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Influence of an Educational Innovation Program and Digitally Supported Tasks on Psychological Aspects, Motivational Climate, and Academic Performance

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Abstract: Background: In university education, there is a need to provide students with the ability to use knowledge, and it has been shown that the cooperative model, with respect to information and communication technology (ICT), is effective. The aim of this study was to analyze the influence of an educational innovation program, based on the jigsaw technique and digitally supported tasks, on the psychological aspects, motivational climate, and academic performance of university students. Methods: A quasi-experimental study was conducted with an experimental group consisting of 100 university students (mean age: 21.84 ± 1.50 years). The motivational climate and the basic psychological needs in education, intrinsic motivation, academic self-concept, and academic performance were measured. Results: Significant increases were found in all variables after the intervention ($p < 0.006$–0.001), except for the variable, ego-motivational climate. The covariate perception of prior competences was significant for the model ($p < 0.001$). The students who had chosen a specific topic to develop with the jigsaw technique obtained a better grade than the rest of their classmates when the student's academic performance was included as a covariate ($p < 0.001$). Conclusions: The psychological aspects, motivational climates, and academic performances of university students improved after the implementation of an educational innovation program, based on the cooperative learning model with the jigsaw technique, and the use of digitally supported tasks.

Keywords: education innovation; ICT; learning/teaching strategies; psychological needs; university education

1. Introduction

The European Higher Education Area and the Spanish Royal Decree, 1393/2007, have brought about a change in university education, as the focus is now being placed on the development of competences. Therefore, the need to provide students with the ability to use knowledge, rather than only acquire the knowledge itself, is underlined, so that the theory makes more sense through its practical application [1]. In order to implement the methodological change that this implies, with respect to how teaching has classically been approached at the university level, it has been found that active learning favors knowledge retention and a deeper understanding of the subject learned [2,3], and it also promotes other transversal, but no less important, characteristics, such as autonomy or teamwork, and the resolution of group conflicts [4,5].

According to the theory of achievement goals [6], from a personal perspective, people may have mastery-oriented goals, when they aim to learn and improve, or performance-

oriented goals, when they aim to outperform others. In parallel, from the contextual perspective of motivational climates, defined as the set of implicit and/or explicit signals received by the participant from the environment that has an influence on his/her success or failure, we find a task climate focused on the process, which encourages personal improvement, effort, and learning; and an ego climate based on results, as well as the comparison and competitiveness among group members.

Therefore, from this new paradigm of higher education, it is considered that the motivational climates in the classroom promote the personal goals of students, significantly influencing motivation and performance [7]. "Motivation" has been defined as the set of personal and social factors that favor the initiation of a behavior and its persistence or abandonment [8], and it is determined by the intensity and direction of effort [9]. Motivation is one of the most studied psychoeducational constructs because of its important role in optimizing academic performance [10–14].

Among the most beneficial methodologies for current teaching at the university level, we find cooperative learning [15]. Cooperative learning is characterized by the design of tasks, in small structured heterogeneous groups that allow learning to be adapted among peers to their own and each other's needs [16–19]. More specifically, the elements that characterize cooperative learning are positive interdependence among group members, the promotion of interaction, personal and individual responsibility, the development of interpersonal skills, group processing, and periodic evaluation or self-evaluation [20–22]. When the main advantages of cooperative learning were analyzed, it was found that students, in addition to learning the content, and even increasing their academic performances, achieved an improvement in their social and emotional skills and were more motivated, as they felt themselves to be an active part of the teaching–learning process, an aspect that favors the comprehensive training of students [1,23–29].

Among the most complex cooperative learning techniques, we find the jigsaw technique [30]. It consists of the presentation of the learning objectives and the setting of tasks, subdivided into as many parts as there are members in the group, whereby each group member is individually responsible for investigating a certain subtopic. After an enquiry phase, each group member has to present what he or she found to the rest of the group, every group member thereby completing the missing knowledge with the help of the others. Subsequently, the group has to present the results of the research. Finally, a final joint reflection is encouraged on the functions and scopes of the initially established objectives in order to verify the acquisition of knowledge by the group and its members [25–28,31–34].

