

## Article

# Learning through Challenges and Enigmas: Educational Escape Room as a Predictive Experience of Motivation in University Students

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**Abstract:** (1) Background. One of the most innovative gamification techniques emerging in the current educational context is the escape room, whose implementation aims to promote student motivation and learning. A review of the literature shows that many of the previous works lack a solid theoretical basis when it comes to explaining the motivational effects associated with student participation in this experience. Therefore, the aim of this study is to analyze the relationship between gamification and motivation and identify which dimensions of gamification experience—through an educational escape room—better predict students' motivation, based on the framework of self-determination theory. (2) Methods. This research develops a quantitative and correlational methodology. A total of 135 first-year university students participated. (3) Results. The results of the regression models showed that creative thinking, activation, and dominance predicted intrinsic motivation toward knowledge, achievement, and stimulating experiences. Likewise, a higher level of negative affect was predictive of amotivation and external regulation motivation in students. (4) Conclusions. These findings provide new empirical evidence that could guide the design of educational experiences through escape rooms in the context of higher education.



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**Keywords:** gamification; educational escape room; motivation; learning; higher education

## 1. Introduction

Recent research warns that part of the university student body, especially in the first academic year, may not have or make use of fundamental skills to successfully meet the demands of academic life, experiencing demotivation and loss of interest, physical and psychological exhaustion, lower performance [1], and even early dropout [2,3]. Current trends require responding to generations of students who need to see their academic goals and expectations met. This entails the responsibility of teachers and institutions to innovate in emerging methodologies that seek to incorporate strategies in the classroom that increase student motivation and engagement, trying to provide all possible tools and resources to promote autonomous and meaningful learning [4].

Different studies highlight the decisive role of teaching methodology and, specifically, of gamification, as a strategy to promote motivation in university students [5]. Gamification is defined as the use of strategies, models, dynamics, mechanics, and game elements in non-game contexts to transmit a message or content, or to change a behavior through a playful experience that promotes motivation, involvement, and fun [6] (p. 25). In this sense, research corroborates that fun as a learning formula should be linked to the educational environment [4], overcoming the master-lesson model, where memory is the center of learning. This must be replaced by a learning model where the subject is the protagonist of the process. Thus, different studies suggest that students who learn through gamified environments increase their motivation to learn and their commitment to the task to be performed [7]. However, some authors point out that although a large body of work

indicates more positive than negative or no results of gamification on student motivation, many of them lack a solid theoretical basis when it comes to explaining such motivational effects [8], so it could be said that the question of how gamification motivates students has not been addressed in sufficient depth [9]. Given that gamification can take many forms and can combine various elements in game design, it is inadvisable to study the motivational effects of gamification from a unidimensional perspective of these constructs. In this sense, to advance research on gamification in education, it is recommended to apply psychological theories of motivation [8].

One of the most influential approaches to the study of educational motivation is the self-determination theory of Deci and Ryan [10]. These authors propose different types of motivation based on the interaction between the innate psychological needs of the individual and the environment, highlighting three principles: autonomy, competence, and relatedness [11]. All three elements can be promoted from a gamified environment [8]. According to Baard et al. [12], competence is connected to the learner's motivation to overcome the challenges presented and achieve success. The need for autonomy is related to willingness and decision making with the student being responsible for his or her own actions. Finally, the need for relatedness has to do with connection with others and is based on interdependence and mutual respect among people [11–13]. Thus, motivation is understood as a multidimensional construct that places the person along a continuum, from self-determination, or autonomous and voluntary behaviors towards an activity (Intrinsic Motivation), to the search for external rewards (Extrinsic Motivation) and finally the absence of control of these or demotivation (Amotivation) [14]. Following the line of the self-determination continuum, Intrinsic Motivation (IM) is the behavior characterized by being carried out autonomously, voluntarily, and consciously, thus making the activity or task pleasurable and satisfying for the learner [15,16]. In a second categorization is Extrinsic Motivation (EM), which refers to the performance of an activity to obtain rewards or avoid punishment, i.e., the behavior has meaning because it is directed to an end and not for its own sake (instrumental value). Lastly, it is worth mentioning Amotivation, which appears when the student feels totally unmotivated, incompetent, and incapable of acting to obtain a desired result [14].

In order to motivate students towards learning, gamification through the escape room emerges as one of the most innovative techniques in the current educational context [17,18]. Educational escape rooms are games whose objective is that several teams of students manage to remove themselves from an enclosed space in which a disturbing event is going to happen [19]. Each group of students must cooperate to solve the riddles that lead to the codes or keys that will unlock the door within a time given by the teacher. The riddles to be overcome can be based on logic tests, search tests, riddles and puzzles, mathematics, etc. The way in which these are located in classrooms or educational spaces depends on the narrative and the objectives pursued with the experience, being able to propose linear, open, or multi-linear route designs when organizing the different challenges [20]. Its implementation allows students to acquire abilities and skills, learn to work in a group, and attend to the opinions of others [7]. Furthermore, gamification through escape rooms provides motivation to students, by presenting knowledge in an attractive way and achieving commitment and development of collaboration skills, empathy, and problem solving [5]. In the same way, it is important to highlight that thanks to the implementation of this educational methodology, group cohesion is fostered, facilitating immersion in learning, as well as an alternative evaluation [7].

