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Research article

Project-Based Learning - a Tool to Increase Students' Intrinsic Motivation

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Abstract

During the past decades the world has been changing and transforming at a fast pace due to the advancements in all fields, especially the technological ones and the educational systems have been touched by these alterations. Consequently, educators and teachers are striving to adapt to the students' needs and interests. Moreover, in a society in which students feel more and more demotivated to learn, it is up to teachers to find ways to ignite students' curiosity and interest that may lead to the desired satisfaction and pleasure to learn, resuscitating the intrinsic motivation to learn. In this context, this article aims to highlight the impact of Project-Based Learning as a learning tool which can benefit the students by fostering motivation and engagement during classes due to its key feature: it is an approach which places the students in the centre of learning by encouraging them to participate in an active way and take responsibility for the entire process, thus students own the learning process which enables them to find the engagement and motivation to study within themselves.

Keywords:
motivation, project-based learning, self-determination theory (SDT)

1. Introduction

Students in Romania are highly demotivated regarding school and the educational process, according to the 2021 PISA results (OECD, 2013). They struggle to find purpose and significance in learning, as well as the spark that would guide them towards active, authentic learning, freed from the pressures of national evaluations, mock exams, tests, or simple oral assessments.

The literature has demonstrated that Project-Based Learning is an efficacious teaching strategy used by teachers not only to increase student motivation but also to foster other essential aspects of learning, such as increased interest in the subject of study, greater curiosity, and enhanced creativity. Studies recognize the importance of this method in teaching, as it enables students to acquire skills and develop competencies necessary for lifelong learning. Through Project-Based Learning, students learn to solve real-life problems, become more skilled in decision-making, and improve their time management. Furthermore, they can develop non-technical skills, such as teamwork, cooperation, communication, leadership, and project management.

2. Theoretical foundation

2.1 Project-Based Learning

Project-Based Learning (PBL) is a student-centred instructional method which engages students in the educational process in an active way, allowing them to learn by doing. The literature links Project-Based Learning with the progressive education movement of the late 19th century in the United States, where William Heard Kilpatrick first introduced the term "Project" in his work *The Project Method* (1918). The principles underlying this approach are also reflected in John Dewey's philosophy (1916), which advocates for 'learning by doing' as an essential component of effective education.

Blumenfeld et al. (1991) define Project-Based Learning as an approach in which students lead the learning process and actively engage in investigations to find solutions to real-world problems which they find relevant. Students conduct research, test hypotheses, collect and analyse data, and communicate their findings to peers, parents, or even the broader community. This approach shifts the emphasis away from rote memorization for assessment purposes, encouraging students instead to integrate the newly acquired knowledge across different contexts or disciplines.

In PBL, students play an active role in constructing new knowledge, transitioning from passive recipients of information to responsible agents of their own learning process. According to Vygotsky's social constructivism (1968), students build new knowledge collaboratively, assisted by the teacher, and learn concepts more deeply through cooperation with peers. This fosters greater involvement in learning as

students strive to solve authentic problems relevant to their interests, stimulating curiosity and leading to a deeper, more comprehensive understanding of new concepts.

As a student-centred method, Project-Based Learning reduces the teacher's role as the main provider of knowledge. Teachers take a step back, becoming facilitators of learning rather than the traditional "sage on the stage' and more like a 'guide on the side" (Nation, 2008, p. 109). According to Mergendoller et al. (2013), teachers in this setting fulfil multiple roles, from conductor and coach to process designer. While students have autonomy, the teacher remains a supervisor and moderator throughout, providing guidance and support whenever needed. Teachers also play a key role in helping students develop essential, transferable skills such as negotiation, teamwork, collaboration, communication, active listening, and respect for others' perspectives.

2.2 Motivation

The definition of motivation is challenging to provide as it lacks a comprehensive and universally accepted interpretation. Etymologically, the word 'motivation' comes from the Latin verb *movere* which means 'to move'; in other words, motivation can be understood as what drives a person to choose to engage in a particular activity. However, motivation encompasses more than mere involvement in an activity. It also determines the duration and effort an individual is willing to invest in pursuing that activity. Thus, motivation answers three essential questions:

- Why do people decide to engage in an activity?
- How much time are they willing to spend doing the activity?
- How much effort will they exert in this activity? (Dörnyei & Ushioda, 2011).

Motivation is a meta-concept that subsumes several related constructs, such as engagement, interest, persistence, and self-efficacy (Irvine, 2018). It also encompasses a variety of theories or theoretical constructs, including self-efficacy theory, goal theory, social-cognitive theory, expectancy-value theory, flow theory, attribution theory, and self-determination theory.

