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Exploratory analysis of an e-learning course based on micro-videos to improve the preparation of the undergraduate dissertation in Spanish context

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Abstract: The Bologna Declaration (1999) and the implementation of the European Higher Education Area have opened a new panorama of learning. In Spanish Universities, an Undergraduate Dissertation (UD) is the final step on the developmental period of undergraduate students. However, there are usually no previous subjects during the undergraduate course that prepare the skills required at the *UD*, especially autonomy. Therefore, there are great difficulties for students. To end this training gap, a face-to-face training course was designed, and another one based on micro-videos was designed in 2019–2020. Based on the Self-Determination Theory, the aim was to know if a training course based on micro-videos is more effective for making students feel more prepared for *UD*, than the face-to-face method. A quasi-experimental method has been used with a comparative approach between groups. A mixed methodological approach has developed. For exploratory data analysis, independent two-sample *t*-tests and Pearson's bivariate correlations were performed. An hermeneutic analysis of the content of the interviews was carried out. All the students (n = 34) in both groups showed an improvement in the preparation to successfully pass the *UD*. The main difference found between the two modalities of the course was the more analytical and concrete organization. Qualitatively, more perceived autonomy was found in the micro-video group. However, the results were inconclusive. A blended modality could be considered in the future, with the most flexible and aesthetic structure of micro-videos but with the advantages of face-to-face communication.

Subjects: Education & Training; Educational Technology; Media Education

Keywords: self-determination theory; autonomy; technological education; E-learning

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1. Introduction

In recent years, education, especially at the university, has been transformed due to the increase in the social importance of information and communication technologies (Esnaola-Arribillaga & Bezanilla). One of the great research trends within the area of education technologies has been the e-learning education modality, for that there are numerous studies on this area in different contexts and educational stages (Awan et al., 2021; Jaoua et al., 2022; Valverde-Berrocoso et al., 2020). Besides, a new type of Internet media has received close attention since 2012: micro-videos (or bite-sized video) generated with the length around 6 seconds to 300 seconds (Ma et al., 2018). Compared with long videos, micro-videos are brief but more focused on particular interesting topics. Several characteristics of the micro-video format have been studied that justify its application in education: (1) Shortness: which makes them easy to spread on social media; (2) Social attributes: they possess many social attributes, such as venue, description, hashtag, loops, etc.; (3) Diversification of learning resources: students can access the videos from different devices, such as smartphones; and (4) Learning time privatization: Learners can be based on their own personal factors (Guo et al., 2021; Wu et al., 2017). Although the e-learning modality has been widely studied, it has been proposed to apply and study e-learning based on videos to increase the commitment and autonomy of students (Gerbaudo et al., 2021; Tian & Tsai, 2021; Zhou, 2022). However, the inclusion of videos in a teacher training program does not in itself imply an improvement effect, but rather the entire ecology of learning must be reformed, adding questions, tasks or initiatives that invite reflection on the video (Hamel & Viau-Guay, 2019; Nikolaou et al., 2019). That is why the construction in the training course based on micro videos must be based on the pedagogical design that favors cognitive understanding, the construction of knowledge, or autonomy, avoiding passive reception (Koumi & Wang, 2015).

The Bologna Declaration (1999) and the implementation of the European Higher Education Area have opened a new panorama of training and learning among university students. In Spanish Universities, an Undergraduate Dissertation (UD) is the final step on the developmental period of undergraduate students and make a key role in the evaluation of competencies and knowledge abilities. The *UD* is a final degree project, a which is different subject from those that make up the Degree, in its structure, implementation and in the objectives and learning outcomes it pursues (Nunez et al., 2013). Thus, the *UD* requires a process of tutoring and continuous monitoring between the teacher and the student (Caparà et al., 2016). In addition, it needs the planning and autonomy of the student, who, after choosing the research topic, must carry out a series of steps consistent with the research process until the completion of his written memory and the defense before (De Frutos-Belizon et al., 2020).

Undergraduates at Spanish universities last 4 years, and *UD* is a final course subject. However, there are usually no previous subjects during the undergraduate course that prepare the skills required at the *UD* (Rullán et al., 2011), that is, the skills to carry out a rigorous academic study. Therefore, there can be great difficulties for students. Vicario-Molina et al. (2020) found that main challenge experienced by students are related with the difficulties to work consistently and autonomously on the project and other activities. The *UD*, from its proposal in the European framework, has the purpose of developing different competences in the student. Specifically, according to González and Wagenaar (2003), the new educational paradigm focuses on student learning as well as its results and teaching objectives. In this sense, the development of the *UD* allows to demonstrate an integral preparation in a determined subject, as well as an opportunity to deepen in a specific scientific field. That is why the *UD* promotes the development of specific competences, related to the Degree, as well as generic or transversal, thus allowing the integration of the information to finally communicate it (Rullán et al., 2011).