As mentioned, self-determination theory focuses on the basic psychological and intrinsic needs that can be fostered from a gamified environment [8]: competence, autonomy, and the need for social relatedness [11]. According to the study by Cavalcati et al. [21], gamification of educational content through problem solving is not only task-focused, but also emphasizes competence, autonomy, and social relatedness, which in turn are associated with increased intrinsic motivation in students [11]. In this line, Apostol et al. [22] argue that gamification can promote intrinsic motivation as long as it contains challenges

to overcome, awakens the curiosity of students, allows the ability to control, and contains fantasy elements. In this line, some research confirms that the implementation of the educational escape room has been associated with factors related to IM, such as an improvement in students' social relations and a greater predisposition to collaboration [7], optimization of the level of concentration and learning [18], leadership and teamwork skills [23], critical thinking and problem solving [24], etc. In addition, in a recent study, positive values were obtained in the dimensions of enjoyment/fun, degree of absorption, creative thinking, dominance, and activation after the implementation of an escape room as a didactic strategy in master's degree students [18]. On the other hand, when gamification has the basic purpose of encouraging only student participation in the classes, it provides ME focused on the completion of the various academic activities proposed [21]. Following [4–7], to gamify an activity it is necessary to find the right way to motivate university students, especially in the first academic year, by finding an appropriate moment and taking into account that motivational mechanisms can be enhanced through certain elements of the game [5].

Likewise, some studies suggest that escape rooms may not be free of negative effects [24]. Several papers have found that escape room games can induce a high level of tension, annoyance, hostility, and frustration in participants [24,25]. Despite this, the benefits of integrating this tool in the classroom seem to outweigh the risks of its implementation [18]. In this line, the academic demotivation and loss of interest in studies experienced by a good part of university students in their first courses [2], aspects associated with the experience of greater negative affect in the academic context [26], lower expectations and lessen persistence when learning and committing to tasks [27], which is a matter of concern. It is worth noting that the traditional educational system has been fundamentally based on EM, neglecting the potential of IM that provides a highly pleasurable sensation when acquiring new knowledge and learning [28]. It is worth highlighting at this point the role of the teacher as a facilitator of stimulating experiences that strengthen self-determined motivation and the socio-affective and cognitive development of students. Thus, the educational escape room emerges as a tool to promote student motivation, manifesting itself as a powerful resource in favor of the pursuit of learning.

After a review of the previous literature, it is observed that there are no studies that analyze the effect of the escape room on motivation as a multidimensional construct defined from the framework of self-determination theory. Given the limitations found in previous studies, this work is proposed with the aim of providing new empirical evidence to help in the design and implementation of educational escape rooms with the purpose of increasing intrinsic motivation towards learning in first-year university students, when demotivation and the prevalence of early dropout have a higher incidence [2,3]. Therefore, this study analyzes the relationship between the dimensions of games boosted through the gamified escape room experience with respect to IM, EM, and Amotivation factors in first-year university students. In addition, this study identifies the specific dimensions of the game that are predictive of each type of motivation when we take them into account altogether. Specifically, we propose the following research hypotheses:

**Hypothesis 1.** *the dimensions of games boosted through the gamified escape room experience (fun, absorption, creative thinking, activation, dominance) will be positive and significantly associated with the IM-dependent variables (IM to knowledge, IM to achievement, IM towards stimulating experiences), and negative and significantly associated with the dependent variables of EM (EM identified regulation, EM introjected, EM external regulation) and Amotivation, with the exception of the negative affect game factor that will be inversely and significantly associated with the mentioned dimensions.*

**Hypothesis 2.** *dimensions of games boosted through the gamified escape room experience (fun, absorption, creative thinking, activation, dominance) will have a predictive effect on the dependent variables of IM (IM to knowledge, IM to achievement, IM towards stimulating experiences) while negative affect will predict EM (EM identified regulation, EM introjected, EM external regulation) and Amotivation.*

## 2. Materials and Methods

### 2.1. Participants

A total of 135 male and female students in the first year of the Primary Education Teaching Degree at the University of Zaragoza (Spain) participated in this study. Of these students, 17.8% were male and the rest were female, with a mean age of 18.6 years ( $SD= 2.9$ ). The participants were selected through convenience sampling. The justification for this selection is based on the fact that the researchers have taken as study subjects the students participating in the gamified educational escape room experience. As has been shown in other impact research [17–29] and as described in the following sections, the sample and the reliability obtained in this study are adequate for the type of analysis presented.

### 2.2. Independent Variables

*Sociodemographic data questionnaire.* The gender (female/male/non-binary) and age of the participants were collected.

*Gamified Game Experience Scale (GAMEX, Eppmann et al. [30], validated in the Spanish population by Parra-González and Segura-Robles [31].)* This self-report evaluates gamified experiences. It is composed of 27 items grouped through six subscales evaluated through a five-point Likert scale (1 = Strongly disagree; 5 = Strongly agree): Fun e.g., “playing was fun”; Absorption e.g., “playing made me forget where I am”; Creative thinking e.g., “playing sparked my imagination”; Activation e.g., “while playing I felt active”; Negative affect e.g., “while playing I felt annoyed”; Dominance e.g., “while playing the game I felt confident”. We have used summative scores to calculate the factors. Cronbach’s alpha coefficients for this study were, respectively, 0.84, 0.89, 0.88, 0.77, 0.80, 0.76.