What are the underlying motives for sustained and enduring effort in an activity? Are these motives shaped by external factors—such as rewards, threats, fear of judgment, shame over unmet expectations, socioeconomic factors, and contextual influences—or by internal factors? What happens when a child lacks motivation to participate in an activity or to learn? Can schools effectively motivate students? Do teachers have the resources to inspire in students not only the willingness to engage but also the passion and interest to persist in a task until they find the right solution and to resist giving up at the first failure or setback?

In this paper, we examine motivation through the lens of Self-Determination Theory (SDT) (Ryan & Deci, 1985), which offers a significant foundation for understanding motivation and the factors underlying intentional behaviour. Furthermore, this theory identifies three types of motivation: intrinsic, extrinsic, and amotivation based on the motives that make people take action (Ryan & Deci, 2000). It is centred around the question why people decide to engage in an activity, having at one side a total lack of determination to act or a behaviour which is not self-determined (amotivation) to a behaviour which is self-determined (intrinsically motivated).

Individuals with intrinsic motivation engage in a task for the pleasure and satisfaction they derive from the activity itself. Intrinsically motivated behaviour is self-determined and autonomous.

Extrinsically motivated behaviours have an instrumental nature (Deci et al., 1991), meaning individuals engage in certain activities with a specific goal in mind. These two types of motivation are not opposing each other; extrinsically motivated behaviours are not necessarily non-self-determined, as it was previously assumed before the development of SDT. Deci & Ryan distinguished four types of extrinsic motivation based on the level of behavioural regulation: external, introjected, identified, and integrated (1985):

- *External Regulation*: One's behaviour is driven by reward or punishment. This type of regulation is the least self-determined behaviour. It is non-autonomous and controlled.
- *Introjected Regulation*: This type of extrinsic motivation is also a controlled form of behaviour, however an 'internally controlled' regulation (Ryan & Deci, 2020) as it has been partially internalised. Ryan uses the term' ego-involvement' (1982). One's behaviour and involvement are driven by internal rewards of self-esteem with the view to avoiding failure and anxiety or feeling guilty.
- *Identified Regulation*: Motivation where an individual values an activity and his behaviour employs a degree of willingness which aligns with a

personal identification (e.g., a student working on math because they realize that mastering the subject is essential for achieving a high exam score). The behaviour is autonomous and relatively self-determined, as it is pursued for personally valued reasons rather than external pressure.

- *Integrated Regulation*: This form is the most autonomous as people have internalized the value and the purpose of their actions, and the behaviour aligns fully with the individual's values, becoming an expression of their identity. Such behaviours are fully self-determined and typically emerge in early adulthood, which is why this type of motivation is not relevant for our study involving high school students.

This categorization of extrinsic motivation is grounded in the concept of internalization, which SDT considers a key motivational element. As noted earlier, on this continuum of internalization, behaviour which is regulated externally or introjected represents a controlled form of motivation, while autonomous forms of motivation are behaviours regulated by identification and integration. However, there is a difference between autonomous extrinsic motivations and intrinsic motivation. In the case of the latter, the person's behaviour is motivated by interest, enjoyment and pleasure they derive from an activity, whereas in the case of the former, one appreciates the value of an activity and its worthwhile function.

Amotivation is a state in which an individual lacks the intent to act. We can thus assert that intentionality defines motivated behaviour, while its absence leads to disengaged behaviour, often due to a perceived lack of competence or lack of value in an activity (Deci & Ryan, 2000).

SDT hypothesises that more autonomous forms of motivation lead to more engagement and interest in any activity. In this respect, it is essential that teachers support students' autonomy and create contexts in which students get engaged due to their interest and experience a sort of ownership of activities as a result of the choice they make. In this way, intrinsic motivation is enhanced and students become more engaged in the learning process. We consider that PBL creates the appropriate contexts to develop students' autonomous forms of motivation, especially intrinsic motivation as they choose what they want to investigate according to their interests and curiosity.

