Creativity and Innovation, Essential Skills for Hybrid and Online Training for University Students in Education Sciences

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Abstract

The university of the 21st century faces the challenge of adapting and transforming realities for the good of humanity; for this reason, the training of the following competences is vital: creativity and innovation. The study, development and strengthening of these is a requirement in relation to the online and blended learning teaching-learning processes that currently predominate in Higher Education, which urgently demand these competences. The aim of this research is to assess the perception of university students of Educational Sciences on creativity and innovation in their professional training; it is quantitative, using a questionnaire of perception of competences; the sample corresponds to the type of cluster sampling and is made up of 100 students. The results show a high perception of the importance of creativity and innovation in ICT-mediated activities.

Keywords

Competences, creativity, innovation, ICT, higher education

1. Introduction

"The progress of humanity is linked to creation as a historical result of the development of society; thus, creativity is an essential quality of human beings developed in their historical development" (Borroto, 2017, p. 140).

The sentence with which this analysis begins allows us to highlight the importance of creativity in the training of professionals, which today's society demands and which in turn requires that it be trained and developed as part of the personality; creativity is also present as a social value in the contents used by education (Padrón, 2017, p. 258).

Human beings face a variety of situations in their daily lives that require them to adapt and cope with difficulties, thus demonstrating not only mastery of the subject matter but also the interaction and/or complicity that facilitates greater and better communication, fluency and curiosity among students (Cremin, Barnes, & Scoffham, 2009), integrating an active dynamic in the learning process of the subjects. Creativity is present in everyone, but its development depends to a large extent on the appropriation and creation of opportunities in different educational contexts. It is essential to develop and promote it in universities, as this is where professional training is received (Elisondo,R. C et al, 2009).

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The challenge for education is to generate learning with pedagogical proposals that present innovative activities, resorting to unexpected and unpredictable contexts, thus meeting the demands of students and results (Elisondo et al, 2011). From the above we can conclude that teaching at the University must free itself from the facile use of slides and bet on inspiration and creativity (Nordstrom & Korpelainen, 2011), promoting an environment where university teachers must change their pedagogy by incorporating interaction with their students. In this era of change, it is vital to analyse how creativity is conceived in the university, since it is here that future professionals are prepared for insertion into the labour market and is responsible for the learning needs that demand and bring with them concerns about the consonance between university preparation and the professional competences demanded by each career. Nowadays, the idea that creativity is something that concerns every educator and should be at the very heart of every educational process has gained more strength (Borroto, 2017, p. 137). This position is based on a century dedicated to the analysis and research of creativity; defining it as a process, activity, skill, ability, capacity and ultimately as a competence, by integrating in it a set of knowledge, skills, attitudes and abilities that allow for creative behaviour in all personal and professional activities of human beings (Abarca-Cedeño & Márquez, 2019; Alvarado, 2019).

In this order of ideas and on the basis of the research previously carried out, the present work describes the results obtained in these orders, from a survey applied to a group of students of the National University of Saint Agustin (UNSA), of Arequipa, Peru; and that pursues as objective: to value the perception on the creativity and the innovation of a group of students of 5th year of the Faculty of Sciences of the Education of the UNSA for the improvement of their professional formation.

The results obtained are based on a combination of theoretical and empirical methods, including the analytical-synthetic, inductive-deductive and structural-functional systemic approach, which allowed the generalisation of the results obtained through the instrument applied and which justify the conclusions reached.

The sample of empirical evidence from the results obtained with the 5th year students of the Faculty of Education Sciences of the UNSA and the methodological transparency method, allow its application in other careers, contexts and countries. This will lead to the initial assessment of creativity and innovation in students, in order to subsequently incorporate its intentionality from the organisation, planning and management of the educational process in general and in particular from the teaching-learning process, in order to achieve the training and strengthening of these.

2. Theoretical framework

The conception of pedagogy and didactics is based on the systemic approach that requires the hierarchical and dependent relationship between the active role of the student as the centre of the educational process for his or her integral and autonomous development and the correct direction of the teacher in the training process; in which the role of guide and accompaniment of the student stands out, constantly interacting with him or her to achieve the competences required by the curriculum, profile and specific modules.

Creativity has a preponderant role in the teaching-learning process and should be intentionally planned during the process, activities should be planned to strengthen it, through methods and means defined for this purpose, evaluated on the basis of the learning outcomes and the student's performance.

