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Digital resources and escape rooms: Innovative strategies that improve motivation

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Abstract

Innovations have been made to educational strategies in health sciences to increase intrinsic motivation in students which helps generate a significant and active learning in students with the help of methodologies, such as gamification, using escape rooms (ER) and the use of digital tools, such as the Sectra Table. The objective of this study is to determine the correlation of motivation in medical students using the Sectra Table digital tool versus nursing students who implemented escape rooms in anatomy sessions. This study was carried out at the Universidad Autónoma de Guadalajara. It is a cross-sectional study using a descriptive analysis technique for comparing samples. With a convenience sample of 72 students from the medicine and nursing program, subjecting medicine students to Sectra Table learning and nursing students to escape rooms determining the level of motivation using the RIMMS questionnaire with an alpha greater than .81 for all constructs having as independent variables, confidence, attention, relevance and satisfaction. We performed a statistical analysis by a two-sample comparison model. Obtaining that "escape room" presented higher levels of motivation and with a p-value of 0.0000 satisfaction presented greater motivation levels. Gamification prepares today's society and helps them acquire professional skills that prepare them for life.

Keywords: Educational innovation, Escape room, Gamification, Higher education, ICT supported learning, Motivation.

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Contribution of this paper to the literature
This article provides comparative evidence on the impact of gamification strategies and digital tools on student motivation in health sciences. By analyzing the use of escape rooms and the Sectra Table, it expands knowledge about innovative methodologies that foster meaningful learning and professional skills in medical education.

1. Introduction

1.1. Medical Education

Since its inception, health sciences education has been based on theoretical practices mostly based on lectures. This design is based on a unidirectional method, consisting of a person with knowledge who acts as the main actor, acting as the speaker presenting knowledge to a group of people who only act as listener; sometimes these strategies can be accompanied by prior reading of textbooks taking notes or noting important concepts (Althwanay et al., 2020; Tuma, 2021).

Education has presented challenges, such as understanding and learning large amounts of information. Students in health-related programs are exposed to a vast amount of information to learn given the complexity of their programs, which can be overwhelming and lead to students dropping out. New interactive learning methods have been sought for the new digital generations to maintain attention and interest levels for a greater time to generate significant and active learning in students so they can be prepared for future challenges (Tuma, 2021).

In 1994, learning designs entered the trend of innovation or change as they began to implement digital resources such as presentations or presenting information through a projector with the appearance of the internet. Later in 2021, a huge difference was made showing before and after by implementing massive online courses (MOOC) and the implementation of many digital tools for learning, which was called "e-learning" (Saiyad, Virk, Mahajan, & Singh, 2020).

E-learning is a methodology that contains different applications. It can be used synchronously or asynchronously with the lectures offered by teachers who become facilitators, generating greater understanding on the part of students who become the main actors in the acquisition of their knowledge. In the health sciences context, there are several platforms that work as simulators, virtual laboratories, games (gamification), mobile apps, to increase the study asynchronously since they can access them anywhere or at any time, having the purpose of complementing what was previously learnt in the classroom and generating personalized learning (Saiyad et al., 2020).

It is necessary to conceptualize that technology is not the same as learning. It is necessary to have adequate platforms for the students' educational level and to have the staff trained for their use. During COVID-19, we were obligated to innovate from one day to another, making e-learning the method par excellence, this made us learn that there are different digital tools we can be adequate to lectures with to make them a little more dynamic and non-unidirectional. For this methodology to be successful, the following 12 principles must be considered:

1. The methods used must comply with the established syllabus and objectives.
2. There must be interaction between the teacher and the student, not only using a platform to post information and educational resources.
3. They must promote skills, such as thinking and communication not only post tasks or homework.
4. Encourage social skills and cooperative work among peers with the aim of generating discussion and being able to provide feedback among themselves or share different knowledge.
5. Promote active learning and implement real-life situations and concepts.
6. Encourage individualized learning as well as implement group or individual tasks so that they can reinforce what they know.
7. Constant formative reviews to see how much progress they have made.
8. Prompt feedback, so that they can obtain comments on areas to be reinforced.
9. Have good time management, propose objectives in a determined time, to encourage the student to achieve them, they don´t have to be impossible in the amount of time planned.
10. Communicate expectations to generate motivation to achieve them.
11. Recognize that every student has his learning method; this is why different dynamics must be planned.
12. Monetarization, development and mentoring must be provided to guide the student and encourage learning (Makri, Vlachopoulos, & Martina, 2021; Saiyad et al., 2020).

The subject of anatomy is fundamental in different health science careers, such as medicine and nursing; it deals with identifying and naming the different structures of the human body at its different levels: organic, tissular, musculoskeletal, arterial, etc. It is necessary to identify structures so we can associate them with different clinical symptoms or pathologies and be able to have greater certainty when making a diagnosis (Abdellatif et al., 2022).