In the Guide for the Evaluation of Competences in the *UD* in the field of Social and Legal Sciences of Catalonia (Mateo et al., 2009) is proposed the existence of five phases of special importance in

the development of the *UD*: choice of subject, planning, development, delivery and public presentation and evaluation, improvement and prospective. Of these phases, the delivery and public presentation phase stands out, since the *UD* requires not only a written compilation of the work, but also the ability to develop it orally, which requires the internalization of the knowledge put into game. That is why, in some cases, the *UD* becomes a mixed bag in which all the competencies that had not been developed up to now must be incorporated (Rullán et al., 2011). In some cases, the *UD* becomes an obstacle for students who must incorporate all the skills that have not been developed so far (Vicario-Molina et al., 2020). One of these competences is the autonomy of the student, who, for the first time in the Degree, is required to present a dissertation with a free format and content.

Self-Determination Theory (*SDT*) is one of the classic theories of motivation and psychological attitude, which has been shown to be valid both in *FTF* teaching contexts and in the new digitized concepts (Bang, 2014). The Basic Psychological Needs Theory is another subtheory of the *SDT* that identifies three innate needs or optimal motivation and well-being (Deci & Ryan, 2000): competence, autonomy and relatedness. The competence need refers to believing in one's ability to perform a certain task efficiently and effectively. The autonomy need (self-determination) is based on the desire to experience an internal "locus" of causality, to feel the origin of one's actions. The social relatedness need denotes a feeling of belongingness or being connected with others (Ryan & Deci, 2017). Creating training programs that promote student autonomy can improve affective, cognitive and behavioural outcomes (Ntoumanis & Standage, 2009). Sense of "learning autonomy" is an important variable in students in the educative field, as stated Nikou and Economides (2017). It's necessary to understand the more consistently the need to feel autonomous, on satisfaction in students pursuing formal education via e-learning (Nandi & Mehendale, 2022).

Creating educational programs with a autonomy-supportive learning climate can help to better understand how the educational context affects improving the basic psychological needs of students, especially when faced with tasks perceived as difficult. (Ryan & Deci, 2017, p. 373). Due to the aforementioned, for both students and teachers, the *UD* process can be experienced with difficulty (Caparà et al., 2016). There have already been studies that propose the adaptation of teaching mini-videos to explain the key aspects of the preparation of a *UD* (Abril et al., 2017; Martínez-Rodríguez & Benítez-Corona, 2020), as well as changing all the ecology of learning (Reuker et al., 2021; Rodríguez et al., 2018). It is considered that one of the pillars of educational transformation in the university is based on innovation united with technology, favouring ubiquitous educational experiences; however, it should be noted that ubiquity is not universal and must be customized in application contexts (Carhill-Poza & Williams, 2020).

To end this training gap, initially in the 2018–2019 academic year, it was proposed as a challenge to design, apply and evaluate a training course (Face-to-face method, *FTF*) intended for intermediate courses of Teacher Education Degrees (one is oriented to Primary Education, and another to early Childhood Education) to improve the skills necessary to successfully complete the *UD* and autonomously. However, this training course had several limitations: (1) a low voluntary enrolment of the faculty's students. (2) Difficulty perceived by enrolled students in understanding content (especially those related to epistemology and methodology). Thus, in the academic year 2019–2020 the methodology of the course was transformed into an e-learning modality based on micro-videos (micro-videos method). This was based on several studies where improved motivation, autonomy or comprehension were found using micro-videos (Abril et al., 2017; Fatima et al., 2019; Regmi & Linda, 2020). Likewise, initiatives based on video have been analysed and proposed to promote orientation and autonomy in students towards the *UD* (Gil et al., 2014). However, a lack of a clear theoretical model that specifically encompasses video-based teaching programs has been criticized (Reuker et al., 2021). For this reason, this study has been based on the *SDT* (Ryan & Deci, 2017), a more general psychological theory, but one that allows explaining and guiding the concept of autonomy in human beings, which conveys the difficulty perceived in the present context. The question that guides this research is: is a training course based on micro-videos really

more effective for making students feel more prepared for *UD*, than the *FTF* method? It is considered that the design of the micro-videos method will produce more interest, more autonomy and more understanding than the *FTF* method, improving the preparation of students towards the *UD*. This may be due to an increase in evaluative feedback and more continuous support to the student, thanks to the micro-videos (Ryan & Deci, 2017). The aim is to know if the micro-videos method can improve the design of a training course to prepare the *UD*. To achieve this goal, the design of the *FTF* method and the micro-videos method will be compared, from the point of view of the evaluation carried out by the students. In this way, an optimal course can be redesigned for future academic courses that are the best teaching-learning design for students at the local level.

2. Method

In the present study, a quasi-experimental method has been used with a comparative approach between groups, since it is one of the most suitable in e-learning research (Handley et al., 2018; Valverde-Berrocoso et al., 2020). A mixed methodological approach has developed, since it allows triangulating the sources of data collection, especially if they are attitudinal and psychological variables. The depth and meaning of the qualitative can be complemented with the extension and greater replicability of the quantitative, for which reason it has been recommended for psychoeducational contexts (Ryu, 2020). The independent variable of this study was the educational program (in its two versions: e-learning and *FTF*). The dependent variable was the perceived autonomy (felt preparation) of the students to face the Undergraduate Dissertation.