### 2.3. Dependent Variables

*Educational Motivation Scale (EME-E, Vallerand et al. [32], validated in the Spanish population by Núñez et al. [14].)* This self-report scale evaluates different types of motivations within the self-determination continuum, and each of the items are responses to the question “Why do you go to college?” through a Likert scale (1 = Strongly disagree; 5 = Strongly agree). The scale consists of 28 items grouped across seven subscales of four items each. MI (MI to knowledge: e.g., “Because for me it is a pleasure and satisfaction to learn new things”; MI to achievement: e.g., “For the satisfaction I feel when I excel in my studies”; and MI to stimulating experiences: e.g., “For the intense moments I experience when I communicate my own ideas to others”). Three types of EM (external regulation: e.g., “To have a better salary in the future”; introjected regulation: e.g., “To prove to myself that I am capable of finishing a university degree”; and identified regulation: e.g., “Because it will help me to better choose my professional orientation”). Lastly, Amotivation: e.g., “I don’t know; I can’t figure out what I’m doing in college”. We have used summative scores to calculate the factors. Cronbach’s alpha coefficients for this study were, respectively, MI: 0.90, 0.87; 0.85; ME 0.78, 0.87, 0.80; Amotivation: 0.84.

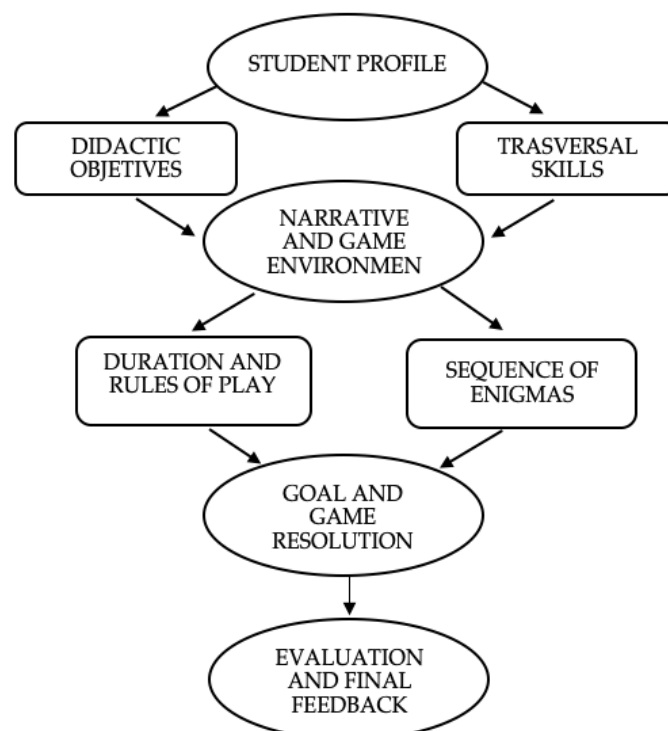
### 2.4. Procedure

Data for this study were collected through a Google questionnaire consisting of sociodemographic variables (gender and age) and several validated questionnaires. Students were informed about the purpose of the study. They were also informed about the voluntary nature of participation in the study, ensuring anonymity and referring to the data protection policy. The questionnaire was conducted after the gamification experience. Likewise, the questionnaire items referred to the escape room experience. The responsible researchers were present during its application to verify the correct completion of the questionnaire. The time required to complete the questionnaire was approximately 15 min. Finally, the participants were thanked for their collaboration with this research.

In order to carry out this study, an educational escape room was designed with the participation of four groups of students of the Primary Education Teaching Degree in the subject of General Didactics and Curriculum taught at the University of Zaragoza. The

gamified experience was carried out in the reference classroom and lasted 45 min. The objective of the activity consisted of students solving challenges and enigmas related to the contents of the subject. The escape room was built by means of five riddles taking as a reference each of the topics taught in the subject. Each test led to obtaining a number that formed a final five-digit key. This key unlocked a safe containing the key to the classroom to escape and a map of the faculty indicating the location to find the final reward. The winning team earned an increase in a few tenths in their final grade for the course. To make the experience truly immersive, a safe, old newspapers, boxes with padlocks, markers, blue light flashlights, as well as disturbing videos that told the narrative story of the escape room were used.

For the design of the educational escape room, a series of phases have been followed, which are shown in the diagram below (see Figure 1). The first phase in the design of the educational escape room is to adapt it to the profile of the target audience, in our case first-year university students. It is essential that the escape room is aimed at a specific group, the students who are going to participate in the game, and that we take into account their age and academic level when designing it. After that, the learning objectives and the transversal competencies that we want to work on in the game must be planned. Subsequently, the narrative and setting must be designed, which are central elements in any educational escape room, so that the game is immersive and students are motivated to learn. The same will be true for the creation of the rules and the duration of the game, which will be linked to the design of the previous phases. In addition, it will be necessary to create and design puzzles related to academic subjects that will lead to the planning of the last point of the game, the climax or final goal, with the resolution of the escape room. Finally, it will be important to design how we are going to evaluate and how we want our students to give us feedback to improve in future editions of the game.



**Figure 1.** Educational escape room design phases.

### 2.5. Ethical Considerations

The present study was approved by the Research Ethics Committee of the Community of Aragon (CEICA) on 7 November 2022, ensuring its relevance based on the requirements of Law 14/2007 on biomedical research.

## 2.6. Data Analysis

The SPSS Statistics 24.0 statistical package was used to process the data analysis. The study was carried out using a quantitative and correlational methodology. First, Cronbach's alpha reliability and normality indices were calculated for each variable studied, showing that they are suitable for the analysis. Next, descriptive and Pearson correlation analyses of the study variables were performed. Finally, linear regression models (Stepwise Forward method) were constructed from the gamification independent variables (Fun, Absorption, Creative Thinking, Activation, Negative Affect, and Dominance) to observe their predictive effect on the dependent variables (IM to knowledge, IM to achievement, IM to stimulating experiences, EM external regulation, EM introjected regulation, EM identified regulation, and Amotivation). The procedure employed was to introduce into the models the factors that presented significant bivariate correlations in the previous analyses. In order to synthesize the abundant amount of data, only the final models that explained a higher percentage of the variance where all factors were significant (at least  $p < 0.05$ ) are presented.

