

Article

Cooperative Approaches and Academic Motivation towards Enhancing Pre-Service Teachers' Achievement

Dolors Cañabate ¹, Maria Eugènia Gras ², Teresa Serra ³ and Jordi Colomer ^{4,*}¹ Department of Specific Didactics, University of Girona, 17004 Girona, Spain; dolors.canyabate@udg.edu² Department of Psychology and Quality of Life Research Institute, University of Girona, 17004 Girona, Spain; eugenia.gras@udg.edu³ Department of Physics, University of Girona, 17003 Girona, Spain; teresa.serra@udg.edu⁴ Teaching Innovation Networks on Reflective and Cooperative Learning, Institute of Sciences Education, University of Girona, 17003 Girona, Spain

* Correspondence: jordi.colomer@udg.edu

Abstract: This paper describes a quantitative study that explores both the degree of preservice teachers' (PSTs) motivation and achievement, and the dimensions of need-supportive teaching, when PSTs were involved in designing and implementing contextualized physical cooperative challenges (CPCCs) in primary schools. The analysis was based on the PSTs' perceptions of the dimensions of need-supportive teaching (namely autonomy support, structure, and involvement), and the dimensions of motivation. Need-supportive teaching was evaluated through a version of the Teacher as a Social Context Questionnaire (TASC-Q), and motivation through a SMOTIV motivation questionnaire. Results showed that the dimensions of the teaching process were all positively correlated, thus, implying the importance of a teacher's role in supporting autonomy, providing structure, and being involved. While motivation during the in-class definition of the CPCCs was correlated with the teachers' involvement, the out-of-class implementation of the CPCCs was found to correlate with the three dimensions of teaching, thus, implying that the PST students' perceptions of developing instructional approaches in schools is mediated by the role their university teachers play in defining and structuring all aspects of the teaching process. Students' achievement, on the other hand, was a process that relied on the synergies between the teachers' involvement and the PST student motivation during the stage when the CPCCs in the classroom environment were defined. This interlink responds to the constructivist position adopted to implement a cooperative approach in the university that, in turn, responds to assessing a student-centered cooperative-based learning approach.

Keywords: need-supportive teaching; motivation; autonomy support; structure; involvement

Citation: Cañabate, D.; Gras, M.E.; Serra, T.; Colomer, J. Cooperative Approaches and Academic Motivation towards Enhancing Pre-Service Teachers' Achievement. *Educ. Sci.* **2021**, *11*, 705. <https://doi.org/10.3390/educsci11110705>

Academic Editor: James Albright

Received: 27 September 2021

Accepted: 1 November 2021

Published: 3 November 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

In recent decades, empirical interest in psychoeducational constructs and models, which are considered fundamental to understanding the development of educational functional outcomes (ability, beliefs, motivation), has grown [1]. One of the determining aspects that drives university students to academic success is motivation [2–5]. Motivation is a complex and multidimensional element that is the basis for students' learning and development. Thus, in the field of educational psychology, there are diverse and active open questions, one of which is "What is the role of academic motivation in pursuing students' outcomes?".

According to Woolfolk [6], motivation is an internal state that activates, directs, and maintains behaviour. According to Brophy [7], motivation is a theoretical construct that is used to explain the initiation, direction, intensity, and persistence of behaviour, especially when it is oriented towards fostering students' specific goals. Motivation is comprised of all the factors capable of provoking, maintaining, and directing behaviour

towards a goal. Motivation is also considered as the impulse that leads a student to choose and carry out an action among those alternatives that are presented in a certain situation. Motivation is both an objective and an action. Feeling motivated implies that students identify themselves with the learning purpose.

McClelland [8] defends that motivation is the psychological process that pushes a person to make a certain decision, to act accordingly and to repeat the action (tasks) depending on the process and the result. Motivation is what induces a person to take some action. In education, motivation refers to the stimulation of the will to learn. Motivation should not be understood as a technique or a teaching method but as a factor that is always present in all learning [9]. Numerous investigations have demonstrated the importance of motivation in learning, since without motivation there is no learning [4,5,10,11]. Motivation is a complex and multidimensional element that is at the base of students' learning and is the key element that drives a student to take an action in order to address or assume a position with respect to a new situation [9].

In recent years, various investigations have been carried out on the motivation of students in the educational domain of physical education [12,13] and particularly in primary education institutions [14,15]. Many of these authors define motivation as a fundamental variable for the success and academic performance of tertiary students and primary school students. Motivation depends on the level of students' self-concept, self-esteem, self-efficacy, and self-regulation [11,16]. The level of motivation is closely related to the social image that the student projects, as well as the perception of oneself, which is also regulated by students' personal, educational, academic and professional environment.

The two motivational theories most used in recent decades to explain student academic success are the achievement goal theory [17,18] and the self-determination theory [19–21]. These theories are not opposed or disjunctive, and the theoretical contributions of each of them complement those of the other. The first theory [17,18] exposes that it is necessary to highlight the personal perspective and the contextual perspective, or motivational climates. It focuses on how individuals may adopt different types of personal goals, either mastery or performance. The mastery orientation aims to increase the personal competence towards the idea of increased learning, while the performance orientation focuses on proving the acquisition of a competence in relation to the competence of others. The second perspective focuses on the social-contextual conditions that facilitate self-motivation and healthy psychological development. One of the factors that may enhance motivation, self-regulation, and well-being is the creation of motivational climates that refer to how the different goal structures of the context influence achievement in educational settings. That is, students are more likely to be perceived as competent, and display positive attitudes toward school-work by adopting mastery goals, selecting challenging assignments, and making effort-based attributions of success [19–21]. As pointed out by Ayllón et al. [22], the two keys to students' performance are both the teachers' involvement towards defining influential and motivational climates and the students' self-efficacy towards students' confidence in their ability to succeed in academic tasks.

The importance of motivational classrooms in the promotion of self-efficacy patterns has been reported widely [2,17,23,24]. For example, elementary and secondary students show the most positive motivation and learning patterns when their school settings emphasize mastery, understanding, and improving skills and knowledge, while students may show diminishing motivation in school environments promoting competition for grades [25]. Motivational classrooms are generally considered precursors to personal performance goals and achievement [26], and their assessment of situation-schemas, self-schemas, self-prime, needs, values, and situated meaning-making processes can predict both directly and mediated personal goal orientations [3,27].

