

Methodological Training and Virtual Skills Of University Students¹

María-Pilar MOLINA-TORRES

Department of Specific Didactics, University of Cordoba

Abstract: *Project-based training allows students to put their knowledge into practice by providing solutions to real problems. These training actions are related to the acquisition of competences and their improvement to support innovation and teacher professionalization. The rapid development of ICTs has motivated a change in teaching methods at all educational stages. Learning through digital tools is a challenge for teacher training. The main objective of this research has focused on incorporating teamwork dynamics to acquire the educational skills of university students during the COVID19 pandemic. For this, a questionnaire made up of fifteen items and a Likert-type scale has been used. The results showed interesting opinions regarding the training of students that make us wonder about the appropriate use of ICTs in university classrooms in exceptional circumstances of educational confinement. Finally, we were able to conclude that didactic platforms are presented as an opportunity for professional and competence training as they are educational elements that contribute to the development of active learning methodologies.*

Keywords: *digital activism, competency learning, online teaching, teacher training, methodology.*

Introduction

Teacher training in digital competencies is a significant educational challenge, especially during the COVID-19 pandemic we are currently experiencing². This challenge requires constant updating in virtual academic environments. For this reason, the limited use of ICT is prevailing in today's teaching-learning processes, which has conditioned the use of virtualization in education. Implementing traditional teaching methods, together with the unexpected pandemic situation, has translated into an endless of problems in the professional reality of teachers³. In this regard, VanSledright argues that traditional and typical standardized testing approaches are rarely up to the task of measuring the more complex knowledge that students are intended to attain, as their actual knowledge cannot be properly assessed⁴.

These events have translated into high levels of creativity and the rise of an educational model based on collaborative work, retroactivity in learning processes and motivation to learn more about digital networks⁵. This way, students have been able to update themselves with new educational programs they did not know about

¹ Acknowledgements: This research was funded by the Spanish Ministry of Science, Innovation and Universities, grant number PGC2018-097481-B-I00.

² V. Ellis, S. Steadman, Q. Mao, "Come to a Screeching Halt: Can Change in Teacher Education during the COVID-19 Pandemic Be Seen as Innovation?", in *European Journal of Teacher Education*, 2020, vol. 43, p. 559-572. Available at: <https://doi.org/10.1080/02619768.2020.1821186>

³ M. N. Suprayogi, M. Valcke, R. Godwin, "Teachers and their implementation of differentiated instruction in the classroom", in *Teaching and Teacher Education*, 2017, vol. 67, p. 291-301. Available at: <https://doi.org/10.1016/j.tate.2017.06.020>

⁴ B. A. VanSledright, *Assessing historical thinking and understanding: innovative designs for new standards*, London, Routledge, 2014.

⁵ M. Van Noy, H. James, C. Bendley, *Reconceptualizing Learning: A Review of the Literature on Informal Learning*. Piscataway, NJ, Rutgers, the State University of New Jersey, 2016.

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due to the few times they had been exposed to them for their initial training⁶. However, in this sense, among the main factors that have influenced this situation, we can mention the lack of training in the necessary skills for the good management of ICT⁷, in addition to a progressive acquisition of professional, didactic, and methodological skills⁸.

Against this background, the benefits of new technologies depend mostly on their use, as well as the development of teaching practices related to fostering students' skills in handling digital information⁹. These are certainly valuable resources for sharing information in real time, as well as for optimizing the learning process to be more practical and less rote¹⁰. However, authors such as Mahmud are uncertain about the influence of new technologies on learning¹¹. From this point of view, students use the ICTs for social and leisure purposes—therefore, they have difficulties when applying these ICTs in educational contexts.

Thus, students do not possess digital skills for the development of more complex tasks and problem solving. In order to promote changes in this situation, formative education in knowledge society acts as a key element. Anyway, it is a fact that digital work dynamics are not a repeated or shared experience in the training of university students. Consequently, and based on the premises described, the objectives of the educational proposal are the following: (1) to improve the training of new teachers, (2) to specify the purpose of ICTs in educational practice, (3) to familiarize students with the most innovative digital resources for virtual teaching, (4) to assess the impact of ICT use in university practice during the COVID-19 situation, and (5) to identify strengths and opportunities, as well as threats and weaknesses, regarding the virtual training of students through a SWOT matrix.