## 3. Results

The results are presented below according to the study hypotheses.

*Correlation analysis between the dimensions of the Gamified Game Experience Scale (GAMEX) and the dimensions of the Educational Motivation Scale (EME-E).*

Regarding H1, Pearson correlations showed positive and significant relationships between game variables and motivation dimensions. First, the game variable "Negative affect" was positively and significantly related to the dimensions of "Amotivation" ( $p < 0.01$ ) and "EM External regulation" ( $p < 0.01$ ). Second, a positive and significant relationship was observed between the game variable "Activation" and the dimensions "IM to Knowledge" ( $p < 0.05$ ) and "IM to Achievement" ( $p < 0.05$ ). Third, the game variable "Creative Thinking" was positively and significantly related to the dimensions "IM to Knowledge" ( $p < 0.01$ ), "IM to Achievement" ( $p < 0.01$ ), and "IM toward Stimulating Experiences" ( $p < 0.01$ ). Fourth, the game variable "Absorption" was positively and significantly related to the dimensions "IM to Knowledge" ( $p < 0.01$ ) and "IM toward Stimulating Experiences" ( $p < 0.05$ ). Fifth, the play variable "Fun" was positively and significantly related to the dimension "IM to Knowledge" ( $p < 0.05$ ). Sixth, the game variable "Dominance" was positively and significantly related to the dimension "IM to Stimulating Experiences" ( $p < 0.01$ ). However, no correlations were found between the game variables and the dimensions "EM Introjected regulation" and "EM Identified regulation". The effect size of the correlations was mainly medium-low [33]. The descriptive results as well as the correlation results are presented in Table 1.

**Table 1.** Pearson's descriptive and correlation analyses between the dimensions of the Gamified Game Experience Scale (GAMEX) and the dimensions of the Educational Motivation Scale (EME-E) after the educational escape room experience.

	M (Gamex)	SD (Gamex)	Min/Max (Gamex)	M_F1	M_F2	M_F3	M_F4	M_F5	M_F6	M_F7
1. Fun	27.5	3.0	17/30	-0.03	0.03	0.06	0.10	0.19 *	0.09	0.14
2. Absorption	23.6	5.3	6/30	-0.07	0.00	-0.08	0.10	0.25 **	0.14	0.21 *
3. Creative thinking	17.1	3.0	8/20	-0.09	-0.02	-0.04	0.17	0.33 **	0.44 **	0.25 **
4. Activation	16.2	2.9	6/20	-0.06	-0.03	-0.02	0.16	0.21 *	0.42 **	0.11
5. Negative affect	6.4	3.0	3/15	0.35 **	0.36 **	0.16	0.02	-0.60	0.32	0.12
6. Dominance	13.5	3.3	6/20	-0.11	0.11	0.16	0.09	0.15	0.15	0.29 **
M (Motivation)	-	-	-	7.2	13.0	13.2	16.7	16.0	16.0	12.2
SD (Motivation)	-	-	-	3.7	3.4	4.6	3.2	3.6	3.7	4.0
Min/Max (Motivation)	-	-	-	4/20	4/20	4/20	5/20	4/20	4/20	4/20

Note: M = mean; SD = standard deviation; \* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; M\_F1: Amotivation; M\_F2: EM External regulation; M\_F3: EM Introjected regulation; M\_F4: EM Identified regulation; M\_F5: IM to Knowledge; M\_F6: IM to Achievement; M\_F7: IM to Stimulating experiences.

*Linear regression analysis. Prediction of the dimensions of motivation as a function of the factors of the GAMEX scale.*

In relation to H2, simple linear regression analyses were performed to study the effect of the game dimensions on the different motivations of university students after the educational escape room experience. To construct the models, the factors that presented significant bivariate correlations in the previous analyses were introduced. Below are the final predictive models where all variables were significant (at least  $p < 0.05$ ) and explained a higher percentage of the variance (Table 2).