In this continuum of self-determination, intrinsic motivation lies at one end, representing fully self-determined behaviour, while amotivation, or the absence of motivation, occupies the opposite end, reflecting non-self-determined behaviour. Between these two poles lies extrinsic motivation, characterized by its four forms and varying degrees of behavioural self-determination, as illustrated in *Table 1.*

Table 1.
Self-Determination Theory's Taxonomy of Motivation (Deci & Ryan, 2017)

Behaviour	Non-self-determined					Self-determined
Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation
Regulatory Styles	Non-regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Perceived Locus of Causality	Impersonal	External	Somewhat External	Somewhat Internal	Internal	Internal
Regulatory processes	Non-valuing, Incompetence, Lack of Control	External Rewards and Punishments	Self-Control, Ego-Involvement, Self-Esteem	Personal Importance, Conscious Valuing	Congruence Awareness	Interest, Enjoyment Satisfaction

3. Research methodology

3.1 Research design

This study proposes to present key informative data highly relevant to the topic of motivation, Project-Based Learning, and the relationship between the two. The research design is quasi-experimental with two groups, namely experimental and control, being subjected to pre-test and post-test. This design with two groups which are not equivalent are referred to in the literature as a 'compromise design' as described by Keringer (1970, apud Cohen et al., 2007, p.282) as it is quite impractical in school settings to randomly assign students in the control or experimental group:

Experimental Group *V*1 *I* *V*2

Control Group *V*3 *V*4

In the experimental group, *I* represents the intervention, while *V1*, *V2*, *V3*, and *V4* denote the values obtained at the pre-test and post-test for both groups. The dotted line separating the two parallel rows indicates that the two groups were not formed randomly under laboratory conditions. The optimal sample size was determined through power analysis using the GPower software (version 3.1). For the proposed research design with two groups and an α level of .05, 68 participants (34 in each experimental condition) would be required to achieve an acceptable power level.

Accordingly, a cohort of 78 high school students in the 10th grade was selected for this study, with 38 in the experimental group and 40 in the control group. Participants were not randomly assigned to the two groups, as this is not feasible within a school setting. However, initial random assignment occurred at the start of high school, based on students' chosen academic profile and admission grade.

3.2 Research objectives, questions and hypotheses

- Research objectives:

O1: Analyse the influence of Project-Based Learning on students' motivation for learning

O2: Identify the effects of motivation types on learning

- Research Questions**:**

Q1: To what extent does Project-Based Learning influence students' motivation for learning?

Q2: What types of motivation develop during Project-Based Learning?

- Research Hypotheses

H1: Students' motivation for learning will increase during Project-Based Learning.

H2: Intrinsic motivation will increase during Project-Based Learning.

H3: Extrinsic motivation will decrease during Project-Based Learning.

3.3 Variable and measurement instrument

This study measured the variable *motivation for learning* using a self-assessment tool entitled the *Academic Motivation Scale (AMS)*. This instrument is an adaptation of the *Academic Motivation Scale - College (AMS-C 28)* developed by Vallerand et al. (1992) and adapted for the Romanian educational system by Amalia Miulescu (2019). Miulescu's research established a tool for evaluating motivation within the Romanian academic setting that adhered to the necessary psychometric standards. The findings aligned with existing literature and reinforced the factorial structure, reliability, and predictive validity of the Romanian adaptation of the AMS. The study validated the seven-factor structure of the scale and demonstrated satisfactory psychometric properties for this version, with Cronbach's alpha values ranging from .69 to .87 and an average of .81.

The AMS evaluates high school students' academic motivation based on Self-Determination Theory, identifying three types of motivation which are grouped into seven dimensions: intrinsic motivation (subdivided into motivation to know, motivation towards accomplishment, and motivation to experience stimulation), extrinsic motivation (with regulatory types of identification, introjection, and external), and amotivation.

The scale includes 28 items which are grouped in seven subscales with four items each that respond to the dimensions previously mentioned with responses were measured using a seven-point Likert scale, ranging from total disagreement (1) to total agreement (7) with a midpoint, neutral (4). Examples include:

- 'Honestly, I don't even know why I waste my time coming to English class' (amotivation);
- 'Because, without English, I won't get a well-paying job in the future' (external regulation);
- 'To prove to myself that I am capable of achieving a high grade in this subject' (introjected regulation);
- 'Because I believe the information from English class will help me in my chosen career' (identified regulation);
- 'For the pleasure I feel when I discover new things in English class' (intrinsic motivation to know);
- 'Due to the enjoyment I feel when I surpass myself in tasks given in class' (intrinsic motivation toward accomplishment);
- 'For the pleasure I feel when reading interesting authors suggested by the teacher in class' (intrinsic motivation to experience stimulation) (Vallerand et al. (1992).