The study of creativity emphasises its close relationship with needs, interests and feelings, as well as the importance of personalisation in the educational process and the critical questioning of the teaching-learning process. Together with this, the need to innovate in the selection and diversity of methods, means and assessment strategies is highlighted; in the latter, it is considered essential to determine the indicators of each activity or task that the student develops, such as determining the indicators that allow the assessment of their level of creativity (Padrón, Bedregal-Alpaca, Rodríguez and Torres, 2022, p. 53). It is necessary to highlight the need for vocational training to strengthen creativity and innovation, in this direction there are many investigations that underline its incidence through teamwork and collaboration (Morado and Ocampo, 2019; Padrón et al., 2020; Cabero, Barroso, Rodríguez and Palacios, 2020). This is currently reinforced by the high demand for hybrid and online training, through the integration of information and communication technologies (ICT), from all its potential and available resources (Marinoni, Van't Land and Jensen, 2020).

Since the COVID-19 pandemic, higher education has seen the need to integrate ICT in all educational processes, seeking alternative solutions based on creativity and innovation for the continuation of the educational process through virtual and distance work. It is of vital importance in the educational field that teachers can adapt to changes and adopt technologies in their daily practice to promote creative, significant and autonomous learning in students (Morado and Ocampo, 2019).

In relation to the integration of ICT into the creative process, concepts such as "advanced technologies" are incorporated, which allows the focus to be placed on the most recent technological developments (Prendes and Cerdán, 2021, p.34). Advanced technologies are a set of digital tools for the management of information and communication (ICTs, which integrate all uses of the Internet), but also technologies that advance in the understanding and application of intelligent processes (artificial intelligence, robotics or computational thinking) or technologies that transform and extend physical reality (augmented reality, virtual reality, extended reality). Applications such as virtual simulators, virtual environments, video games and serious games, 3D printing, the internet of things, cloud computing, smart devices, home automation, blockchain, a list that is always incomplete and continues to grow. These digital technologies have a technical dimension and another dimension associated with their possible applications, in this case in the "educational" order (Prendes and Cerdán, 2021, p. 34).

In the personal, social, cultural and behavioural aspect, creativity contributes a lot to society, as well as being linked to intelligence, cognitive style, context, problem solving, social changes and mainly with innovation (Elisondo et al.,2009). Creative pedagogy and integrationism have an interdisciplinary and multidisciplinary connection that provides tools that facilitate the integrated work of different disciplines in the educational context. This connection is based on the creation of something new, integrating content from two or more disciplines, giving greater importance to creative contexts (Dillon,2006). Also, when we use the term creative action, we infer interactions with different audiences and with the material environment, either now or in the future (Glaveanu, 2015).

Creativity as a competence in Higher Education is a primordial element in the development of professional profiles, due to the fact that the university is the space where educational environments that favour the attainment and development of creativity should be promoted and created. Understanding creativity as a competence, it has a component of knowledge, ability, skill and faculty to be able to perform optimally at a professional level (Ibarra and Rodríguez, 2010). To complement this, creativity allows activities to be carried out in an open way, considering different perspectives and ways of proceeding, this implies that students are able to respond in an original and novel way, thus improving the acquisition of knowledge, starting from simple original answers to solving academic and/or professional situations and tasks (Gómez-Ruiz, M. A., Rodríguez Gómez, G., & Ibarra-Sáiz, M. S. (2013) and (Suárez & Fontao, 2009).

Innovation in the educational context is widely studied in the pedagogical literature and also in Didactics, particularly in its incidence through the teaching-learning process (Borroto, 2017, p. 137). Achieving an innovative and creative process where the student is the centre and demonstrates high levels of these competences is one of the maximum demands of university education today; and much more than that, it is one of society's needs for young people and their personal and professional performance.

In this order of ideas, it is considered appropriate to emphasise the role of the teacher, from the direction of the teaching-learning process, to the accompaniment, guidance and mediation to provide the necessary support to students through counselling and individualised attention (Rodríguez and Padrón 2021; Vázquez et al., 2020).