By the end of the 20th century, dissection was the method of learning the subject of anatomy worldwide, since observing the structures, it is easier to identify where they are located, such as non-pathological or pathological anatomy of these. Since there are some difficulties in some countries to obtain bodies other methods began to be used, such as " bodypainting" in which structures are distinguished by using different colors, visually it is easier to memorize their location (Tuma, 2021).

With the e-learning implementation, new digital tools, such as 3D models started developing. In these models, we can make virtual dissections and zoom in on the different compartments and spaces and see their conformation easily (Tuma, 2021).

1.2. Learning Innovation

Although lectures are the principal learning method in health sciences, over time, more dynamic techniques that allow frequent interaction between students and teachers have been implemented. This improves more effective learning and helps get a better understanding and create long-term knowledge (Tuma, 2021).

Actual global social dynamics are characterized by continuous changes, imposing challenges and exigences on the educational system having as its essential goal the achievement of quality education. Therefore, attempts related to educational advances and innovation have led to the generation and application of Information and

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Communication Technologies (ICT) in the learning and teaching process with the goal to create active and motivational environments for students (Saiyad et al., 2020).

The use of ICTs in the classroom can directly increase student motivation if it is used effectively due to the creation of dynamic and attractive environments for actual digital generations. However, limitations with its use exist because there is no knowledge of the activities that could be carried out in innovative ways in the classroom, teachers training for its strategy implementation, institutions acquisitive power to accept its infrastructure and the power of resilience to change of both teachers and students (Tuma, 2021).

There are different learning models, such as game-based learning, which through different games or strategies simulating a game scenario, the desired information are captured because they awaken a competitive attitude in the students. This motivates and encourages them to learn while they play, so they have unconscious learning when carrying out an activity that is attractive to them (Tuma, 2021).

Scholar motivation has a relation with significant, active and personalized learning which increases understanding level optimizing student success (Barrios, Gimeno, Moneo, García, & Orozco, 2022).

1.2.1. Sectra Table

The use of new digital resources in human anatomy has different precedents between different countries according to the economic capacity, resources and infrastructure of each institution having the purpose to get innovative technological tools used in teaching this subject to new generations of health science students (Hecht-López, Maturana-Arancibia, & Parra-Villegas, 2023).

In our case, the use of SECTRA® Table, implementing it as a non-immersive innovative technological tool, which is a digital anatomical dissection table with 3D anatomy computer resources and 3D printed anatomical models, connected to the IDS7 SECTRA® data base to access the VH dissector® and SECTRA® Education Portal programs, where there is a repository of files shared by all institutions that have this tool with the purpose to create an archive where we can all learn, since each institution uploads to the cloud those clinical cases that it considers interesting or unusual (Hecht-López et al., 2023).

1.2.2. Gamification

Gamification was first described in 2008 as "the use of game design elements in non-game contexts." It can be used in different areas such as business and education. This technique belongs to the game-based learning, and the student must recognize mistakes as well as the correct way to solve the situations presented (Barrios et al., 2022; Guckian, Eveson, & May, 2020; Macías-Guillén, Díez, Serrano-Luján, & Borrás-Gené, 2021; Makri et al., 2021; Veldkamp, Van De Grint, Knippels, & Van Joolingen, 2020).

This method was first applied in 1838 in the business area and was described in the book named, "The Game of Business" as an "oligopolistic game where the player must face real world situations", it helps to increase topic understanding, such as developing skills and competencies as collaborative work, autonomy and social interaction, characteristics that prepare them to be competitive in the work environment in which they will develop in the future (Guckian et al., 2020; Macías-Guillén et al., 2021).

In gamification you can present lessons in a game-like manner, this helps us generate a change in participants' behavior, generating emotions as: exploration, investigation and initiative (Christopoulos & Mystakidis, 2023).

Some key elements must be complete, such as the theme to implement a game design. It must be according to the topics seen and narrative to help us guide through the game and characters. This can be individual or teams and skills. This refers to the different tests or puzzles to be completed (Christopoulos & Mystakidis, 2023).

Games used in different educational contexts have been proven to increase student motivation when learning since depending on the game design, there may be advances in social skills, collaboration among peers, and cognitive abilities. It is necessary that the implemented game be adequate to the students' educational level because if very complex games are presented, the stress level increases and participants lose interest in the method (Guckian et al., 2020; Macías-Guillén et al., 2021; Veldkamp et al., 2020).

The gamification strategy is not new. However, there are currently new games, such as escape rooms that allow us to continue innovating under this new methodology which has become popular in the educational area improving student learning and motivational skills (Veldkamp et al., 2020).

1.2.2.1. Escape Rooms

Escape rooms (ER) were initially described in 2007 in Tokyo, Japan and were used as a game mode to generate new skills and abilities. They consist of a series of tests in a delimited area which when solved properly, new areas will unlock with the purpose of "escape" at a given time. Due to their design as well as the low cost they represent for institutions, they were implemented in the educational area (Barrios et al., 2022; Guckian et al., 2020).