After carrying out a theoretical and reflective analysis on the transversal competences necessary to carry out the *UD* that are not developed in specific subjects of the study plans of the in the aforementioned university Degrees, a *FTF* training course was designed for the 2018–2019 academic year, called “How to do a *UD* in education”. With this *FTF* method, specific sessions were included for the competences of scientific-academic reading and writing, communication and defence before the public, methodological and epistemological understanding of knowledge and science, and the development and projection of a work topic (Mateo et al., 2009; Rullán et al., 2011; Table 1).

In the *FTF* course of 2018–2019, 5 *FTF* training seminars where designed. The course lasted 25 hours, of which 12 were *FTF* and 13 of autonomous work on readings. Twelve students were enrolled, and the course duration was 2 months. The methodology was traditional, that is, five 2-hour *FTF* seminars were given. The educative evaluation consisted of attendance and participation and the preparation of a final work as a simulation of *UD*.

Table 1. Programming of sessions and contents of the face-to-face course

session	Topic	Duration (hours)
1	Process to follow in the completion of a UD/Thinking science Choosing and preparing an academic work	2
2	Knowledge, production and power	2
3	Introduction to the methodology of documentary research	2
4	Quantitative and qualitative designs of educational research	2
5	Academic writing and parts of the paper	2
-	Choosing and preparing an academic work	15

Each student was assigned a reference tutor with whom they could be in contact in the face of work difficulties. By having 12 students enrolled in the 2nd and 3rd grade of the Degree, it made the teaching advice more continuous and of higher quality. Two main support manuals were used so that the students could deepen the contents of the seminar, as well as consult especially the methodical part: the first was Fundamentals of Research in Psychology (Regmi & Linda, 2020) and the second on Methodology of educational research (Bisquerra, 2004) and conducting academic work specifically (González-García et al., 2014). Besides, more specific bibliography was provided in each seminar session.

In the 2019–2020 micro-videos course, a total transformation of the methodology was carry out. It not only consisted of conducting training with the support of digital audio-visual technology, but the structure and approach of the course were changed (Koumi & Wang, 2015): different times, formats, communication, evaluation, that is, a new ecology that creates new learning opportunities (Santos et al., 2018). Instead of 2-hour on-site seminars, 28 specific micro-videos were designed and developed (Table 2). 25 students were enrolled, and the duration of the course was extended to 3 months. The course lasted 25 hours in microvideos format. The course had a more analytical design, since each topic had a video class (for example: "anonymized link"), a self-assessment questionnaire, and complementary reading material, and training modules with some independence. The content blocks of the training modules were the same as the 5 *FTF* seminars, but spread over multiple micro-videos: (1) Epistemology and Knowledge Methodology (6 micro-videos); (2) Search and curation of content (6 micro-videos); (3) Reading and interpretation of academic texts (6 micro-videos); (4) Academic writing (7 micro-videos); (5) Communication, dissemination, and defence of an academic work (3 micro-videos). Although in general all the videos designed had a brief approach, there were variations according to the type of content of the video (that is, whether more technical or deeper and theoretical questions are addressed). The mean and standard deviation of the duration of all videos was 5' 17" ± 3' 14", with the maximum duration being 16' 3" and the minimum duration 3' 14". In total, 2 H 22' 47" of high-quality videos were produced.

Table 2. Programming of sessions and contents of the micro-videos course

Content block	Content	N° video classes
Epistemology and Knowledge Methodology	Introduction to the course./What is an academic job./What is an academic investigation?/What is science?/Scientific paradigms./ Phases of scientific research.	6
Search and curation of content	Regulations on the Undergraduate Dissertation. / Types of End of Degree Project./ What do I do my academic work?/ The research questions/The documentary strategy/How to cite bibliographic sources.	6
Reading and interpretation of academic texts	The philosophical strategy/The experimental strategy. / The non-manipulative strategy./ The structure of a scientific article/ The survey design./Observational design. /	6
Academic writing	Academic writing/The theoretical framework/Sections in a research study	7
Communication, dissemination, and defense of an academic work	Communicative competence/ Defense and argumentation	3

The educative evaluation was based on the completion of the academic questionnaires and the viewing of the videos, that is, the analytical data record offered by YouTube, which allowed a better measurement of student participation in the course. Each student could develop the course at their own pace, since there were no intermediate delivery dates. Google Classroom was used as a digital platform, as has been suggested due to its flexibility and interdisciplinary compared to other platforms such as Moodle (De-Souza et al., 2016; Esnaola-Arribillaga & Bezanilla, 2020). Besides, Google Forms was used to carry out the questionnaires, and YouTube was used to publish the videos, following similar experiences (Martínez-Rodríguez & Benítez-Corona, 2020). For the filming of the micro-videos, a lighting room was built in the Faculty, and Camtasia Studio was used as the video editor.

Both courses lasted 25 hours, and were held at the Faculty of Human Sciences and Education at the University of Zaragoza (Spain). They were advertised under the name "How to carry out a *UD* in the educational field" through posters, *FTF* explanations, and massive electronic messages. The character of both courses was voluntary, they were official, and a training diploma of 1 ECTS was offered. The approach of both courses was thought and designed prior to the social situation of COVID-19, although the online course was implemented just with the beginning of the official confinement situation in Spain, in March 2020.

