The Challenge of Increasing the Effectiveness of Learning by Using Active Methodologies

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Abstract: One of the most important objectives of the Sustainable Development Goals (SDGs) is quality education, which is related to reducing school dropouts. To this end, the use of active learning methodologies improves the motivation, facilitating the learning process and, hence, reducing the dropouts. The present study proposes a methodological approach based on collaborative learning, titled: Presentation–Questions–Answers (PQA). The aim of the research is to determine whether the use of a collaborative learning methodology affects the motivation and learning of students studying theoretical content. An analytical experimental linear study was developed, whereby students were distributed across two groups, (i) a control group, which employed a lecture-based traditional approach, and (ii) an experimental group, which employed a collaborative methodology. Pre-and post-tests were carried out to assess the knowledge and motivation of students using the Situational Motivation Scale (validated scale) and a specific knowledge scale. Improvement was found in the effectiveness of the experimental group regarding the control group, with findings showing that the group utilizing the collaborative methodology acquired 64% more knowledge than the control group during the same period. However, no significant changes were found in either the intrinsic or the extrinsic motivation of the students in either group. The results prove that the use of collaborative learning maintains students' motivation and is more effective than lecture-based methods in learning theoretical content.

Keywords: collaborative learning; motivation; quality education; theoretical subjects; active learning

1. Introduction

One of the most common problems for teachers is how to teach theoretical content—in many cases far from practical reality—motivating students to learn at the same time and, subsequently, reducing the dropouts. The Sustainable Development Goals (SDGs) established by the United Nations (UN) take into account such a problem and, consequently, develop the challenge of the 2020–2030s for Quality Education, which is related to reducing the school dropouts. Although the problem is present at different levels of education, it is especially relevant in higher education [1] where, in many cases, the syllabi and curricula of degree programs are based on theoretical content, creating a gap between theory and practice. Theoretical content is usually presented through induction courses, where inexperienced freshmen do not know how to manage such content and consequently sense that

the subjects in question are hard to learn. This may result in poor results and a low success rate for the induction courses of many universities [2].

Theoretical content is often complex, not very interesting, and considered too abstract for students [3], in addition to not being very useful for professional practice. Focus on purely abstract theory, or the focus being confined to theory, is among the most common reasons for lack of motivation in students [4]. One main aspect of learning is that students should connect instructional requirements with their ultimate learning goal [5]. However, when students are demotivated, they cannot see the importance of theoretical content [4] or the relationship between theory and practice [6]. In this context, abstract theory arouses little interest and becomes difficult to understand in many cases. If students do not understand theoretical content, they may not ask questions because they are afraid of asking inappropriate ones [4]. Therefore, students disconnect from lectures: "Most students tend to fall asleep after 15 min of my lecture class if the topic that I had to cover that day is too complex and theoretical" ([7], p. 144). In summary, teaching and learning theoretical content may affect both motivation and learning results, making pedagogical methodology a crucial topic [8].

One of the major concerns in education is selecting the optimum teaching mode to motivate and encourage students. Lecture-based learning is the most widely used pedagogical methodology to teach theory. However, there are pedagogical approaches based on more active roles for teacher and students that can be useful, such as problem-based learning, project-oriented learning, or case-based learning, which can be combined with collaborative learning [9]. Currently, there is special interest among the scientific community to understand the relationship between the motivation of students and the effectiveness of collaborative learning [10–12]. However, in the context of higher education, the influence of collaborative learning methods on both motivation and effectiveness of learning is not clear. Whereas some papers suggest that collaborative learning can improve these aspects [3,13], other studies yield uncertainty. Baghcheghi, Koohestain, and Rezaei [14] compared different teaching methodologies and did not find improvement in students' soft skills through collaborative learning when comparing it to traditional learning methods in theoretical classes. Other studies addressed the issue using a more practical approach (i.e., technology-based cooperative learning to improve skills), and likewise, no significant statistical differences between collaborative learning and individual learning were found [15], although a trend of improvement when using collaborative learning has been recognized. These studies [4,15], therefore, highlight the need to obtain empirical results that connect motivation and effectiveness in the learning process and particularly in the study of abstract theory, which is precisely the focus of the current study.

In this work, the authors want to improve effectiveness of learning without losing motivation while students learn theoretical content. To this end, a new teaching–learning method based on collaborative learning called Presentation–Questions–Answers (PQA) is presented here, which is designed to solve the problems described above and to motivate students to learn theoretical content. Consequently, the aim of this study is to evaluate the validity of the collaborative learning methodology proposed for higher education in the teaching–learning process of theoretical subjects. The main research question addressed was whether the use of a collaborative methodology improves the learning effectiveness and the student motivation in learning purely theoretical content, stating the following hypotheses:

Hypothesis 1 (H1). *The use of a collaborative methodology improves the effectiveness of theoretical content learning.*

Hypothesis 2 (H2). *The use of a collaborative methodology improves the student's motivation in the learning of theoretical content.*

To answer these questions, a quantitative analysis of effectiveness and motivation was carried out using validated methods (Situational Motivation Scale, SIMS) [16], taking into account the differences found between a control group using the lecture-based traditional teaching method and an experimental group utilizing the PQA collaborative learning methodology.