There are different types of applied ER, such as the classic ones which consist of the realization of different tasks and activities in a delimited space, including non-digital activities. On the other hand, we have hall rooms, which are more easily applied in classrooms due to their low cost, they are completely digital, and the delimited space is determined in different apps or programs to create them (Guckian et al., 2020).

There are three types of puzzles in an ER.

1. Cognitive: In which they use concepts and abilities learnt previously.
2. Physical: In which you need physical activity to accomplish its resolution.
3. Meta-puzzles: Which depend on the results obtained in the previous puzzles to be able to complete the challenge called major (Althwanay et al., 2020; Hecht-López et al., 2023).

The ER consists of five essential elements for their proper application.

1. The escape room which includes the area or the different rooms designated for the activity.
2. Tasks to solve puzzles.
3. Digital and physical elements.
4. A Game Master: This person will oversee guiding the group through clues or clarifications that are needed as the game progresses. They must be able to solve the escape room.
5. Narrative: This must be a history capable of capturing the audience´ attention during the game, this should refer to the concepts studied previously (Macías-Guillén et al., 2021).

Characteristics of a game master

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1. Design according to the puzzles presented.
2. Tell an interesting story for the participants.
3. Provide data appropriate to the level of knowledge and skills of participants.
4. Have the ability to always guide participants during the ER activity giving clues that can guide them to complement their performance in the activity (Macías-Guillén et al., 2021).

This game design has demonstrated to improve student participation, just as increase motivation, when compared to the traditional learning design, lectures, ER demonstrated an increase in concept retention (Barrios et al., 2022; Guckian et al., 2020; Macías-Guillén et al., 2021).

1.3. Motivation

Studying represents an indispensable need for each professional. Study habits transform into activities necessary to acquire, use and implement knowledge with the purpose of fostering the foundations for professional competence.

Study habits correspond to established behaviors associated with the way in which the student achieves or fails to achieve his or her academic goals.

Success in study is not only a function of intelligence and effort but also the efficiency of study habits which must have three elements to put into practice: knowledge, capacity and desire.

The importance of generating motivation in students is considered to foster desire. This is extremely necessary in all educational strata, it is conceptualized as the interest in an activity forged in response to need, it corresponds to the mechanism that stimulates the action, and it can be physiological or psychological and involves voluntary behaviors. In other words, correspond to the process through which goal-directed activities are initiated and sustained (Ramírez Montaldo, Soto Hilario, & Campos Cornejo, 2020).

Students' motivation tries to exert a driving force to carry out any activity that the teacher asks of them. Hence, teaching and learning activities must be done according to the formulation of the learning purposes.
Taking the above into account, motivation can be generally divided into two large groups (see Figure 1).

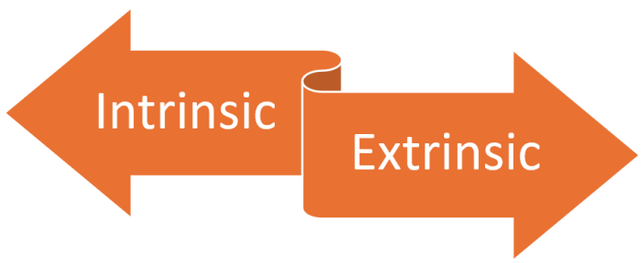

Figure 1. General motivation division

Intrinsic motivation is the desire to act caused by an internal impulse factor. Students with intrinsic motivation are noticeable in their participation in learning activities as they feel that they need and want to achieve their real goals by always wanting to know more about something, want to be known by the professor, show their best skills, learn better by demonstrating high participation. On the other hand, extrinsic motivation is defined as the active motives and work by external stimuli as it means, it is not a real feeling or desire to learn among students (Wardani et al., 2020).

Considering the previous classification, we can understand that motivation plays an important role in the competencies making a subclassification as follows:

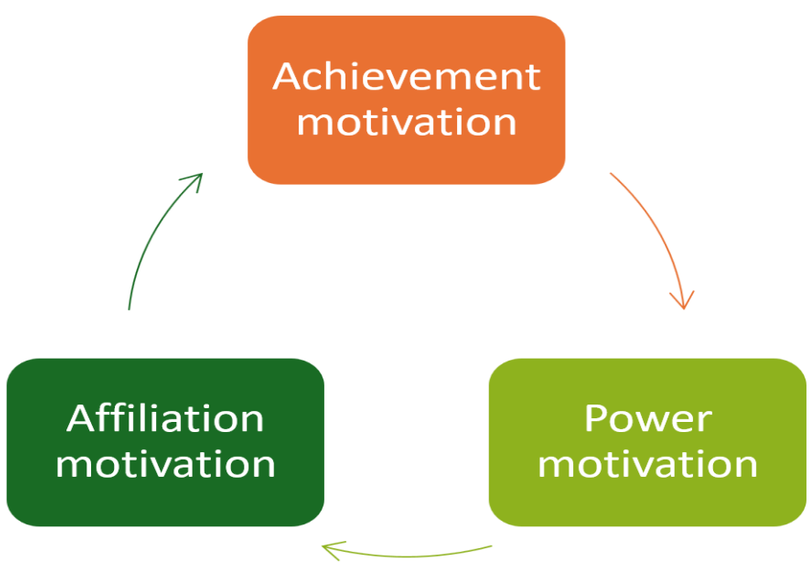

Figure 2. Motivation classification

In the figure above (see Figure 2), the motivation classification is demonstrated dividing it into 3 categories, the first one is called achievement motivation, which identifies the expansion of individual and group work, the second category is power motivation, which means people need to obtain constant prestige and respect and the third category is the affiliation motivation, which is the need for belonging. Students develop a sense of competition among themselves (Bayser, 2023).

It was necessary to select the appropriate instrument to measure the fulfillment of said objective using the questionnaire "Reduced Instructional Materials Motivation Survey IMMS" (RIMMS) by Macías-Guillén et al.

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(2021) defined and validated by Prieto-Andreu, Gómez-Escalonilla-Torrijos, and Said-Hung (2022) to meet the main objective of the research.

Hecht-López et al. (2023) modified the variables described by Keller´s model (see Figure 3) which describes the students' academic conduct guided by motives and intentions that largely determine the cognitive resources when facing different types of learning. Although based on the definition of motivation in the formative process of students, this is one of the most relevant variables, since it can determine if it is in a positive or negative direction that the student can follow regarding a course and must be considered in the design of a subject. These variables are described below.

Figure 3. Four-dimensional motivational model with practical applications in instructional design.

- Attention: It refers to the interest placed by students in gaining and maintaining their attention.

Some different actions, words and materials can be used by professors to increase the students' interest in the class and maintain their attention, the combination of multiple strategies can create better classes, and this itself make them more exciting.

- Relevance: It focuses on the course relevance in relation to the objectives to achieve and student needs.
- Confidence: This dimension means that students must feel safe in their capacity to have a learning success (success expectancy).
- Satisfaction: In this dimension, the final objective is that the student must feel satisfied by the previous learning opportunities and the knowledge achieved (Santos Garduño, Esparza Martínez, & Portuguez Castro, 2021).

This four-dimensional model fits with the present study by implementing this element as a motivational sources to improve the perception that students have of their courses.

The objective of this study is to determine the correlation between motivation in medical students in the use of the Sectra Table digital tool versus nursing students who implemented escape rooms in anatomy sessions.

2. Materials and Methods

2.1. Method

This research analyzed the correlation of motivation in medical students in the use of the Sectra Table versus nursing students who implemented escape rooms in anatomy sessions. In both academic programs, this subject is fundamental for clinical reasoning. The anatomy subject for medical students is imparted to first semester students; the content is distributed in 10 units in which the student is subjected to different academic activities, such as lectures, teamwork activities and laboratories in which the Sectra Table has been implemented. In the nursing program, it is taught in the first quarter, and it is distributed in 8 units in which the student receives lectures and works in laboratories and collaborative activities, in this last one, the escape room educational resource is applied.

2.2. Sample

The study was carried out at the Autonomous University of Guadalajara, Biological Sciences Institute Campus, between September 04 and December 09, 2024. The population in this study was students from the regular program coursing first semester of the faculty of medicine and students coursing the first quarter of the nursing program enrolled in the anatomy subject, being a population of 381 students. This is a cross-sectional study using a

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descriptive analysis technique for comparing samples. The sample was selected with a non-probability convenience sampling technique. The inclusion criteria were that they were regular program students and voluntary participation. The exclusion criteria were that they were irregular program students and refused to participate.

2.3. Variables

The dependent variable was motivation and the independent variables were attention, relevance, confidence, and satisfaction. They were correlated through the reduced inventory of the Hecht-López et al. (2023) Instructional Material Motivational Survey (RIMMS) elaborated in 2010 and validated by Saiyad et al. (2020).

2.4. Instruments

The "Reduced Instructional Materials Motivation Survey IMMS" (RIMMS) of Hecht-López et al. (2023) questionnaire was applied, defined and validated by Macías-Guillén et al. (2021) which indicates that for a teaching strategy to motivate a student during the teaching-learning process, it must be attractive and interesting, design answers according to the objective of the session, the student auto perception improves, and lastly, satisfy by making didactic activities back-fed to achieve knowledge. This questionnaire was taken from the original Instructional Material Motivation Survey (IMMS) by Prieto-Andreu et al. (2022) which estimates students' motivation educative ambience, it conforms of 36 questions distributed in four subscales: attention, relevance, confidence and satisfaction. It is a self-report measure. It evaluates the perceived motivation not the real effort. To investigate the motivation of the user in self-directed instruction contexts, particularly in confidence- focused instructions, its structure was analyzed to measure people's reactions to the different didactic materials offered. Therefore, the IMMS was reduced and after evaluating its' structure and validity, the "Reduced Instructional Materials Motivation Survey IMSS" (RIMMS) was obtained, which is composed of 12 items with a Likert format and offers information to analyze the same 4 subscales, and it's designed to measure the reactions to the self-directed instructions materials. It has an internal consistency superior to .70 (alpha greater than .81 for all constructs) with an internal correlation statistically significant with a p-value less than .05.