Previous studies have analyzed the influence of jigsaw techniques on psychological parameters and academic performance, finding that this technique allows for the individualization of learning, as it adapts to the needs of each student [26], promotes autonomy and self-efficacy in learning [26], and caters to the diversity of interests, values, motivations, and abilities of students [1]. In this way, meaningful learning of the content is achieved, which can increase academic performance by encouraging continued study of the subject, so that students do not memorize, but, rather, mature their knowledge [1,23–29]. This technique has also been found to increase motivation globally, and, more specifically, intrinsic and extrinsic motivation [35]. In addition, it improves cooperative learning, as it fosters a positive attitude among group members, develops solidarity and civic commitment among students, and teaches the social skills needed for relating to the group and assertively expressing one's own point of view [1,23,24,26], aspects that favor the comprehensive teaching of students.

On the other hand, in recent years, there has been a great increase in the use of digital technology in society, in general, and in the educational sphere, in particular, which offers new didactic resources that could favor the teaching–learning process. Although information and communication technologies (ICT), by themselves, may not be factors that increase learning [36], their use in the field of education through reflection and educational research offers the possibility for teachers to use these tools as instruments to improve the teaching–learning process [37].

Among the different ICT tools that can be used in the field of education, we find digital posters. This manner of presenting information digitally is a new form of communication that facilitates the teaching–learning process as it becomes more attractive and as it manages to maintain the user's attention, thereby facilitating the teaching–learning process under optimal conditions [38].

Previous research has corroborated the benefits of integrating cooperative tasks in the university context [39,40]. However, to date, the effect that certain cooperative learning techniques, such as the jigsaw technique, may have on the learning of university students is unknown. Creating a virtual poster could be interesting from a methodological point of view, offering students learning that is adapted to their needs, and developing digital technology skills in the last phase of the jigsaw technique. Nevertheless, research on this aspect is lacking.

Therefore, the aim of the present research was to analyze the influence of an educational innovation program, based on the cooperative learning jigsaw technique and digitally supported tasks, on the motivational climates, the satisfaction of basic psychological needs in education, the intrinsic motivations, academic self-concepts, and the academic performances of university students.

2. Materials and Methods

2.1. Design

This research is part of the teaching innovation project, entitled "Cooperative learning and digital technology: Methodological innovation to improve the teaching and learning experiences of university students in the area of Health and Quality of Life in the final year of the degree in Physical Activity and Sport Sciences-Together Postlearning", with code PID-04/20, subsidized by the Catholic University of Murcia as part of the university's Research Support Plan.

This is a quasi-experimental research study, with an experimental group and two measurement times (pretest and post-test).

The independent variable of the present study was the educational innovation program, which was based on the cooperative learning jigsaw technique and the digitally supported tasks. The dependent variables were the motivational climate (MC) (ego and task), the basic psychological needs in education (autonomy, relatedness, and competence), the intrinsic motivation (IM) (knowledge, achievement, and stimulating experiences), and academic self-concept, which were assessed before and after the implementation of the innovation program. Two measurements of these variables were taken (pretest and post-test). The covariates were academic performance, the rating of the virtual poster, the role in the group, and the perception of previous transversal competences.

In order to analyze the differences in the grades in the subjects that were worked on, between the students who had chosen that subject and those who had not (independent variable), the grades obtained in the exam questions on that subject were compared (dependent variable) with the same covariates as in the previous case.

The research was carried out following the CONSORT guidelines. Before the start of the study, approval was obtained from the Institutional Ethics Committee [code: CE052011]. In addition, all participants in the study signed an informed consent form prior to data collection, where they were informed about the objectives of the study, as well as the treatment of the data obtained and their confidentiality.