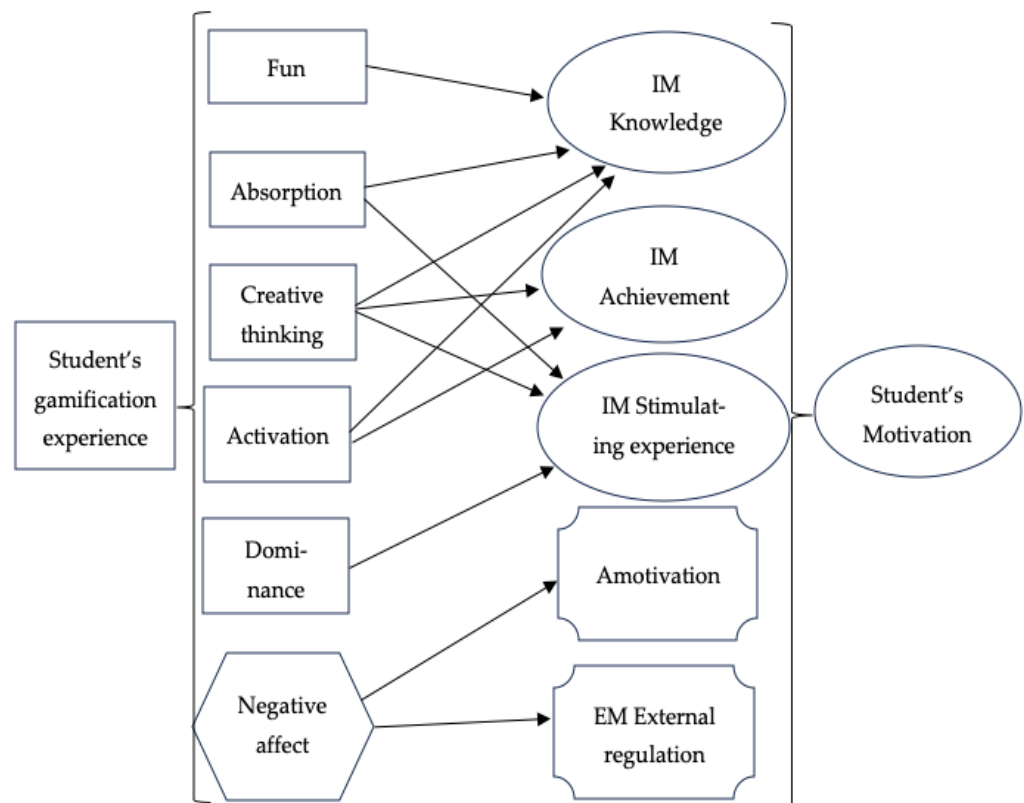
**Table 2.** Simple linear regression analysis of student motivation as a function of gamification dimensions after the educational escape room experience.

	B	S.E.	t	F	CI 95%
<b>Amotivation</b>					
Negative affect	0.347	0.09	4.265 **	18.188	0.222/0.605
<b>EM External regulation</b>					
Negative affect	0.359	0.07	4.441 **	19.721	0.188/0.490
<b>IM to Knowledge</b>					
Creative thinking	0.391	0.09	4.030 **	16.240	0.199/0.583
<b>IM to Achievement</b>					
Creative thinking	0.284	0.10	2.775 **	18.577	0.81/0.481
Activation	0.208	0.10	2.240 *		0.27/0.439
<b>IM Stimulating experiences</b>					
Creative thinking	0.215	0.09	2.445 *	9.571	0.045/0.429
Dominance	0.214	0.10	2.553 *		0.048/0.459

Note: B = standardized coefficient; S.E. = standard error; CI = confidence interval; \*\* =  $p < 0.01$ ; \* =  $p < 0.05$ .

Firstly, for the model obtained with the dependent variable “Amotivation”, the independent variable “Negative affect” entered the equation (coefficient B = 0.347;  $p = 0.000$ ). This model obtained a predictive model estimate of 11% (adjusted  $R^2 = 0.114$ ). Secondly, when we took “EM External regulation” as the dependent variable, the dimension “Negative affect” entered the equation (coefficient B = 0.339;  $p = 0.000$ ). This model obtained a predictive model estimate of 12% (adjusted  $R^2 = 0.123$ ). Thirdly, when we took “IM to Knowledge” as the dependent variable, the independent variable “Creative thinking” entered the equation (coefficient B = 0.330;  $p = 0.000$ ). This model obtained a predictive model estimate of 12% (adjusted  $R^2 = 0.123$ ). Fourthly, when we took “IM to Achievement” as the dependent variable, the independent variables “Creative Thinking” (coefficient B = 0.284;  $p = 0.000$ ) and “Activation” (coefficient B = 0.229;  $p = 0.05$ ) entered the equation. This model obtained a predictive model estimate of 21% (adjusted  $R^2 = 0.208$ ). Lastly, when we took as the dependent variable “IM Stimulating experiences” the independent variables “Creative thinking” (coefficient B = 0.215;  $p = 0.05$ ) and “Dominance” (coefficient B = 0.214;  $p = 0.05$ ) entered the equation. This model obtained a predictive model estimate of 11% (adjusted  $R^2 = 0.113$ ).

Results obtained from the regression analysis are exposed in the next Figure 2.



**Figure 2.** Gamification dimensions as predictors of students' motivation.

#### 4. Discussion

The main objective of this research has been to analyze the predictive capacity of the different dimensions of games boosted through the gamified escape room experience on the motivation of university students. The findings of this study provide new clues about the functionality of the escape room as a tool to promote intrinsic motivation in students. Thus, our results allow us to affirm that the emotional system of students is activated through participation in this gamified experience, creating self-determined motivation, and this, to the extent that it predisposes to action induced and maintained by these emotions, favors learning [28]. In particular, the data obtained show that fun, absorption, creative thinking, and emotional arousal (activation) are related to IM toward knowledge, creative thinking, and emotional arousal, which are associated with IM toward achievement, while absorption, creative thinking, and dominance are related to IM toward stimulating experiences. On the other hand, greater negative affect (annoyance, hostility, and frustration) during play was associated with external ME regulation and academic demotivation of the student body. As in previous studies [24,25], our results suggest that escape rooms may not be free of negative effects inducing negative affect and stress in some students. Despite this, the effects of the escape room on students' intrinsic motivation outweigh the risks of implementing this tool [24], as it is more than interesting to generate a learning context in which future education professionals have to face situations in which emotional management and cooperation are necessary, given the relevance of these competencies in their future teaching work.

