The effect of an educational video game on high school students' motivation, self-efficacy and knowledge in a History course

CLAUDIA ZAPATA*
RICARDO NAVARRO**
VANESSA VEGA***
Pontificia Universidad Católica del Perú, Perú

Abstract

The purpose of this study was to explore the effects of an educational video game on high school students' motivation, self-efficacy and knowledge. The game tells the story of Mariano Melgar, a Peruvian thinker, patriot and hero. The authors used a quasi-experimental design and conducted pre- and post-tests to estimate the effect of the video game. The sample consisted of 67 students from two schools in Lima. The students were randomly assigned to one of two conditions: playing a video game or watching a documentary. Results show that playing the video

* Magíster en Ciencia de la Computación, por la Pontificia Universidad Católica del Perú. Miembro investigador del Grupo de Investigación Avatar-PUCP y del Grupo de Investigación de Usabilidad y Métricas de Software-PUCP. Asesora del desarrollo del videojuego 1814: La Rebelión del Cusco. Asesora de usabilidad del Proyecto Carpooling PUCP. Su experiencia profesional se centra en el diseño y evaluación de interfaces usables y accesibles, en la gestión de proyectos de desarrollo de *software*, soluciones aplicadas al aprendizaje mediante videojuegos. Correo electrónico: zapata.cmp@pucp.edu.pe ORCID: https://orcid.org/0000-0003-0134-6487

** Magíster en Cognición, Aprendizaje y Desarrollo por la Pontificia Universidad Católica del Perú. Ha publicado estudios sobre los efectos de las tecnologías en el aprendizaje y rendimiento académico de los estudiantes universitarios y de Educación Básica Regular. Es investigador del grupo Avatar PUCP donde realiza proyectos de desarrollo e investigación. Actualmente se desempeña como docente en la Facultad de Psicología de la Pontificia Universidad Católica del Perú enseñando cursos de investigación, estadística y neurociencias. Correo electrónico: ricardo.navarro@pucp.pe ORCID: https://orcid.org/0000-0002-7069-978

*** Licenciada en Psicología Educacional por la Pontificia Universidad Católica del Perú. Diplomada en Diseño y Gestión de Proyectos Sociales. Ha participado en proyectos de investigación relacionados a tecnología, juego y aprendizaje. Cuenta con experiencia en el diseño de proyectos educativos sobre el uso de videojuegos del área de matemática e historia. Además, cuenta con experiencia en el diseño y dictado de cursos virtuales y talleres. Actualmente, trabaja en el área de Investigación y Formación del Grupo Avatar PUCP. Correo electrónico: vanessa.vega@pucp.pe ORCID: https://orcid.org/0000-0002-5022-9386

Claudia Zapata, Ricardo Navarro y Vanessa Vega

game was more effective in increasing students' knowledge, whereas watching a documentary increased demotivation and decreased self-efficacy through vicarious experience. In view of this, it is important to explore further video games' usefulness as educational materials.

Keywords: motivation, self-efficacy, video games, history instruction

El efecto de un videojuego educativo en la motivación, autoeficacia y conocimiento de estudiantes de secundaria en un curso de historia

Resumen

El objetivo de este estudio fue explorar los efectos de un videojuego educativo en la motivación, la autoeficacia y el conocimiento de estudiantes de secundaria. El juego aborda la historia de Mariano Melgar, un intelectual y héroe peruano. Tuvo un diseño cuasi-experimental, por lo que se realizaron análisis pre-test y post-test. El experimento se realizó con 67 estudiantes de dos escuelas de Lima. Se les asignó al azar una de dos condiciones: jugar a un videojuego o ver un documental. Los resultados muestran que el videojuego fue más eficaz para incrementar el conocimiento de los estudiantes, mientras que el documental aumentó la desmotivación y disminuyó la autoeficacia mediante la experiencia vicaria. En vista de esto, resulta relevante explorar con mayor profundidad la utilidad de los videojuegos como material didáctico.