Although the classroom goal conditions (mastery, performance-approach, and combined mastery/performance-approach) and the entering personal goal orientations are complementary and mutually informative, the research that integrates the two to study motivation in students' learning outcomes is still under debate [28]. The theory of self-

determination [19,20,29] postulates that, in the interaction with the environment, people regulate their behaviours voluntarily, but if the environment acts in a controlling way, the innate psychological needs (competence, autonomy, and relatedness) may be compromised [19,20]. Therefore, it is important that the performance of academic tasks satisfies the basic psychological needs through the promotion of the two distinct motivational sources, i.e., academic self-efficacy and individual interest [20,22,30]. The degree to which teachers avoid controlled study and promote the students' need for autonomy has an important effect on the motivation of the students, with them increasing performance and enjoying greater well-being [31].

Ryan and Deci [32] explain that there are two processes, one mediated by extrinsic motivation, where the motivational activator is external, and in which students do not feel motivated by the nature of the task, but rather conceive it as a means to other ends. The extrinsic motivation depends on what others say or do about student performance, or on whether the students themselves tangibly gain from their learning. However, in contrast, the intrinsic motivation is associated with internal factors that the individuals experience while doing tasks. The task awakens interest in the students and then motivation is reinforced, specifically when the students begin to master the purpose of the task. That is, it refers to the personal satisfaction that is experienced when successfully facing the task itself. It is worth mentioning that both motivations (intrinsic and extrinsic) are continually mixed and sometimes it is impossible to separate them.

Therefore, motivation is defined as a psychosocial parameter that largely explains students' academic achievement and students' commitment to their own training [22]. For some authors [20,29,33,34], intrinsic motivation is the true motivation, and every teacher should awaken/encourage students to achieve change or progress behaviour [35,36]. To be intrinsically motivated implies assuming a problem as a personal challenge, without the influence of having an external reward for doing it [37]. However, it is rather influenced from the incentives that arise from the task itself, in its difficulty, in the challenge and/or stimulus that it represents for the students to undertake the action, and the research and satisfactory conclusion of the task [38]. Intrinsically motivated students present an autonomous orientation, interpret the information to make choices, and self-regulate learning towards chosen goals. Self-determination, thus, implies the need to choose how to initiate and regulate one's own behaviour.

Students who act with self-determination are more committed to their tasks. Self-determination is favoured or limited by environments, relationships, and social contexts [19–21,33,34]. Strengthening intrinsic motivation in others implies, from the outset, a real and deep commitment of teachers to their students, their way of transmitting learning outcomes and their way of relating to students. It is important that the students perceive the teacher's motivation. This may be through the teacher's confidence and empathy, or the teacher's training to carry out the classes, show interest in the students, with the teacher valuing their work, allowing them to speak and express themselves, inducing the student to use other capacities in addition to intellectual ones, promoting personal and professional experiences, and ensuring that they establish constructive, and not merely informative, communication with their peers [35]. The teacher must start by fostering the student's abilities, creating a class climate where each student feels valued and which provides the deployment of capacities so that the students learn to motivate themselves, promoting the growth of the professional identity and the satisfaction towards basic needs for autonomy, competence, and relatedness. For all this, the role of the teacher is irreplaceable; the student without the teacher's accompaniment could hardly achieve the same ends [39].

Of special interest is how the promotion of a specific pedagogical instruction is linked to the promotion of motivation. In educational settings, the development of motivation by students may be also time dependent. Instruction and experimentation for PSTs occurs at different time stages, for example. Therefore, this study is to determine how contextualized physical cooperative challenges (CPCCs) [40] developed by PSTs, first in the university

classrooms and then in the primary school classrooms, may be linked to motivation developed at three stages: students' motivation during preparation, prior to the implementation of the CPCC, the students' motivation during the practical sessions in the schools, and the students' motivation during the final stage, where students reflect on the pedagogical instruction. Furthermore, this study also analyses teachers' actions when providing students with the basic needs of autonomy support, structure, and involvement, which may also be time dependent. Therefore, in view of all these processes, this study aims to answer three main questions:

Question 1 (Q1): *How the fostering of motivation is related to the teaching process of providing basic psychological needs.*

Question 2 (Q2): *How students' achievement is related to the teaching process of providing basic psychological needs.*

Question 3 (Q3): *How students' achievement is related to the time development of motivation.*

2. Materials and Methods

2.1. Participants

The experiment was carried out with a group of 101 PSTs who were taking the four-year bachelor's degree in Primary School Teacher Education (52.5%), the degree in Pre-School Teacher Education (12.9%), or the double degree in Primary and Pre-School Teacher Education (34.7%) at the University of Girona in Spain. Seventy-three percent of them were women and 27% men. This experimental study was carried out during a 75-h course in the Department of Specific Didactics at the University of Girona, Spain.

During the practical classes, held in three primary schools in the area of the University of Girona, the PSTs were divided into thirty-five groups. The PSTs were randomly assigned to each primary-school group, and performed the CPCCs over three days, in consecutive weeks. The CPCCs were carried out by 128 primary school children (aged 11 and 12), with around four students carrying out a CPCC in a cooperative oriented framework.

A written request was made to the primary-school children's families asking for permission to allow their children to participate in the study. The text was provided in both Catalan and Spanish. The request complied with the principles of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of children with regard to the processing of personal data and on the free movement of such data. The study research also followed appropriate country-specific ethical guidelines and regulations regarding research with minors, including eliciting assent from minors, informed consent from their parents or legal guardians, and storage of protected primary data.

2.2. Context

The CPCCs are a structured technique used in physical education that relies on cooperative learning fundamentals [9,10]. They are carried out in small groups that demand the participation of all the team members—a fundamental characteristic of cooperative learning, in which peers are encouraged to develop positive interdependence, individual accountability, promotive interaction, while promoting the acquisition of social skills as well.

In a first stage, the PSTs came up with a cooperative activity to be implemented in the school, with sixteen CPCCs proposed during the instruction in the classes. The number of CPCCs were reduced to ten once the class had evaluated the challenges as a group. In a second stage, the CPCCs were presented by the PSTs to the primary-school children in a structured manner where the material required to carry out the challenge had already been arranged by the PSTs in the space where the challenge was about to be developed. All the primary-school groups were asked to complete the same challenge at the same time, and the PSTs set the time limitations, the space used, and the proposed material to be used. Each group of primary-school children, composed of two to three children, carried out ten contextualized psychomotor cooperative challenges (CPCCs) in the schools, each lasting

20 minutes. The primary-school children, in a consensual way, had to coordinate themselves to complete each challenge. The students structured the CPCCs and produced a strategy to establish co-responsibility dynamics in the learning of group members in order to achieve a common goal [9,10]. The principles of dialogue, respect, help, cooperation, thinking in terms of action, learning to reflect or share among the members of a group were promoted by the PSTs. Likewise, these principles are at the core of CPCCs [9,10].