Materials and Methods

Participants and Sample

The research is undertaken through a quantitative methodology that analysed a sample of 102 students, 62.8% women and 37.2% men with ages ranging—for the most part—between 22 and 23 years old. The study population

⁶ D. A. Montes, C. I. Suárez, “La formación docente universitaria: claves formativas de universidades españolas”, in *Revista Electrónica de Investigación Educativa*, 2016, vol. 18, no. 3, p. 51-64. Available at: <http://redie.uabc.mx/redie/article/view/996>

⁷ O. Mas, J. Tejada, *Funciones y competencias en la docencia universitaria*, Madrid, Editorial Síntesis, 2013.

⁸ M. P. Molina, “La competencia digital en la formación de los estudiantes del Grado de Educación Primaria”, in A. M. de Vicente, J. Sierra (coords.), *Aproximación periodística y educ comunicativa al fenómeno de las redes sociales*, Madrid, McGraw-Hill Interamericana de España, 2020, p. 765-778.

⁹ I.K.R. Hatlevik, O.E. Hatlevik, “Students’ evaluation of digital information: The role teachers play and factors that influence variability in teacher behavior”, in *Computers in Human Behavior*, 2018, vol. 83, p. 56-63. Available at: <https://doi.org/10.1016/j.chb.2018.01.022>

¹⁰ L. M. Putz, F. Hofbauer, H. Treiblmaier, “Can gamification help to improve education? Findings from a longitudinal study”, in *Computers in Human Behavior*, 2020, vol. 110, no. 106392. Available at <https://doi.org/10.1016/j.chb.2020.106392>

¹¹ M. M. Mahmud, “Technology and language – what works and what does not: A meta-analysis of blended learning research”, in *Journal of Asia TEFL*, 2018, vol. 15, no. 2, p. 365-382. Available at <http://dx.doi.org/10.18823/asiatefl.2018.15.2.7.365>

was taking the subject “Didactics of Social Sciences” in the Degree of Primary Education at the University of Cordoba, Spain, from March 2020 to the current academic year, 2020-2021. The participants were selected from two different groups and were involved in the study about the use of digital skills in the context of the COVID-19 pandemic.

Design of the Research

A non-experimental quantitative questionnaire based upon a Likert scale of five values (1-5) was used to design the present study. These studies are common in research related to the field of education and Social Science Didactics¹², since they provide an answer to the amount of learning acquired, together with the evaluation of different variables¹³.

Data Collection and Analysis Instrument

The questionnaire used to collect and process the data was named “Virtual training of university teachers”. This instrument was configured in two clearly differentiated blocks. The first one focused on the analysis of students' perceptions of ICT use, whereas the second explores students' views on digital learning during the pandemic context (see Table 1). Both parts make up the questionnaire based upon a Likert scale of five values ranging from 1 (strongly disagree) to 5 (strongly agree).

In order to answer the fifteen questions divided into these two categories, the students received the necessary explanations for their completion, which was carried out in three practical sessions of an hour and a half. The works of Cea D'Ancona and Johnson and Christensen were taken into account in its development¹⁴. As for the validation of its content, we have four experts specialized in ICT teacher training. Finally, an Excel table was used as technical support so as to analyse and interpret the information collected to make the graphs and calculation, with the final goal of meeting the objectives set out in the research.

Students' perceptions about ICT use

1	I think that my digital learning is not adequate.	1	2	3	4	5
2	I believe that university education in ICT can improve my professional skills.	1	2	3	4	5
3	I would like to know how to create online teaching resources.	1	2	3	4	5
4	I consider that I have not had the opportunity to learn	1	2	3	4	5

¹² K. Barton, “Métodos de investigación en didáctica de las ciencias sociales. Cuestiones y perspectivas contemporáneas”, in K. Barton (ed.), *Research Methods in Social Studies Education. Contemporary Issues and Perspectives*, Greenwich CT, Information Age, 2006, p. 1-9.