Palabras clave: motivación, autoeficacia, videojuegos, enseñanza de la historia

O efeito de um jogo educativo na motivação, autoeficácia e conhecimento de alunos do ensino médio em um curso de história

Resumo

O objetivo deste estudo foi investigar os efeitos de um videogame educativo na motivação, autoeficácia e conhecimento de alunos do ensino médio, abordando a história de Mariano Melgar, um herói intelectual e patriótico peruano. Adotou-se um desenho quase experimental, realizando pré-testes e pós-testes para avaliar o impacto do videogame. O experimento envolveu 67 alunos de duas escolas em Lima, randomizados para duas condições: jogar o videogame ou assistir a um documentário. Os resultados revelaram que o videogame foi mais eficaz para aumentar o conhecimento dos alunos, ao passo que assistir a um documentário resultou em aumento da desmotivação e redução da autoeficácia por meio da experiência vicária. Diante desses resultados, sugere-se uma exploração mais aprofundada sobre a utilidade dos videogames como ferramenta educacional.

Palavras-chave: motivação, autoeficácia, jogos educativos, ensino de história.

1. Introduction

1.1. Motivation and Self-efficacy in Education

In recent years, in order to innovate and support pedagogical practice, it has become common practice to incorporate Information and Communication Technologies (ICTs) in the classroom (Dolighan & Owen, 2021; Maheshwari, 2021). This suggests that ICTs can contribute to a meaningful teaching process, one which fosters a positive learning climate and autonomous motivation (Filippello et al., 2020; Reeve & Cheon, 2021; Ryan & Deci, 2020).

In this context, it is important to consider students' motivation, and hence this study uses as a conceptual framework the Self-Determination Theory (SDT), a macro-theory of motivation. SDT views motivation as a complex concept, considering the impulses that lead someone to perform a behavior (Deci & Ryan, 2000; Herrera & Matos, 2009; Reeve, 2002). According to Deci and Ryan (2000), three types of motivation can regulate an impulse: autonomous motivation, controlled motivation, and demotivation.

Autonomous motivation refers to actions stemming from personal interest (Deci & Ryan, 2000; Ryan & Deci, 2002; Vallerand et al., 1992). In contrast, controlled motivation refers to the influence of external stimuli on performing a behavior (Deci & Ryan, 2000; Ryan & Deci 2017). In addition to these opposing impulses, SDT views demotivation as the absence of interest in achieving a goal (Ryan & Deci, 2002), a phenomenon detrimental to students' educational outcomes (Galleguillos & Olmedo, 2019; Kaiser et al., 2020; Reeve et al., 2020). Autonomous motivation has been proven to positively influence students' learning (Shah et al., 2021), academic performance (Lin et al., 2017), and academic self-efficacy (Ahmadi et al., 2021; Howard et al., 2021).

On the other hand, self-efficacy refers to the perception of one's abilities to perform certain actions and produce a given result (Bandura, 1997; Bandura 2006) and has also been studied as a predictor of academic performance (Schirichian et al., 2022; Supervía & Robres, 2021; Zysberg & Schwabsky, 2021). In the academic context, self-efficacy is thus understood as the beliefs that students have about their academic skills (Li et al., 2021; Peura et al., 2021). This is also constructed from the vicarious experience of observing others (Delgado et al., 2019; Usher & Pajares, 2009); the interpretation of previous achievements, comparing them with those of others; the persuasion and social messages received from others (Hattie & Timperley, 2007; Moreta & Ocaña, 2021); and students' evaluations of their performance influenced

181

by their physiological and emotional states (Espinosa et al., 2020; Supervía & Robres, 2021).

The references above show that motivation and self-efficacy are relevant variables in education, which need to be addressed together with the use of ICTs (Calderón et al., 2020; Hanham et al., 2021; Rosli & Saleh, 2022). In particular, a relatively new trend of research focuses on the influence of video games on education (Martinez et al., 2022) and history instruction (Guerrero et al., 2021). However, there are few similar studies in Latin America and far fewer in Peru. Hence the need to address this issue to learn more about it in Peruvian classrooms.

