

# Student motivation in the first year of University: findings from the implementation of a PBL project for a real context

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## Abstract

Student motivation is a key dimension for first year students at University. Project-based Learning (PBL) is seen as an effective teaching and learning approach to enhance student motivation and engagement. This paper describes the results from the implementation of a PBL project that was developed for a real context – a non-profit social organization that works with children. The project included, for the first time, two curricular units from the field of Psychology and Education Sciences, integrated in the first year of the study plan of the Social Education degree programme at Portucalense University, Portugal. The paper describes, on the one hand, the objectives, planning and assessment of the PBL experience from a curricular and pedagogic point of view and, on the other hand, presents students' perceptions about their PBL experience. Data collection was based on an online survey to students, at the start of the PBL project and after its conclusion, and a content analysis of the project reports of the groups. Findings reveal the importance of the development of the project for a real context and with a specific target audience as the main issues that enhanced student motivation and engagement in the courses involved in the project. Working in teams, the opportunity to develop generic competences, the stronger link between theory and practice, student resilience, teacher support and continuous feedback are also mentioned as important features of PBL that impact student motivation in the first year of University.

**Keywords:** Active Learning; Project-Based Learning; Academic Motivation; University Students.

## 1 Introduction

University entry represents one of the most important, ambitious, and difficult stages in early adulthood (Arnett, 2004). For the majority of young adults, this stage represents the search for a higher educational level, the establishment of personal and professional goals and the creation of future work prospects (Blanco et al., 2008). In order to deal with these multiple changes, challenges and demands, students must have an adequate and consistent personal structure and effective adaptation skills (Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010). Nevertheless, students are not always prepared to face them. Very often the university context creates stress and anxiety among vulnerable students who are more exposed to the challenges that the competitive environment usually generates (Reddy, Menon, & Thattil, 2018). In fact, going to college is perceived as an essential investment in the career for any student and higher education has become a universal and mass system (much bigger, less exclusive and more important). This expansion means that today, more than ever, educational institutions favour and create a competitive environment (Araújo et al., 2006; Davies & Hammack, 2005; Granado et al., 2005). This causes an overwhelming emotional burden that leaves students with minimal opportunity to relax and recreate, which can negatively affect them in performing tasks effectively and consequently affects their academic performance (Liu & Zhao, 2018; Trigueros et al., 2020), or it may even lead to dropping out of higher education (Sosu & Pheunpha, 2019). Considering this, universities have the mission and the duty to support students to become life-long learners and versatile experts in their own fields, fostering and stimulating the development of lifelong learning skills, such as problem solving and critical thinking, essential to increase students' competitiveness in the labour market (Dolmans, Loyens, Marcq, & Gijbels, 2016). Moreover, according to the Bologna declaration, successful learning and studying in higher education should involve students in deep learning (Asikainen 2014), by allowing them to be responsible and to acquire autonomy during the learning process that are essential skills for lifelong growing knowledge and practice (van den Hurk, 2006).

Traditionally, the teaching methods that prevail in different educational contexts, namely at the university, are based on a limited practical applicability of knowledge and a pre-eminence of rote learning. Thus, students are faced with fictional situations designed by the teacher that often differ from real situations. Furthermore, the education system often pays more attention to the results achieved by students, without worrying about the mental processes they have used to assimilate information and/or whether there is a clear applicability of the assimilated knowledge by students to various everyday situations. For this reason, one of the aspects that must be promoted from the educational point of view is the predominance of significant learning, with the aim of developing conscious and reflexive learning by students that will allow them not only to consolidate their own knowledge but also to establish the information, skills and values that they will have to assimilate and apply in the future (Trigueros, Padilla, Aguilar-Parra, Lirola et al., 2020; Zohar, & Barzilai, 2013; Rodríguez-Sandoval, Vargas-Solano, & Luna-Cortés, 2010). The analysis of the importance of student motivation to the educational context and academic achievement should also be done considering student's performance and engagement, namely in achievement-oriented educational settings, where self-efficacy can be seen in the student's perceived confidence in achieving certain goals. The sense of self-efficacy helps to determine what choices students make, how much mental effort they invest and how long they persist in a task (Schunk & Pajares, 2005). However, few studies have shed light on the mechanisms that manage how different types of motivation (i.e., intrinsic motivation, extrinsic motivation, and self-efficacy) affect learning engagement and performance. In a very recent study involving 1930 medical students in China (Wu, Li, Zheng, & Guo, 2020), results showed that the total effect of intrinsic motivation on academic performance was larger than that of extrinsic motivation. Moreover, significant indirect effects of either intrinsic or extrinsic motivation on academic performance were found through learning engagement. Besides, both intrinsic motivation and extrinsic motivation predicted self-efficacy, the direct effect of self-efficacy on academic performance was not significant. This suggests the need to develop motivation-related counselling methods to promote the academic achievement for different groups of medical students.