2.2. Participants

The sample size was calculated using Rstudio software (version 3.15.0, Rstudio Inc., Boston, MA, USA). The significance level was set at $\alpha = 0.05$. The standard deviation (SD) was set on the basis of the motivational climate dimension of the Perception of School Goals Emphasis Scale questionnaire from previous studies (SD = 0.92) [41]. With an error (d) of 0.18, the estimated sample needed was 100 participants. In the present study, 100 students (mean age: 21.84 $\pm$ 1.50 years), from three academic subjects of the sport

and quality-of-life module, found in the last academic year of the Physical Activity and Sport Sciences Degree (4th year) of the Catholic University, San Antonio of Murcia (Spain), participated voluntarily. All the subjects had between 4.5 and 6 ECTS credits, with 66% of the theoretical hours, and 33% of the practical classroom hours (total: between 45 and 60 classroom hours per subject), to be developed in 14 consecutive weeks, having, therefore, between 2 and 6 h of class per week per subject. The selection of participants was carried out by consecutive nonprobabilistic sampling, selecting all possible suitable students who wished to participate voluntarily in this study, and who met the following inclusion criteria: (1) Enrolled in the degree in Physical Activity and Sport Sciences; (2) Enrolled in the final year of the degree; (3) Attending the theoretical sessions in person; and (4) Not having participated in the project with another subject.

2.3. Instruments

The Perception of School Goal Emphasis Scales (PSGES) [41] were used to measure the MC, differentiating between the task motivational climate and the ego motivational climate.

The Satisfaction of Psychological Needs in Education Scale (ESNPE) [42], which differentiates between the dimensions of autonomy, relatedness, and competence, was used to assess the basic psychological needs of the students.

The Educational Motivation Scale (EME) [43] was used to analyze the IM for knowledge, the IM for achievement, and the IM for stimulating experiences.

The academic dimension of the self-concept questionnaire, Form 5 (AF5) [44], validated by Tomás and Oliver [45], was used to measure academic self-concept.

For the initial assessment of each of the three subjects utilized in this study, a questionnaire, consisting of ten multiple-choice questions on their initial knowledge of the subject with four options, was generated using the Google Forms® survey tool. The questionnaire was scored at +1 point per correct answer, with no penalty for failed questions.

An ad hoc questionnaire was also designed in Google Forms® to discover the participants' levels of prior competences with respect to searching for scientific information, recording and editing videos, and creating virtual posters prior to the intervention, with Likert-type responses, where 1 was "Very bad", and 5 was "Very good". The sum of the values of the three categories was used as the final value of the variable prior to the transversal competences.

An ad hoc rubric was developed using Google Forms® so that the members of each group could self-evaluate their virtual poster before presenting it, following the recommendations of previous research on the use of rubrics designed for this purpose [46].

Academic performance was measured by means of the grades given to the ordinary reports of the three subjects, examined once they had been completed. These grades were obtained from the completion of: (a) A first theoretical partial exam, held in the middle of the term (Week 9), with a multiple-choice exam with 40 questions, with four possible answers, with a deduction of 0.33 points for each wrong answer (30% of the final grade); (b) A second theoretical partial exam, taken at the end of the subject (after Week 14), with a multiple-choice exam with 40 questions, with four possible answers, with a deduction of 0.33 points for each wrong answer (30% of the final grade); and (c) An applied work based on the creation of a virtual poster using the Glogster® tool (40% of the final grade). The academic performance scale ranged from failing (0–4.9) to outstanding (9.0–10.0).

Regarding the theoretical partial exams, each of the two theoretical partial exams included the same number of theoretical topics. The first half of the theoretical topics, according to the teaching guide, were included in the first partial exam, and the second half of the topics in the second partial exam. All the students took the exams at the same time and had the same exam questions in a randomized order. Of those topics that had been chosen by the professor for the development of the innovation program, ten multiple-choice questions were included in the partial theory exam to which this topic belonged, with four possible answers, with a deduction of 0.33 points for each wrong answer, in such a way that the grade for each of the subjects worked on was obtained on a scale of 0 to 10.0.

Thus, each student received a general grade for each partial exam, and a specific grade for each one of the three topics that were chosen by the professor for the innovation program.