2.3. Measures

2.3.1. Need Supportive Teaching

The PSTs perception of need-supportive teaching was obtained from a version of the Teacher as a Social Context questionnaire TASC-Q [41–43]. In our study, a version of TASC-Q was used and consisted of 24 items on a five-point Likert scale from 1 (completely disagree) to 5 (completely agree). TASC-Q is divided into three categories: autonomy support, structure, and involvement. Table A1 shows the full list of these items and the order in which they appeared in the questionnaire. As the original version of the TASC-Q was in English, the questionnaire had to be translated into Catalan (in Appendix A). Two native Catalan speakers carried out translation of the items and a native English speaker then translated them back into English. No major issues were identified during the translation process.

Table 1. TASC-Q items, descriptive statistics (M for mean and SD for Standard Deviation) and results of PCA (Factor Loading). In bold, the items that present significant factor loading.

Item	M	SD	Skewness	Kurtosis	Factor Loading
<i>Factor Autonomy support. 7 items. Cronbach Alpha = 0.72</i>					
1. My teachers give me a lot of freedom in how I organize the activities	4.25	0.62	−0.48	0.69	0.60
2. My teachers listen to my ideas	4.27	0.66	−0.35	−0.74	0.77
3. It seems like my teachers are always telling me what activities to do	3.06	0.94	−0.19	−0.36	–
4. My teachers don't give me much choice in how I organize the activities	4.31	0.63	−0.34	−0.64	0.46
5. My teachers listen to my opinion	4.30	0.64	−0.36	−0.67	0.66
6. My teachers don't explain how I can use things we learn in the classes	4.13	0.83	−0.99	1.35	0.48
7. My teachers are always criticising how I organize the activities	4.09	0.76	−0.43	−0.37	0.54
8. My teachers explain why what I do in classes is important to me	4.42	0.70	−0.78	−0.59	0.32
<i>Factor: Structure. Cronbach. 4 items. Alpha = 0.62</i>					
9. My teachers make clear what they expect of me in class	4.00	0.81	−0.34	−0.61	0.66
10. If I can't solve a problem, my teachers show me the different strategies to try	3.83	0.78	−0.35	−0.10	0.37
11. Every time I do something wrong, my teachers respond differently	3.09	0.78	0.11	−0.03	–
12. My teachers don't tell me what they expect of me	4.03	0.71	−0.55	0.56	0.72
13. My teachers check whether I'm ready before they start a new topic	3.92	0.64	0.07	−0.55	–
14. My teachers show me how to solve a problem	4.08	0.73	−0.75	1.87	–

Table 1. Cont.

Item	M	SD	Skewness	Kurtosis	Factor Loading
15. My teachers keep changing how they respond towards me	3.81	0.72	−0.20	−0.10	0.44
16. My teachers make sure I understand before they move on	3.82	0.78	−0.71	1.18	–
<i>Factor Involvement. 8 items. Cronbach Alpha = 0.80</i>					
17. My teachers know me well	3.10	0.90	−0.28	0.42	0.66
18. My teachers just don't understand me	4.05	0.68	−0.25	−0.18	0.46
19. My teachers talk to me	4.01	0.82	−0.35	−0.64	0.49
20. I can't count on my teachers when I need them	4.43	0.61	−0.81	1.16	0.58
21. My teachers like me	3.85	0.68	−0.57	1.96	0.71
22. My teachers dedicate time to me	3.85	0.70	0.21	−0.92	0.73
23. My teachers really care about me	3.68	0.76	0.05	−0.46	0.83
24. I can't depend on my teachers for important things	3.83	0.94	−0.91	1.04	0.32

2.3.2. Motivation

Motivation during the execution of the CPCCs was also considered. A questionnaire was created to measure the motivation during the phases of implementation of the CPCCs by the PSTs in the school. Likewise, the questionnaire measures PSTs' general motivation during the preparatory phase (SMOTIV-in class) of the CPCCs, the execution phase (SMOTIV-out class) of the CPCCs in the schools and the reflective phase (SMOTIV-reflective) after implementing the instructional method. It is based on a Likert scale from 1 (completely unmotivated) to 5 (completely motivated). The SMOTIV questionnaire is composed of 15 items. Table 2 shows the list of the items. As for the TASC-Q, the questions were written in Catalan (in Appendix A) and then translated into English by a native English speaker. Again, no major issues were identified during the translation process.

Table 2. SMOTIV items, descriptive statistics (M for mean and SD for Standard Deviation) and results of PCA (Factor Loading). In bold, the items that present significant factor loading.

Item	M	SD	Skewness	Kurtosis	Factor Loading
<i>Factor SMOTIV-in class. 6 items. Cronbach Alpha = 0.92</i>					
1. I'm motivated to know my capacities	3.84	1.13	−0.83	−0.11	0.79
2. I'm motivated to learn new learning methodologies	3.50	1.49	−0.47	−1.29	0.91
3. I'm motivated to know girls' and boys' reactions	3.51	1.41	−0.50	−1.09	0.82
4. I'm motivated to know how to value my practice	3.84	0.99	−0.79	0.41	0.74
5. I'm motivated to value my learning process	3.50	1.32	−0.40	−1.12	0.83
6. I'm motivated to continue training as a future teacher	3.84	1.33	−0.69	−0.97	0.91
<i>Factor SMOTIV-out class. 7 items Cronbach Alpha = 0.84</i>					
7. I'm motivated to know if I can overcome the challenge	4.35	0.74	−0.81	−0.18	0.74
8. I'm motivated to know my limits	4.22	0.76	−0.53	−0.59	0.78

Table 2. Cont.

Item	M	SD	Skewness	Kurtosis	Factor Loading
9. I'm motivated to know how to treat girls and boys appropriately	4.42	0.71	−0.80	−0.61	0.80
10. I'm motivated to know if I will be able to solve challenges	4.27	0.87	−0.92	−0.10	0.66
11. I'm motivated to know if I can overcome the challenge	4.27	0.76	−0.63	−0.52	0.55
12. I'm motivated to carry out good teaching practice	4.36	0.69	−0.60	−0.73	0.52
13. I'm motivated to reformulate the action taken at the school	4.30	0.74	−1.29	3.19	0.54

2.3.3. Achievement

The student achievement was the average of grades over three stages. The first stage was done by the school-teachers based on a cooperative learning questionnaire to evaluate the individual performance of each student in the schools during the implementation of the CPCCs; it accounted for 30% of the total. The second one was performed by the teachers in the university and was based on the evaluation of a reflective diary students presented at the end of the CPCC sessions that encompassed the level of reflection; this accounted for 55% of the total. The reflective diaries were evaluated for each student using the validated NARRA rubric [44]. This rubric has been found optimal for evaluating reflective diaries on four levels of analysis: description, argumentation, reflection, and critical reflection.