It should be noted that the creative thinking developed during the game was predictive of IM toward knowledge, IM toward achievement, and IM toward stimulating experiences. Creative thinking is a cognitive activity that functions as a strategy in the formulation, construction, and resolution of situations and problems, both in everyday life and in learning contexts [34]. It is an ability that involves everything from basic psychological processes, such as perception, to more complex processes, such as the processing and organization of information, in addition to other personal variables such as motivation,



openness to experience, and emotion [35]. Creative thinking is associated with a state described as flow [36], in which the learner is truly engaged in pursuits that bring pleasures without any promise of external reward. As has been confirmed in previous studies, it could be said that the educational escape room is a powerful resource to enhance students' creative thinking [37], and with it, the satisfaction of learning new things, participating in stimulating experiences, and engaging with academic goals.

Likewise, the activation and the sense of mastery of the students predicted IM towards achievement and IM towards stimulating experiences. The curiosity aroused in the students by the escape room favors an attitude of activation and predisposition for awakening IM for exploring the unknown. In line with previous studies [38], our results show that the different challenges and enigmas stimulate curiosity and interest in the content of the subject. Therefore, it can be affirmed that the educational escape room is a novel tool that seems to increase students' attention. In addition, an adequate design of this contributes to the perception of mastery or personal control, thus favoring the degree of self-control over the learning process and increasing the motivational potential of students. The narrative and the riddles created for the escape room should promote the development of feelings of control and efficacy regarding the students' personal ability to face the challenges. Therefore, it is advisable that prior to the development of the activity, teachers clearly specify the didactic objectives and present a motivating proposal through different activities that satisfactorily develop the learning process.

Finally, negative affect during the game predicted greater demotivation and external ME regulation in the students. This result coincides with previous studies [24,25,38] that indicate elevated levels of annoyance, hostility, frustration, and stress in some students during the educational escape room experience. Our results suggest that escape rooms may not be free of negative effects. The competitiveness generated by the game has been found to be associated with numerous factors such as personal ability to manage emotions, sense of dominance and resilience [39], or the magnitude of the prize [40]. In relation to this last aspect, it is possible that the increase in a few tenths in the final grade of the subject that was offered to the winning team originated frustration in other groups of students, although this reward was not notified to the students until after the game was over. At the same time, a lower ability to manage emotions and a lower sense of dominance and resilience in overcoming the challenges and enigmas in a given time could have generated discomfort and hostility, which would explain the demotivation and the EM of some participants. Despite this, there are many studies that confirm the positive results of the use of gamification on student motivation and learning [5]. This is why the data from this study are in line with the evidence from the previous literature that some university students in their first years may not have or make use of fundamental skills to successfully cope with the demands of academic life [41–44], experiencing demotivation and loss of interest, physical and mental exhaustion, and lower academic performance [1–3]. It is worth highlighting at this point the relevant role of the teacher as a facilitator of stimulating experiences that strengthen intrinsic motivation and the socio-affective and cognitive development of students [45–47].

## 5. Conclusions

It should be pointed out that this study has certain methodological limitations. Thus, the fact of having used a sample of university students exclusively from one autonomous community limits the ability to generalize the results to the national level. Finally, it is important to refer to the cross-sectional nature of this research, so that future studies should continue to corroborate the results found through prospective designs that allow us to infer causal relationships between the variables studied. Despite these limitations, this research provides additional information to explain the motivational effects of the implementation of an educational escape room based on a solid theoretical foundation such as self-determination theory [11]. Therefore, we consider that the findings of this research offer empirical support that can be useful in the design and implementation of educational escape rooms. In any case, in future research it would be necessary to measure

some possible moderating or mediating variables to deepen the understanding of these results, for example, the capacity for emotional regulation [48]. Likewise, it would also be interesting to use qualitative research, such as focus groups, in order to clarify the student's negative affect when using this methodology. All this would help to expand knowledge about its impact on the educational process and student engagement. Similarly, this will help teachers to adjust the design and provide additional resources to facilitate motivation and learning.

Finally, it is worth highlighting the methodological change that is being carried out by university institutions. As has been detailed throughout this research, educational escape rooms are a resource with great potential to increase the intrinsic motivation of students and the significance of the teaching–learning processes since they promote fun, absorption, emotional excitement, and the perception of dominance while activating creative thinking and, therefore, the state of flow as an effect; however, they are not exempt from negative effects, generated by the competitiveness between groups, that teachers will have to assist by facilitating resources for emotional regulation and frustration tolerance.

In conclusion, it could be said that the educational experience we present has facilitated the acquisition of the contents of the subject and the development of different skills related to teaching, such as the implementation of group strategies for the resolution of challenges and enigmas, promoting creative thinking, curiosity towards learning (activation), and the feeling of dominance of the task. Therefore, through its implementation, it contributes to enhancing the use of fundamental skills to successfully meet the demands of academic life, while favoring the comprehensive training of students for their future professional work in the educational field.

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## References

1. Usán, P.; Salavera, C. Motivación escolar, inteligencia emocional y rendimiento académico en estudiantes de educación secundaria obligatoria. *Actual. Psicol.* **2018**, *32*, 95–112. [[CrossRef](#)]
2. González-Castro, I.; Vázquez-García, M.A.; Zavala-Guirado, M.A. La desmotivación y su relación con factores académicos y psicosociales de estudiantes universitarios. *Rev. Digit. Investig. Docencia Univ.* **2021**, *15*, e1392. [[CrossRef](#)]
3. Rodríguez-Pineda, M.; Zamora-Araya, J.A. Abandono temprano en estudiantes universitarios: Un estudio de cohorte sobre sus posibles causas. *Uniciencia* **2021**, *35*, 19–37. [[CrossRef](#)]
4. Prieto-Andreu, J.M.; Gómez-Escalonilla-Torrijos, J.D.; Said-Hung, E. Gamificación, motivación y rendimiento en educación: Una revisión sistemática. *Rev. Electrónica Educ.* **2022**, *26*, 251–273. [[CrossRef](#)]
5. Prieto, J.M. Una revisión sistemática sobre gamificación, motivación y aprendizaje en universitarios. *Rev. Interuniv.* **2020**, *32*, 73–99. [[CrossRef](#)]
6. Llorens, F.; Gallego, F.; Villagrà, C.; Compañ, P.; Satorre, R.; Molina, R. Gamificación del Proceso de Aprendizaje: Lecciones Aprendidas. *VAEP-RITA* **2016**, *4*, 25–32.