2.4. Procedures

At the beginning of each subject, a pretest was carried out (Week 1), which consisted of completing the initial assessment; the previous competences questionnaire; the PSGES [41]; the ESNPE [42]; the EME [43]; and the academic dimension of the AF5 questionnaire [44].

Following the recommendations of the jigsaw cooperative learning technique, each professor responsible for the academic subject selected three topics, with a practical focus, that were relevant to the meaningful learning of the subject and its subsequent applicability, determining four subtopics or key points within each topic (Week 0). The academic subjects involved in the current study, and the division of topics and subtopics for each one, are shown in the Supplementary Table S1.

The participants had to individually choose which of the three subjects presented by the professor aroused their interest the most, and three lists of students were created, according to the subject chosen in the subject's virtual campus chat (Week 1). In this way, the ability of the students to choose increased their motivation and their involvement in the development of the project [47].

Subsequently, among those individuals who had chosen the same subject, the participants formed groups of four people and chose a captain, who was in charge of communicating with the professor in order to consult him/her about any doubts during the completion of the task, and who was the person who was registered in the Glogster® tool for the preparation of the virtual poster (Week 2). In order to comply with the heterogeneity criterion, the configuration of these groups was confirmed by the professor on the basis of the results of the initial assessment and the level of prior transversal competences.

Afterwards, the members of each group met, and the subthemes previously marked by the professor for research were distributed, with each student being responsible for researching one of these subthemes individually (Week 3). An infographic was produced so that the students were aware of the key points to be taken into account when searching for information. After this, three theoretical sessions, lasting 1.5 h (total: 4.5 h), were dedicated to the sequential implementation of the methodology of the innovation project. In the first session, expert meetings were held where, within the same theme, those responsible for the same subtheme discussed the information they had found (Week 5). In the second session, back in the focus groups, the group members discussed the findings of the research phase and the expert groups with their colleagues and debated about the interconnectedness of the learning acquired by the different group members (Week 6). On the third week, the group participants designed how they were going to create the videos, what support they were going to use, and what contents they were going to include in order to respond to each of the themes and subthemes proposed by the professor (Week 7). Finally, the students recorded and edited the videos in order to subsequently compose the virtual poster with the Glogster® tool. Upon delivery of the poster (Week 9), each group member completed the rubric (self-evaluation), and the same rubric was also used by the corresponding professor to evaluate the poster produced by each group (the heteroevaluation).

Once this process had been completed, the professor taught the contents related to each of the topics in a theoretical manner, following a traditional methodology, so that all the students had access to the contents of all the topics. The rest of the theoretical contents of the subject were also taught following a traditional methodology.

At the end of the course, the post-test was carried out (Week 14). For this, the students again self-completed the PSHES [41]; the ESNPE [42]; the EME [43]; and the academic dimension of the AF5 questionnaire [44].

2.5. Statistical Analysis

The normal distribution of the sample was assessed with the Kolmogorov–Smirnov test, and the kurtosis, skewness, and homogeneity were assessed with Levene's test. A

descriptive analysis of the sample was performed. Differences between the pretest and the post-test were compared with a *t*-test for the related samples in the variables: motivational climate ego or task; basic psychological needs in education; IM for knowledge, achievement, or stimulating situations; and academic self-concept. In order to analyze the differences in the test scores for each of the subjects, between the participants who had chosen that subject and those who had not, a *t*-text for independent samples was carried out. The differences in these variables were also assessed on the basis of the covariates: academic performance; the rating of the virtual poster; previous transversal competences; and the role in the group (captain/member). These were assessed by means of an ANCOVA. The effect size was calculated using partial eta squared (η^2_p). The significance level was set a priori at $p < 0.05$. All statistical analyses were performed with SPSS v.23 software (IBM, Endicott, NY, USA).

