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Assessment of the intrinsic motivation of dental students to problem-based learning remotely

Avaliação da motivação intrínseca de estudantes de odontologia para aprendizagem baseada em problemas de forma remota

Evaluación de la motivación intrínseca de los estudiantes de odontología para el aprendizaje basado en problemas de forma remota

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Abstract
The objective of this work was evaluate the intrinsic motivation of dentistry students at a college in the Brazilian northeast region facing teaching/learning through problem-based learning in remote format. Students from the dentistry course of a college with an active methodology that used the remote way to continue tutoring activities during the pandemic period were invited to participate. They answered a sociodemographic questionnaire and intrinsic motivation was measured through the instrument called intrinsic motivation inventory. Data collection was performed using Google Forms and the data were tabulated and analyzed using descriptive and analytical statistics. Of the 107 students enrolled in the dentistry course at the time of collection, 65 (60.7%) participated in the study. The average age of the students was 19.7 years, and the average global score of intrinsic motivation, considering all Intrinsic Motivation Inventory items, was 4.48. All subscales/domains have motivation scores >3.0, with the pressure/tension and relationships domain showing the lowest average scores, 3.74 and 3.76 respectively. The present study demonstrated that the students of the dentistry course are intrinsically motivated to carry out the meetings and activities of the tutorial group of problem-based learning in the remote format.
Keywords: Motivation; Learning; Higher education; Self-determination; Teaching.

Resumo
O objetivo deste trabalho foi avaliar a motivação intrínseca de estudantes de odontologia de uma faculdade do nordeste brasileiro frente ao ensino-aprendizagem por meio da aprendizagem baseada em problema no formato remoto. Foram convidados a participar estudantes do curso de odontologia de uma faculdade com metodologia ativa que utilizou a forma remota para dar continuidade as atividades de tutoria durante o período pandêmico. Os mesmos

responderam um questionário sociodemográfico e a motivação intrínseca foi mesurada através do instrumento denominado inventário de motivação intrínseca. A coleta de dados foi realizada através do Google Formulário e os dados foram tabulados e analisados a partir de estatística descritiva e analítica. Dos 107 alunos matriculados no curso de odontologia no momento da coleta, participaram 65 (60,7%) do estudo. A idade média dos estudantes foi de 19,7 anos e a média do escore global da motivação intrínseca, considerando todos os itens do Inventário de Motivação Intrínseca, foi de 4,48. Todas as subescalas/domínios apresentam escores de motivação >3,0, sendo o domínio de pressão/tensão e relações os que apresentaram os menores escores médios, 3,74 e 3,76 respectivamente. Foi demonstrado pelo presente estudo que os estudantes do curso de odontologia encontram-se motivados intrinsecamente para a realização dos encontros e atividades do grupo tutorial da aprendizagem baseada em problema no formato remoto.
Palavras-chave: Motivação; Aprendizagem; Educação superior; Autodeterminação, Ensino.

Resumen
El objetivo de este trabajo fue evaluar la motivación intrínseca de estudiantes de Odontología de uma facultad del nordeste brasileño frente a la enseñanza-aprendizaje a través del aprendizaje basado en problemas em formato remoto. Fueron invitados a participarestudiantes del Curso de Odontologia de una Universidad con metodología activa que usa la forma remota para dar continuidad a las actividades de tutoría durante el período de "pandemia". Los mismos responderán unas preguntas sociodemográficas y la motivación intrínseca. La coleta de datos fue realizada a través del Google forma y los datos fueron contabilizados y analizados desde la estadística descriptiva y analítica. De los 107 alumnos matriculados en el curso de odontología en el tiempo de recoger, participaron 65(60,7%) del estudio. La edad media de los estudiantes fue de 19,7 años y la media del puntaje global de la motivación intrínseca, considerando todos los elementos del Inventario de Motivación Intrínseca, fue de 4,48. Todas las subescalas/dominios presentan motivación >3,0, siendo el dominio de presión/tensión y relaciones los que presentaron los menores puntajes medios, 3,74 y 3, 76 respectivamente. Fue demostrado por el presente estudio que los estudiantes del curso de odontología se encuentran motivados intrínsecamente para la realización de los encuentros y actividades del grupo tutorial del aprendizaje de molde remoto basado en problemas.
Palabras clave: Motivación; Aprendizaje; Educación superior; Autonomía personal; Enseñanza.