Finally, the third stage, which accounted for 15% of the total, was performed by the students themselves in a process of co-assessment between those students that participated in the same group during the implementation of the CPCC activities in the school. The co-assessment was carried out based on a questionnaire that was constructed by students and teachers in the university.

2.4. Analysis

Descriptive statistics (mean, standard deviation, kurtosis, and skewness indexes) were used to describe the data. The Kaiser–Meyer–Olkin index (KMO) was used as a measure of sample adequacy and Bartlett's Test of Sphericity to test if variables are suitable for factor analysis. Principle Component Analysis (PCA) was used to know the factorial structure of Teacher as a Social Context questionnaire (TASC-Q) and Motivation questionnaire (SMOTIV). Pearson's correlation was used to study the relationship between the TASC-Q and SMOTIV factors. Finally, within subjects ANOVA was used to compare the means of the three TASC-Q factors and the three motivation factors. All analyses were performed using the SPSS version 27.0 statistical package.

3. Results

3.1. Teacher as a Social Context Questionnaire (TASC-Q) and Student Motivation Questionnaire (SMOTIV)

Table A1 shows descriptives and results of Principle Component Analysis (PCA) for the adaptation of the TASC-Q questionnaire, with the table presenting the descriptive statistics: mean, standard deviation, skewness, and kurtosis. The Kaiser–Meyer–Olkin analysis (KMO = 0.74) shows that the sample size is adequate while the results of the Bartlett Test of Sphericity ($X^2 = 808.98$; $p < 0.001$) shows that it is adequate to apply the PCA to the set of data.

Following Leenknecht et al. [43], the 24 items from the TASC-Q questionnaire were then subjected to three factor PCA with varimax rotation. Only 19 items were found to load over 0.30 (Table A1) with seven items for the autonomy support factor, four items for the structure factor, and eight items for the involvement factor. This solution explained 40.95%

of the variance. The autonomy support factor explained 14.12% of the variance and had an acceptable internal consistency, with a Cronbach Alpha of 0.72. Only four items load over 0.30 in Structure factor with a Cronbach Alpha of 0.62. This factor explained 10.02% of variance. All eight items loaded over 0.30 in the Involvement factor. This factor explained 16.28% of variance and had a good internal consistency. The Cronbach Alphas for each category were sufficient for the autonomy support (0.72) and structure (0.62) factors and good for the involvement (0.80) factor.

In relation to the autonomy support, negative skewness values indicate that PSTs think that their teachers listen to them and that they follow-up all the work being carried out. In addition, negative skewness of question 1 indicates that they feel free enough to organize the activities themselves, although they then think that they do not have much choice in how they organize the activities (with a negative skewness in question 4). Regarding the structure, negative skewness values indicate that teachers clearly explain what it is expected from the students. Moreover, negative skewness in question 14 indicates that in general, there is a lack of indications of how to solve a problem. In addition, the negative skewness value of question 16 indicates that students feel that teachers check whether they have understood or not to move forward. In relation to involvement, negative skewness values in questions 17–21 indicate that they feel that teachers know them well and can count on them. However, there is a low positive value of skewness in question 22 where students think that teachers do not care much about them.

Table 2 shows the descriptives and results of PCA of the SMOTIV questionnaire. The Kaiser–Meyer–Olkin analysis ($KMO = 0.86$) shows that the size sample is also adequate and the results of Bartlett test of Sphericity ($X^2 = 838.4; p < 0.001$) that it is adequate to use the PCA. The 15 items composing the SMOTIV questionnaire were then subjected to three factors PCA with varimax rotation. Three factors had eigenvalues larger than one. These factors explained 64.04% of variance. Factor 1, the SMOTIV-in class included six items, and explained 32.97% of the variance and had an excellent internal consistency with a Cronbach Alpha of 0.92 (Table 2). The factor 2, the SMOTIV-out class included seven items, and they explained a 21.71% of variance and had a good internal consistency too, with a Cronbach Alpha of 0.84 (Table 2). The third factor 3, the SMOTIV-reflective included only two items, and explained a 10.37% of variance but had a poor internal consistency, with a Cronbach Alpha of 0.56 (Table 2); therefore, this factor was discarded for the analysis of students' motivation.

All the questions related to motivation in Table 2 present negative skewness values, indicating that in general students feel motivated to perform the activity in and out of class. They also feel motivated to carry out professional practice and to work with classmates.

3.2. Associations between Need-Supportive Teaching Categories, Motivation Categories and Achievement

Correlations between the three dimensions of TASC-Q are positive and significant (Table 3). Results of within subjects ANOVA show that there are also significant differences between them ($F = 36.83; p < 0.001, \eta^2 = 0.27$). Contrasts showed differences between the Autonomy support and Structure factors ($F = 41.30; p < 0.001$) and between Autonomy support and Involvement factors ($F = 75.99; p < 0.001$) but not between the Structure and Involvement factors ($F = 1.72; p = 0.19$). The TASC-Q factors significantly correlated with SMOTIV-out class but only the Involvement factor was found to correlate with the first factor of the Motivation questionnaire, the SMOTIV-in class (Table 3).

The within subjects ANOVA analysis shows that there were significant differences between the two motivational factors ($F = 34.64; p < 0.0001; \eta^2 = 0.26$). Mean score in SMOTIV-in class was significantly lower than in SMOTIV-out class ($F = 42.35; p < 0.001$). The Achievement factor only correlated with the TASC-Q' Involvement factor and with the SMOTIV-in class factor (Table 3).

Table 3. Descriptive statistics of TASC-Q, SMOTIV factors and achievement, and Pearson correlation between the factors under study. In bold, the correlation that are significant.

Factor	Possible Range	Mean	SD	1	2	3	4	5
1. Autonomy support	1–5	4.25	0.43	–				
2. Structure	1–5	3.92	0.52	0.41 **	–			
3. Involvement	1–5	3.85	0.49	0.50 **	0.47 **	–		
4. SMOTIV-in class	1–5	3.67	1.10	0.004	0.09	0.23 *	–	
5. SMOTIV-out class	1–5	4.31	0.54	0.33 **	0.30 **	0.44 **	0.44 **	–
6. Achievement	0–10	7.51	0.95	0.12	0.14	0.30**	0.31 **	0.12

* $p < 0.05$, ** $p < 0.01$.

4. Discussion

4.1. Synergistic Interplay between Motivation and Need-Supportive Teaching Dimensions

The results of this study prove that there is a significant correlation with the three dimensions of need-supportive teaching: autonomy support, structure, and involvement. Therefore, we have proved that there is an interdependence between the three dimensions of need-supportive teaching while PSTs implemented, developed, and reflected on the instructional approach. In our study, the correlations were between $r = 0.41$ and 0.50 , which are somewhat lower than those obtained by Leenknecht et al. [43], with our study focusing on a very specific pedagogical instruction, i.e., the CPCCs, compared to the generalist study on 24 different bachelor's degree programs by Leenknecht et al. [43].