1.2. History Teaching and Videogames

According to Peru's Ministry of Education (MINEDU, 2016), history teaching in Peru is important for encouraging the exercise of citizenship, which allows students to consider living within a changing society. MINEDU (2016) states that the purpose of teaching history is for students to understand the relationship between the past and the present and to recognize themselves as social actors who can construct and transform the present and future. In line with this, Almagro and Cerez (2020) point out the importance of such content for national identity and collective memory.

Interaction between teachers and students must therefore be encouraged, using a participatory methodology and supported by technology (Carrasco et al., 2021), otherwise students will memorize content without reasoning or constructing new concepts (González et al., 2022). This can be seen currently in the use of technological aids in history instruction using audiovisual materials: students do not learn to take a critical view of history (Cuenca et al., 2021). In view of this, some scholars propose using video games (Evaristo et al., 2016).

Games are defined as voluntary and immersive activities that entertain users in a way that is separate from the real world (Barclay & Bowers, 2020; Cutting et al., 2020; Huang et al., 2019; Ijaz et al., 2020). All games have the following characteristics: fantasy, rules and objectives, sensory stimuli, challenge or level of difficulty, mystery in the game, interaction, and the amount of control one has over the game (Chen et al., 2021; Hügel & Davies, 2022; Maheu et al., 2018; Tsai & Tsai, 2020). These features are what foster users' interest and can aid teaching (Los & Schweinle, 2019; Lou & Noels, 2022). Video games also appear to have various cognitive benefits for students (Abd et al., 2022; Megagianni & Kakana, 2021), as well as positive effects

on academic performance in subjects such as math and science (Cook et al., 2022; Gkora & Stathopoulou, 2022; Rosenthal & Ratan, 2022).

Furthermore, video games can also increase students' motivation to learn and self-efficacy by creating greater interest and commitment to content presented in class (Bozgun & Baytemir, 2021; Byusa et al., 2022; Sanchez et al., 2022; Yunus et al., 2021). The use of portable consoles in the classroom also helps keep students motivated, regardless of the strategy used by the teacher (Gouseti et al., 2020; McFadyen, 2021). SDT has also studied the motivation for playing video games, and perceived autonomy and competence appear to be related to students' enjoyment of them (Ryan et al., 2006).

Although there is evidence of the positive influence of video games on various school subjects, there is particular evidence related to their use in history teaching (Boom, 2020; Kessner & Harris, 2022; Patterson et al., 2022). This is mostly found in international studies, and there is little evidence of the use of video games on history in the classroom in Latin America. In Peru, a study by Evaristo et al. (2016) concluded that video games as a teaching aid can be a positive stimulus for teaching. Nevertheless, the study pointed to important constraints (such as the time of exposure to the stimuli), and so further research is needed to corroborate these findings.

The purpose of this study is to identify the influence of a historical video game on the academic performance, motivation, and self-efficacy of ninth-grade students. It uses a quasi-experimental design for comparing the results obtained from one group that used the video game and another that used a documentary as pedagogical material. The variables studied are expected to show greater improvement as a result of using video games.

2. Method

2.1. Participants

The sample was composed of 67 students from two schools in Lima. The students were randomly assigned to one of the two conditions of the study, class A ("Video game" condition) or class B ("Documentary" condition). In total, there were 31 girls (46.3 percent) and 36 boys (53.7 percent), aged from 13 to 16 (M = 14, SD = .58). All students were in ninth grade (third grade of secondary education).

In the first school, 23 students participated (M = 14.05 years old, SD = .49) in class A (video game), nine of whom were girls, and fourteen were boys. Nineteen students participated (M = 13.89 years, SD = .57) in class B (docu-

183

mentary), nine of whom were boys, and ten were girls. In the second school, 14 students were randomly assigned (M = 14.07 years, SD = .73) to class A (video game). Nine were boys, and five were girls. Eleven students participated (M = 14 years, SD = .63) in class B (documentary), four of whom were boys and seven were girls.