Problem and project-based learning (PBL) is an educational approach in which complex authentic problems serve as the context and stimulus for learning. PBL is designed to encourage active participation during learning, being associated to positive effects on academic self-efficacy (self-control efficacy, task-level preference) and academic failure tolerance (behavior, task-difficulty preference) as academic motivation (Yune, Im, Lee, Baek, & Lee, 2010).

Therefore, the aim of this study is to analyse and discuss student motivation based on the implementation of a Project-based Learning (PBL) approach with first year students of the Social Education programme at Portucalense University. Specifically, this paper describes the results from the implementation of a PBL project developed for a real non-profit social organization that works with children, discussing students' perceptions about the usefulness of this methodology in their learning of technical and soft skills, academic motivation, academic performance and academic success. The paper is organized in four main sections. In the first part, a brief presentation of the state of the art on student motivation in PBL is presented. Section two focuses on the methodology of the study. It includes the research questions and methods and a brief description of the context of the study. The third and last section of the paper present and discuss the results of the study, drawing on findings from the data analyses and its relationship with the literature review in the field.

## 2 Methodology

### 2.1 Research questions and methods

The aim of this study is to analyse and discuss student motivation based on the implementation of a Project-based Learning (PBL) approach with first year students of the Social Education programme at Portucalense University.

To attain this goal, the following research questions were defined:

- What are students' perceptions about their PBL experience?
- How does PBL enhance student motivation?

- What are the key dimensions for student motivation in the first year of university?

The study followed a qualitative approach. For data collection, an online questionnaire, with open-ended questions, was applied to students, at the start of the PBL project (initial perceptions) and after its conclusion (final perceptions). The questionnaire is based on previous research developed by the authors about the impact of PBL on students' learning (Fernandes, Abelha, Albuquerque, & Sousa, 2020; Fernandes, Abelha, Fernandes, & Albuquerque, 2018). Besides the questionnaire, a document analysis was also used, namely regarding the project reports developed by the groups. The participants in the study include 10 students (8 female, 2 male) enrolled in the two curricular units.

## 2.2 Context of the study

The study took place in the 1st semester of the 1st year of the Degree in Social Education at the Portucalense University and involved two curricular units – Cultural Animation in Education Contexts (CAEC) and Developmental Psychology 1 (DP1). The main purpose of the PBL project was to develop an cultural animation programme for children and/or adolescents who attend a non-profit social organization, based on the principles of the two curricular units involved. The mission of the association involved in the project is to promote the education of children and young people from vulnerable families aiming for their social inclusion. The mediation with the the association and information about its mission and needs of the target population, essential for the development of the PBL projects, was given by a third-year student of the Social Education programme, who was carrying out her curricular internship at the association. This student will also be responsible, in the future, for the implementation of the activities of the PBL projects (planned by the first-year students) at the institution. It should be noted that this particularity proved to be an element that triggered higher motivational levels among the students.

The working groups, comprised 2 to 3 students in a total of 4 groups ( $N= 8$  female and 2 male students), developed four intervention projects aiming: 1) working on steriotips related to religion, race, sexual orientation and weight and promote social inclusion of adolescents; 2) making young people aware of their rights and duties, working on the concept of freedom; 3) to promote civic participation with a focus on environmental education and also to give pedagogical support as a way of reinforcing the work done in the classroom in most difficult learning activities and contents; and 4) to contribute to academic success and to the personal development of young people, namely by defining more effective study strategies through playful activities.