3. Results

Table 1 shows the mean ± SD of the variables related to the motivational climate, basic psychological needs in the educational environment, intrinsic motivation, and academic self-concept. The *t*-text for related samples showed significant differences in all the variables, with higher values after the intervention (t = −2.81 to −4.22; $p < 0.006$ to 0.001), except for the ego-motivation climate, which did not show a significant change. The inclusion in the model of covariates (Table 2), such as academic performance, the rating of the virtual poster, or the role in the group (captain or not), showed no influence on the differences found between the pretest and post-test results. Only the covariate, previous transversal competences, influenced the differences found in all the variables analyzed. It did so in favor of the students who presented a greater awareness of transversal competences with regard to the use of digitally supported tools and bibliographic searches (F = 40.15–109.88; $p < 0.001$).

Table 1. Descriptive statistics and differences between pretest and post-test psychological aspects and academic self-concepts.

Variable	Mean ± SD Pretest	Mean ± SD Post-Test	t	*p*	ICC (95%) Min; Max
MC (ego)	10.58 ± 6.57	11.81 ± 6.38	−1.59	0.115	−2.76; 0.31
MC (task)	26.94 ± 13.57	31.39 ± 9.37	−3.04	0.003	−7.35; −1.55
Autonomy	14.74 ± 7.79	17.73 ± 5.84	−3.50	0.001	−4.68; −1.30
Relation	16.94 ± 8.67	20.53 ± 5.93	−3.81	<0.001	−5.46; −1.72
Self-competence	16.48 ± 8.55	20.33 ± 5.99	−4.22	<0.001	−5.66; −2.04
IM (knowledge)	19.41 ± 9.69	22.54 ± 7.22	−2.81	0.006	−5.34; −0.91
IM (achievement)	19.06 ± 9.69	22.19 ± 7.17	−2.96	<0.001	−5.23; −1.03
IM (stimulating experiences)	16.19 ± 8.90	19.86 ± 7.39	−3.70	<0.001	−5.64; −1.70
Academic self-concept	34.52 ± 18.57	41.54 ± 15.50	−3.62	<0.001	−10.87; −3.17

MC: motivational climate; MI: intrinsic motivation.

The descriptive statistics and the differences found in the variables related to inter-subject differences in academic performance are shown in Table 3. The students did not obtain a better grade in the subject area for which they performed an in-depth study with respect to the classmates who studied other subjects in depth, except in the ANCOVA model (Table 4) with the covariate, academic performance, with differences found between the students who had studied a subject in depth and those who had not in the grades obtained when the results were related to the students' academic performances (F = 60.78; $p < 0.001$).

Table 2. Influence of the covariables, academic performance, competences, and roles, on the differences between pretest and post-test psychological aspects and academic self-concepts.

Variable	Pre/Post × Academic Performance			Pre/Post × Virtual Poster Qualification			Pre/Post × Transversal Competences			Pre/Post × Role in the Group		
	F	*p*	η^2_p	F	*p*	η^2_p	F	*p*	η^2_p	F	*p*	η^2_p
MC (ego)	1.28	0.261	0.01	2.16	0.145	0.02	40.15	<0.001	0.29	0.59	0.443	0.01
MC (task)	0.82	0.366	0.01	1.05	0.307	0.01	109.88	<0.001	0.53	0.61	0.437	0.01
Autonomy	1.75	0.189	0.02	1.98	0.162	0.02	81.66	<0.001	0.46	1.80	0.183	0.02
Relation	1.22	0.272	0.01	1.25	0.267	0.01	79.83	<0.001	0.45	1.57	0.214	0.02
Self-competence	1.15	0.287	0.01	3.42	0.067	0.03	87.90	<0.001	0.47	0.97	0.327	0.01
IM (knowledge)	0.89	0.348	0.01	0.76	0.385	0.01	80.01	<0.001	0.45	0.90	0.346	0.01
IM (achievement)	0.75	0.39	0.01	0.69	0.409	0.01	78.62	<0.001	0.45	0.44	0.508	0.00
IM (stimulating experiences)	0.25	0.616	0.00	0.10	0.75	0.00	49.78	<0.001	0.34	0.72	0.397	0.01
Academic self-concept	0.01	0.964	0.00	0.14	0.711	0.00	48.71	<0.001	0.33	1.02	0.316	0.01

MC: motivational climate; MI: intrinsic motivation.