Their parents were informed of the nature of the study and agreed to their children's participation in the study by signing an informed consent form, which explained the purpose of the research and the confidentiality of the information, and specified that students could withdraw from the study at any time.

2.2. Instruments

The study had a quasi-experimental cross-sectional design. The following instruments were used as measures of the effects of the video game on the variables studied.

Classes on Mariano Melgar. Two history lessons about Mariano Melgar were designed with the help of a history teacher. These were similar in form and content. Class A played the video game "Mariano: The Last Dream" as pedagogical material, while Class B watched the documentary "Mariano Melgar: Passion, Homeland and Poetry" (Aguirre, 2016). Both lessons were taught by senior Education students.

Video game "Mariano: The Last Dream". This is a 2.5D side-scrolling Puzzle and Platform game inspired by the life of the Peruvian figure, Mariano Melgar. The player takes the role of Melgar in his last dream, moments before being shot, and must use his skills as a patriotic poet to save his beloved Silvia and his compatriots from the Horrible Night. The video game was designed and developed by Avatar Group of the Pontificia *Universidad Católica del Perú* (Pontifical Catholic University of Peru) for the project "Development and Validation of a multimedia software as a pedagogical tool to increase knowledge of secondary education students about the independence of Peru". The game design covered pedagogical requirements for the game to be incorporated into a history class. The game's main objective was to show three different facets of Mariano Melgar: as an intellectual, poet and patriot. The game was divided into three levels. Each level highlights one of the facets of the historical figure.

Figure 1. *Video game "Mariano: The Last Dream"*

Figure 2. *Cinematic of the video game "Mariano: The Last Dream"*
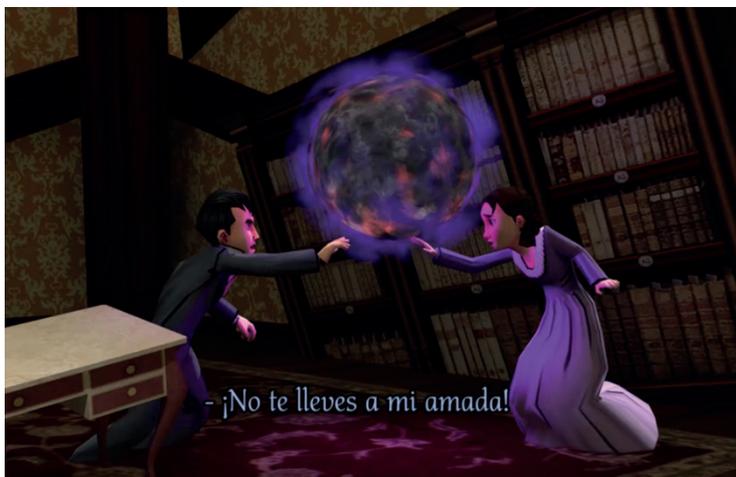
Documentary "Mariano Melgar: Passion, Homeland and Poetry". Is the fourth episode of the documentary series "Bicentenary: The Road to Freedom" made in 2016 (Aguirre, 2016). This chapter focuses on the life of Mariano Melgar, poet and thinker, and the importance of this historical figure for Peru's independence.

Class observation guide. To ensure that the lessons in both schools were equivalent and no external variables influenced teachers' performance, the researchers designed an observation guide for the various parts of the lesson and all the content the teacher needed to address.

Test of knowledge about Mariano Melgar. With the help of a teacher, the researchers designed a test to evaluate knowledge about Mariano Melgar in both conditions. This test consists of 12 multiple-choice questions on the three aspects highlighted in the lessons about the life of Melgar: Melgar as a curious thinker, Melgar as a romantic poet, and Melgar as a patriot and hero.