To monitor the progress of the project and the students' learning, several checkpoints, also known as Milestones (see Table 1), were established by the teaching team to support the students during the PBL project, as well as to enable moments of sharing and feedback among students and teachers involved.

Table 1. Milestones

#	Week	Date	Milestone
1	Week 2	22.10.2020	Presentation of the PBL Project
2	Week 3	29.10.2020	Guest Lecture: Presentation of the association and its mission
3	Week 7	03.12.2020	Project Monitoring Session - Intermediate Presentation
4	Week 11	05.01.2021	Submission of Preliminary Report (Moodle)
5	Week 10	07.01.2021	Feedback on the Preliminary Report
6	Week 11	12.01.2021 14.01.2021	Final Project Presentation
7	Week 12	21.01.2021	Final Report Submission (Moodle)

The final assessment of the students in each CU is based on two components: one related to the student's final classification in the project (40%) and another related to the classification resulting from the student's continuous assessment in the CU (60%).

### 3 Results

This section presents the results of the study, which are organized in two main subsections: the first part, presents data from students' expectations about their PBL experience; the second part, presents data from students' perceptions at the end of their PBL experience.

#### 3.1 Students' expectations about their PBL experience

In the first week of the project, after the PBL approach and the objectives of the project were presented, students were asked to complete a short online questionnaire about their expectations regarding their PBL experience. It was interesting to notice that when students were asked to state what motivated them the most, most of the answers referred to the opportunity to collaborate with the non-profit social organization and its target audience – children. The possibility of developing a project that can have an impact on others, was also mentioned as a motivational issue. The following quotes from students confirm this:

*What motivated me the most in this project was the fact that I could make a difference in someone else's life and, in that way, I can contribute to their journey in a positive manner.*

*What motivated me the most was knowing that I could help and teach children and youth or even adults with a theme that touches me personally.*

*Being able to work and carry out a project for children.*

This same idea was also present in students' answers when they were questioned about what they expected to be the most positive and less positive aspects of this PBL experience. Regarding the positive aspects, being able to work with a real context and to develop a project for a specific target audience, using their own creativity, was stated by most of the students:

*Communicate, interact with others and above all help in a positive way.*

*The positive aspects of this project are being able to really help a real institution, it is also being able to put our knowledge and creativity into practice. Another positive aspect is that we can teach and educate people with the project.*

*The most positive aspect for me is his goal, which makes us help children to develop their emotional capacities.*

Students had difficulty in identifying or anticipating the less positive aspects. Most of them answered that they could not see any negative aspects. However, one student was able to identify the workload and the pandemic situation of COVID-19 as possible barriers for the success of the project.

*The less positive aspects are the work that it will take, because a good project takes a lot of work but it ends up rewarding at the end and also the problem of COVID that ends up getting in the way despite being directly related to the project itself, it ends up interfering in it negatively.*

#### 3.2 Students' perceptions at the end of their PBL experience

In the same way, after the project was concluded, students were asked to share their perceptions about the PBL experience. Data presented in this section is based on a content analysis of the open-ended questions of the online questionnaire applied to students and some of the project reports delivered by the groups, which included a final reflection of the overall PBL experience. Considering the research questions defined for this study, it was possible to identify three main categories that explore how PBL enhanced student motivation. These categories include: 1) stronger link between theory and practice; 2) working in teams and developing competences; and, finally, 3) student resilience and continuous improvement.

### 3.2.1 Stronger link between theory and practice

Students were aware that PBL provided a stronger link between theory and practice, this is, the continuity between training and the professional future. The practical dimension of the project, which put emphasis on the process, rather than on the product or the end result, was also visible in students' final perceptions about the PBL experience.

*The added value of this PBL is to make a project that can be used in practice, that is, the project was made to be used and not just evaluated and placed in the corner.*

*It was more practical work*

*The fact that we never carried out an interdisciplinary project was challenging, as we had to base it on the principles of Developmental Psychology and Cultural Animation in an Educational Context. (Project Report of Group 2)*

The project also allowed students to understand the diversity of approaches to the same reality, both in the conceptual framework that is given (two different curricular units), as well as in the products that result from the activity. This results in greater richness in the learning process and in the result itself. It brings benefits for institutions and individuals, as there are no better perspectives or worse, but just different focuses of analysis.