Thus, taking into account the experience of the authors in the difficulty to motivate students to study the theoretical contents of the subject Nursing Models and Theories (NMT), this study is centered on students of a Nursing Degree. Despite this, the objective of this work is general and the results are useful for any teacher who is responsible for a subject that presents theoretical and complex content, since with the new teaching–learning method PQA they could create an educational environment more motivating than the typical traditional master class, which, depending on the type of subject, in many cases can be monotonous and boring (see Appendix B).

2. Theorical Concepts

Motivation is at the core of cognitive, biological, and social regulation processes. Therefore, it plays an important role in human behavior and is a central issue in the study of personal conduct. Motivation is highly valued because it helps to produce positive results [17] and favorable impacts. Motivation improves active learning [18] and is an important factor in the teaching–learning process because it concerns important aspects of activation and intention, such as energy, direction, and persistence. Studies show several approaches and models for studying motivation [19], the self-determination theory being among these, which supplies a theoretical framework that is very useful in understanding motivation in educational contexts [20]. The self-determination theory defines several dimensions of motivation depending on the level of self-determination:

(1) Intrinsic motivation refers to an individual doing something because it is interesting or enjoyable; it is a powerful resource for educators because it encourages students to learn and is a natural source of learning and achievement that instructors can use to direct students' efforts. Intrinsic motivation produces results in high-quality learning and creativity [17] and is an important component in active learning. This is the most self-determined dimension.

(2) Extrinsic motivation via identified regulation affects an individual who performs a task because he/she considers it important for his/her goals and values. The subject does not consider the task interesting or enjoyable, but he/she thinks it is relevant and thus regulates his/her behavior. Therefore, it implies an option as it occurs when the behavior is considered important for the subject's goals and values.

(3) Extrinsic motivation via external regulation affects an individual who does something exclusively because he/she obtains some outcome, e.g., getting a reward or avoiding a punishment. In this dimension of motivation, the student does something because it leads to the achievement of some goal. Extrinsic motivation via external regulation has less self-determination and more external regulation than motivation via identified regulation.

(4) Amotivation, the least self-determined dimension, occurs when the individual does not perceive or connect a behavior and its consequences. The individual's behavior is not affected by intrinsic or extrinsic motivators [21].

Self-determination theory postulates that social and environmental factors influence motivation and can facilitate or inhibit intrinsic motivation, thereby affecting its potential positive impact. As we know, these factors are present in the teaching–learning context, especially in collaborative and active learning where students have to collaborate to reach a common goal, generating social interaction, sharing spaces, and interpreting information and knowledge [22]. Thus, facilitating intrinsic motivation in students' learning is more important than focusing on the rewards for motivating students' learning [23]. Study results have shown that learning strategies and teaching methodologies are two of the most important aspects in educational settings to improve motivation [24]. Therefore, from the point of view of intrinsic motivation, researching educational methodologies and collaborative learning is of much interest to the scientific community [9].

Collaborative learning is an educational approach that refers to a situation where a group of people work together to learn something or develop skills or competencies. Dillenbourg [25] defines collaborative learning as a situation where some modes of interaction may occur that foster learning

procedures but with no guarantee that they will, in fact, occur. There are some particularly important factors in the collaborative learning method, such as the composition of a group and the functional roles played by its members [26], the regulation process of both the task and the team [27], and the consciousness, or feeling, of the group [28]. These factors influence motivation and collective efficacy and affect the outcomes of different tasks [29]. Research has found several advantages to collaborative learning, such as encouraging the use of high-level cognitive strategies, developing critical thinking, and promoting positive attitudes in learners toward learning and groupmates. Studies have found that collaborative learning provides open and flexible resources to learners to work collaboratively with their peers [26].

Moreover, several motivational factors in collaborative learning have been considered in previous research [10], such as intrinsic and extrinsic peer motivation [30], group composition and self-efficacy [26], and academic motivation [11]. One deduction from the results of the extant research is that it is necessary to know more about the motivation factors in collaborative learning, especially the effects of different teaching–learning methodologies and their implications for motivation [9].