7. García-Lázaro, I.G. Escape Room como propuesta de gamificación en educación. *Rev. Educ. Hekademos* **2019**, *27*, 71–79.
8. Sailer, M.; Ulrich, J.; Mayr, S.; Mandi, H. How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Comput. Hum. Behav.* **2017**, *69*, 371–380. [[CrossRef](#)]
9. Seaborn, K.; Fels, D.I. Gamification in theory and action: A survey. *Int. J. Hum. Comput. Stud.* **2015**, *74*, 14–31. [[CrossRef](#)]
10. Deci, E.L.; Ryan, R.M. *Intrinsic Motivation and Selfdetermination in Human Behavior*; Plenum Press: New York, NY, USA, 1985.
11. Deci, E.L.; Ryan, R.M. The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychol. Inq.* **2000**, *11*, 227–268. [[CrossRef](#)]
12. Baard, P.P.; Deci, E.L.; Ryan, R.M. Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings 1. *J. Appl. Soc. Psychol.* **2004**, *34*, 2045–2068. [[CrossRef](#)]
13. Deci, E.L.; Ryan, R.M. A Motivational Approach to Self: Integration in Personality. In *Nebraska Symposium on Motivation: Perspectives on Motivation*; Dienstbier, R., Ed.; University of Nebraska Press: Lincoln, NE, USA, 1991; Volume 38, pp. 237–288.
14. Núñez, J.L.; Martín-Albo, J.G.; Navarro, J.G. Validación de la versión española de la Échelle de Motivation en Éducation. *Psicothema* **2005**, *17*, 344–349.
15. Deci, E.L.; Ryan, R.M. Autonomy and Need Satisfaction in Close Relationships: Relationships Motivation Theory. In *Human Motivation and Interpersonal Relationships: Theory, Research and Applications*; Weinstein, N., Ed.; Springer: Dordrecht, The Netherlands, 2014; pp. 53–73.
16. Deci, E.L.; Ryan, R.M. Optimizing Students’ Motivation in the Era of Testing and Pressur: A Self-Determination Theory Perspective. In *Building Autonomous Learners*; Springer: Singapore, 2016; pp. 9–29. [[CrossRef](#)]
17. Pozo-Sánchez, S.; Lampropoulos, G.; López-Belmonte, J. Comparing Gamification Models in Higher Education Using Face-to-Face and Virtual Escape Rooms. *J. New Approaches Educ. Res.* **2022**, *11*, 307–322. [[CrossRef](#)]
18. Veldkamp, A.; van de Grint, L.; Knippels, M.C.P.; van Joolingen, W.R. Escape education: A systematic review on escape rooms in education. *Educ. Res. Rev.* **2020**, *31*, 100364. [[CrossRef](#)]
19. Tudela, P.A.G.; Vera, M.D.M.S.; Fernández, I.M.S. Mejoras y necesidades de una escape room educativa en la formación inicial de docentes. *Espiral. Cuad. Del Profr.* **2020**, *13*, 109–120. [[CrossRef](#)]
20. Wiemker, M.; Elumir, E.; Clare, A. Can You Transform an Unpleasant Situation into a Pleasant One? *Game-Based Learn.* **2016**, 55–68. Available online: <http://www.teamworkandteamplay.com/resources/resource-escaperooms.pdf> (accessed on 1 July 2023).
21. Cavalcanti, C.C.; Filatro, A.; Presada, W.A. Gamification design for tutor education in an online course. *ETD Educ. Tentica Digit.* **2018**, *20*, 887–904. [[CrossRef](#)]
22. Apostol, S.; Zaharescu, L.; Alexe, I. Gamification of learning and educational games. *Int. Sci. Conf. eLearning Softw. Educ.* **2013**, *2*, 67–72.
23. Moore, L.; Campbell, N. Effectiveness of an escape room for undergraduate interprofessional learning: A mixed methods single group pre-post evaluation. *BMC Med. Educ.* **2021**, *21*, 220. [[CrossRef](#)]
24. Anguas-Gracia, A.; Subiron-Valera, A.B.; Antón-Solanas, I.; Rodríguez-Roca, B.; Satustegui-Dorda, P.J.; Urcola-Pardo, F. An evaluation of undergraduate student nurses’ gameful experience while playing an escape room game as part of a community health nursing course. *Nurse Educ. Today* **2021**, *103*, 104948. [[CrossRef](#)] [[PubMed](#)]
25. Soler, O.M.; Aguayo-González, M.; Gutiérrez, S.S.R.; Pera, M.J.; Leyva-Moral, J.M. Nursing students’ expectations of their first clinical placement: A qualitative study. *Nurse Educ. Today* **2020**, *98*, 104736. [[CrossRef](#)] [[PubMed](#)]
26. Barbosa-Luna, A.E.; Tristán, J.L.; Tomás, I.; González, A.; López-Walle, J.M. Climas motivacionales, motivación autodeterminada, afectos y burnout en deportistas: Enfoque multinivel. *Acción Psicológica* **2017**, *14*, 105–118. [[CrossRef](#)]
27. Gálvez-Nieto, J.L.; Polanco, K.; Salvo, S. Propiedades psicométricas de la Escala de Autoconcepto Académico (EAA) en estudiantes chilenos. *Rev. Iberoam. De Diagnóstico Y Evaluación-E Avaliação Psicológica* **2017**, *1*, 5–16. [[CrossRef](#)] [[PubMed](#)]
28. Moreno, A.E.; Rodríguez, J.V.R.; Rodríguez, I.R. La importancia de la emoción en el aprendizaje: Propuestas para mejorar la motivación de los estudiantes. *Cuad. De Pedagog. Univ.* **2018**, *15*, 3–11. [[CrossRef](#)]
29. Chou, P.N.; Feng, S.T. Using a Tablet Computer Application to Advance High School Students’ Laboratory Learning Experiences: A Focus on Electrical Engineering Education. *Sustainability* **2019**, *11*, 381. [[CrossRef](#)]
30. Eppmann, R.; Bekk, M.; Klein, K. Gameful experience in gamification: Construction and validation of a gameful experience scale [GAMEX]. *J. Interact. Mark.* **2018**, *43*, 98–115. [[CrossRef](#)]
31. Parra-González, M.E.; Segura-Robles, A. Traducción y Validación de la Escala de Evaluación de Experiencias Gamificadas (GAMEX). *Bordón* **2019**, *71*, 87–99. [[CrossRef](#)]
32. Vallerand, R.J.; Pelletier, L.G.; Blais, M.R.; Brière, N.M.; Senécal, C.; Vallières, E.F. The Academic Motivation Scale: A measure of intrinsic, extrinsic and amotivation in education. *Educ. Psychol. Meas.* **1992**, *52*, 1.003–1.017. [[CrossRef](#)]
33. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences. Second Edition*; Lawrence Erlbaum Associates: New York, NJ, USA, 1988.
34. Torrance, E.P. *Torrance Tests of Creative Thinking*; Personnel Press: Lexington, MA, USA, 1966.
35. Cropley, D.H. Promote creativity and innovation in engineering education. *Psychol. Aesthet. Creat. Arts* **2015**, *9*, 161–171. [[CrossRef](#)]
36. Csikszentmihalyi, M. *Flow: The Psychology of Optimal Experience*; Harper and Row: New York, NY, USA, 1990.
37. Parra-González, M.E.; Segura-Robles, A.; Romero-García, C. Análisis del pensamiento creativo y niveles de activación del alumno tras una experiencia de gamificación. *Educación* **2020**, *56*, 475–489. [[CrossRef](#)]