*All projects contributed to learn new and different things, as each project was different from each other.*

*Throughout the project, it was possible for us to acquire new knowledge, as well as to develop communication skills. In the course of this work, some difficulties were felt, which were essentially related in the proper management of our time and in the selection and organization of the information collected. However, we found that the development of a close and cooperative relationship, as a group, were essential characteristics, not only for the elaboration and completion of this project, but also so that we can face the next challenges, overcome new adversities and always respect the importance of individual work in the production of group work. (Project Report of Group 2)*

### 3.2.2 Working in teams and developing generic competences

PBL is all about working in teams and this implies the development of generic skills, namely communication, leadership in achieving goals, concern for quality and effectiveness, self-assessment and hetero-assessment skills, ability for conflict management, commitment, organization and planning. When asked to identify the most positive aspects about the PBL experience, teamwork was the most referred idea, as seen through the following evidence from students:

*The fact that we must work in a group, which is something that we will have to deal with during our future work.*

*The capacity for creativity, commitment and organization as a group.*

*Working as a team, creating the project itself because I think it was good for our learning and also creativity*

Based on the analysis of student project reports delivered by each group, it was possible to verify that some groups (two out of four) included a final reflection about their learning process, and this necessarily focused on issues related to working in teams and the development of interpersonal competences. These two excerpts from the project report of group number 3 confirm this.

*"The challenge of creating a project within the curricular units of Cultural Animation in Educational Contexts and Developmental Psychology I, aroused great interest in addition to many doubts. My two colleagues and I, at first, were kind of lost in planning and diagnosing needs, I believe that it took us some time to understand for sure what we were supposed to do for our project on behalf of the Association "My place in the world", but with some tips from the teachers and with our teamwork we ended up getting there and reaching consensus on what we would do to respond to the needs of our target audience, the young people of this association. "1, 2, 3 is your turn", it will be marked as the first project that I developed as a team – (Project Report of Group 3)*

*"I liked to develop this project because it was something that challenged me, I had never done anything like this, in fact at the beginning I felt that I was half lost because I didn't even know what I was going to come out. I knew that a project was time consuming and something that required a lot of work, but in fact I had no idea of what the development and creation of a project really was. I think the fact that the project was aimed at young audiences was something positive, however, also with its difficulties, but I think that here Elsa's help, in saying what she liked working with the kids, made things a little easier. The help of my colleagues was also important because they gave me ideas, they gave me their opinion that for me it was important to develop my activity. And finally, it was the help of Professor Sandra and Professor Ana, who helped us to go the right way at the beginning of the project, giving us the right guidelines and always trying in some way to help us throughout the project." – (Project Report of Group 3)*

### **3.2.3 Students' resilience and continuous improvement**

The third category that could be identified based on the data analysis is students' resilience and continuous improvement. Being able to overcome oneself is a basic motivational component (reasons for personal fulfilment imply that the context can know the individual and what he values, believe in skills and promote autonomy). Two students referred exactly to this aspect, when identifying what was most positive about the PBL experience:

*Overcoming myself!*

*Developing my first project and being successful!*

To motivate someone implies the proactive involvement of individuals and the recognition of the practical / concrete relevance of the activity (identification with the objectives to be achieved). It is a continuous process and a journey of continuous improvement. Therefore, the importance of feedback for the implementation of improvement processes is also recognized by students.