3. Teaching-Learning Method PQA

The teaching–learning method proposed here for theoretical subjects seeks to boost students' ability to acquire skills through teamwork. This methodology, called Presentation–Questions–Answers (PQA), is structured in three consecutive phases: (i) Presentation (P); (ii) Questions (Q), and (iii) Answers (A). The organization of this teaching methodology works to structure the interaction of the entire group of students through smaller working groups of three or four students (small group). Figure 1 shows how collaborative learning is encouraged during all phases (Presentation, Questions, and Answers) at several levels: (i) between small groups and the teacher, where the teacher has an encouraging role in personalizing tutoring; (ii) among the members of each smaller working group, favoring equal learning among peers, and (iii) between the entire group and the teacher.
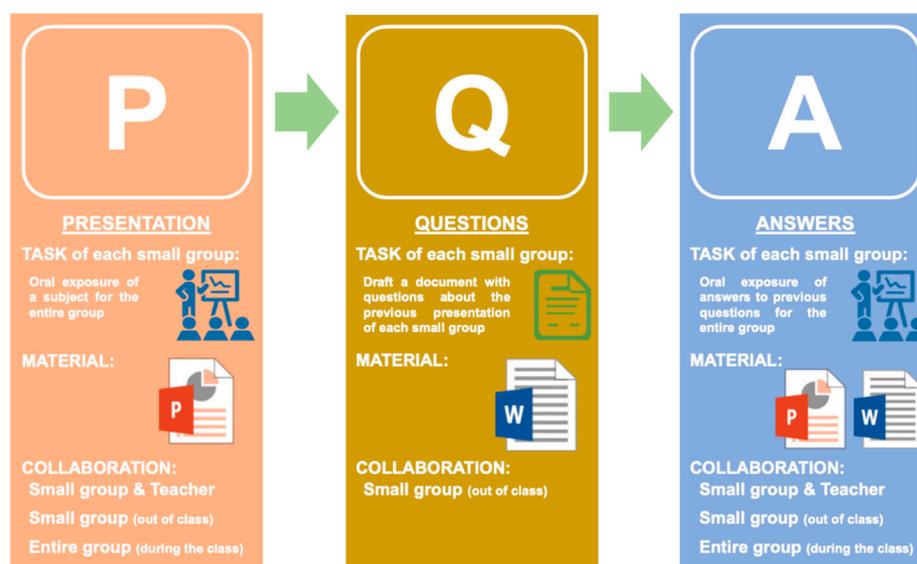

Figure 1. Scheme of each of the consecutive phases of the Presentation–Questions–Answers (PQA) methodology.

Although there are good teaching experiences in collaborative learning with large working groups, the PQA methodology is designed for smaller working groups (comprising three or four students per group). According to previous studies (Smith, 1996), small groups themselves can be more favorable for effective learning.

The PQA methodology begins with the Presentation phase (P phase, see Figure 1). The learning task for each small group is focused on orally explaining a topic assigned by the teacher orally, for which

each of the groups will produce a Power Point document that will be used during the oral exposition. There are three elements of the P phase (Figure 1): (i) first, the teacher assigns topics to each small working group; (ii) second, the students of each small working group work on the topic assigned (outside the classroom); (iii) finally, students of each small working group present their work orally in the classroom, where both classmates and instructor can witness expositions. During the first stage of the PQA methodology, the presentations made by each small working group help the whole student group to learn from both mistakes and successful choices made by the others. A short period of time should be dedicated to an open discussion of possible improvements after each oral presentation. This encourages collaborative learning, not only among the different working groups, but also between the students and the teacher, who acts as a mentor. Therefore, it is advisable for the teacher to contribute constructive and educational feedback after each oral presentation and to play the role of facilitator [31] so that all students can learn during the P phase. Therefore, on the basis of the teacher's behavior and recommendations, the students have a good example of the appropriate working behavior to employ in a group setting [32].

In the second phase, the Question phase (Q phase), the learning task for each small group consists of putting forth a series of written questions to each of the other groups regarding the work presented by their classmates in the P phase (Figure 1). Each small group may develop a document including the questions. Although the same type of interaction occurs in the Q phase as in the previous P phase, collaboration among the members of each small workgroup is the main interaction and focus of this phase. The number of questions is set by the teacher. The Q phase ensures that all students have observed and analyzed the oral presentation of their classmates in addition to providing the opportunity to consult an appropriate bibliography and actively study the different topics presented by the small groups in the previous P phase.

Finally, once all the students have given their questions to the teacher, these documents are distributed to each group, thus starting the third and last phase, the Answers phase (A phase, see Figure 1). Therefore, no group can see the questions developed by the other groups until they are handed out by the teacher. The learning task for each small group is then to write down the answers to all the questions put forth by their classmates as well as to orally explain four of them. This guarantees that all of the members in each small group are fluent in the topic they have worked on. Each small group must develop both a Microsoft Word document including all of their responses and a Power Point presentation explaining only the four responses selected for the oral presentation. The same three types of interaction mentioned in the P phase also arise in this last A phase (Figure 1).

It is advisable that in these two last phases (Questions and Answers), each small working group has the possibility to access the work developed by the other groups (the Power Point presentations of the oral presentation). Furthermore, through a discussion with the whole group, each student can learn how to improve their skills related to asking and answering questions and how to search for sources in a bibliography, among other tasks.