The synergistic relationship of autonomy support and structure has also been reported by Sierens et al. [45], with a correlation of 0.67 between the perceived teacher autonomy support and the perceived teacher structure. In our study, and considering the factor loadings for each dimension, seven questions were relevant for the teacher autonomy support, four questions for teacher structure, and all the initial eight for involvement. The relevant questions for teacher structure were related to teachers showing strategies to perform the activities, teachers expecting PST outcomes and teachers giving specific and one-to-one feedback. This indicates that during the implementation of the CPCCs, the PSTs indicated preference for a certain degree of structure in addition to teachers supporting student autonomy and teacher involvement. The scores for the dimension of autonomy support were 8.4% and 11.5% higher than for the dimensions of teachers' structure and involvement, respectively, indicating the preference of PSTs for a certain degree of autonomy support. This result is somewhat different to others where teachers' involvement is the most determinant dimension in relation with behavioural and emotional engagement [22,42]. This might have some implications since it posits the idea that when PSTs face a new educational instruction, they probably expect a higher degree of autonomy [39] with less attention to the interpersonal approach fostering students' engagement. In more detail, students provided higher scores for those questions that implied supportive teacher feedback, which is aligned with other studies reporting the link between teacher feedback and student self-efficacy [35,46–49].

The results also proved a synergistic relationship between the two categories of motivation, which is the PST motivation in the university classrooms and the motivation during the implementation of the CPCCs in the schools. The PCA analysis produced six questions for the SMOTIV-in class category and seven for the SMOTIV-out class. SMOTIV-out class category correlated significantly with the three categories of need supportive teaching while the SMOTIV-in class category only correlated with the teachers' involvement category. Therefore, our findings support the fact that during the implementation of the CPCCs, PST motivation can be related to the teaching process of teachers providing basic psychological needs. As reported by Lozano-Jiménez et al. [50], the effectiveness in the application of an educational approach not only depends on the perception of

PST autonomy support to improve PST involvement but also by the improvement of the synergistic effects between the PST psychological needs and academic motivation. Indeed, in our experiments, there was a synergistic effect between the academic motivation by the PSTs during the implementation of the CPCCs in the schools. We can conclude that motivation is then mediated by a sense of professional practice where technical and professional skill can be fostered [51]. This process being exacerbated by cooperative settings [9–11].

4.2. Students' Achievement Depending on Teaching Providing Basic Psychological Needs and the Time Development of Motivation

Higher levels of need support teaching have been largely associated with better PST motivation and achievement [52,53], which relates to our findings of PST achievement with motivation expressed during the formulation of the CPCCs by the PSTs. Furthermore, in our experiments, PST achievement is significantly correlated with teacher-reported involvement but not with teacher-reported autonomy support and structure. This is somewhat similar to the results by Hornstra et al. [52], in which high levels of teacher-reported structure and involvement could not compensate for a lack of teacher-reported autonomy support for students in the first year of secondary school. This is complementary to the need of fostering together the three dimensions of need-supportive teaching to provide optimal support to classroom-levels of behavioural, emotional, and cognitive engagement [54]. Evidence shows that teacher involvement together with student self-efficacy are the two elements most strongly and positively related to achievement [22]. That is, students obtain higher marks when they believe that their teachers are dependable and available to offer resources, and when they feel capable of organizing and implementing the courses of action necessary to acquire knowledge [22].

This study found that PST achievement is related to the CPCC design phase but not during the later stages of implementation of the activities in the schools, nor in the process of reflection. Achievement is linked to the initial stages of implementation of the CPCCs, which in turn is associated to the formative assessment of the instruction. Indeed, our results may provide support for those assumptions of perceived use of formative assessment, which is associated with more feelings of autonomy and competence, and more PST motivation [55] when student–teacher interactions are embedded in in-class environments, with the perceptions of in-class teacher involvement being associated with students' autonomous motivation [56,57] and achievement [52]. All in all, these results suggest that what is most important for PSTs is not only the specific pedagogical instruction provided by the teachers [12,13,58] but the quality of student–teacher interactions mediated by involvement.

5. Conclusions

A pre-service teacher's definition of a cooperative-learning approach and its subsequent implementation in primary schools is facilitated by university teachers encouraging autonomy and structure. Providing support for PST autonomy and establishing structure were found to correlate with teacher involvement. Therefore, we can conclude that when PST students are embedded in new instructional approaches that they will then implement and test in primary schools, the beginnings of their professional identity is, thus, reinforced by the dimensions of their teaching. This suggests that a preservice student's professional identity is a complex process that develops when the dimensions of need-supportive teaching are considered equally. This study also reports that achievement was correlated with the teacher involvement and with the motivation of the students when defining the cooperative physical challenges. This result shows that assessment is a student-centred process that can be mediated through the individual student motivation when developing professional activities in primary schools.

6. Limitations of the Study

This study has some limitations. The relationship between motivation and the need-supportive teaching dimensions with each of the basic elements of cooperative learning (positive interdependence, individual accountability, promotive interaction, social skills, and group processing) are still to be investigated. Therefore, our analysis is lacking knowledge on determining how, for example, higher levels of individual accountability or positive interdependence provide higher levels of student motivation. All these relationships may provide clues for the formative assessment that finally links with student achievement. For this, it will be necessary to review the assessment criteria in the formative assessment and create links between achievement at the different stages of the implementation of the instructional approach. This should include knowledge of the relationship of the out-of-class practice (in the schools) to the basic criteria of cooperative learning.

Another aspect that might be considered is the limited involvement and participation of schoolteachers in the preparatory phase of the project. Specifically, in the design of the CPCCs, so that the contextualization of the educational approaches would be present from the very beginning of the project definition until its execution. Schoolteachers could provide students with a contextual framework that is closer and adapted to the characteristics and needs of the primary school students, making it easier for PSTs to be able to adjust both the objectives and associated competencies of the CPCCs to the school context.

Author Contributions: Conceptualization, D.C. and J.C.; methodology, M.E.G., D.C. and J.C.; validation, T.S. and D.C.; formal analysis, M.E.G. and J.C.; investigation, T.S. and J.C.; resources, J.C. and D.C.; data curation, D.C., and J.C.; writing—original draft preparation, D.C. and J.C.; writing—review and editing, J.C.; visualization, J.C. and T.S.; supervision, J.C. and T.S.; project administration, J.C.; funding acquisition, D.C. and J.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Josep Pallach Institute of Education Sciences, University of Girona, grant number ICE-XIDAC05-2021 and ICE-XIDAR05-2021.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of the University of Girona (protocol code XIDAC-XIDAR052019 on the 11 September 2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: The authors are very grateful to the schools of Vedruna (in Girona), Arrels (in Salt), and Gifra (in Sant Gregori).