¹³ J. König, R. Ligtoet, S. Klemenz, M. Rothlandb, “Effects of opportunities to learn in teacher preparation on future teachers’ general pedagogical knowledge: Analyzing program characteristics and outcomes”, in *Studies in Educational Evaluation*, 2017, vol. 53, p. 122-133. Available at <https://doi.org/10.1016/j.stueduc.2017.03.001>.

¹⁴ M. A. Cea D'Ancona, *Metodología cuantitativa. Estrategias y técnicas de investigación social*, Madrid, Editorial Síntesis, 2001; B. Johnson, L. Christensen, *Educational Research. Quantitative, Qualitative and Mixed Approaches*, Thousand Oaks, CA: Sage, 2012.

	about ICT.					
5	I think that digital resources can help me learn content from different subjects.	1	2	3	4	5
6	I think that virtual education does not appear as curricular content in the teaching guides at my university degree.	1	2	3	4	5
7	I understand the basic guidelines of virtual university platforms.	1	2	3	4	5

Students' views about digital learning during the pandemic context

8	I believe that the pandemic situation promotes collaborative work.	1	2	3	4	5
9	I imagine that knowing more about ICT enhances my curriculum development.	1	2	3	4	5
10	I feel motivated to use digital platforms for educational purposes.	1	2	3	4	5
11	I think digital resources can help me develop autonomous learning.	1	2	3	4	5
12	I believe that virtual and face-to-face teaching should complement each other.	1	2	3	4	5
13	It is necessary that the use of virtual teaching is generalized as an educational strategy in university teaching.	1	2	3	4	5
14	I believe that digital tools can help me plan and evaluate my teaching-learning process.	1	2	3	4	5
15	I find that digital teaching allows me to develop problem-solving skills.	1	2	3	4	5

Table 1. Questionnaire: “Virtual training of university teachers”

Results

These results were described with frequencies and percentages for analysis purposes and with the aim to respond to the objectives of the study. Regarding the first objective focused on the training of new teachers, items 4 and 9 were selected. The results in Table 2 show high percentages, between 86.2% and 80.4%, which indicate the students' need for ICT training to improve their university education. Perhaps this lack of opportunities in the curricular formation on digital tools can be understood as a methodological deficiency persisting in current curricula.

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree
4.- I consider that I have not had the opportunity to learn about ICT.						
%	100	1	0	2	10.8	86.2
Frq	102	1	0	2	11	88
9.- I imagine that knowing more about ICT enhances my curriculum development.						
%	100	2	7.8	2.9	6.9	80.4
Frq	102	2	8	3	7	82

Table 2. Considerations of the students about their digital training.

Next, the second objective aimed at specifying the purpose of ICT in educational practice is tackled. On this occasion, items 5 and 14 have been chosen in Table 3. The percentages of both items for “Strongly agree” are discrete, with 54.9% and 59.8%. This may indicate the lack of implementation of digital resources in the subjects of the Degree, as well as the insecurity experienced by students when using these resources in their practical sessions.

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree
5.- I think that digital resources can help me learn content from different subjects.						
%	100	4.9	5.9	12.7	21.6	54.9
Frq	102	5	6	13	22	56
14.- I believe that digital tools can help me plan and evaluate my teaching-learning process.						
%	100	0	19.6	8.8	11.8	59.8
Frq	102	0	20	9	12	61

Table 3. Considerations of the students about the usefulness of ICT.

In order to meet the third objective, which aims to identify the students' relationship with the most innovative digital resource in virtual teaching, we selected items 3 and 11. In this case, 75.5% of students strongly agree about the need to learn how to develop online educational resources. At the same time,

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52.9% strongly agree that digital resources can help them to plan and develop autonomous learning. These results encourage the use and implementation of ICT resources so that online teaching results in the acquisition of meaningful learning and educational innovation (Table 4).

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree
3.- I would like to know how to create online teaching resources.						
%	100	1	0	15.7	7.8	75.5
Frq	102	1	0	16	8	77
11.- I think digital resources can help me develop autonomous learning.						
%	100	2.9	2	11.8	30.4	52.9
Frq	102	3	2	12	31	54

Table 4. Considerations of the students about the use of innovative resources.