The purpose of the PQA methodology is focused at all times on encouraging members of small groups to collaborate with each other both to develop a greater sense of belonging to a well-structured group and to foster social responsibility to help the other members of the group with those aspects of the topic that they may not fully understand [33]. Resolving problems and doubts and generating feedback in small groups in a collaborative manner makes learning complex theoretical subjects easier [7]. Learning both aspects, active collaboration and the feeling of belonging to a group, is both important and useful for the students' future careers, regardless of the subject they are studying. With collaborative and active learning methodologies like PQA, students learn best because they take responsibility for their own education.

4. Material and Methods

An analytical experimental and linear (prospective) design based on a control group (CG) and an experimental group (EG) is presented in this research work. The students of the CG received educative

content in a traditional way, referred to here as a master class. In such a traditional way, the explanation of theoretical content was facilitated by the teacher, who had an active role in the teaching–learning process. On the other hand, the EG received the same theoretical content through the collaborative methodology described above (innovative PQA).

A nursing degree course formed the educational context for the study. The use of the collaborative learning method is increasing in health education. Indeed, this learning approach is among the ten most used practice education models in nursing education [34]. The participants of this study had to learn Nursing Models and Theories (NMT). NMT contains complex theoretical content necessary for the strengthening of the nursing discipline [35].

The study group consisted of 86 students of Basic Nursing Fundamentals, a subject taught in the first year of the Nursing Degree program at the Catholic University of Ávila in Spain, which includes NMT content. The study was carried out during the 2016–2017 academic year. All the students were Spanish, covering different regions of Spain. In addition, it should be noted that the sample is varied at the socioeconomic level, since there are students from upper-middle class families, as well as others who study on scholarship.

This study was authorized by the Dean of the Faculty of Health Science. All students in the nursing degree course were informed of the study and of the group (experimental or control) in which they would work. Those students who gave their informed consent took part in the final sample, whereas those who decided not to participate were not included in the study. The participants were randomly distributed in both the control and experimental groups, and then they were free to choose the small working group within each of these two groups (CG and EG). Besides, they were also informed of their right to leave the study at any given time without consequence.

The teaching methodologies employed (collaborative methodology vs. master class) were considered as independent variables, while both the learning effectiveness and students' motivation were considered as dependent variables. Thus, four variables were defined to analyze motivation across the following forms: IM (intrinsic motivation), EMIR (extrinsic motivation identified regulation), EMER (extrinsic motivation external regulation), and AM (amotivation). As previously noted, the collaborative methodology employed was PQA. The Spanish translation of the Situational Motivation Scale (SIMS) [16], Escala Motivacional Situada (EMSI) [36], was used to measure the motivation variable in the teaching–learning process (cf. Appendix A). The EMSI is a validated and consolidated scale in the educational context and has been used in other learning domains [37]. Such a scale is based on self-determination theory [21] and measures four dimensions of motivation: IM, EMIR, EMER, and AM. The EMSI measures these four dimensions through the formation of a question list consisting of 14 items that express evaluations and are rated on a Likert-like scale that ranges from 1 (does not correspond with what I think) to 7 (corresponds exactly with what I think) for each item. The nursing students had to evaluate each item according to the Likert scale in the methodology used (PQA or master class).

A knowledge test specifically designed for the study was used to measure learning efficacy of theoretical content (NMT). This test consists of 10 multiple-choice questions (four options) with one correct option among these. All surveys, accessible to students via the Internet, were developed using Google Forms.

In both groups, a pre-and a post-test were carried out to quantify the degree of students' motivation and effectiveness. Figure 2 reflects the design of the study, highlighting four notable phases: (1) the division of the students into two groups (EG and CG); (2) explanation of the research design to the students and the realization of the pre-tests (motivation and effectiveness); (3) the facilitation of the content through a master class in the CG and through the PQA collaborative methodology in the EG; and finally (4) the realization of the post-tests (motivation and effectiveness).
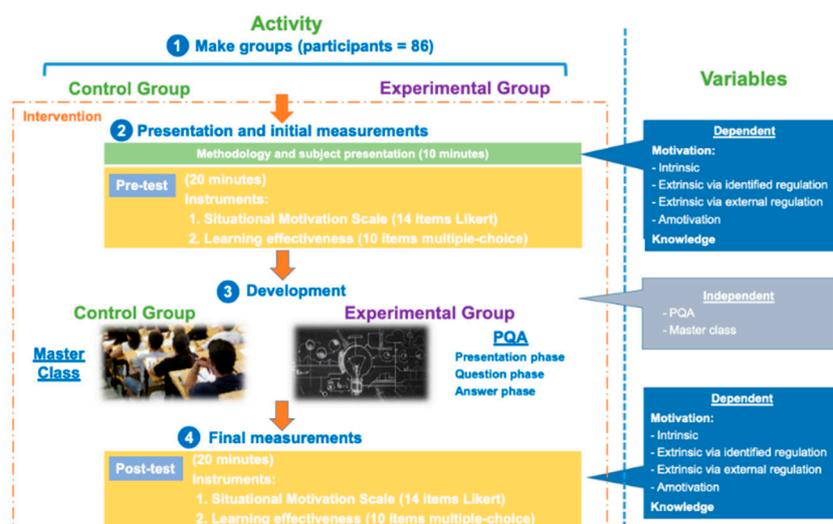
Figure 2. Outline of the research design for both the control group (CG) and the experimental group (EG).