*"This project was undoubtedly something challenging and new. I was not at all prepared and it was quite scary at first. However, as I and my colleagues developed it, it became easier because I was enjoying working. Above all, it helped me to develop my creativity, as well as discover strengths in terms of work that I didn't know I had. Although the target audience is defined and, at the outset, it is something positive, it proved, on the contrary, to be something that made our work difficult. However, these types of challenges are important and always end up being beneficial, especially in this first stage of our academic life. The project is mine, my colleague X's and my colleague X's, but without a doubt that without the help of Professor Sandra and Professor Ana we would still be at the beginning of its realization." – (Project Report of Group 3)*

*"In short, the development of this project contributed positively to our academic development, gave support to strengthen our background and our professional and, also, personal identity and the development of our critical thinking". (Project Report of Group 2)*

## 4 Final remarks: Key dimensions of PBL to enhance student motivation in the first year of university

As recognized by students involved in the present study, PBL helps students to develop effective problem-solving skills and to become active participants in their own learning by enabling them to construct knowledge, as sustained by previous studies (Levett-Jones, 2005; Loyens, Magda, & Rikers, 2008). Motivated by the opportunity to collaborate with the non-profit social organization and its target audience (children), first year students of the Social Education programme at Portucalense University mentioned that the possibility of developing a project that can have an impact on others was the main motivational drive of their involvement in the project tasks. Students were aware that PBL provided a stronger link between theory and practice and this recognition allowed them to put emphasis on the learning process, rather than on the product or the end result associated to the assessment process.

Academic motivation is also promoted by working in teams, which supports not only a deeper understanding of contents, but also engages students in strategies that allow them to work collaboratively in solving problems, reflecting on experiences, and engaging in self-directed inquiry (Hmelo-Silver, Duncan, & Chinn, 2006; Paris & Paris, 2001). Students referred assertive communication, leadership in achieving goals, concern for quality and effectiveness, self-assessment and hetero-assessment skills, conflict management skills and commitment as the most important soft skills acquired because of this teamwork.

Self-regulatory skills are of little value if students do not motivate themselves to use them. In fact, academic motivation implies the proactive involvement of students in the learning process and this, in turn, implies that students recognize the practical relevance of the activity and the objectives to be achieved. One of the most studied self-motivational beliefs is self-efficacy, which refers to an individual's beliefs about his or her capabilities to learn or perform behaviour at a defined level (Bandura, 1998). Self-efficacy beliefs are hypothesized to be mediators of behavioural change (Zimmerman, 2002; Pintrich & Schrauben, 1992) and develop from four sources: direct experiences, vicarious experiences from observing peers, persuasion by others, and personal physiological reactions (Bandura, 1998). Supporting students to learn is the super ordinate aim of higher education and the teacher is a key figure who can mediate the stress associated to the challenging experiences faced, especially by the first-year students at the university (Darling-Hammond, 2000; Rivkin, Hanushek, & Kain, 2005; Mahlerl, Großschedl, & Harms, 2018). The role and support of the teacher in classes is also a key issue. This issue was also recognized by students in our study, who considered the teachers' feedback and monitoring of extreme importance for the implementation of improvements in the groups' projects and for the development of self-regulated strategies to effectively set goals, plan and use strategies to achieve the goals established, to manage their resources, and monitor and evaluate their progress at various stages of the learning process. As previous findings already suggested, when students are responsible for their own learning, they are also more motivated to learn (Gabr & Mohamed, 2011), have higher levels of intrinsic goal orientation and task value (Sungur & Tekkaya, 2006), and use more elaboration strategies, critical thinking, and metacognition (Sungur & Tekkaya, 2006). In sum, they acquire autonomy in learning that is essential for lifelong growing knowledge and practice (van Den Hurk, 2006).

Most of the students had difficulty in identifying or anticipating the less positive aspects of their involvement in a PBL project. Nevertheless, the anticipation of possible obstacles for the achievement of the objectives established is essential to maintain motivation when these obstacles occur, namely to reorganize the behaviour necessary to achieve these objectives. In fact, students with high levels of self-efficacy are more willing to take on challenging tasks (Zimmerman, 2000). When facing a difficult learning task, a student with high self-efficacy is more likely to participate actively, work harder, remain more problem focused, and persevere for a longer time than a student with low self-efficacy, who is more likely to become frustrated and give up (Papinczak, Young, Groves & Haynes, 2008). Therefore, increasing students' self-efficacy beliefs, as happened in the present study and recognized by participants as the most important achievement of this PBL experience (*"Overcoming myself!"* and *"Developing my first project and being successful!"*), will improve students' motivation and SRL skills, and vice versa.