1. Introduction

The implementation of the Unified Health System in Brazil brought the need to structure a new model in the professional training process (Ceccim & Feuerweker, 2004; González & Almeida, 2010). Before the creation of the Unified Health System, the current model in Brazil was the Flexnerian model, in which health was centred on curative care, and fragmented into specialities. To meet the assumptions of the Unified Health System, the training process became oriented towards the integrality of the individual, in humanization and health promotion, considering the social context (González & Almeida, 2010).

With the need for change in teaching, active teaching methodologies have gained increasing visibility, especially problem-based learning (PBL). Problem-based learning is a pedagogical approach by which a scenario is created in which problems are described serving as triggers for students to identify their learning objectives. This method seeks to encourage students to make decisions, leading them to be actively involved in the construction of knowledge and to develop skills in various contexts with a scientific and clinical basis (Bodagh et al., 2017; Tolfo, 2020).

For the PBL method to achieve its goals of working on the student's initiative and self-learning, individual student motivation is necessary to ensure the quality of the teaching-learning process (Azevedo et al., 2019). The word motivation derives from the Latin “movere”, which means "to move", “everything that can move”. Thus, it is understood that motivation is something particular and individual, according to experiences, culture, and needs, and is related to the objective to be achieved (Cook & Artino, 2016; Hackney, 2017; Lui et al., 2020).

Human motivation and its interfaces with the area of education can be studied through the Theory of Self-Determination (Hackney, 2017; Howard et al., 2021), which aims to improve one's motivation at work, interpersonal relationships, and the teaching-learning process. This theory is divided into Intrinsic Motivation (IM), Extrinsic Motivation (EM), and Demotivation (Azevedo et al., 2019; Cook & Artino, 2016). Intrinsic motivation is linked to the inner strength that

will stimulate the individual to achieve their goals, objectives, and personal projects. It is related to the intentional "doing something", and also with the reason why one feels satisfaction in doing it, without the need for a reward. This motivation is also known as Autonomous Motivation (Lafayette, 2019).

One of the instruments used to assess intrinsic motivation is the Intrinsic Motivation Inventory (IMI). This instrument was duly translated, adapted and validated for Brazilian Portuguese (Azevedo et al., 2019; Cook & Artino, 2016). It is composed of seven subscales or domains that assess different aspects such as interest/pleasure; perceived competence; effort/importance; pressure/tension; perception of choice; value/utility; and relationships.

Several authors have studied the impact of IM on individual performance in various contexts applied to teaching (Azevedo et al., 2019; Cook & Artino, 2016; Kusurkar et al., 2012; Kusurkar et al., 2011), involving students of different ages and courses (Azevedo et al., 2019 Kusurkar et al., 2012; Kusurkar et al., 2011; Orsini et al., 2015 Robinson et al., 2012) employees and preceptors (Kusurkar et al., 2012; Ohly & Fritz, 2007) and have found a positive relationship between IM and individual performance. However, the literature does not report on the motivation of dentistry students for the PBL method using a remote teaching tool.

One of the assumptions of a tutorial group is the interaction between the participants, and how this interaction can influence the students' motivation concerning the teaching-learning process. Given the distance imposed by the pandemic caused by the coronavirus, and the adaptations that were necessary to educational activities which were now carried out remotely, the objective of this work was to evaluate the intrinsic motivation of dentistry students at a college in the Brazilian northeast region facing teaching/learning through problem-based learning in remote format.

2. Methodology

Study type, location and ethical aspects

This is a cross-sectional observational study with an analytical component. The same was approved by the ethics committee (document no. 37069320.2.0000.5569). The research meets the standards for research with human beings recommended by the National Health Council, through resolutions 466/2012 and 510/2016, and authorization was obtained from the participants through the consent form to carry out the study. The study was carried out in a virtual environment, through the Google Form platform, with dental students from Faculdade Pernambucana de Saúde – FPS.