Academic motivation test to learn history. The questionnaire "*Why do you study at university?*" (Matos, 2010) is a reduced version of the Spanish adaptation of the Academic Motivation Scale (AMS, Vallerand et al., 1992). For this study, the researchers adapted the test developed by Matos (2010) to measure students' motivation to learn history. It has 23 items grouped into three scales: autonomous motivation (identified and intrinsic regulation), controlled motivation (external and introjected regulation), and demotivation. The researchers used a Likert scale of 1 (completely disagree) to 7 (completely agree). The sample adequacy measure Kaiser-Meyer-Olkin (KMO) was .749, which is an acceptable value (Field, 2009), and Bartlett's sphericity test was significant ($\chi 2$ = 428.03, *df* = 153, *p* < .001). The total variability explained by the two dimensions is 56.32 percent. The former, autonomous motivation, explains 40.75 percent of the total variance, while the second, controlled motivation, explains 15.56 percent. The factorial loads reach values between .67 and .89 in the first factor, and between .30 and .76 in the second factor, acceptable values according to Field (2009). The researchers also conducted a reliability analysis of the two types of motivation regarding history lessons. For autonomous motivation they found an alpha coefficient of .946, and an alpha coefficient of .698 for controlled motivation. Both reliability indices are good, suggesting the test adequately measures controlled and autonomous motivation (Aiken, 1996). Likewise, all corrected item-total correlations reach adequate values (Field, 2009).

Self-efficacy test in history. This test was adapted from a self-efficacy scale for mathematics established by Usher and Pajares (2009). The test consists of 24 items divided into four subscales: Successful personal experiences (mastery experience); Successful experiences of others (vicarious experience); Social persuasion (social persuasion), and Physiological state (physiological state). The sample adequacy measure KMO was .738, which is a good value (Field, 2009), and Bartlett's sphericity test was significant ($\chi 2$ = 371.072, *df* = 136, *p* < .001). In addition, the factorial analysis indicated the existence of four

factors, expected according to the theory. The total variability explained by these factors is 73.32 percent. The first factor, *Personal Successful Experiences*, explains 40.20 percent of the total variance. The second, *Successful Experiences of Others*, explains 15.51 percent of the total variance, while the third, *Social Persuasion*, explains 10.82 percent. Finally, the fourth factor, *Physiological State*, explains 6.78 percent of the total variance. The factorial loads reach values between .62 and .87 on the first factor, .65 and .83 on the second, .74 and .79 on the third, and .64 and .85 on the fourth. All of these are adequate values, according to Field (2009).

2.3. Procedure

With the support of a teacher, the researchers designed two history lessons (class A and B) about the life of Mariano Melgar. These were similar in both form and content. Class A used the video game "Mariano: The Last Dream" as a pedagogical tool, and class B used the documentary "Mariano Melgar: passion, country and poetry" (Aguirre, 2016). Next, the researchers designed a class observation guide to ensure that both classes complied with the pro-posed instructional design. This enabled them to monitor similarity, with the only difference being the support material that the teacher used. The researchers also designed a knowledge test about the life of Mariano Melgar with an expert on the subject.

The researchers adapted the scales about "motivation to learn history" and "self-efficacy in history", and performed validity and reliability analyses for both scales with a sample of secondary students from Lima. They modified certain items based on the results, and then contacted the authorities of two schools in Lima.

The authorities of both schools told their students about the study and gave them a form to be signed by their parents if the students wished to take part. This form stated that students' participation in the research was voluntary and anonymous and that they could withdraw from the evaluation without it affecting them in any way. After receiving permission from their parents, the students were randomly assigned (through a draw) to one of the two study conditions, class A (video game) or class B (documentary). The students who agreed to participate were gathered on a specific day and time in each school.

The researchers visited both schools first, to apply the knowledge test about Melgar, the motivation to learn history scale, and the self-efficacy in history scale. After a few days, the history lessons (A and B) were carried out simul-taneously, with the students assigned randomly to each group. The lesson was

187

scheduled to last two hours, and went ahead without a hitch in the second school. However, due to logistical problems in the first school, the lesson had to be cut to approximately one hour and twenty minutes.