The responses to the questionnaires were made anonymously and voluntarily by the participants, who were informed from the beginning. This study was previously evaluated by an external research council of the study authors, which decided to approve the project with code PIIDUZ_19_089.

2.1. Sample

The development context has been the Faculty of Human Sciences and Education of the University of Zaragoza (Spain). In this study, convenience sampling was used, as it is the most appropriate and frequent for this type of study (Johnson & Christensen, 2012). The decision was based on giving priority to the availability and voluntariness of the participants, their representativeness (as participants enrolled in the courses), instead of probabilistic criteria. This makes it possible to obtain more characteristic cases or with greater interpretative richness, but at the same time reduces the external validity or generalization.

The sample comprised 37 students (56.8 % girls, n = 21; 43.2 % boys, n = 16) from the Faculty of Human Sciences and Education. The mean age of the participants was 20.01 (SD = 1.01; Min = 19; Max = 22), and 43.2 % of the sample studied 2nd year of the career (n = 16) and 56.8 % studied 3rd year of the career (n = 21). 45.9 % of the sample studied Teacher Training for Childhood Education Degree (n = 17) and 54.1 % studied Teacher Training for Primary Education Degree (n = 20).

2.2. Data collection

To compare the convenience of the two courses, a main quantitative methodology has been used, which was complemented with a qualitative approach to gain interpretive power, following similar studies (Segovia & Guerra-Zúñiga, 2020). Both analyses of the study have had an exploratory nature, with a cross-sectional design. There were three data collection procedures: questionnaire (for psychological variables), individual interview (as a complement to the questionnaire), and YouTube analytics (to measure participation and viewing of the micro-videos).

An official questionnaire from the University of Zaragoza was used to collect the psychological variables associated with the evaluation of students towards the design of each course. This questionnaire was passed at the end of each course (*FTF* group and microvideos group), and the participants completed it only once. Both courses it was filled in virtually. This questionnaire has been drawn up by the "Quality Assurance Section" (https://encuestas.unizar.es/) of the University of Zaragoza, which is based on the quality criteria for course evaluation and is applied to evaluate the quality of the subjects annually. The criteria and dimensions of the questionnaire are

Table 3. Descriptive quantitative data of the variables used to evaluate the design of the courses

Variable	Face-to-face method (n = 12) (mean ± SD)	Micro-videos method (n = 22) (mean ± SD)
Definition objectives and contents	3.92 ± 0.79	4.45 ± 0.67
Accomplishment of the goals	4.25 ± 0.75	4.32 ± 0.65
Course extension	3.08 ± 0.90	3.45 ± 0.74
Usefulness of the practices	3.75 ± 0.87	3.73 ± 0.83
Organization	4.08 ± 0.79	4.45 ± 0.67
Direction	4.50 ± 0.80	4.45 ± 0.67
Effective teacher communication	4.50 ± 0.52	4.68 ± 0.48
Teaching enthusiasm	4.58 ± 0.51	4.77 ± 0.53
Documentation and contributed material	4.00 ± 0.60	4.05 ± 0.84
Assessment criteria information	4.17 ± 0.94	4.41 ± 0.80
Clarity of evaluation criteria	4.08 ± 0.79	4.00 ± 1.02
Continuous evaluation (yes/no)	0.83 ± 0.39	0.91 ± 0.29
Preparation-task balance	4.33 ± 0.49	4.18 ± 0.73
Student expectations met	4.42 ± 0.51	4.09 ± 0.92
Professional utility	4.67 ± 0.65	4.55 ± 0.67
Interest in the course	4.67 ± 0.49	4.32 ± 0.57
Difficulty	3.00 ± 0.85	2.68 ± 0.78
Pedagogical approach	3.92 ± 0.67	4.18 ± 0.80
General rating	4.33 ± 0.65	4.45 ± 0.60

consistent with those required by state quality assessment agencies. The questionnaire variables can be seen in Table 3. The use of this questionnaire was considered adequate because the students were already used to using it in other subjects and levels, and because the results of this study would be extrapolated and comparable for future courses.

The reliability of this questionnaire for this sample was analyzed using Cronbach's α. However, according to current methodological literature (Hayes & Coutts, 2020), reliability was *computed* McDonald's ω too (McDonald, 1999, pp. 89–90). McDonald's ω has the advantage in this study that it is not affected by the number of items in the calculation, and that it makes the calculations more stable (Ventura-León & Caycho-Rodríguez, 2017). Reliability can be considered acceptable with a ω > 0.65 (Katz, 2006), and it is be recommended between 0.7 and 0.9 (Ventura-León & Caycho-Rodríguez, 2017). This questionnaire achieved a reliability of ω = 0.868 (and α = 0.847) applying it to this sample. This questionnaire has 4 dimensions: (1) Study plan (ω = 0.685, α = 0.612); (2) organization (ω = 0.698, α = 0.677); (3) Evaluation system (ω = 0.677, α = 0.666); (4) Overall assessment (ω = 0.824, α = .822). It has 20 items of 5 graduated responses Likert type (5 being the most positive value and 1 being the most negative) or in a dichotomous key (yes/no), and that measures the fundamental variables of course design. Questionnaire design with dimensions and items has been specified in Table 4.