With regard to the fourth objective, in order to analyse the impact of the use of ICT in university praxis during the COVID19 situation, items 10 and 12 have been chosen. As the results in Table 5 show, 90.2% of the students are motivated to use digital platforms for teaching purposes. However, 78.4% think that face-to-face and virtual teaching should complement each other, and we understand their opinions are reinforced by the hybrid or multimodal teaching that is currently being used in the vast majority of Spanish universities.

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree
10.- I feel motivated to use digital platforms for educational purposes.						
%	100	0	0	2	7.8	90.2
Frq	102	0	0	2	8	92
12.- I believe that virtual and face-to-face teaching should complement each other.						
%	100	8.8	6.9	1	4.9	78.4
Frq	102	9	7	1	5	80

Table 5. Considerations of the students about the impact of ICT by COVID19.

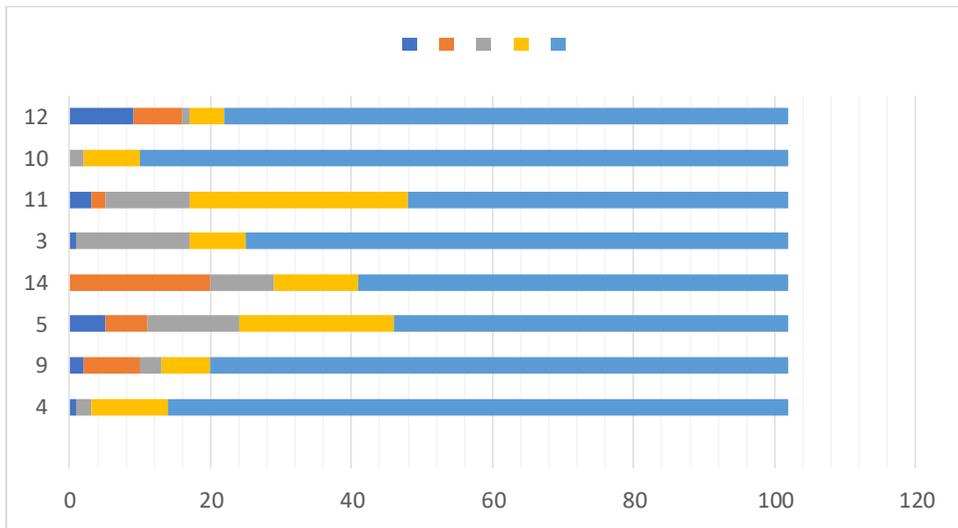


Figure 1. Quantitative results of the items for the achievement of the objectives.

Discussion and conclusions

Since the onset of the COVID19 pandemic, university institutions have been committed to assess teaching competencies so that the students achieve the intended learning outcomes. The correct measures to implement virtual teaching have materialized in the most appropriate methodological adaptations and assessment tools¹⁵. The evidence in the actions carried out has been reflected in the results of this study organised around two fundamental questions: student perceptions of ICT use and student views on digital learning during the recent pandemic context. Likewise, in order to determine the weaknesses/threats and strengths/opportunities, from a formative approach of the students, the adaptation of university teaching to the bimodal model shows the following contributions:

STRENGTHS	OPPORTUNITIES
<ul style="list-style-type: none"> - Continuous training in ICTs - Learning by discovery. - To complement bimodal teaching with face-to-face teaching. 	<ul style="list-style-type: none"> - To learn new teaching methods. - Update on digital resources. - Possibility of using different university platforms.
WEAKNESSES	THREATS
<ul style="list-style-type: none"> - Lack of previous training in ICTs. - Inability to cope with situations of change in teaching (face-to-face/online) 	<ul style="list-style-type: none"> - Risk of digital isolation of students due to limited computer resources. - Demotivation of students. - Passivity and lack of involvement of the

¹⁵ M. P. Molina, R. Ortiz, “Active Learning Methodologies in Teacher Training for Cultural Sustainability”, in *Sustainability*, 2020, vol. 12, no 21, 9043. Available at <https://doi.org/10.3390/su12219043>

- Setbacks to planning for learning.	students in online sessions.
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Table 6. Strengths and weaknesses of the research.