Study participants

Students enrolled in the FPS Dentistry course during the data collection period (from March 2021 to August 2021) were invited to participate in the study. The sample is non-probabilistic and is composed of all students, over 18 years old, who agreed to answer the data collection instrument.

Application of the PBL method in a remote format

The PBL is routinely applied in all courses at the Faculdade Pernambucana de Saúde. It takes place in two weekly meetings and, from them, all the theoretical contents of the institution's courses are developed. In this pandemic scenario whose in-person activities were suspended, the method began to be applied in a remote format with synchronous meetings. For this, the virtual environment of the WebEx Meet application (California, USA) was used.

During the tutorials, students were asked to participate with cameras on and that their contributions/discussions were carried out through the device's audio resource.

Data collection and collection instrument

A sociodemographic data collection form was created and one was used for each research participant, in which information related to age, gender, marital status, if they have children, and if they had a confirmed positive diagnosis of covid and if this diagnosis occurred during the period of remote tutoring.

To assess students' intrinsic motivation, the Intrinsic Motivation Inventory (IMI) was used. The version of the instrument used in this study was cross-cultural validation and adaptation for the Brazilian population by Azevedo et al., (2019). The IMI is a Likert-type scale that contains a total of 45 items distributed in seven subscales, which assess: 1. interest/pleasure; 2. perceived competence; 3. effort/importance; 4. pressure/tension; 5. perception of choice; 6. value/utility; and 7. integration (relationship) during the performance of a certain activity.

Participants assigned a scale value (1, 2, 3, 4, 5, 6 or 7) to each item, where the closer to 1 “the less true” is that statement for them and the closer to 7 “the more true” is the statement. In the IMI, the interest/pleasure subscale is considered the measure of self-report of intrinsic motivation, and the subscales perception of choice and perceived competence are considered as positive predictors of intrinsic motivation. On the other hand, the pressure/tension subscale is theorized as a negative predictor of intrinsic motivation (Azevedo et al., 2019).

Data collection was carried out after approval by the ethics committee and through the Google Form containing an access link to accept to participate in the research after reading and understanding the ICF, as well as the data collection instrument. After responding, all students received a copy of the questionnaire with their answers and the Informed Consent Form by email.

Data processing and analysis

The data were tabulated in a Microsoft Excel spreadsheet, version 2010, using the double-entry feature, to detect and correct possible typing errors. Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 23.0, using descriptive frequency and inferential analysis. The continuous variables studied were presented through the mean and standard deviation (SD) and the categorical data were described through frequency distribution tables.

Regarding the IMI, each of the 7 subscales/domains (interest/pleasure, perceived competence, effort/importance, pressure/tension, perception of choice, value/utility and relationships) were defined through the arithmetic mean of the set of items that composed it. The seven response options (1 to 7) were considered, ranging from 1 = not true, 4 = somewhat true to 7 = very true, to define the gradation of scores. Thus, the following cut-off points were assigned: ≤3.0 (not true/not motivated), >3.0 and 3.0) and not (≤3.0). From these points, the student's motivation in each of the subscales/domains was evaluated independently.

Considering some factors that could influence the intrinsic motivation of the student, the variables gender, if the student works in addition to studying, if he had a diagnosis of covid and if this diagnosis occurred during moments of remote tutoring were analyzed to verify the possible associated factors to intrinsic motivation. For this, an analysis was performed using the Poisson regression model, with a confidence interval of 95% and the p-value was assigned from the Wald test. A cut-off point (score ≤4.0 and >4.0) was performed, based on the frequency distribution, using the general mean score of motivation (arithmetic mean based on the result of all domains and subscales). Thus, the students were divided into two categories (poorly motivated – those with an average score ≤4.0; and motivated – those with an average score >4.0).