Regarding the qualitative approach, 5 interviews were conducted with the *FTF* group and 3 virtual interviews with the micro-videos group. Sampling was for convenience, based on: (1) the availability of volunteers; (2) the ability and communicative interest of the participants. Therefore, the design of the interview was open, and was based on the questions and dimensions of the quantitative questionnaire. All the interviews were individual, they were carried out by the same

Table 4. Questionnaire design with dimensions and items

Response scale:	**1 (Completely disagree)**	**2**	**3**	**4**	**5 (Completely Agree)**
Dimension 1: Study plan					
1. The objectives and contents of the program have been defined at the beginning of the course					
2. The objectives of the course have been met					
3. The extension of the program has been adequate.					
4. The practices and experiences of the course have been useful					
Dimension 2: Organization of the course					
5. The organization of the course has been good.					
6. The direction of the course has been adequate					
7. The teacher has been able to transmit concepts and promote learning.					
8. The teacher has shown interest and enthusiasm in his teaching.					
9. The material and documentation provided have been good.					
Dimension 3: Evaluation system					

(*Continued*)

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Table4. (*Continued*)

Response scale:	**1 (Completely disagree)**	**2**	**3**	**4**	**5 (Completely Agree)**
10. The evaluation criteria have been transmitted from the beginning of the course.					
11. The evaluation criteria have been explained and clarified.					
12. There has been continuous evaluation throughout the course					
13. There has been a balance between the difficulty of the practices and the preparation.					
Dimension 4: Overall assessment					
14. Your expectations regarding this course have been met.					
15. The training received can be useful for your professional future					
16. I would recommend other students to do this because of its design. (Yes/no)					
17. I found the design of the course very interesting.					
18. I found this course difficult					
General rating					

(*Continued*)

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Table4. (*Continued*)

Response scale:	**1 (Completely disagree)**	**2**	**3**	**4**	**5 (Completely Agree)**
19. The pedagogical approach seemed appropriate to me.					
20. I am generally satisfied with the course					

researcher. They were carried out the week after receiving the training course. The average duration of the interviews was 21 minutes. The interviews were transcribed into a word processor.

2.3. Data analysis

For data analysis, normality and homogeneity of variances were analysed and the outliers were removed, going from n = 37 to n = 34 (n = 12 *FTF* group and n = 22 microvideos group). Subsequently, independent two-sample *t*-tests were performed. The use of this test is justified by the fact that it is a quasi-experimental design, since a random estimation of complete groups of subjects to the control and experimental did not take place, and because of its sensitivity and discrimination capacity for small samples (Handley et al., 2018). To calculate the effect size in *t*-tests, Cohen's d for the were used, considering a small effect (d = 0.2–0.3), medium (d = 0.5–0.8) and large (d greater than 0.8; Cohen, 1988).

Pearson's bivariate correlations were performed. Descriptive statistics for viewing the videos provided by YouTube were also taken into account to complement the data analysed in this study and gain interpretive power. To calculate the effect size in the correlations, Cohen's *r* for the correlations was used, considering a small effect ($r \approx 0.1$), medium ($r \approx 0.3$) and large ($r \approx 0.5$; Cohen, 1988).

An analysis of the content of the interviews was carried out to allow emerging variables and to understand key aspects of the course not previously considered (Bolívar, 2002). The content analysis was not systematic (Bardin, 2002), but hermeneutical, which implies a more holistic and open interpretation based on semantics and context, and not so much in the number of texts to interpret (Gadamer, 1977). This data collection was performed to complement the quantitative data, thus, the quantitative data was triangulated with the qualitative ones.

3. Results and discussion

The level of enrolment in both courses was different, despite using the same dissemination strategy for the course. There were 12 students enrolled in the *FTF* course, while in the following year the enrolment amounted to 25 students. To answer the initial research question and the objective of the study, this section has been structured into 3 findings: (1) the lack of quantitative differences between both methods; (2) An increase in perceived autonomy with micro-videos; and (3) Evaluation of the design from the student perspective.

3.1. The methods are not so different

Table 3 shows the quantitative descriptive results extracted from the questionnaire, based on difference of means and standard deviations (*SD*). It was found a positive general attitude towards the course in the students of both groups, which makes it difficult to find differences in both teaching-learning methods (Table 3). This fact is already known in educational science studies, where an improvement can be expected in different intervention groups due to the maturation factor, so it is difficult to establish differences (Hattie, 2017). Zhan and Mei (2013) also found no differences in student satisfaction with respect to the *FTF* and e-learning modality, and they suggested that it may be due to the equal psychological need for academic self-concept.