5. Results

This section presents a statistical analysis of the results and describes the main findings relative to the hypotheses formulated in the Research Design section above. For the statistical analysis of data, the SPSS Statistics software (v. 24) was used.

Data collected is measured on two scales, one of which is a metric scale to measure learning effectiveness (interval scale) and the other is an ordinal nonmetric scale to measure student's motivation (see Table A1 in Appendix A). To analyze the results, the variable increase in learning is defined as the difference between pre-and post-test scoring. The descriptive statistics of this variable for each group are shown in Table 1. To validate hypothesis H_1, it is necessary to check that the increase in learning of both groups is different and that the difference is statistically significant. To achieve this, it is necessary to check that the samples follow a normal distribution population and, thus, determine the test of comparison of means to be used (parametric and no-parametric tests) [38].

Table 1. Descriptive statistics of the increase in learning.

| Group | N | Descriptive Statistic | | | |
		Minimum	Maximum	Mean	Std. Deviation
Experimental	33	−3	7	3.03	2.43
Control	27	−4	7	1.63	2.36

In order to contract the means of both groups we have checked whether distributions adjusted to the normal to perform the subsequently parametric or nonparametric analysis.

As the study deals with small sample sizes (shown in column N of Table 1), the Shapiro-Wilk test was employed, indicating that both groups (EG and CG) follow a normal distribution population ($p > 0.05$). As neither sample follows a normal distribution population, a parametric analysis of comparison of means was employed, focusing in particular on Student's t-test (Table 2) [38]. The results shown in Table 2 indicate that equal variances can be assumed to be confirmed by the Levene test (p-value = 0.807 > 0.05); therefore, the p-value marked in bold ($p = 0.028 < 0.05$) confirms that the mean increase in learning for the two groups is statistically different.

Table 2. Descriptive statistics of the increase in learning.

	Levene Test (Variances Equal)	***t*-Student (Mean Equal)**
Equal Variance	0.807	0.028
Different Variance		0.028

On the other hand, the means for the post-tests were compared to validate whether they were significantly different. The average scores of learning effectiveness for both groups are shown in Table 3, considering the results of the pre-and post-tests (Mpre-test and Mpost-test in Table 3). Additionally, an increase in learning regarding the score of the pre-test (ΔL) is expressed as follows (note that the variable is expressed as a percentage):

$$\Delta L\,(\%) = (\text{Scoring Posttest-Scoring Pretest})/(\text{Scoring Pretest}) \times 100 \qquad (1)$$

Although the variable (ΔL) confirms that progress in theoretical content learning exists in both groups (Table 3), the value is considerably higher in the experimental group.

Table 3. Pre-test and post-test average scores.

Variable	Experimental Group	Control Group
$M_{\text{pre-test}}$	2.48	2.74
$M_{\text{post-test}}$	5.52	4.37
$\Delta L\,(\%)$	123	59

In order to compare means that do not follow normal distribution, no-parametric test should be applied. Therefore, the means of the post-tests were compared using the Mann–Whitney test, as they were two independent samples that did not follow normal distribution. The values of the test, which are not presented here for clarity and space, indicated that the difference is statistically significant (p-value = 0.028 < 0.05). Additionally, the pre-tests were examined, and no difference was found between the means for the two groups. Therefore, both groups exhibited the same knowledge level before the study.

In summary, the mean score obtained by the students who learned theoretical content through the collaborative learning methodology measured through the specific knowledge scale (Mpost-test = 5.52) was greater than the mean score obtained by the students who worked with the traditional approach in the master class (Mpost-test = 4.37). Furthermore, the fact that students who used the collaborative methodology had a slightly lower level of knowledge before the study (Mpre-test = 2.48) than the students of the master class group (Mpre-test = 2.74) should be taken into account. Thus, the increase in learning was 64% higher when using the collaborative learning approach (ΔL = 123%) as compared to the traditional master class teaching method (ΔL = 59%).

Additionally, the increase in measured learning of the students who used the collaborative learning method (mean = 3.03) was almost twice that of the students who worked with the master class traditional teaching method (mean = 1.63), making this difference statistically significant at a 95% confidence level (p < 0.05). Therefore, the initial hypothesis H_1 can be confirmed: the use of a collaborative methodology improves the effectiveness of the theoretical content learning.