2.5. Procedure

Once it was presented and approved by the corresponding university authorities of the dean´s office, the application of the inventories in both groups began. To avoid bias, an intern was requested from the subject management to ensure accurate information was obtained.

A sample of 72 students of both sexes of the human anatomy assignment was selected and divided into two groups. Each one implemented a different didactic strategy to analyze the same musculoskeletal system topics. The first group consisted of 36 medical students who used the Sectra Table digital resource that presents a rectangular table-sized mobile touch screen which contains a full-body interactive human atlas, with software featuring over 2,000 anatomical structures in 3D and multiplanar views and images collected from CT scans and MRIs mainly. The second group of 36 students too, used the escape room digital tool which consists of a gamified experience based on the game to awaken motivation and attention. The game consists of getting out of a room by solving a series of puzzles within the room prepared to be solved through observation and analysis. It was offered to the students by a digital resource that works as a room, and a clinical case was presented to resolve the issues.

At the end of the academic sessions, the "Reduced Instructional Materials Motivation Survey" (RIMMS) was implemented to answer this investigation's objective. The analysis technique used was descriptive, multiple correlation and sample comparison; statistical significance was considered at $p \leq 0.05$. The statistical analysis was realized in the Statgraphics Centurion 18 statistical package.

3. Results

Analysis was made using the Stratigraphic Centurion program using a model comparing two samples. Scales were established to analyze the dimensions of attention, relevance, confidence and satisfaction in low, medium or high levels, according to the score obtained in each one. On the low scale, we used punctuation between 3 and 7, medium with a score of 8-11, and high with a score between 12 and15 points. We used the RIMSS level and classified it in different scales to examine motivation. The low score was between 12 and28, the medium score was between 29 and 44 and the high score was between 45-60 points.

The validity of the questionnaire was calculated with the sample of this study. This procedure performs a factor analysis (see Table 1). The purpose of the analysis is to obtain a small number of factors that explain most of the variability in the 12 variables.

In this case, a factor has been extracted since it is the only factor with an eigenvalue greater than or equal to 1.0 which explains 76.421% of the variability in the original data (see Figure 4).

We have selected the principal components method; the initial estimate of the communality has been established to assume that all variability in the data is due to common factors.

Table 1. Factor analysis

Number factor	Eigenvalue	Percentage of variance	Accumulated percentage
1	9.170	76.421	76.421
2	0.596	4.971	81.391
3	0.496	4.130	85.521
4	0.395	3.291	88.813
5	0.309	2.573	91.386
6	0.229	1.909	93.295
7	0.194	1.620	94.915
8	0.174	1.451	96.365
9	0.166	1.385	97.751
10	0.125	1.044	98.795
11	0.076	0.636	99.431
12	0.068	0.569	100.000

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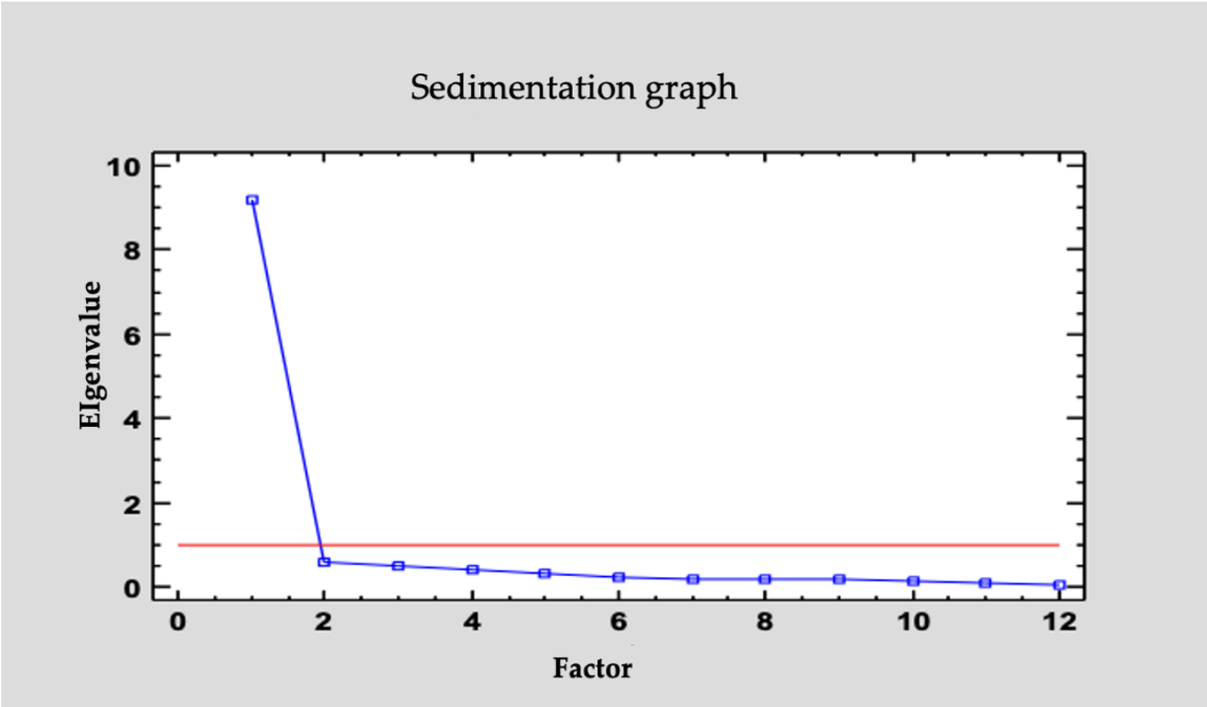