38. Navarro-Mateos, C.; Pérez-López, I.J. El escape room como estrategia didáctica en el Máster de Profesorado. *Retos: Nuevas Tend. En Educ. Física Deporte Y Recreación* **2022**, *44*, 221–231. [[CrossRef](#)]
39. Moke, K.K.F.; Chang, C.K.W.; Prihadi, K.; Goh, C.L. Mediation effect of resilience on the relationship between self-efficacy and competitiveness among university students. *Int. J. Eval. Res. Educ.* **2018**, *7*, 279–284. [[CrossRef](#)]
40. Oliva, A.; Ríos, M.; Antolín, L.; Parra, Á.; Hernando Á y Pertegal M, Á. Más allá del déficit: Construyendo un modelo de desarrollo positivo adolescente. *Infanc. Aprendiz.* **2010**, *33*, 223–234. [[CrossRef](#)]
41. González-Yubero, S.; Lázaro-Visa, S.; Palomera, R. ¿Qué aporta la inteligencia emocional al estude de los factores protectores personales del consumo de alcohol en la adolescencia? *Psicol. Educ.* **2021**, *27*, 27–36. [[CrossRef](#)]
42. González-Yubero, S.; Palomera, R.; Lázaro-Visa, S. Empatía, estilos de afrontamiento y actitudes hacia el consumo como factores protectores del uso intensivo de alcohol y el policonsumo en la adolescencia. *Behav. Psychol./Psicol. Conduct.* **2021**, *29*, 313–330. [[CrossRef](#)]
43. González-Yubero, S.; Lázaro-Visa, S.; Palomera, R. Personal variables of protection against cannabis use in adolescence: The roles of emotional intelligence, coping styles and assertiveness as associated factors. *Int. J. Environ. Res. Public Health* **2021**, *18*, 5576. [[CrossRef](#)]
44. González-Yubero, S.; Lázaro-Visa, S.; Palomera, R. The protective association of trait and ability emotional intelligence with adolescent tobacco use. *Int. J. Environ. Res. Public Health* **2020**, *17*, 6865. [[CrossRef](#)] [[PubMed](#)]
45. Abeysekera, L.; Dawson, P. Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *High. Educ. Res. Dev.* **2015**, *34*, 1–14. [[CrossRef](#)]
46. Jiyang, H.; Perron Brian, E.; Hongbiao, Y.; Yamin, L. Faculty stressors and their relations to teacher efficacy, engagement and teaching satisfaction. *High. Educ. Res. Dev.* **2021**, *40*, 247–262. [[CrossRef](#)]
47. Waite, S.; Davis, B. Developing undergraduate research skills in a faculty of education: Motivation through collaboration. *High. Educ. Res. Dev.* **2006**, *25*, 403–419. [[CrossRef](#)]
48. Koole, S. The psychology of the emotion regulation: An integrative review. *Cogn. Emot.* **2009**, *23*, 4–41. [[CrossRef](#)]

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