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. TASC-Q items, descriptive statistics (M for mean and SD for Standard Deviation), and results of PCA (Factor Loading), both in English and Catalan (in brackets). In bold, the items that present significant factor loading.

Item	M	SD	Skewness	Kurtosis	Factor Loading
<i>Factor Autonomy support. 7 items. Cronbach Alpha = 0.72</i>					
1. My teachers give me a lot of freedom in how I organize the activities [Els professors em donen molta llibertat per organitzar activitats]	4.25	0.62	−0.48	0.69	0.60

Table A1. Cont.

Item	M	SD	Skewness	Kurtosis	Factor Loading
2. My teachers listen to my ideas [Els professors escolten les meves idees]	4.27	0.66	−0.35	−0.74	0.77
3. It seems like my teachers are always telling me what activities to do [Sembla que els professors sempre diuen quines activitats he de realitzar]	3.06	0.94	−0.19	−0.36	–
4. My teachers don't give me much choice in how I organize the activities [Els professors no em donen moltes opcions en com organitzar les activitats]	4.31	0.63	−0.34	−0.64	0.46
5. My teachers listen to my opinion [Els professors escolten la meva opinió]	4.30	0.64	−0.36	−0.67	0.66
6. My teachers don't explain how I can use things we learn in the classes [Els professors no expliquen com utilitzar el que aprenc a les classes]	4.13	0.83	−0.99	1.35	0.48
7. My teachers are always criticising how I organize the activities [Els professors sempre critiquen com organitzo les activitats]	4.09	0.76	−0.43	−0.37	0.54
8. My teachers explain why what I do in classes is important to me [Els professors m'expliquen perquè el que faig a les classes és important per a mi]	4.42	0.70	−0.78	−0.59	0.32
<i>Factor: Structure. Cronbach. 4 items. Alpha = 0.62</i>					
9. My teachers make clear what they expect of me in class [Els professors deixen clar el que esperen de mi a classe]	4.00	0.81	−0.34	−0.61	0.66
10. If I can't solve a problem, my teachers show me the different strategies to try [Si no sé resoldre un problema, els professors m'ensenyen diferents estratègies per intentar-ho]	3.83	0.78	−0.35	−0.10	0.37
11. Every time I do something wrong, my teachers respond differently [Cada vegada que faig alguna cosa errònia, els professors responen de manera diferent]	3.09	0.78	0.11	−0.03	–
12. My teachers don't tell me what they expect of me [Els professors no m'expliquen el que esperen de mi]	4.03	0.71	−0.55	0.56	0.72
13. My teachers check whether I'm ready before they start a new topic [Els professors analitzen si estic preparat abans de començar un nou tema]	3.92	0.64	0.07	−0.55	–
14. My teachers show me how to solve a problem [Els professors m'ensenyen com resoldre un problema]	4.08	0.73	−0.75	1.87	–
15. My teachers keep changing how they respond towards me [Els professors canvien la manera d'adreçar-se a mi]	3.81	0.72	−0.20	−0.10	0.44

Table A1. Cont.

Item	M	SD	Skewness	Kurtosis	Factor Loading
16. My teachers make sure I understand before they move on [Els professors s'asseguren que entenc un tema abans de continuar]	3.82	0.78	−0.71	1.18	–
<i>Factor Involvement. 8 items. Cronbach Alpha = 0.80</i>					
17. My teachers know me well [Els professors em coneixen bé]	3.10	0.90	−0.28	0.42	0.66
18. My teachers just don't understand me [Els professors, simplement, no m'entenen]	4.05	0.68	−0.25	−0.18	0.46
19. My teachers talk to me [Els professors parlen amb mi]	4.01	0.82	−0.35	−0.64	0.49
20. I can't count on my teachers when I need them [No puc confiar amb els professors quan els necessito]	4.43	0.61	−0.81	1.16	0.58
21. My teachers like me [Agrado als professors]	3.85	0.68	−0.57	1.96	0.71
22. My teachers dedicate time to me [Els professors em dediquen temps]	3.85	0.70	0.21	−0.92	0.73
23. My teachers really care about me [Els professors es preocupen per mi]	3.68	0.76	0.05	−0.46	0.83
24. I can't depend on my teachers for important things [No puc dependre dels professors en questions importants]	3.83	0.94	−0.91	1.04	0.32

References

- Green, M.F.; Helleman, G.; Horan, W.P.; Lee, J.; Wynn, J. From Perception to Functional Outcome in Schizophrenia. *Arch. Gen. Psychiatry* **2012**, *69*, 1216–1224. [\[CrossRef\]](#) [\[PubMed\]](#)
- Church, M.A.; Elliot, A.J.; Gable, S.L. Perceptions of classroom environment, achievement goals, and achievement outcomes. *J. Educ. Psychol.* **2001**, *93*, 43–54. [\[CrossRef\]](#)
- Daniels, L.M.; Perry, R.P.; Stupnisky, R.H.; Stewart, T.L.; Newall, N.E.G.; Clifton, R.A. The longitudinal effects of achievement goals and perceived control on university student achievement. *Eur. J. Psychol. Educ.* **2014**, *29*, 175–194. [\[CrossRef\]](#)
- Jang, H.; Kim, E.J.; Reeve, J. Longitudinal Test of Self-Determination Theory's Motivation Mediation Model in a Naturally Occurring Classroom Context. *J. Educ. Psychol.* **2012**, *104*, 1175–1188. [\[CrossRef\]](#)
- Matos, L.; Lens, W.; Vansteenkiste, M.; Mouratidis, A. Optimal Motivation in Peruvian High Schools: Should Learners Pursue and Teachers Promote Mastery Goals, Performance-Approach Goals or Both? *Learn. Individ. Differ.* **2017**, *55*, 87–96. [\[CrossRef\]](#)
- Woolfolk, A. *Educational Psychology*, 14th ed.; Pearson: Ohio, OH, USA, 2019.
- Brophy, J. *Motivating Students to Learn*, 2nd ed.; Lawrence Erlbaum Associates, Inc.: Mahwah, NJ, USA, 2004.
- McClelland, D.C. Toward a Theory of Motive Acquisition. *Am. Psychol.* **1965**, *20*, 321–333. [\[CrossRef\]](#)
- Cañabate, D.; Serra, T.; Bubnys, R.; Colomer, J. Pre-Service Teachers' Reflections on Cooperative Learning: Instructional Approaches and Identity Construction. *Sustainability* **2019**, *11*, 5970. [\[CrossRef\]](#)
- Colomer, J.; Cañabate, D.; Stanikūnienė, B.; Bubnys, R. Formulating Modes of Cooperative Learning for Education for Sustainable Development. *Sustainability* **2021**, *13*, 3465. [\[CrossRef\]](#)
- Colomer, J.; Serra, T.; Gras, M.E.; Cañabate, D. Longitudinal Self-Directed Competence Development of University Students Through Self-Reflection. *Reflective Pr.* **2021**, *22*, 727–740. [\[CrossRef\]](#)
- Castro-Sánchez, M.; Zurita-Ortega, F.; Chacón-Cuberos, R. Motivation towards Sport Based on Socio-Demographic Variables in University Students from Granada. *J. Sport Health Res.* **2019**, *11*, 55–68.
- Silva, P.D.C.; Sicilia, A.; Burgueño, R.; Lirola, M.-J. Motivación Educativa en la Formación Inicial del Profesorado de Educación Física // Academic Motivation in the Initial Training of Physical Education Teachers. *RIMCAFD* **2018**, *18*, 537–554. [\[CrossRef\]](#)
- van Blankenstein, F.M.; Saab, N.; van der Rijst, R.M.; Danel, M.S.; Berg, A.S.B.-V.D.; Broek, P.W.V.D. How do Self-Efficacy Beliefs for Academic Writing and Collaboration and Intrinsic Motivation for Academic Writing and Research Develop during an Undergraduate Research Project? *Educ. Stud.* **2019**, *45*, 209–225. [\[CrossRef\]](#)