After performing a *t* student analysis, it was found that there are only significant differences in the variable "definition of objectives and contents" (t (32) = −2.095, p = 0.044, 95 % *CI* [−1.061 to −0.015]), with a high effect size (d = .72). Micro-videos method got a higher score (μ = 4.45, SD = 0.67) compared to face-to-face method (μ = 3.92, SD = 0.79), that is, the students who studied with the micro-videos method perceived that the definition of the objectives and contents was much better (bearing in mind that the objectives and contents of both courses were the same: only the educational method changed). There were no differences in the rest of the variables (Table 5).

This results were complemented by bivariate correlation analysis, which was carried out on each group separately, in order to be able to interpret whether the same correlations existed in both

Table 5. Independent two-sample for equality of means

Variable	t	df	Sig. (bilateral)	Mean difference	95% confidence interval of the difference	
					Lower	Higher
Definition objectives and contents	−2.095	32	0.044	−0.538	−1.061	−0.015
Accomplishment of the goals	−0.277	32	0.783	−0.068	−0.569	0.433
Course extension	−1.296	32	0.204	−0.371	−0.954	0.212
Usefulness of the practices	0.075	32	0.940	0.023	−0.592	0.637
Organization	−1.446	32	0.158	−0.371	−0.894	0.152
Direction	0.177	32	0.861	0.045	−0.479	0.570
Effective teacher communication	−1.028	32	0.312	−0.182	−0.542	0.178
Teaching enthusiasm	−1.008	32	0.321	−0.189	−0.572	0.194
Documentation and contributed material	−0.165	32	0.870	−0.045	−0.608	0.517
Assessment criteria information	−0.797	32	0.431	−0.242	−0.862	0.377
Clarity of evaluation criteria	0.244	32	0.809	0.083	−0.612	0.778
Continuous evaluation (yes/no)	−0.640	32	0.527	−0.076	−0.317	0.165
Preparation-task balance	0.640	32	0.527	0.152	−0.331	0.634
Student expectations met	1.128	32	0.268	0.326	−0.263	0.914
Professional utility	0.508	32	0.615	0.121	−0.364	0.607
Interest in the course	1.788	32	0.083	0.348	−0.049	0.746
Difficulty	1.100	32	0.279	0.318	−0.271	0.907

(*Continued*)

cogent education

Table5. (*Continued*)

Variable	t	df	Sig. (bilateral)	Mean difference	95% confidence interval of the difference	
					Lower	Higher
Pedagogical approach	−0.980	32	0.334	−0.265	−0.816	0.286
General rating	−0.549	32	0.587	−0.121	−0.571	0.329

groups and to be able to compare. It was found that in the microvideos method group, the variable "definition of objectives and content" correlated positively with "achievement of objectives" (Pearson's r = .639, p = .001, Cohen's r = .4), with 'teaching communication' (Pearson's r = .623, p = .002, Cohen's r = .38), with 'teaching enthusiasm' (Pearson's r = .440, p = .041, Cohen's r = .19), with 'preparation-task balance' (Pearson's r = .599, p = .003, Cohen's r = .35), with 'student expectations met' (Pearson's r = .546, p = .009, Cohen's r = .29), with 'interest in the course' (Pearson's r = .602, p = .003, Cohen's r = .36), with 'pedagogical approach' (Pearson's r = .463, p = .03, Cohen's r = .21) and with 'general grade' (Pearson's r = .650, p = .001, Cohen's r = .42). Most of these correlations had a moderate effect size (r < 0.3). These correlations with "definition of objectives and content" variable were not found in the *FTF* group: "achievement of objectives" (Pearson's r = .342, p = .276), with 'teaching communication' (Pearson's r = .549, p = .065), with 'teaching enthusiasm' (Pearson's r = .353, p = .261), with 'preparation-task balance' (Pearson's r = .310, p = .326), with 'student expectations met' (Pearson's r = .315, p = .318), with 'interest in the course' (Pearson's r = −.078, p = .811), with 'pedagogical approach' (Pearson's r = .500, p = .098) and with 'general grade' (Pearson's r = .235, p = .463). This could indicate that the clarity and detail in the definition of objectives and content facilitates a more favourable attitude of the students towards the course. On the other hand, it seems that both courses are not so different, since there have only been differences in 'definition of objectives and contents' variable. This finding coincides with what was found in another rigorous research, which shows that, for the moment, the most digitized approach or even Artificial Intelligence cannot replace traditional didactics with the presence of the teacher and *FTF* activities (Voskoglou & Salem, 2020).

The qualitative data allows triangulating the quantitative findings. On the one hand, there have been positive contributions in both groups: "I liked it and it has served me well" (*FTF* group); "The truth is that it has helped me a lot, especially in the preparation of the *UD*" (micro-videos group).

All these data allow that, at an exploratory level, the *FTF* method and the one based on micro-videos are not so different in terms of general preparation for the *UD*, according to similar studies that there were no differences in these two types of educational contexts (Zhan & Mei, 2013).