Table 3. Descriptive statistics and intersubject differences in the ratings of the chosen topic.

Variable	Mean ± SD Selected Topic	Mean ± SD Not Selected Topic	t	*p*	ICC (95%) Min; Max
Rating of students who have selected the topic vs. those who have not selected the topic	6.80 ± 2.55	6.72 ± 2.93	0.226	0.821	−0.59; 0.74

Table 4. Influence of the covariables, academic performance, competences, and roles, on the intersubject differences in the ratings of the chosen topic.

Variables	Selected vs. Not Selected × Academic Performance			Selected vs. Not Selected × Virtual Poster Qualification			Selected vs. Not Selected × Transversal Competencies		Selected vs. Not Selected × Role in the Group			
	F	*p*	η^2_p	F	*p*	η^2_p	F	*p*	η^2_p	F	*p*	η^2_p
Rating of students who have selected the topic vs. those who have not selected the topic	60.78	<0.001	0.16	0.20	0.655	0.01	0.51	0.476	0.01	0.51	0.476	0.01

4. Discussion

The aim of this research was to analyze the influence of an educational innovation program, based on the jigsaw cooperative learning technique and digitally supported tasks, on psychological variables, such as the satisfaction of basic psychological needs in education, the intrinsic motivations, and the motivational climates of university students. The results reported an improvement in most of these parameters after the intervention. More specifically, the differences found in the *t*-test showed the effectiveness of the intervention on the task-motivation climate. These results are congruent with those found in previous studies in which students who experienced cooperative learning in their academic programs showed significant increases in their perceived task-motivation climates [48–53]. Motivational perspectives on cooperative learning indicate that task motivation is the most important part of the process, driving all other mechanisms involved in learning [48]. Cooperative incentive dynamics promote a situation in which, in order to achieve individual goals, it is imperative that the group succeeds. Thus, any task-related individual effort should be encouraged and praised by teammates [48,54,55].

By contrast, no significant change was found in the ego-motivational climate dimension. The lack of differences in this dimension can be explained by the fact that the jigsaw cooperative learning technique is based on developing a classroom climate oriented towards learning, towards the task, towards the sum of individual efforts to progress, and not towards an end product, the student's ego, or the interpersonal competence to succeed [56].

With regard to the satisfaction of basic psychological needs (autonomy, relatedness, and competence) in education, the results show a significant increase after the intervention. This finding is in line with previous studies, where the use of cooperative learning at the university teaching stage had significant positive effects on the levels of perceived competence and social relationships [32]. Moreover, in cooperative learning, the teacher becomes a resource, in addition to the other sources of information, whom students must consult in order to complete the tasks. Consequently, students are involved in the decision-making processes in the classroom, favoring the satisfaction of their basic psychological needs [1,48].

It should be noted that, after the cooperative learning experience, the levels of the intrinsic educational motivation of the university students studied increased significantly in all its dimensions (IM for knowledge, IM for achievement, and IM for stimulating experiences). These results are in line with previous studies, where the use of this pedagogical model in the classroom has significant positive effects on the levels of self-determined motivation [32,57–59]. At the same time, these motivational effects of cooperative learning foster autonomy and activate the students' basic cognitive processes [60].

A second objective of the present research was to analyze the influence of the intervention on academic self-concept and academic performance. A significant increase in the students' academic self-concepts was found after the cooperative learning program was implemented. Coincidentally, Pérez and Poveda [61] found that the use of cooperative learning increased self-concept in a sample of secondary school students [61]. More specifically, the jigsaw technique has been endorsed in other research studies as a facilitator of academic self-concept [62]. Given that students' academic self-concepts are forged through their interactions with their peers, applying the cooperative learning model guarantees social interaction in the classroom and an improvement in the self-images of these individuals [63–65].