15. Hinojo-Lucena, F.J.; Mingorance-Estrada, M.F.C.; Trujillo-Torres, J.M.; Aznar-Díaz, I.; Reche, M.P.C. Incidence of the Flipped Classroom in the Physical Education Students' Academic Performance in University Contexts. *Sustainability* **2018**, *10*, 1334. [[CrossRef](#)]
16. Engelbertink, M.M.J.; Colomer, J.; Mittendorff, K.M.W.; Alsina, Á.; Kelders, S.M.; Ayllón, S.; Westerhof, G.J. The Reflection Level and the Construction of Professional Identity of University Students. *Reflective Pr.* **2020**, *22*, 73–85. [[CrossRef](#)]
17. Ames, C. Classrooms: Goals, Structures and Student Motivation. *J. Educ. Psychol.* **1992**, *84*, 261–271. [[CrossRef](#)]
18. Elliot, A.J. A Conceptual History of the Achievement Goal Construct. In *Handbook of Competence and Motivation*; Elliot, A.J., Dweck, C.S., Eds.; Guilford Press: New York, NY, USA, 2005; pp. 52–72.
19. Deci, E.L.; Ryan, R.M. Self-Determination Theory: A Macrotheory of Human Motivation, Development, and Health. *Can. Psychol.* **2008**, *49*, 182–185. [[CrossRef](#)]
20. Ryan, R.M.; Deci, E.L. Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *Am. Psychol.* **2000**, *55*, 68–78. [[CrossRef](#)]
21. Ryan, R.M.; Deci, E.L. Promoting Self-Determined School Engagement: Motivation, Learning and Well-Being. In *Hand-Book of Motivation at School*; Wentzel, K.R., Wigfield, A., Eds.; Routledge: New York, NY, USA, 2009; pp. 171–196.
22. Ayllón, S.; Alsina, A.; Colomer, J. Teachers' Involvement and Students' Self-Efficacy: Keys to Achievement in Higher Education. *PLoS ONE* **2019**, *14*, e0216865. [[CrossRef](#)]
23. Carmichael, C.; Muir, T.; Callingham, R. The Impact of Within-School Autonomy on Students' Goal Orientations and Engagement with Mathematics. *Math. Educ. Res. J.* **2017**, *29*, 219–236. [[CrossRef](#)]
24. Lau, S.; Nie, Y. Interplay between Personal Goals and Classroom Goal Structures in Predicting Student Outcomes: A Multilevel Analysis of Person-Context Interactions. *J. Educ. Psychol.* **2008**, *100*, 15–29. [[CrossRef](#)]
25. Meece, J.L.; Anderman, E.M.; Anderman, L.H. Classroom Goal Structure, Student Motivation, and Academic Achievement. *Annu. Rev. Psychol.* **2006**, *57*, 487–503. [[CrossRef](#)]
26. Urdan, T. Predictors of Academic Self-Handicapping and Achievement: Examining Achievement Goals, Classroom Goal Structures, and Culture. *J. Educ. Psychol.* **2004**, *96*, 251–264. [[CrossRef](#)]
27. Kaplan, A.; Maehr, M.L. The Contributions and Prospects of Goal Orientation Theory. *Educ. Psychol. Rev.* **2007**, *19*, 141–184. [[CrossRef](#)]
28. Linnenbrink, E.A. The Dilemma of Performance-Approach Goals: The Use of Multiple Goal Contexts to Promote Students' Motivation and Learning. *J. Educ. Psychol.* **2005**, *97*, 197–213. [[CrossRef](#)]
29. Ryan, R.M.; Deci, E. Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemp. Educ. Psychol.* **2000**, *25*, 54–67. [[CrossRef](#)]
30. Lee, W.; Lee, M.-J.; Bong, M. Testing Interest and Self-Efficacy as Predictors of Academic Self-Regulation and Achievement. *Contemp. Educ. Psychol.* **2014**, *39*, 86–99. [[CrossRef](#)]
31. Reeve, J. Why Teachers Adopt a Controlling Motivating Style Toward Students and How They Can Become More Autonomy Supportive. *Educ. Psychol.* **2009**, *44*, 159–175. [[CrossRef](#)]
32. Richard, R.M.; Deci, E.L. *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*; Guilford Press: London, UK, 2017. [[CrossRef](#)]
33. Ryan, R.M.; Deci, E.L. (Eds.) Overview of Self-Determination Theory: An Organismic Dialectical Perspective. In *Handbook of Self-Determination Research*; University of Rochester Press: Rochester, NY, USA, 2002.
34. Ryan, R.M.; Deci, E. Self-Regulation and the Problem of Human Autonomy: Does Psychology Need Choice, Self-Determination, and Will? *J. Pers.* **2006**, *74*, 1557–1586. [[CrossRef](#)]
35. Cañabate, D.; Nogué, L.; Serra, T.; Colomer, J. Supportive Peer Feedback in Tertiary Education: Analysis of Pre-Service Teachers' Perceptions. *Educ. Sci.* **2019**, *9*, 280. [[CrossRef](#)]
36. Colomer, J.; Serra, T.; Cañabate, D.; Bubnys, R. Reflective Learning in Higher Education: Active Methodologies for Transformative Practices. *Sustainability* **2020**, *12*, 3827. [[CrossRef](#)]
37. Jiménez, M. Motivación Intrínseca. Competencia, Autodeterminación y Control. In *Emoción y Motivación: La Adaptación Humana*; Fernández-Abascal, E.G., Martín Díaz, M.D., Jiménez, M.P., Eds.; Centro de Estudios Ramón Areces: Madrid, Spain, 2007.
38. Panadero, E.; Alonso-Tapia, J. ¿Cómo Autorregulan Nuestros Alumnos? Modelo de Zimmerman sobre Estrategias de Aprendizaje. *Ann. Psychol.* **2014**, *30*, 450–462. [[CrossRef](#)]
39. Gutiérrez, M.; Tomás, J.-M. Clima Motivacional en Clase, Motivación y Exito Académico en Estudiantes Universitarios. *Rev. Psicodidáctica* **2018**, *23*, 94–101. [[CrossRef](#)]
40. Cañabate, D.; Bubnys, R.; Nogué, L.; Martínez-Mínguez, L.; Nieva, C.; Colomer, J. Cooperative Learning to Reduce Inequalities: Instructional Approaches and Dimensions. *Sustainability* **2021**, *13*, 10234. [[CrossRef](#)]
41. Belmont, M.; Skinner, E.; Wellborn, J.; Connell, J. *Teacher as Social Context: A Measure of Student Perceptions of Teacher Provision of Involvement, Structure, and Autonomy Support*; Tech. Rep. No. 102; University of Rochester: Rochester, NY, USA, 1988.
42. Iglesias-García, M.-T.; Maulana, R.; Fernández-García, C.-M.; García-Pérez, O. Teacher as Social Context (TASC) Questionnaire in the Spanish Setting: Teacher Version. *Psicol. Educ.* **2020**, *26*, 17–26. [[CrossRef](#)]
43. Leenknecht, M.J.; Wijnia, L.; Loyens, S.M.; Rikers, R. Need-Supportive Teaching in Higher Education: Configurations of Autonomy Support, Structure, and Involvement. *Teach. Teach. Educ.* **2017**, *68*, 134–142. [[CrossRef](#)]