From this perspective, it shows the need for training in ICT to acquire meaningful learning in the subjects taught in university degrees¹⁶. This purpose assumes that initial training is strengthened in their conceptual, procedural, and attitudinal knowledge in digital education¹⁷. Moreno stresses the importance of educational technology to acquire computer skills, complement curricular content and achieve interaction with the different agents in the educational community¹⁸. These didactic improvements influence the training of new students and the achievement of methodological changes.

On the other hand, the benefits of this training are reflected in the different tables of this research. The results show that the participants have very positive impressions of the usefulness of ICT and the opportunities for autonomous learning. The flexibility of digital tools to work both face-to-face and virtually is evaluated by the students as a significant aspect in their teaching¹⁹. They also highlight the lack of knowledge about online learning during their university studies. These circumstances have a negative impact on their educational competencies, with a discrete level in the acquisition of skills and abilities in the use of emerging technologies²⁰.

Nevertheless, implementing these teaching strategies adapted to a global pandemic context is not intended to replace face-to-face methodologies. In fact, the results indicate that participants believe that online teaching should be complemented by face-to-face teaching. As Pérez-Escoda, Castro-Zubizarreta and Fandos indicate, education has the responsibility to move towards a school 2.0 which brings students the possibility of being a part of information society in an effective way²¹. Teachers' roles are embedded in a teaching-learning environment, where the digital tools are partial components²².

In short, and despite the difficulties at the time, both teachers and students have adapted to the new bimodal modality without having a complete mastery of

¹⁶ S. Gorard, N. Selwyn, L. Madden, “Logged on to learning? Assessing the impact of technology on participation in lifelong learning”, in *International Journal of Lifelong Education*, 2003, vol. 22, no. 3, p. 281-296. Available at: <https://doi.org/10.1080/02601370304845>

¹⁷ D. Laurillard, *Rethinking University Teaching: A Framework for the Use of Technology in Higher Education*, London, Routledge, 2002.

¹⁸ M. D. Moreno, “Alfabetización digital: el pleno dominio del lápiz y el ratón”, in *Comunicar*, 2008, vol. 30, no. 15, p. 137-146. Available at: <https://doi.org/10.3916/c30-2008-02-007>

¹⁹ P. Miralles, C. J. Gómez, V. B. Arias, O. Fontal, “Digital resources and didactic methodology in the initial training of history teachers”, in *Comunicar*, 2019, vol. 61, p. 45-56. Available at: <https://doi.org/10.3916/C61-2019-04>

²⁰ S. Hakak, et al, “Cloud-assisted gamification for education and learning—Recent advances and challenge”, in *CEE*, 2019, vol. 74, p. 22-34.

²¹ A. Pérez-Escoda, A. Castro-Zubizarreta, M. Fandos, “Digital Skills in the Z Generation: Key Questions for a Curricular Introduction in Primary School”, in *Comunicar*, 2016, vol. 49, p. 71-79. Available at: <http://dx.doi.org/10.3916/C49-2016-07>

²² J. D. Wake, O. Dysthe, S. Mjelstad, “New and Changing Teacher Roles in Higher Education in a Digital Age”, in *Educational Technology & Society*, 2007, vol. 10, no. 1, p. 40-51.

ICT²³. In this line, novice students are immersed in a complex situation, where their concerns differ from those that expert teachers have²⁴. Hence the need to study teachers' conceptions about their didactic, technological, and curricular knowledge that will create real possibilities of a change in teaching practice²⁵.

²³ T. D. Mitchell, "Traditional vs. critical service-learning: Engaging the literature to differentiate two models", in *Michigan Journal of Community Service Learning*, 2008, vol. 14, no. 2, p. 50-65.

²⁴ J. Conde-Jiménez, A. Martín-Gutiérrez, "Potencialidades y necesidades de mejora en la formación de profesores noveles universitarios", in *Revista Electrónica de Investigación Educativa*, 2016, vol. 18, no. 1, p. 140-152.

²⁵ C. U. Bilgin, A. Gul, "Investigating the Effectiveness of Gamification on Group Cohesion, Attitude, and Academic Achievement in Collaborative Learning Environments", in *TechTrends*, 2020, vol. 64, no 1, p. 124-136. Available at: <https://doi.org/10.1007/s11528-019-00442-x>

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