3.2. An increase in perceived autonomy with micro-videos

A better perceived autonomy was qualitatively found in the micro-video group. However, this must be taken with caution. The greater autonomy could be manifested due to the design of the course evaluation (Ren et al., 2015): "[The evaluation of the course] was quick and you could see the answer instantly. You did not have to wait for the course director to correct it, but only you gave him to see answers and you already knew what you had hit and what you had not. And it is really that, an immediate learning because you take the exam and you already know directly what you have done well and badly since the ideas that you see that you have failed are better for you. For example, on many occasions, if I failed one, I would go to the video and watch that part again to see why the answer I had marked was not correct". It is understood that one of the dimensions of autonomy is that students can take the course with explanations and asynchronous corrections by the teacher (Laupper et al., 2020; Wang & Yu, 2016). Following to *SDT*-based study of Fandino et al. (2019), students felt the tutor's accompaniment through his microvideos, timely and clear feedback and other communicative strategies such as video conferences implementation and an accessible attitude and guiding role providing a positive preparation. The greater autonomy expressed qualitatively could be explained by the greater perception of progress and follow-up, a characteristic studied in the design of micro-videos (Wu et al., 2017). Another reason for the increase in perceived autonomy is the consideration of the micro-video course as more supportive at the level of evaluation and feedback; from the *SDT*, Reeve et al. (2004) found that the trained teachers displayed significantly more autonomous-supportive behaviors than the control-group teachers and, furthermore, that the students in the classes of the trained teachers (with a more supportive style) were more engaged in their learning than were the students in the control group.

This gain of autonomy could be explained by an increase in trust, as found Khasawneh et al. (2016). This autonomy could be associated with the more analytical and concrete design of the videos, and with all the tasks of reflection and work associated with them; likewise, that autonomy achieved in the micro-videos group could have been promoted by the possibility of accessing the learning content from different formats and environments (Tian & Tsai, 2021). It has been found through Google Analytics that 65.1 % of the students accessed the videos from a laptop, 26.9 % from a smartphone, and 7.9 % from a digital tablet.

Another important variable associated with the autonomy is the self-discipline that each student has previously (Kuo et al., 2019; Ryan & Deci, 2017). This self-discipline facilitated by the micro-video method was explained in this way: "if you have more self-discipline, I see it well, because for example, you can manage the schedule as you want; you can adapt it to your needs. But you still think that you are not going to be able to say: come on, `I'll get on and do it and it's more complicated`. But that depends on each person, it seems to me". In this sense, a more guided classroom course can be more successful for certain students than a more flexible and digital one; as has been studied, an essential feature of the micro-video design is that learners can get in a short time, a gradual learning (Ren et al., 2015). Flexibility and self-control can be interpreted by students as an advantage offered by the platform, as was found by, as found in the study of Fandino et al. (2019).

Ubiquity may have also favoured autonomy towards learning in the micro-videos group with respect to the *FTF* group, as another student prompts: "I think that above all it highlights the autonomy with which you can carry out the work. In other words, both the autonomy to follow the course, as well as the autonomy to carry out the *UD*, because on many occasions, I have been fortunate that my *UD* tutor has always been there when I asked her something. But it is true that there are times when you think that the number of questions you ask your tutor is excessive. So of course, it is having the course that surely solves 90 % of those doubts, that they are not very complicated and that it is normal to have them and that you do not need your *UD* director to answer you. So from my opinion it has given me a lot of autonomy both to follow the course and to develop the *UD*". This finding of increased autonomy in the micro-videos context was also found in the adult university population (Moreno-Guerrero et al., 2020). This greater autonomy in micro-videos activities could be associated with an improvement in academic performance (Abu Saa et al., 2019), although in the present study it has not been measured because it would be necessary to wait for the participants to re-complete the real *UD* in the following academic years.

Perceived autonomy could be improved by the micro-learning design of the contents, and several students recognized it: "I really liked the option of being able to see the individual videos, in case you were looking for specific information"; This approach and format of micro-videos has been proposed in other studies as a possible solution to increase the participation and involvement of students (Esnaola-Arribillaga & Bezanilla, 2020).

3.3. Evaluation of the design from the student perspective

One student stated in an emergent way that the essential characteristic of the micro-videos course had been its ubiquity, with the advantages of time and work management for the students that this implies: "Also, although all this COVID had not happened yet, it is true that this course was already considered as something online and I think that is a very good idea since you can access it whenever you want, [. . .] you can say the same as before «well now that I have 5 minutes I'm going to see a new video». Then it is easier to mark and follow your own rhythm and also see all the information when it suits you, without having to be at a set time and space". The advantages pointed out by this student have also been indicated in another study, where this approach and format of micro-videos is proposed as a possible solution to increase the participation and involvement of the students (Dotta & Le, 2019). Likewise, Pedro found in his study the relationship between the design of the course activities with the interest and participation of the enrolled students (Giesbers et al., 2013).