The results of the assessment of motivation are provided and organized according to the four dimensions of motivation of the self-regulation theory. As reflected in Table 4, intrinsic motivation (IM) and extrinsic motivation via identified regulation (EMIR) showed a tendency to decrease at the end of the study among students who worked with the collaborative learning methodology. However, extrinsic motivation via external regulation (EMER) and amotivation (AM) showed a tendency to increase. Similarly, this trend occurred among students who participated in the master classes (Table 5).

Table 4. Descriptive statistics of the Experimental Group.

| | Pre-Test (N = 32) | | | | Post-Test (N = 30) | | | |
	IM	EMIR	EMER	AM	IM	EMIR	EMER	AM
Minimum	1.50	2.33	2.00	1.00	1.75	1.67	2.00	1.00
Maximum	6.50	7.00	5.67	4.50	7.00	7.00	7.00	6.00
Mean	4.53	5.41	4.04	3.00	3.97	4.93	4.24	3.20
Std. deviation	1.05	0.97	1.01	1.09	1.32	1.24	1.16	1.09
Variance	1.11	0.94	1.02	1.18	1.73	1.54	1.35	1.18

Table 5. Descriptive statistics of the Control Group.

| | Pre-Test (N = 29) | | | | Post-Test (N = 27) | | | |
	IM	EMIR	EMER	AM	IM	EMIR	EMER	AM
Minimum	2.25	2.00	1.00	1.00	2.00	2.33	1.00	1.00
Maximum	7.00	7.00	6.67	7.00	7.00	7.00	7.00	6.75
Mean	4.36	5.17	4.21	3.15	4.29	4.94	4.26	3.22
Std. deviation	1.21	1.19	1.41	1.45	1.44	1.35	1.62	1.44
Variance	1.46	1.43	1.98	2.11	2.06	1.82	2.61	2.07

A statistical analysis similar to the one described above was applied to contrast the results of the motivation [39]. First, the distribution of samples was tested by applying Shapiro–Wilk. Second, Student's t-test was employed for normal samples. Finally, for samples without normal distribution no-parametric tests were applied, particularly Mann–Whitney and Wilcoxon tests [38]. Both normality and mean comparison tests were carried out with a 95% confidence level to verify whether these trends are statistically significant. To this end, the Shapiro–Wilk test was applied to ensure normal distribution in all samples, except for the AM sample of EG (values are not presented for clarity and space). Student's t-test was employed in normal samples to check whether there were statistically significant differences. For samples without a normal distribution population (AM), the Mann–Whitney and Wilcoxon tests were employed (independent sample and paired sample, respectively). Table 6 shows the results of these tests, which prove that there are no significant differences ($p < 0.05$).

Table 6. Mean contrast of motivation.

| | *t*-Student (*p*-Value) (Independent Sample) | | *t*-Student (*p*-Value) (Paired Sample) | |
	Mean Contrast Between Pre-Test of EG & CG	Mean Contrast Between Post-Test of EG & CG	Mean Contrast Between Pre-and Post-Test of EG	Mean Contrast Between Pre-and Post-Test of CG
IM	0.561	0.383	0.084	0.794
EMI	0.403	0.989	0.065	0.299
EME	0.597	0.968	0.401	0.906
AM	0.925 [a]	0.947	0.418 [b]	0.965

[a] Mann–Whitney test; [b] Wilcoxon test related sample.

Therefore, students did not experience significant changes in any of the four dimensions of motivation, either when learning through the collaborative methodology or with the master classes, confirming that there is no variation in the motivation of the students when studying theoretical content, regardless of the methodology used. Consequently, the second hypothesis, H_2, should be rejected since the results obtained indicate that the students' motivation does not change.

Correlations between learning effectiveness and motivation (IM, EMIR, EMER, and AM) were also studied. To this end, two tests were employed: the Pearson parametric test and the Spearman nonparametric test [40]. Results (the values of which are not shown for clarity and space) showed

no correlation between the effectiveness of learning and motivation in either the control group or the experimental group.

6. Discussion

The results of the study indicate that the students not only learn more, but also make more progress in theoretical content learning through a collaborative methodology (ΔL = 123%) than through the master class methodology (ΔL = 59%). We should remember that ΔL measures the deviation of the score obtained in the post-test regarding the pre-test for each student. Zhang and Cui [41] point out that collaborative learning positively contributes to students' learning, improving the performance of their skills and their knowledge. The results shown here also support the improvement in students' knowledge (stressing that PQA is a methodology based on collaborative learning). In the same way, Ruengtam [42] found an improvement in the student learning efficiency for theoretical subjects through the use of collaborative learning.