3. Results

Of the 107 students enrolled in the Dentistry course at the time of collection, 65 (60.7%) participated. The mean age of the students who participated in the research was 19.75 (±3.4), with a minimum age of 18 and a maximum of 41 years. The

students included in the study were distributed among all 5 initial semesters of the course (the only semesters active at the time of collection, given Dentistry is a 10-semester course, but it has been recently established at FPS). The categorization of students into motivated and poorly motivated, based on the frequency distribution, resulted in two groups: the group of motivated students with n=30 (46.2% of the sample) and average scores that ranged between 5.0 and 7.0 and another group of poorly motivated students with n=35, which corresponded to 53.8% of the sample who had average scores from 1.0 to 4.0.

The mean global score (and standard deviation) of intrinsic motivation, considering all IMI items, was 4.48 (±0.61). The scores by domains/subscales are shown in Table 1. All subscales/domains have motivation scores >3.0, with the pressure/tension and relationships domain showing the lowest average scores, 3.74 and 3.76 respectively. The value/utility subscale was the only one that presented an average score of high motivation, being greater than 6.0. Concerning sociodemographic characteristics, most students were female (86.2%), single (96.2%), without children (99%) and did not work (87.7%). Almost all students (98.1%) did not have a previous degree.

Table 1. Mean intrinsic motivation scores of dentistry students (mean ± standard deviation).

Subscale	Mean score† ± SD	Motivation
Interest/pleasure	4.36 ± 0.78	Moderate motivation
Perceived competence	4.50 ± 1.08	Moderate motivation
Effort/importance	4.35 ± 0.70	Moderate motivation
Pressure/tension	3.74 ± 0.91	‡
Perception of choice	3.98 ± 1.07	Low motivation
Value/utility	6.39 ± 0.96	High motivation
Relationsa	3.76 ± 0.70	Low motivation

†Mean intrinsic motivation scores: ≤ 3.0 (not motivated), > 3.0 to ≤ 4.0 (low motivation), > 4.0 to ≤ 5.0 (moderate motivation), > 5.0 to ≤ 6.0 (high motivation) and > 6 (very high motivation). ‡ In the case of the pressure/tension subscale, a low average score points to a state of low pressure and tension and, therefore, indicates motivation. Source: Authors.

Table 2 presents the results of the adjustment of Poisson regression models for the intrinsic motivation condition of the dental student in the remote tutorial group scenario, according to gender variables, if the student works in addition to studying, if he had a positive diagnosis of covid and if this diagnosis occurred during the remote tutorials. It can be seen that the work variable showed a statistical difference concerning intrinsic motivation. Students who reported working had a higher mean motivation score (5.00 ± 0.9) than those who did not work (4.40 ± 0.5). The other variables analyzed showed no statistical difference. From the prevalence ratio calculated from Poisson regression, it was found that individuals who work are 1.22 times more motivated when compared to those who do not work.

Table 2. Results of the adjustment of Poisson regression models for the intrinsic motivation condition of Dentistry students in the remote tutorial group scenario compared to the variables gender, work, positive diagnosis for COVID and if the diagnosis occurred during the remote tutorials.

Variable (n=65)	Motivated (n/%)	PR† (IC 95%)	p-value*
Gender			
Male (n=9)	3 (4.6%)	0.88 (0.69-1.11)	0.285
Female (n=56)	27 (41.5%)	1	
Working			
Yes (n=8)	6 (9.2%)	1.22 (1.01-1.47)	**0.033**
No (n=57)	24 (36.9%)	1	
Covid diagnosis			
Yes (n=19)	7 (10.8%)	0.85 (0.66-1.10)	0.229
No (n=46)	23 (35.4%)	1	
Covid diagnosis during remote tutorial sessions			0.425
Yes (n=9)	4 (6.2%)	1.13 (0.82-1.52)	
No (n-10)	3 (4.6%)	1	

†Prevalence Ration; *Wald test. The percentage of motivated individuals was calculated regarding the total sample number. Source: Authors.