Together with this, the importance of collaborative learning, the diversity of technologies, resources and activities is highlighted, where the student not only learns and develops but also becomes involved in the learning and training process of the other members of the group (Bedregal and Padrón 2020); the application of active methodologies that require students to participate creatively and innovatively (Hernández, Cubillas and Padrón, 2022); as well as the creativity and motivation of the teacher, and the dynamism and interactivity through different materials and real, audiovisual and virtual media, among others (Gutiérrez and Díaz, 2021; Padrón, Bedregal-Alpaca, Rodríguez and Torres, 2022).

Finally, it is considered appropriate to encourage the deployment of competences such as creativity and innovation in university environments, from the creative activities themselves and the development of various innovative actions (Chiecher, Elisondo, Paoloni and Donolo, 2018).

3. Methodology

The research follows a quantitative approach in accordance with the objective set and the purpose to be achieved. The study population is made up of 177 students in their fifth year of the degree course in Educational Sciences at the State University of Arequipa, UNSA. The type of sampling is by cluster and is made up of 100 students.

The instrument used was the CDES - Digital Competences in Higher Education Questionnaire, adapted from Mengual et al (2011). For the present study, it consists of 12 factors corresponding to the students' perception of the competences: creativity and innovation.

The results shown below provide a general overview of the students' perception of the two competences that are valued in their close relationship with the integration of ICT based on the requirements set out above. They show the importance of continuing to work on the training of competences, especially those emphasised in this study: creativity and innovation through blended learning (B-Learning) and distance learning (E-Learning).

Table 1

Age according to gender of university students in Education Sciences

Age	Genre				TOTAL	
	Man		Woman			
	Nº.	%	Nº.	%	Nº.	%
19 a 24	22	22,0	51	51,0	73	73,0
25 a 30	9	9,0	16	16,0	25	25,0
31 a 35	0	0,0	2	2,0	2	2,0
TOTAL	31	31,0	69	69,0	100	100

Table 2

Digital characteristics of university students in Education Sciences

Digital features	Nº.	%
You have a personal computer		
No	20	20,0
Yes	80	80,0
You have Internet access at home		
No	13	13,0
Yes	87	87,0
How many hours a week do you use the computer?		
One hour or less	7	7,0

More than 1 hour and up to 5 hours	19	19,0
More than 5 hours and up to 20	57	57,0
More than 20 hours	17	17,0
Do you often use the computer for the development of classroom subjects?		
No	12	12,0
Yes	88	88,0
TOTAL	100	100

Table 3
Perception of university students of Education Sciences on creativity and innovation for hybrid and online training

Creativity and innovation	**Nº.**	**%**
Low	2	2,0
Medium	8	8,0
High	90	90,0
TOTAL	100	100

Table 4
Perception of university students of Education Sciences on the competences required for hybrid and online learning

Competences	**Technological literacy**		**Access and use of information**		**Communication and collaboration**		**Digital citizenship**	
	Nº.	**%**	**Nº.**	**%**	**Nº.**	**%**	**Nº.**	**%**
Low	3	3,0	2	2,0	2	2,0	2	2,0
Medium	12	12,0	22	22,0	18	18,0	18	18,0
High	85	85,0	76	76,0	80	80,0	80	80,0
TOTAL	100	100	100	100	100	100	100	100

Table 5
Relationship between perceptions of creativity and innovation and technological literacy

Technological literacy	Creativity and innovation						TOTAL	
	Low		Medium		High			
	Nº.	%	Nº.	%	Nº.	%	Nº.	%
Low	2	2,0	0	0,0	1	1,0	3	3,0
Medium	0	0,0	3	3,0	9	9,0	12	12,0
High	0	0,0	5	5,0	80	80,0	85	85,0
TOTAL	2	2,0	8	8,0	90	90,0	100	100

X2=71.24 P<0.05 P=0.00

Table 6
Relationship between perceptions of creativity and innovation and access to and use of information

Access and use of information	Creativity and innovation						TOTAL	
	Low		Medium		High			
	Nº.	%	Nº.	%	Nº.	%	Nº.	%
Low	2	2,0	0	0,0	0	0,0	2	2,0
Medium	0	0,0	6	6,0	16	16,0	22	22,0
High	0	0,0	2	2,0	74	74,0	76	76,0
TOTAL	2	2,0	8	8,0	90	90,0	100	100

X2=114.10 P<0.05 P=0.00

Table 7
Relationship between perceptions of creativity and innovation and communication and collaboration