According to the instructions given in the description of the instrument, the answers for questions 5, 12, 19, 26 have been reversed. The total score was obtained by summing up all 28 items, as well as calculating individual scores for each of the three subscales of the instrument (extrinsic motivation, intrinsic motivation, and amotivation). The Cronbach's alpha coefficients for the AMS questionnaire ranged from α = .88 at the pre-test stage to α = .87 following the intervention. The scale was administered to both groups, experimental and control at the beginning and at the end of either the intervention for the experimental group or the traditional teaching of the subject for the control group. The completion of the test took 20 minutes and it was a pen and paper completion during the English class. Regarding ethical aspects which were involved, the students' parents or legal representatives have been informed about the purpose of the study and the fact that the students' participation in the study is voluntary and parents need to give their informed consent to it. Students have been informed as well about the possibility of withdrawal from the study at any time if considered. The AMS scale was anonymous, students didn't have to sign the answer form. We have emphasized the necessity of objectivity and honesty in completion of the AMS scale.

4. Results and discussion

Table 2.

Descriptive statistical data for the control and experimental conditions regarding the studied variable

	Experimental group		Control group	
Variable	*M*	*SD*	*M*	*SD*
AMS_pre_Extrinsic Motivation_Identified Regulation	21.89	4.90	19.03	4.64
AMS_pre_Extrinsic Motivation_Introjected Regulation	20.39	5.07	18.72	7.46
AMS_pre_Extrinsic Motivation_External Regulation	22.74	4.69	21.77	4.63
AMS_pre_Intrinsic Motivation_ To Know	21.74	3.77	19.82	4.70
AMS_pre_Intrinsic Motivation_Towards Accomplishment	19.66	4.41	17.85	5.91
AMS_pre_Intrinsic Motivation_To Experience Stimulation	16.50	4.07	13.97	6.03
AMS_pre_Extrinsic Motivation_Total	65.03	12.12	59.51	13.34
AMS_pre_Intrinsic Motivation_Total	57.89	9.89	51.64	15.47
AMS_pre_Amotivation	25.58	4.26	23.23	5.49
AMS_post_Extrinsic Motivation_ Identified Regulation	20.55	5.83	21.48	3.94
AMS_post_ExtrinsicMotivation_ Introjected Regulation	19.95	4.89	18.79	5.55
AMS_post_Extrinsic Motivation_ External Regulation	20.74	6.04	22.57	4.88
AMS_post_Intrinsic Motivation_ To Know	22.11	4.08	19.18	4.01
AMS_post_Intrinsic Motivation_ Towards Accomplishment	20.84	3.82	16.80	5.42
AMS_post_Intrinsic Motivation_To Experience Stimulation	18.32	3.87	13.35	5.37
AMS_post_Extrinsic Motivation_Total	61.24	14.75	62.60	10.91
AMS_post_Intrinsic Motivation_Total	61.26	10.42	49.33	12.62
AMS_post_Amotivation	25.61	4.18	22.45	5.25

Note: M = Mean; *SD* = standard deviation.

Regarding the level of motivation displayed by students before and after the intervention, it can be stated that, for the experimental group, the projects in which they participated positively influenced intrinsic motivation. The total mean intrinsic motivation score increased from 57.89 before the intervention to 61.26 after the intervention, emphasising a significant increase in overall intrinsic motivation.

The table below illustrates the increase in the mean intrinsic motivation score after the intervention for the experimental group, as well as the decrease in the mean intrinsic motivation score following traditional instruction for the control group, both for each subscale and the overall score.

When examining the three subscales of intrinsic motivation—namely, intrinsic motivation to know, intrinsic motivation towards accomplishment, and intrinsic motivation to experience stimulation—we observe an increase in the mean scores across all three subscales: from (21.71, 19.66, 16.50) before the intervention to (22.11, 20.84, 18.2) after the intervention.

We can conclude that Project-Based Learning, as an innovative teaching method, can be used by educators to enhance students' intrinsic motivation for

learning, as students become more engaged in project tasks, discover an interest in collaborative project work as they can choose the topic and are stimulated by challenging tasks, all of which foster a desire to independently explore new ideas, rather than merely completing a task assigned by the teacher.

Table 3.
Values of intrinsic motivation for experimental and control groups

Subscale of intrisic motivation	Increase after the intervention Experimental group	Increase after teaching Control group
Motivation to know	0.4	0.64
Motivation towards accomplishment	1.18	1.05
Motivation to experience stimulation	1.82	0.62
Intrinsic motivation-total	3.37	2.31

In the control group, the mean intrinsic motivation score declined after traditional instruction of the same lesson, from 51.64 before instruction to 49.33 afterwards. Analysing the three subscales of intrinsic motivation—motivation to know, motivation towards accomplishment, and motivation to experience stimulation—the pre-instrustruction means were 19.82, 17.85, and 13.97, respectively. After traditional instruction, these means decreased to 19.18, 16.80, and 13.35. The smallest decline was observed in the third subscale, motivation to experience stimulation. This may suggest that the novelty of the topics discussed during instruction ("The Pink Tax" and "The Drug Trap") could have encouraged student engagement and curiosity for learning new concepts, even within the traditional teaching framework where the teacher delivers all information.