Nevertheless, the investigations of Lin [15] in the field of nursing education (the same education context as the present study) highlight that there is no statistically significant improvement in the effectiveness of learning when comparing collaborative learning with traditional methodology. To understand this divergence of our findings, it is important to consider two existing variables in Lin's study [15] that are absent in the study described in the current paper: (i) technological materials, as students used online platforms and multimedia material, and (ii) the fact that the type of practical knowledge students worked to acquire in Lin's study focused on developing the practical skill of catheterizing patients. As these variables have different cognitive burdens to those in the present study, where there is essentially no use of computers and no practical content conveyed, but rather, students focused on theoretical work. In the authors' opinion, cognitive burdens can affect the effectiveness of learning and may be a reason why the results of these experiences are different.

To the question of why the use of a collaborative learning methodology improves learning efficiency in terms of the master classes, the response is not only related to the type of content delivered but may also be related to the structure of the learning methodology. Thus, Yardimci et al. [43] point out that the organization of the collaborative learning process is an essential element in its efficacy. NMT (the subject of the study) features significant amounts of theoretical and descriptive content, which are experienced by the students as dull and monotonous. The students' active involvement in the PQA methodology, favored by establishing a well-defined and progressive learning process structure (Presentation, Questions, and Answers phases), counteracts the dullness and monotony that students can experience with the master class methodology, thereby resulting in a positive impact on students' learning progress. In addition, a positive correlation between collaboration and student's sense of community was stablished in previous articles [44], especially among graduate students. In summary, the result of the study presented here is consistent with previous studies that show that the employment of collaborative learning is useful in improving students' understanding of the theoretical aspects of subjects [45–47]. Therefore, in view of the previous studies, the position of the authors in favor of improving the student learning efficiency through the PQA methodology is based on: (i) the use of collaborative learning methodology [42]; (ii) the development of technological materials [15]; and (iii) the well-defined progressive learning process [43].

Regarding motivation, some of our findings are aligned with the results of other studies on nursing education. Kosgeroglu, Acat, Ayranci, Ozabaci, and Erkal [48] found non-meaningful variation in the motivation of different groups and courses of a nursing degree. In any case, the importance and influence of the motivational elements of learning is questionable since there are studies both in favor of [49] and against this [50]. Some studies have even highlighted the preference in online nursing students for learning methods based on videos and narrated Power Point presentations, and identify the collaborative methodologies as the least preferred for the students [51]. In contrast, other studies in the same field (online nursing students) state that collaborative learning in digital

learning environments enhances motivation for learning [52]. This way, the results of this paper raise a new contribution in this controversial discussion, which is evidenced in previous studies [53].

The fact that the PQA methodology and the master class methodology do not present different levels of motivation should not be interpreted negatively since there are at least two possible explanations to justify this. First, motivation is a complex psychological indicator that is generally not modified within short time frames. The study was carried out over two months, so the time elapsed was not sufficient for motivation to be significantly affected. Second, the PQA methodology assumes that the student actively works within the teaching–learning process since the method is designed for the student to sustain consistent study of the subject. This aspect of sustained effort could work to discourage students throughout the study period and decrease motivation. However, as students' motivation was not reduced, the fact that the degree of motivation did not vary from pre-test to post-test can be interpreted as a positive aspect of this methodology.

As future lines of research, it would be interesting to know what general recommendations, related to any society (culture, geography, linguistic group, educational system, etc.), can be established to use the teaching–learning method PQA.

7. Conclusions

Since there are no previous studies analyzing the effectiveness and motivation of collaborative learning using consolidated psychological scales, this study helps to validate the use of the collaborative method in teaching and learning theoretical and complex content. Thus, this study was designed to analyze variations in the motivation and knowledge of undergraduate students while they studied theoretical content through an innovative collaborative methodology (PQA) and through the master class methodology. The results of the study indicate that the measurable increase in learning is about twice that when using a collaborative learning methodology, than when participating in master classes. Additionally, having worked with the collaborative learning methodology, the students did not lose the motivation they initially showed. Thus, this study proves that methodologies based on collaborative learning can be used as an effective learning approach for theoretical content and can also preserve students' motivation. However, we cannot claim that the use of collaborative learning always has a positive impact on learning results. Thus, in summary, the results of this study reveal that active methodologies based on collaborative learning can be a good alternative to replace the traditional master class, when the contents of the subject are purely theoretical. Future research should shed light on the impact of collaborative methodologies on the study of theoretical subjects and students' motivation in different educational settings.

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Appendix A. The Situational Motivation Scale (SIMS)—(English translation of the Escala Motivacional Situada-EMSI-)

Directions: Read each item carefully. Using the scale below, please circle the number that best describes the reason why you are currently engaged in this activity.

Answer each item according to the following scale: 1: corresponds not all; 2: corresponds a very little; 3: corresponds a little; 4: corresponds moderately; 5: corresponds enough; 6: corresponds a lot; 7: corresponds exactly.

(1)   Why do you think the PQA method that you used in class should be used to learn Nursing Models and Theories?

(2) Why do you think the lecture-based method that you used in class should be used to learn Nursing Models and Theories?

Table A1. Situational Motivation Scale (SIMS).

