Lower limit	Upper limit
(Constant)	1,243E-14	,000		1,000	,000	,000
Hability	1,000	,000	<b>,625</b>	,000	1,000	1,000
Proactivity	1,000	,000	,493	,000	1,000	1,000

a. Dependent variable: Dimension Flexibility

Table 9 shows that all the indicators of the originality dimension have significance (Sig.) less than 5%, so they are subject to the regression model. Likewise, it can be seen that the ability indicator ( $\beta = .541$ ) is the one that has the greatest weight or impact on this dimension. Therefore, the third specific

**Table 9.**

*Standardized coefficients of the multivariate linear regression of the originality dimension in students of the specialty of education in a university in Lima*

Model		Non-standardized coefficients		Standardized coefficients	95.0% confidence interval for B		
		B	Desv. Error	Beta	Sig.	Lower limit	Upper limit
2	(Constant)	-7,105E-15	,000		1,000	,000	,000
	Interest to know	1,000	,000	<b>,541</b>	,000	1,000	1,000
	Independent behaviour	1,000	,000	,528	,000	1,000	1,000

a. Dependent variable: Dimension Originality

## Discussion

The results in Table 2 are consistent with the study conducted by Guzmán (2018) who found that 36% of students had an expected achievement on divergent thinking and 60% of them had an outstanding achievement while a small 4% had an achievement in progress. It also agrees with the results of Coronel (2015), who maintained that students have good narrative fluency and a good capacity to produce new ideas, due to their different styles of flexible thinking, given that one of the essential characteristics of divergent thinking is that students must have initiative and creativity, contributing new ideas and solutions in accordance with academic requirements.

The results in Table 3 are consistent with the study conducted by Guzmán (2018) who found that 28% of the students in his study had an expected achievement on the fluidity dimension of divergent thinking and a considerable 72% had an outstanding achievement. Similarly, the results obtained are similar to those mentioned by Coronel's study (2015), who found that 50% of the students interviewed had a fluidity of narrative and were able to produce a large number of innovative ideas. The above corroborates what was expressed by Beltrán, Garzón and Burgos (2016) who defined creativity as the ability to produce new forms and restructure stereotyped situations, highlighting that the dimension of divergent thinking is important in the elaboration when defining creativity as the restructuring of a situation.

The results in Table 4 are in line with the study carried out by Guzmán (2018) who found that 32% of students had an expected achievement on the flexibility dimension of

hypothesis of the research is accepted. Based on these results, it was concluded that the predominant indicator of the originality of the divergent thinking of the students analyzed was the interest in knowledge.

divergent thinking; while 64% of them obtained an outstanding achievement and only 4% were in a process state. Likewise, the results obtained can be compared with those expressed by Coronel (2015), who found that 44.0% of the students analyzed for the flexibility dimension had an average level because they only showed little criteria for flexibility of thought. The above can be contrasted with what was mentioned by Rodríguez (2017), who mentioned that divergent thinking meant satisfying a need or an inconvenience and, to achieve this, the orientation was changed at the moment it was opportune, reaching multiple responses which were all correct, so he suggested that divergent thinking implies having occurrences, fantasy intuitions, arousing curiosity, experimentation, dangers, mental elasticity, metaphorical thinking, even a certain aesthetic sense.

The results in Table 5 are consistent with the study conducted by Guzmán (2018), who found that 72% of the students obtained the expected achievement on the originality dimension of divergent thinking, while 16% of them obtained an outstanding achievement and only 13% positioned themselves in an achievement in progress. Similarly, the results of the Coronel study (2015) were consistent with the findings of the originality dimension, which found that 55% of the students interviewed had an average rating, as opposed to the generation of original ideas. On the other hand, Vallejos (2015), maintained in his study that originality was the most characteristic aspect of creativity and that it implied thinking about completely new ideas or perceiving problems in a different way, an aspect that brings as a consequence the ability to generate innovative answers, for example, finding the way to solve a mathematical

problem as no one has ever thought of before. Likewise, it coincides with that determined by Uriol (2018), who indicated that the aptitude or disposition of the student is an aspect to be considered in order to generate, in an unconventional way, different, remote, ingenious or novel answers.

## Conclusions

Divergent thinking is a tool that has been elucidated in recent decades, since as indicated in the theoretical underpinnings on the subject, there is no doubt that the creative aspect in human beings can have a certain domain since a person is usually creative in one area, but not in all or does not manage to consolidate high levels of effectiveness in a homogeneous manner. This aspect has a direct correspondence with the aspects of intelligence studied by Gardner who, in spite of trying to elucidate the intricate network of the dimensions of intelligence, has not been able to consolidate all the aspects related to it. This perhaps explains the disparity in the results found for the analysis of certain traits associated with divergent thinking in the present study, and this diatribe can be resolved in what Ferrando et al. proposed, who mentioned that "Perhaps the answer is that divergent thinking is not sufficient for creative thinking, but it is a requirement for it to occur. (2017, p. 97)

It is recommended to be an innovative, creative teacher, applying innovative teaching strategies in the university classroom such as: analogical dialogue, the day of the word, stories and dramatization to generate new forms of learning in the students to expand their spectrum of divergent thinking, since, in this way, they will be able to have more innovative and original ideas, which will give them a lot of satisfaction in the future. For all these reasons, a restructuring of the methodological processes that are developed in the university must be carried out if the aim is to exploit those creative capacities of the students in contexts in which new proposals oriented to this end can be made more flexible.

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