Table 4.
Values of extrinsic motivation for experimental and control groups

Subscale of extrinsic motivation	Decrease after intervention Experimental group	Increase after teaching Control grup
External regulation	2.00	0.8
Introjected regulation	0.44	0.07
Identified regulation	1.34	2.45
Extrinsic motivation- total	3.79	3.09

Regarding extrinsic motivation, the total mean score for the experimental group declined significantly from 65.03 before the intervention to 61.24 after the intervention.

Overall, it can be suggested that students' engagement during classes is often motivated by the anticipation of a reward, most commonly a grade. In the case of the project work completed, however, participation was not conditioned by receiving a grade. Thus, students' attitudes towards learning were less influenced by external rewards, and their project engagement was not dependent on extrinsic factors, with the most substantial decrease observed in external regulation (from 22.74 before the intervention to 20.74 afterward).

The situation is different for the control group, where total extrinsic motivation increased from 59.1 before traditional instruction to 62.60 after traditional instruction as well as two of the subscales. This indicates that students are learning primarily because the teacher has imposed it upon them or constrained them to do so, rather than finding satisfaction in the learning process itself.

Table 5.
Values of amotivation for experimental and control groups

Amotivation	Increase after intervention Experimental group	Decrease after teaching Control group
Amotivation	0.03	0.78

Regarding amotivation, there is no significant difference between the pre-intervention and post-intervention means, with values of 25.58 and 25.61, respectively; the difference being only 0.03. This demonstrates that students who lack motivation to engage in any activity are resistant to most teaching methods, whether innovative or traditional. A similar situation is observed in the control group, where there is a slight decrease following traditional instruction, from 23.23 to 22.45, a difference of 0.78.

5. Conclusions

Project-based learning (PBL) is an educational tool that places students at the core of the learning process. Research findings indicate that its use as an instructional method positively influences the educational process by enhancing students' motivation to study, particularly their intrinsic motivation.

Motivation serves as the source of engagement in an activity, persistence in carrying it out, and the energy expended in completing tasks. Although the initial impetus for stimulating motivation may be external—referring here to extrinsic motivation, such as rewards, high grades, or feelings of shame or fear—

students' behaviour can be regulated so that this external control diminishes, allowing for self-determined behaviour. This self-determined behaviour involves valuing tasks and integrating them systematically, so that the reason students engage is the pleasure of learning new things, the satisfaction of achieving certain outcomes, or simply the experience of being so deeply engaged in an activity that nothing else seems to matter, as articulated by Csikszentmihalyi's (2014) flow theory.

It is desirable for intrinsic motivation to be activated at the expense of extrinsic motivation, as we want our students—future college students and, later, young professionals eager to perform in the workplace and succeed—to value effort and engagement in task completion for the enjoyment and satisfaction they feel when discovering something new or finding an interesting solution. Grades and tests that students study for hinder this natural developmental process and tend to control student behaviour, leading to negative effects on their engagement and interest in tasks (Ryan & Deci, 2017). Furthermore, the pressure of grades "diverts students' natural tendency to understand, explore, and be creative" (Ulrich, 2016, p. 66).

Despite the positive acknowledgment of the influence of project-based learning on student motivation, there are challenges in implementing this method for both students and teachers. It is important to note that implementing this teaching method is difficult for teachers without adequate prior training. A lack of experience in managing student work throughout projects can negatively impact overall outcomes. Additionally, for the method to be effective, students should be familiar with it from an early age, as studies have shown. At the same time, the novelty of the method may have positively influenced students, yet the challenges faced by teachers compel us to continue researching this field.

Further research is necessary to determine whether student motivation may be influenced not by the teaching method itself, but by the level of motivation of the teachers, as they support the learning process. Students' attitudes toward learning may be affected by teachers' attitudes and motivation.

Students with low motivation or those lacking motivation who studied using the project-based learning method did not show subsequent improvements in motivation. Researchers have explained that these results stem from the fact that individuals tend to avoid activities in which they do not excel. It would be interesting to investigate whether students' self-efficacy aligns with the effectiveness of the method. This would suggest that the use of project-based learning could be particularly effective for those students who are highly motivated and confident in their high competence in task resolution and the success of their work.

Authors note:

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