4. Discussion

The theme of motivation has been studied by several authors today. Particularly in Brazil, motivation in the context of learning has been the subject of research under different theoretical approaches. Some studies have evaluated the intrinsic motivation of higher education students in health courses such as physiotherapy (Blascovi-Assis, 2016), medicine (Azevedo et al., 2019), nursing (Hackney, 2017) and dentistry (Orsini et al., 2015). However, there are no reports in the literature of intrinsic motivation data in the context of learning in remote format, which makes the results obtained in this work relevant given the changes that the teaching process has been going through as a result of the pandemic scenario.

In PBL, the teaching method used by the students who participated in this study, individual student motivation has direct implications for their involvement and the quality of the teaching-learning process (Jones et al., 2013). Its positive effects on academic performance, adaptation and well-being have been established, and supported by various theories that determine student stimulation strategies (Deci & Ryan, 2000; Jang et al., 2016).

The Theory of Self-Determination (TSD) assumes that people are active organisms and tend to develop to deal with the challenges of the environment and interact with new experiences, observing the sense of themselves based on autonomy, competence and establishment of a bond (Deci; Ryan, 2000). These factors directly influence student motivation and, through this study, it can be seen that even using the PBL method in remote format and at a time as challenging as the covid pandemic, students remained intrinsically motivated (average score > 3). These findings corroborate other studies that verified the intrinsic motivation of undergraduate students. Blascovi-Assis (2016) evaluated the motivation of physical therapy students using the Vallerand academic motivation scale. The authors identified that there was no difference in student motivation at different stages of the course. Thus, they were motivated both at the beginning and at the final stage of graduation. The dentistry students who composed the sample of this study are from the initial semesters of their training (1st to 4th). This is justified by the fact that the course is new and does not yet have graduated students. In this way, the intrinsic motivation of these students can be monitored throughout their training.

Azevedo et al. (2019) evaluated intrinsic motivation in the tutorial group scenario in medical students from a college with active methodology, using the IMI. The authors reported that the average global score of intrinsic motivation, considering all IMI items, was 3.8. Considering that the average global score of intrinsic motivation found in this study, using the same instrument in a population of dentistry students, was 4.48, it can be considered that dentistry students seem to be motivated even performing the tutorial group meetings in remote format.

It is important to emphasize that the data collection of this study was carried out amid a global pandemic of covid, a time when the psychological of students could be affected in the course of drastic changes in lifestyle and insecurities with their health and that of their families. relatives. This pact could be even greater for those students who have tested positive for covid. The data obtained in this study showed that there was no significant difference between those who had a positive diagnosis for covid compared to those who did not, as well as when compared with the time of diagnosis whether or not during the period of remote tutoring. This demonstrates that the motivation among the students was indifferent about their diagnosis.

Regarding gender, the motivation of male and female students was statistically similar. These data corroborate other studies that also showed no difference in intrinsic motivation between genders (Azevedo et al., 2019; Kærsgaard et al., 2020). Kærsgaard et al. (2020) reported that the motivational spectrum varies widely, regardless of gender, and also found out that dental students are motivated by role models, personal orientation and strong interest in health sciences, in addition to future working conditions. These aspects may have kept students motivated during remote tutoring regardless of gender.

The fact that the student worked had a positive aspect regarding the motivation of the dental students included in this research. A significant difference was found showing that those students who worked and studied were more motivated for remote tutorial meetings than those who did not work. The act of reconciling work and study for these students can serve as motivation and interest in the course/study, in addition to increasing these students' sense of responsibility. The authors recognize that the fact that there is no comparison of the intrinsic motivation of students in tutoring carried out remotely with face-to-face tutoring is a limitation of this study. Furthermore, as the studied population was composed of a course with only initial periods, further studies can be carried out comparing students' motivation at the beginning and at the end of the course.

5. Conclusion

It was demonstrated by the present study that the students of the dentistry course were intrinsically motivated to carry out the meetings and activities of the tutorial group of problem-based learning in the remote format. The positive diagnosis for covid was not a factor that influenced the students' motivation. It can be suggested that work positively influences the intrinsic motivation for remote tutorial meetings.

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