Summing up, the reported PBL experience contributed to the growing evidence that this methodology promotes active learning and students' intrinsic motivation, which enhances deep learning (Dolmans, Loyens, Marcq, Gijbels, 2016). At this level, self-efficacy beliefs seem to affect students' motivation through self-regulatory processes. Monitoring students' development in these skills and giving them feedback could be beneficial for the cognitive achievement, especially for students with learning difficulties and lacking study skills (Demirören, Turan, & Öztuna, 2016).

## 5 References

- Araújo, B. R., Almeida, L. S., Guisande, M. A., & Paul, M. C. (2006). Vivências e satisfação acadêmicas em estudantes do curso de enfermagem. *Revista Galego-Portuguesa de Psicología e Educación*, 13, 363-371.
- Arnett, J. (2004). *Adolescence and emerging adulthood: A cultural approach*. New Jersey: Pearson Education.
- Bandura, A. (1998). Self-efficacy. In: Ramachaudran VS, ed. *Encyclopedia of human behavior*. New York: Academic Press; 1994, Vol. 4, pp. 7181. (Reprinted In: Friedman H, ed. *Encyclopedia of mental health*. San Diego, CA: Academic Press.
- Bewick, B., Koutsopoulou, G., Miles, J., Slaa, E., & Barkham, M. (2010). Changes in undergraduate student's psychological well-being as they progress through university. *Studies in Higher Education*, 35(6), 633-645. DOI: 10.1080/03075070903216643
- Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B., Min Liu, S., & Olfson, M. (2008). Mental health of college students and their non-college-attending peers. *Archives of General Psychiatry*, 65(12), 1429-1437.
- Darling-Hammond, L. (2000). Teacher quality and student achievement. *Education Policy Analysis Archives*. 8(1),1-4.
- Davies, S., & Hammack, F. M. (2005). The channeling of student competition in higher education: Comparing Canada and the U.S. *The Journal of Higher Education*, 76(1), 89-106. <https://doi.org/10.1080/00221546.2005.11772276>
- Demirören, M., Turan, S., & Öztuna, D. (2016). Medical students' self-efficacy in problem-based learning and its relationship with self-regulated learning. *Medical Education Online*. 21, 30049. doi: 10.3402/meo.v21.30049.
- Dolmans, D., Loyens, S., Marcq, H., & Gijbels, D. (2016). Deep and surface learning in problem-based learning: a review of the literature. *Advances in Health Sciences Education*. 21(5), 1087-1112. doi: 10.1007/s10459-015-9645-6.
- Fernandes, S., Abelha, M., Fernandes, S., & Albuquerque, A. (2018). Implementação de PBL no curso de Educação Social: resultados de um estudo piloto na Universidade Portucalense. In: 10th International Symposium on Project Approaches in Engineering Education (PAEE) and 15th Active Learning in Engineering Education Workshop (ALE), 2018, Brasília – Brasil. Proceedings of the PAEE/ALE'2018. Braga: School of Engineering of University of Minho, p.446-455.
- Fernandes, S., Abelha, M., Albuquerque, A., & Sousa, E. (2020). Curricular and Pedagogic Innovation in a Social Education programme: findings from the implementation of PBL. In: 12th International Symposium on Project Approaches in Engineering Education (PAEE) and 17th Active Learning in Engineering Education Workshop (ALE), 2020, Bangkok – Thailand. Proceedings of the PAEE/ALE'2020. Braga: School of Engineering of University of Minho, p.375-384.
- Gabr, H., & Mohamed, N. (2011). Effect of problem-based learning in undergraduate nursing students enrolled in nursing administration course. *International Journal Academic Research*, 3(1), 154-169.
- Granado, J. I., Santos, A. A., Almeida, L. S., Soares, A. P., & Guisande, M. A. (2005). Integração acadêmica de estudantes universitários: Contributos para a adaptação e validação do QVA-r no Brasil. *Psicologia e Educação*, 2(4), 31-41.
- Hmelo-Silver, C.E., Duncan, R.G., & Chinn, C.A. (2006). Scaffolding and achievement in problem-based and inquiry learning: a response to Kirschner, Sweller, and Clark. *Educational Psychologist*, 42(2), 99-107.
- Levett-Jones, T.L. (2005). Self-directed learning: implications and limitations for undergraduate nursing education. *Nurse Education Today*, 25(5), 363-8. doi: 10.1016/j.nedt.2005.03.003.
- Liu, Q., & Zhao, F. (2018). Academic stress, academic procrastination and academic performance: A moderated dual-mediation model. *Journal on Innovation and Sustainability*, RISUS, 9(2), 38-46.
- Loyens, S., Magda, J., & Rikers, R. (2008). Self-directed learning in problem-based learning and its relationships with self-regulated learning. *Educational Psychology Review*, 20(4), 411-427.
- Mahlerl, D., Großschedl, J., & Harms, U. (2018). Does motivation matter? – The relationship between teachers' self-efficacy and enthusiasm and students' performance. PLOS ONE | <https://doi.org/10.1371/journal.pone.0207252>
- Papinczak, T., Young, L., Groves, M., & Haynes, M. (2008). Effect of a metacognitive intervention on students' approaches to learning and self-efficacy in a first-year medical course. *Advances in Health Sciences Education*, 13(2), 213-32.
- Paris, S.G., & Paris, A.H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36(2), 89-101.
- Pintrich, P. R., & Schrauben, B. (1992). Students' motivational beliefs and their cognitive engagement in classroom academic tasks. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom* (p. 149-183). Lawrence Erlbaum Associates, Inc.
- Reddy, K.J., Menon, K.R., & Thattil, A. (2018) Academic Stress and Its Sources among University Students. *Biomedical and Pharmacology Journal*, 11(1), 531-537.
- Rivkin, S.G., Hanushek, E.A., & Kain, J.F. (2005). Teachers, schools, and academic achievement. *Econometrica*. 73(2), 417-458.
- Schunk, D. H., & Pajares, F. (2005). Competence Perceptions and Academic Functioning. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (p. 85-104). Guilford Publications.
- Sosu E.M., & Pheunpha, P. (2019). Trajectory of University Dropout: Investigating the Cumulative Effect of Academic Vulnerability and Proximity to Family Support. *Frontiers in Education*, 4. DOI=10.3389/feduc.2019.00006
- Sungur, S., & Tekkaya C. (2006). Effects of problem-based learning and traditional instruction on self-regulated learning. *The Journal of Educational Research*, 99(5), 307-320. DOI: [10.3200/JOER.99.5.307-320](https://doi.org/10.3200/JOER.99.5.307-320)