Figure 4. Sedimentation graph of construct validity.

Note: The red line refers to the Kaiser criterion for determining the number of factors in the factor analysis. The first factor has a significantly larger eigenvalue than the others, indicating that a single factor may be sufficient to explain a considerable proportion of the variance in the data.

The first factor has an eigenvalue ≥ 1.0 which means that this factor explains a significant proportion of the variability of the data and explains 76.421% of the total variability. This means that the data are predominantly one-dimensional; there is a dominant underlying factor that explains the relation between the 12 items and it could be related to the principal method (Mesa Sectra vs. escape room). Coming from two different groups, this one-dimensionality implies that both groups share a similar structure in the evaluated data.

There was a normality test with the Shapiro-Wilk statistic in both groups. In the medicine students group that studies with the "Sectra Table", the Shapiro-Wilk W statistic resulted in 0.730 with a p-value of 8.7416E-13, this equals 0. 000000000000407119.

In the nursing program student group that studied with "escape rooms", the W statistic was 0.158 with a P-value of 4.07119E-13 that equals 0. 000000000000407119. Both groups demonstrated an abnormal distribution, therefore, nonparametric measures were taken.

A Mann-Whitney (Wilcoxon) test was executed to compare medians with the next data.

Null Hypothesis: Median1= Median2

Alt. Hypothesis: Median1<> Median2

Sample average range 1: 24.1111

Sample average range 2: 48.8889

W= 1094.0: P-value= 4.81722E-7

The Mann-Whitney W test is constructed by combining both samples, ordering the data from smallest to largest, and comparing the average ranking of both samples in the combined data. Because the p-value is less than 0.05, there is a significant statistical difference between the medians with a level of confidence of 95.0%

The null hypothesis was rejected for alpha = 0.05. There was a significant statistic difference between the medians at a confidence level of 95.0%. Table 2 presents the statistical abstract for TOLAL RIMMS and as shown in Figure 5. It can be said that the group in which the didactic resource "escape room" was implemented presented higher levels of motivation than the group that implemented the use of the digital tool "Mesa Sectra."

Table 2. Statistical abstract for TOTAL RIMMS

Parameters	Total RIMMS 1	Total RIMMS 2
Count	36.000	36.000
Average	42.667	55.167
Standard deviation	10.970	5.598
Coefficient of variation	25.711%	10.148%
Minimum	20.000	41.000
Maximum	60.000	60.000
Range	40.000	19.000
Standardized bias	-1.066	-2.233
Standardized kurtosis	-1.334	-0.614

A forward stepwise regression model was performed which showed the results after fitting a multiple linear regression model to describe the relationship between motivation level and four independent variables.

The fitted model equation is as follows:

RIMMS = 3.96733 + 1.29496*SATISFACCIÓN + 1.14137*ATENCION + 1.2818*CONFIDENCE

Due to the p-value in the ANOVA table being less than 0.05, there is a statistically significant relationship between the variables with a confidence level of 95.0%. The R-squared statistic indicates that the model adjusted like this explains 99.2534% of the RIMMS variability. The R-squared adjusted statistic is more appropriate to compare models with different numbers of independent variables; it is 99.2205%. The standard error of the estimate shows that the standard deviation of the residual is 0.944288. The Mean Absolute Error (MAE) of 0.673166 is the

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average value of the residues. The Durbin-Watson (DW) statistics examine the residual to determine if there are any significant correlations based on the order in which they are presented in the data file.