44. Alsina, Á.; Ayllón, S.; Colomer, J. Validating the Narrative Reflection Assessment Rubric (NARRA) for Reflective Narratives in Higher Education. *Assess. Eval. High. Educ.* **2019**, *44*, 155–168. [[CrossRef](#)]
45. Sierens, E.; Vansteenkiste, M.; Goossens, L.; Soenens, B.; Dochy, F. The Synergistic Relationship of Perceived Autonomy Support and Structure in the Prediction of Self-Regulated Learning. *Br. J. Educ. Psychol.* **2009**, *79*, 57–68. [[CrossRef](#)]
46. Esterhazy, R.; Damsa, C. Unpacking the Feedback Process: An Analysis of Undergraduate Students' Interactional Meaning-Making of Feedback Comments. *Stud. High. Educ.* **2017**, *44*, 260–274. [[CrossRef](#)]
47. Yang, M.; Carless, D. The Feedback Triangle and the Enhancement of Dialogic Feedback Processes. *Teach. High. Educ.* **2013**, *18*, 285–297. [[CrossRef](#)]
48. Pitt, E.; Norton, L. 'Now That's the Feedback I Want!' Students' Reactions to Feedback on Graded Work and What They Do with it. *Assess. Eval. High. Educ.* **2017**, *42*, 499–516. [[CrossRef](#)]
49. Kaufman, J.H.; Schunn, C. Students' Perceptions about Peer Assessment for Writing: Their Origin and Impact on Revision Work. *Instr. Sci.* **2008**, *39*, 387–406. [[CrossRef](#)]
50. Lozano-Jiménez, J.; Huéscar, E.; Moreno-Murcia, J. Effects of an Autonomy Support Intervention on the Involvement of Higher Education Students. *Sustainability* **2021**, *13*, 5006. [[CrossRef](#)]
51. Ballesteros, M.; Sánchez, J.S.; Ratkovich, N.; Cruz, J.C.; Reyes, L.H. Modernizing the chemical Engineering Curriculum Via a Student-Centered Framework that Promotes Technical, Professional, and Technology Expertise Skills: The Case of Unit Operations. *Educ. Chem. Eng.* **2020**, *35*, 8–21. [[CrossRef](#)]
52. Hornstra, L.; Stroet, K.; Weijers, D. Profiles of Teachers' Need-Support: How Do Autonomy Support, Structure, and Involvement Cohere and Predict Motivation and Learning Outcomes? *Teach. Teach. Educ.* **2021**, *99*, 103257. [[CrossRef](#)]
53. Ahn, I.; Chiu, M.M.; Patrick, H. Connecting Teacher and Student Motivation: Student-Perceived Teacher Need-Supportive Practices and Student Need Satisfaction. *Contemp. Educ. Psychol.* **2021**, *64*, 101950. [[CrossRef](#)]
54. Olivier, E.; Galand, B.; Morin, A.J.; Hospel, V. Need-Supportive Teaching and Student Engagement in the Classroom: Comparing the Additive, Synergistic, and Global Contributions. *Learn. Instr.* **2021**, *71*, 101389. [[CrossRef](#)]
55. Leenknecht, M.; Wijnia, L.; Köhler, M.; Fryer, L.; Rikers, R.; Loyens, S. Formative Assessment as Practice: The Role of Students' Motivation. *Assess. Eval. High. Educ.* **2020**, *46*, 236–255. [[CrossRef](#)]
56. Leenknecht, M.J.M.; Snijders, I.; Wijnia, L.; Rikers, R.M.J.P.; Loyens, S.M.M. Building Relationships in Higher Education to Support Students' Motivation. *Teach. High. Educ.* **2020**, 1–22. [[CrossRef](#)]
57. Domen, J.; Hornstra, L.; Weijers, D.; Van Der Veen, I.; Peetsma, T. Differentiated Need Support by Teachers: Student-Specific Provision of Autonomy and Structure and Relations with Student Motivation. *Br. J. Educ. Psychol.* **2019**, *90*, 403–423. [[CrossRef](#)]
58. Bonem, E.M.; Fedesco, H.N.; Zissimopoulos, A.N. What You Do is Less Important than How You Do It: The Effects of Learning Environment on Student Outcomes. *Learn. Environ. Res.* **2020**, *23*, 27–44. [[CrossRef](#)]