- Trigueros, R., Padilla, A., Aguilar-Parra, J.M., Lirola, M.J., García-Luengo, A.V., Rocamora-Pérez, P., & López-Liria, R. (2020). The Influence of Teachers on Motivation and Academic Stress and Their Effect on the Learning Strategies of University Students. *International Journal of Environmental Research and Public Health*, 17(23), 9089. doi: 10.3390/ijerph17239089.
- van Den Hurk, M. (2006). The relation between self-regulated strategies and individual study time, prepared participation and achievement in a problem-based curriculum. *Active Learning in Higher Education*, 7, 155-169.
- Wu H., Li, S., Zheng, J., & Guo, J. (2020). Medical students' motivation and academic performance: the mediating roles of self-efficacy and learning engagement. *Medical Education Online*. 25(1), 1742964. doi: 10.1080/10872981.2020.1742964.
- Yune, S. J., Im, S.J., Lee, S.H., Baek, S. Y., & Lee, S.Y. (2010). Effects of Differences in Problem-Based Learning Course Length on Academic Motivation and Self-Directed Learning Readiness in Medical School Students. *Korean Journal of Medical Education*, 22(1), 23-31. <https://doi.org/10.3946/kjme.2010.22.1.23>
- Zimmerman, B.J. (2000). Self-efficacy: an essential motive to learn. *Contemporary Educational Psychology*, 25, 82-91.
- Zimmerman, B.J. (2002). Becoming a self-regulated learner: an overview. *Theory Into Practice*, 41(2), 64-70.
- Zohar, A., & Barzilai, S. (2013). A review of research on metacognition in science education: Current and future directions. *Studies in Science Education*, 49, 121-169.