Communication and collaboration	Creativity and innovation						TOTAL	
	Low		Medium		High			
	Nº.	%	Nº.	%	Nº.	%	Nº.	%
Low	2	2,0	0	0,0	0	0,0	2	2,0

Medium	0	0,0	6	6,0	12	12,0	18	18,0
High	0	0,0	2	2,0	78	78,0	80	80,0
TOTAL	2	2,0	8	8,0	90	90,0	100	100

X2=119.01 P<0.05 P=0.00

Table 7
Relationship between perceptions of creativity and innovation and digital citizenship

Digital citizenship	**Creativity and innovation**						**TOTAL**	
	Low		**Medium**		**High**			
	Nº.	**%**	**Nº.**	**%**	**Nº.**	**%**	**Nº.**	**%**
Low	2	2,0	0	0,0	0	0,0	2	2,0
Medium	0	0,0	6	6,0	12	12,0	18	18,0
High	0	0,0	2	2,0	78	78,0	80	80,0
TOTAL	2	2,0	8	8,0	90	90,0	100	100

X2=119.01 P<0.05 P=0.00

Table 3 shows that the majority (90%) of students consider that creativity and innovation in teaching and learning processes mediated by information and communication technologies (ICT) are highly important.

Table 4 shows that students consider technological literacy to be of high importance, 22% consider access to and use of information to be of regular importance, while 80.0% perceive the importance of digital citizenship to be high.

It can be seen that they have a responsible perception of the practical application of knowledge, which is evident in the current trend towards developmental learning, which is concerned with linking theory to the student's professional and personal problems.

The perception of creativity and innovation and technological literacy show a statistically significant relationship (P<0.05), 80.0% of the students who perceive creativity and innovation to be of high importance also consider technological literacy to be of high importance in the teaching-educational processes mediated by information and communication technologies (ICT). Javier Velázquez Sandoval and Rocío Adela Andrade Cázares in their research concluded that in the type of use and mastery of ICT tools they show that the students surveyed have a degree of mastery located in the literacy that allows them to identify and use resources for the search, processing and asynchronous communication of information in their teaching work. On the other hand, the respondents also present this same level of mastery in recognising video-communication tools and for the creation of multimedia educational content, however, their exploitation is not channelled to the educational process. Therefore, the need to generate and develop digital competences that enable their use for didactic purposes is conceived as a requirement.

Table 6 shows that the perception of creativity and innovation and access to and use of information are statistically significantly related (P<0.05). 74.0% of the students who perceive creativity and innovation to be of high importance also consider access to and use of information to be of high importance in access to and use of information mediated by information and communication technologies (ICT).

Table 7 shows that the perception of creativity and innovation and digital citizenship are statistically significant (P<0.05). 78.0% of the students who perceive creativity and innovation to be of high importance also consider access to and use of information to be of high importance in access to and use of information mediated by information and communication technologies (ICT).

Finally, the high percentage obtained in the indicators "developing experiences that stimulate creative and innovative thinking" and "tending towards professional effectiveness and self-renewal by incorporating ICT in their work context", responds significantly to the importance of educational treatment, going beyond instruction and the purely cognitive, directing the gaze of university teachers towards theories and methodologies that stimulate a more creative, innovative process, which achieves student participation as the centre of the process through collaborative learning, active methodologies, learning to learn and learning to teach, formative assessment and active student participation in their assessment and training; so that they become creatively and responsibly involved in their own and others' learning process.

4. Conclusions

We found that students consider creativity and innovation to be indispensable in their training as future teachers, competences that allow them to develop the tasks assigned in collaborative groups, which leads to training creative and innovative future teachers, promoting them to be original, spontaneous and promote change, valuing, modifying and testing all the time (Hernández et al., 2015).

Another important finding of the study is that students attach the greatest importance to ICT in their professional performance and in the stimulation of critical thinking that favours their comprehensive training. (Gómez-Ruiz, M. A., Rodríguez-Gómez, G., & Ibarra-Sáiz, M. S, 2013).

We note that to enhance knowledge development, collaboration, improvisation and metacognition need to be implemented in the university classroom (Sawyer, 2015).

Taking into account the findings of the study, it is necessary to understand that in order to develop the creativity and innovation of university students, new formulas must be implemented in their training, so as to encourage debate, argumentation and problem solving as a result of learning, guaranteeing the optimal development of their professional profile and a real training in line with current needs.

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