Another finding of this study was that, although there were not significant differences in the grades of the subjects that were specifically addressed in this project, between the students who had studied these subjects in depth with the cooperative learning methodology and those who had not, in general, significant differences were found when academic performance was included as a covariable in the model. These results partially corroborate those found in previous studies, which were also conducted in higher education, and which confirmed the positive influence of cooperative learning on the academic performances of university students [15,52,66–68]. In recent studies, specifically in the area of physical education, Hortigüela-Alcalá et al. [39] found improvements in the academic performances of university students who developed cooperative tasks related to a subject in small groups, with the professor monitoring and providing feedback throughout the process being essential [39]. Along the same line, Meroño et al. [40] affirmed the positive influence of cooperative tasks, positioning affective learning as a central element in teaching and an important influence on the academic performances of university students. These findings, today, emphasize the benefits of assuming individual and group responsibilities [15], which, in turn, require positive interdependence between the members of the group [69]. In this sense, the rubric-based approach to self-assessment processes could also facilitate the performance of roles within the group and the interactions with professors in the pursuit of the educational goals [54].

On the other hand, the professor also taught the topics that had been the subject of the group work, which meant that certain groups revised these contents twice. Not seeing a clear effect on the grades is interpreted positively, but it could also have the reverse interpretation: working in depth on something adds little to the learning provoked by "traditional" teaching. This is in line with some studies that found that the jigsaw technique had no clear advantage in the student's academic performance as compared with "traditional" methods [1]. Thus, the influence of cooperative methodologies vs. "traditional" methodologies on grades is an important issue for future research.

In addition, the results show that there were no differences in any of the study variables between the students who played the role of captain and those who did not take on this responsibility. According to Salonen, Vauras, and Efklides [70], this may indicate that the relationships between students within each work group were indeed cooperative, as they took place in a coregulatory context involving shared decision making [70]. With regard to the latter, when comparing academic performance scores according to the opportunity to choose the topic that aroused their interest, higher academic performance scores were found for students who chose the topic to be addressed, as compared to students who carried out the tasks on the basis of the topic imposed by the professor. These results coincide with those found by Calderón et al. [47], and highlight the ability to choose as a pedagogical principle that drives the academic performance results of university students.

Another of the most noteworthy aspects is the differences found in favor of the students who presented a greater awareness of transversal competences with regard to the use of digitally supported tools (for searching for information, recording, editing videos, and/or creating virtual posters) in all the psychological aspects analyzed, as well as in academic self-concepts. These results are consistent with those found in previous studies, which corroborate the effectiveness of cooperative tasks for integrating new technologies in training processes [29,40].

The main limitation of the present research is the absence of a control group. Therefore, the natural progression of the participants could be a contributing factor to the positive outcomes. It is, therefore, a quasi-experimental design study, the conclusions of which should be contrasted in a subsequent longitudinal study. Another limitation is that the groups that participated in the study were not randomly selected, so the personality traits of the participants could be another contributing factor to the positive outcomes. Lastly, another limitation of the present study is that the virtual poster was a part of the global grade, leading to the estimation of the overall academic performance, which means that these two variables are highly correlated. This may cause issues with multicollinearity and is problematic for fitting the model and interpreting the results.

5. Conclusions

In conclusion, the motivational climate towards task, the satisfaction of basic psychological needs in education, and the intrinsic motivation improved after the implementation of an educational innovation program based on the cooperative learning jigsaw technique and digitally supported tasks. In addition, the completion of an in-depth work on a specific topic of a subject favored the student's achievement of a better grade in that content, as compared to his/her classmates who worked on different topics, with significant differences observed when academic performance acted as a covariate. The findings of the present study support the high potential of methodologies based on cooperative learning, specifically the jigsaw technique, as a teaching/learning plan labelled under the umbrella of this pedagogical model, on the psychological aspects and academic performances of university students.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/educsci11120821/s1. Table S1. Academic subjects involved in the educational innovation program and the division into topics and subtopics for each one.

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Data Availability Statement: The database can be accessed via the corresponding author, or through the link: https://docs.google.com/spreadsheets/d/14BJnTiyT73dPBHxPoCLEDu76lIqQRbp7/edit?usp=sharing&ouid=111459398586462090405&rtpof=true&sd=true (accessed on 4 November 2021).

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