1. Because I think that this activity is interesting	1 2 3 4 5 6 7
2. Because I am doing it for my own good	1 2 3 4 5 6 7
3. Because I am supposed to do it	1 2 3 4 5 6 7
4. There may be good reasons to do this activity, but personally I don't see any	1 2 3 4 5 6 7
5. Because I think that this activity is pleasant	1 2 3 4 5 6 7
6. Because I think that this activity is good for me	1 2 3 4 5 6 7
7. Because it is something that I have to do	1 2 3 4 5 6 7
8. I do this activity but I am not sure if it is worth it	1 2 3 4 5 6 7
9. Because this activity is fun	1 2 3 4 5 6 7
10. I don't know; I don't see what this activity brings me	1 2 3 4 5 6 7
11. Because I feel good when doing this activity	1 2 3 4 5 6 7
12. Because I believe that this activity is important for me	1 2 3 4 5 6 7
13. Because I feel that I have to do it	1 2 3 4 5 6 7
14. I do this activity, but I am not sure it is a good thing to pursue it	1 2 3 4 5 6 7

(1) Question for the experimental group's students who learnt with PQA method.
(2) Question for the control group' students who learnt with lecture-based method.

Appendix B. Assessment of Student Knowledge about Nursing Models

Thank you for participating in this experience, which seeks to comprehend your knowledge of nursing models.
Remember that we are not evaluating you for the course grade, and that the information collected in this test will be treated confidentially and used exclusively for this study.
Questions:

1. Which care model does Virginia Henderson propose?

    (a) Consideration of the person-care under the category of 11 Functional Health Patterns.
    (b) Consideration of the person-care under the category of 13 Health Domains.
    (c) Consideration of the person-care under the category of 14 Basic Needs.
    (d) Consideration of the person-care under the category of 3 dimensions of self-care.

2. Florence Nightingale's nursing philosophical approach focuses on:

    (a) The relationship between the patient and his environment.
    (b) The relationship between the patient and the nurse.
    (c) Patient relationship and holistic care.
    (d) The relationship between the patient and their health status.

3. According to Virginia Henderson's care model, we reach the goal when:

    (a) The person reaches his/her highest level of accommodation.
    (b) The person reaches the highest level of self-care.
    (c) The person reaches the highest level of his/her health status.
    (d) The person achieves the maximum possible independence.

4. Which authors proposed Self-Care Theory and Self-Care Deficit?

    (a) Hildegard Peplau.
    (b) Martha Rogers.

(c)　　Dorothea Orem.

(d)　　Mr. Callista Roy.

5.　Orientation, identification, exploitation, and resolution phases belong to the theory of:

(a)　　Hildegard Peplau.

(b)　　Madeleine Leininger.

(c)　　Jean Watson.

(d)　　Lydia E. Hall.

6.　Which author proposed a nursing model in which the nurse's role is to "promote patient's adaptative behaviors by handing focal, contextual, and residual encouragement"?

(a)　　Jean Watson.

(b)　　Sister Callista Roy.

(c)　　Dorothea Orem.

(d)　　F.G. Abdellah.

7.　Which of the following authors formulates 21 nursing problems divided into three areas, which are called physical, sociological, and emotional area?

(a)　　Lydia E. Hall.

(b)　　Martha Rogers.

(c)　　F.G. Abdellah.

(d)　　Virginia Henderson.

8.　The theory where humans are fields of energy which are integrated into the fields of their environment forming a universe of open systems, was proposed by:

(a)　　Madeleine Leininger.

(b)　　Martha Rogers.

(c)　　Imogene King.

(d)　　Jean Watson.

9.　According to the different classifications of nurse care models, it could be stated that:

(a)　　Dorothea Orem's model has an existentialist and energy field trend.

(b)　　Virginia Henderson's model belongs to the sociological and interpersonal relationship trend.

(c)　　The model of Sr Callista Roy belongs to the trend of interpersonal relationships and to the school of desirable effects.

(d)　　Hildegard Peplau's model is included in *the humanist* trend and the *Caring school.*

10.　Underline the false sentence about different models of nursing:

(a)　　Florence Nightingale (1820–1910) defined *nurse care* as "a service to humanity that the nurse assumes and carries out by putting the patient in the best possible conditions for nature to act upon him."

(b)　　Virginia Henderson stated that "The unique function of the nurse is to help the individual, healthy or sick, to carry out those activities that contribute to health or their recovery (or to a peaceful death) that she could perform without help if she had the necessary strength or knowledge, and to do so in such a way as to help her achieve independence as quickly as possible."

    (c)   Dorothea Orem will define a nursing model based on the *person's* adaptation to their environment. Shi distinguishes *four adaptive modes:* physiological mode, self-esteem mode, role function mode, and interdependence mode.

    (d)   Models by Martha E. Rogers, Callista Roy, M. Leininger, and J. Watson (among others) are later than the second half of the 20th century.

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