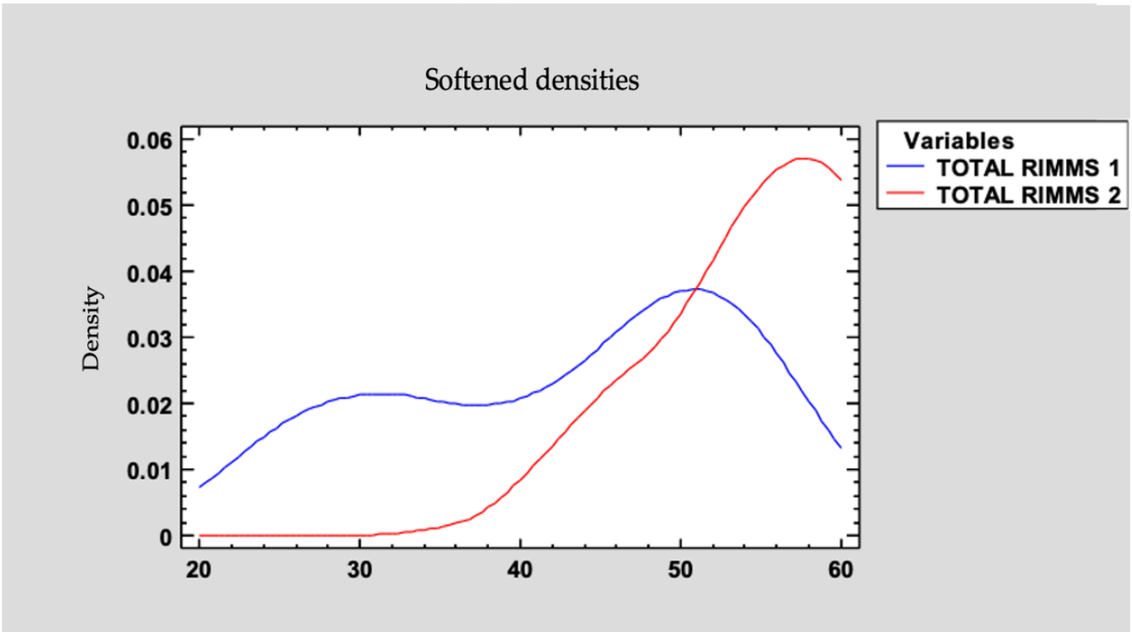

Figure 5. Softened densities.

Since the p- value is greater than 0.05, there is no indication of any serial autocorrelation in the residues with a confidence level of 95.0%

To determine whether the model can be simplified, the highest p-value of the independent variables is 0.0000, which corresponds to SATISFACTION. Because the p- value is less than 0.05, this term is statistically significant with a confidence level of 95.0%.

The total satisfaction score is obtained by adding responses to these three items with a maximum of 15 points. Scales were made to obtain the classification of satisfaction levels. In the lowest level are students with values between 3 and 7, medium between 8 and 11, and high between 12 and 15 (see Figure 6).

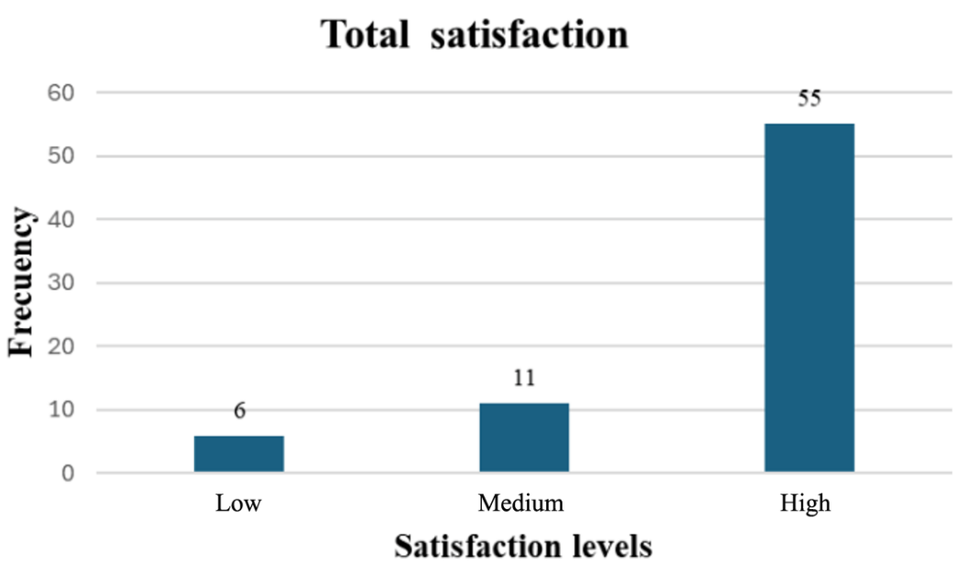

Figure 6. Graph of total satisfaction.