Regarding the format and design of the course, a student of the *FTF* course indicated: "The philosophy sessions … they were quite heavy for me. They are interesting, but I think they deviated a bit from the topic. The same given in another way … The first sessions should be made shorter". In this sense, the following year in the micro-videos course another student pointed out: "I think that (the micro-videos course) is true that it seemed very extensive, but since they were all 5-minute videos and that they were on such specific topics, I think it covered everything, but in that, in short videos". Another student affirmed: "I really liked that video format that makes it much more accessible than accessing the typical documents that you have to find, read, and which is heavier at first. Seeing a relatively short video that is well explained to me has helped me a lot". This mention of interest and interaction in the activities and materials of the course was already found in the study of Fandino et al. (2019), also from the *SDT*. However, this apparent increase in interest and engagement contrasts with the average viewing duration of the videos, which has been 2'51" ± 1'19" (being the average duration of the videos of 5'17" ± 3'14"). Is participation in micro-videos courses really different in terms of maintaining attention and interest compared to *FTF* courses? To the advantages of the digital format such as repeated reproduction, the ubiquity of learning or flexibility, we must add the prudence indicated by Han (2015), which reflect that the shortening of learning sessions also responds to the current, faster production system, diverse and with instant rewards. In this sense, not all content is equally compatible with the short video lesson format, such as those associated with reflection, philosophy and epistemology.

Another student of the microvideos course stated: "I like the subject of videos, being that it is not a *FTF* course, I quite like it. In other words, having the videos in the most visual image of someone who is explaining it to me helps me". Specifically, accessibility was mentioned as a virtue of microvideo-based design: "For example, if I have a question with the *UD*, I will go to this specific video and in 5/10 minutes I will have it resolved. But it is true that the format of the short videos, I think it is better because this way you can access it at any time, watch it in a short space of time and have the solution". These comments in the micro-videos group could help understand the differences found in the variable definition of objectives and content: "I have found it very helpful, especially, the videos that seem to me to be a very concise, concrete tool, very well explained and that «it happens very well» so to speak". One of the virtues most mentioned by different interviewees about the micro-videos course has been the short format of the micro-videos: "The truth is that it has helped me a lot, especially in the preparation of the *UD* and I have found it very helpful, above all, the videos that seem to me to be a very concise, concrete tool, very well explained".

4. Limitations of the study and future lines of research

There were participants in both courses who expressed the suitability and usefulness of the course, as well as that they had learned and felt more prepared to face the *UD* successfully. The present exploratory analysis can, therefore, clarify only small differences in the design of both courses. A sign of differences between the two methods has been found with the qualitative approach, but not with the quantitative one. Although this type of inconsistency has already been marked in science (Mathison, 1988), sometimes in nature when the phenomenon to be studied is complex. However, it is a limit of this research, and therefore this study is inconclusive regarding the differences between the two methods, and new studies should be developed with similar educational programs. One limit of this study is the sample size. New similar studies are needed in the Spanish context, which achieve a larger sample size, to gain statistical power.

It will be of interest to contribute to *SDT* to evaluate longitudinally, if those who take these training courses during the intermediate courses of the degree, carry out their *UD* with less uncertainty or with greater success, compared to those who do not carry out this previous training.

It would be a way to find real differences in academic performance between those who took a classroom course and an micro-videos course (Abu Saa et al., 2019), if they exist.

Likewise, this exploratory study should open new investigations with control measures as a PRE measure with the questionnaire and the increase of the sample (provided that the educational approach of the courses is not lost). In order to establish causality between the educational methods studied and the perceived autonomy or perceived readiness towards *UD*, studies are needed to really control the personal and contextual variables (family, social environment, study habits, access to digital technologies, other motivations, etc.), since they affect the attitude of students regarding the evaluation of these programs (Fandino et al., 2019; Ryan & Deci, 2017).

5. Conclusion

This study offers indications about the importance of considering the perceived autonomy in student teachers to increase their sense of preparation for the *UD*. Traditional *FTF* method and micro-videos method are not so different to prepare students for their *UD*, according to the exploratory results of this study. However, signs have been found that the transformation of a traditional *FTF* method towards micro-videos method could improve the felt autonomy of the students, especially due to the and the more flexible structure.

A practical implication of this study is the advisability of creating more analytical courses, where the objectives, contents and activities are specified and specified in a more orderly manner, as well as the contents being more accessible and feedback being provided more frequently. However, these features can be done both in *FTF* mode and with microvideos.

Quantitatively, significant differences were only found regarding “definition of objectives and contents”; however, in the rest of elements there were no quantitative differences. The mixed methodological approach has allowed us to gain interpretive power in this study, although interesting facts have been found through qualitative methodology that are not corroborated by quantitative analysis. This study gives a fresh insight into microvideos format program, considering the lack of comprehensive research on the influencing variables that impact the user felt preparation to *UD* and the effect on their perceived autonomy.

This research adds evidence to the *SDT* regarding the promotion of perceived autonomy through the microvideo-based program, although in an unclear way due to the sample size. It can be stated that the micro-videos method could improve the design of a training course to prepare the *UD*. All the students in both groups showed an improvement in the preparation to successfully pass the final degree project and greater autonomy. A blended modality could be considered in the future, with the most flexible and aesthetic structure of micro-videos but with the advantages of *FTF* communication (Zhan & Mei, 2013).

There are no major essential differences between the two educational methods, although there are specific characteristics that do differ. A research design has been provided that clearly presents the educational programs applied, as well as the procedure, which makes this study transparent and replicable in the future. More studies are needed on the different didactic methodologies in university education, which make it possible to know more rigorously what concrete virtues the *FTF* method and the method based on micro-videos have.

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