4. Discussion

Using the Statgraphics Centurion program through a two-sample comparison model with 72 first semester students of medicine and nursing programs, the motivation generated by the use of the Sectra Table as a non-immersive digital tool was compared against the use of escape room as a gamification tool applying the RIMMS questionnaire with the purpose to accomplish our investigations objective to realize a measure of the impact on student motivation using these two tools, remembering that our dependent variable was motivation including 4 independent variables: confidence, satisfaction, attention and relevance the following results were obtained from the multiple correlation to demonstrate which of the 4 independent variables were most related to motivation in general by joining the two samples, obtaining that the one with the greatest statistical strength with motivation is satisfaction followed by attention, and lastly by confidence, leaving relevance as an independent variable that doesn´t influences motivation in this student group, these results can be compared with those obtained by Santos Garduño et al. (2021) who realized a study with the same RIMMS questionnaire to measure generated motivation just like us with a digital tool that in their case was immersive like virtual reality, they obtained the highest positive percentage in the dimensions of attention and satisfaction, both variables related to intrinsic motivation, which is more difficult to accomplish in educational interventions (Tuma, 2021).

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As mentioned in the introduction section of this article, students who are intrinsically motivated make their participation in learning activities known because they feel that they need and want to achieve their real goals by always wanting to know more about something; therefore, they learn better by showing high participation in all the activities proposed by the teacher (Wardani et al., 2020).

It is important to highlight that in the applied questionnaire, nursing students which were subjected to gamification through escape rooms demonstrated greater motivation levels during class compared to the group of medical students, to whom sessions were applied through Sectra Table, confirming the hypothesis in Prieto-Althwanay et al.'s (2020) article in which a comparison is made between the different studies carried out over time to compare whether the gamification method helps students retain a greater amount of knowledge in the long term and in turn obtain better results in tests carried out, they concluded that in 67% of the students subjected to the gamification model, this strategy helped them promote motivation, where the students also obtained higher grades 12, this leads us to think that their knowledge retention was greater, generating significant , active and personalized learning by the gamification nature itself.

With the results mentioned previously, it is determined that the students subjected to the test study are responding positively to the stimuli using the gamification method to motivate them. Mention is made of an R square with a value of 99.2535% which means that the method used is strong or highly effective demonstrating an increase in satisfaction and in turn presenting greater retention of knowledge in the nursing students' group, compared to the medicine students group subjected to the Sectra Table, coinciding with the article by Barrios et. Al. (2022) which mentions escape rooms are an innovative learning technique and presents many benefits for students since by adding the time variable, initial stress levels rise along with the motivation to complete sessions. [8]

In our study results, the sample group belonging to nursing was the one that triggered the most positive values regarding the use of escape rooms. These results are consistent with those obtained in the article by Farus-Brown et.al. (2020) who conducted a study on how escape rooms influence nursing students, presenting a sample of 51 students, who were given a questionnaire on how motivated they felt with the use of escape rooms demonstrating that the most altered independent variable was security because it helped them in 90% of cases to interact with other people or to complete group tasks to generate long-term knowledge, which agrees with one of the principal objectives of education in gamification, which mentions that they are strategies allowing students to acquire new knowledge in a didactic way and generate new skills that will serve them in their professional future.

When applying different gamification methods, such as digital escape rooms, intrinsic student motivation is engaged, generating a better understanding and conceptualization of the different classes seen previously. In the study by Makri et. al., (2021) it is mentioned that a pre-test was applied in which the general average was 56, and a post-escape room test was applied with which a better score was obtained (average of 86), demonstrating that the application of escape rooms helps to fill those gaps that remain post lectures, generating a better understanding, this may be due to the game´s own characteristic where you need to guess and understand the first puzzle in order to be able to enter the rest of the game, reinforcing the knowledge previously learnt (Makri et al., 2021; Prieto-Andreu et al., 2022).

5. Conclusion

It is important that as teachers we take into account that our learning activities whether or not they include technology should foster students intrinsic motivation; this will allow them to create significant, active, collaborative and personalized learning that prepare them for the demands of today´s society and acquire the professional skills that prepare them for their working life, even those that teach them to work as a team and in a collaborative manner. Similarly, promoting innovative activities, such as escape rooms helps us to attract the student´s attention due to the characteristics of the new digitalized generations.

Regarding the creation of escape rooms, there is a problem with some teachers who use the traditional teaching method, sometimes due to a bad attitude towards changing the teaching strategies they have been using for some time now even the fear or difficulty they might have to create an adequate escape room or the use of specific platforms for the creation of these games.

We think nursing students had a better affinity for the escape room activity, since this tends to be more methodical in its procedures, even in the acquisition of knowledge; on the other hand, medical students have greater difficulty in following steps in the proposed learning activities.

Some of the advantages to consider in escape rooms are the possibility to realize multidisciplinary activities with more colleagues from health sciences programs which helps us as an institution to prepare our students in a better way to face their future work practices where they will be part of an interdisciplinary team.

It is important to highlight that the gamification learning strategy had better acceptance by students being more motivating despite the implementation of the Sectra Table as a technological tool, considering that our current students belong to a digitalized era.

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