To deliver the lessons, two final-year Education students were trained on the subject of Mariano Melgar and the structure of the lessons. The student in charge of class A was taught about the content and mechanics of the video game, while the student in charge of class B was taught the information to be provided to the students. At the end of both sessions, the researchers again applied the knowledge test, the motivation to learn history scale, and the self-efficacy in history scale.

2.4. Statistical Analysis

The Statistical Package for Social Sciences (SPSS, version 23) software was used to analyze the information. The researchers first performed the Shapiro-Wilk normality test to identify whether the results had a normal or non-normal distribution, and used this as a basis for pre test and post test comparisons and correlations.

3. Results

The researchers started by conducting the Shapiro-Wilk normality test to establish whether the sample had a normal distribution. Most of the variables did so. However, some variables did not, and so the researchers examined asymmetry and kurtosis coefficients. These statistics were not greater than 3 and 10, respectively, indicating that non-normality was not severe (Kline, 2013). The researchers therefore conducted a parametric analysis.

They performed a t-test for related samples, to examine if the intervention with the video game and the documentary had influenced students' knowledge. In the "Documentary" group, the scores before the intervention (M = 7.17, SD = 4.81) were significantly lower than scores after the intervention (M = 13.00, SD = 3.47), $t(29)$ = -6.25, $p < .05$, d = 2.32. Similarly, significant differences were found in the scores before (M = 7.03, SD = 4.75) and after (M = 14.35, SD = 2.58) in the "Video Game" condition, $t(36)$=-9.50, $p < .05$, d = 3.17. This indicates that after the lesson (regardless of the tool used), students' performance had significantly improved.

No statistically significant differences were found in the knowledge test scores before the intervention in comparisons between groups (Video Game and Documentary). The "Video Game" condition (M = 7.03, SD = 4.75)

and the "Documentary" condition (M = 7.17, SD = 4.81) were similar for this variable, $t(65)$ = -.119, p > .05. This status changed after the intervention, since significant differences were found in the knowledge test scores. The students who played the video game (M = 14.35, SD = 2.58) obtained higher scores than those who watched the documentary (M = 13, SD = 3.47), $t(65)$ = 1.83, p < .05, d = .45.

The researchers also conducted a t-test for paired samples to find out if the intervention led to a change in self-efficacy. In the "Video Game" condition, they found significant differences only in the Vicarious Experience dimension between the scores before (M = 4.40, SD = 1.16) and after the intervention (M = 4.17, SD = 1.15), $t(35)$ = 2.41, p < .05, d = .81. Similarly, in the "Documentary" condition, they found significant differences in the Vicarious Experience scores before (M = 4.31, SD = 1.07) and after the intervention (M = 3.73, SD = 1.07), $t(26)$ = 4.19, p < .05, d = 1.56.

Regarding motivation, there were no significant differences in the dimensions evaluated after the video game intervention; in other words, students did not report a change in their motivation after playing the video game. This varied however in the "Documentary" condition, because there were differences in "Autonomous Motivation" and "Demotivation" (Table 1). In the former, scores decreased after the history lesson (with the documentary). In the latter, the scores increased after it (increasing the demotivation on the history course).

Table 1. *Comparison of Motivation Mean Scores in the "Documentary" Condition*

	Pre-intervention			Post-intervention			df	t	d
	n	M	SD	n	M	SD			
Autonomous	25	4.12	1.04	26	3.84	0.98	24	2.19*	.89
Demotivation	25	2.19	0.95	26	2.79	1.14	25	-2.49*	1.02

* The correlation is significant at the .05 level (unilateral).

When comparing self-efficacy and motivation between groups (video game and documentary), no statistically significant differences were found in the scores before the intervention, confirming that these variables were similar between the groups. After the intervention, scores differed in the Vicarious Experience dimension (Self-efficacy), in which the students in the "Video Game" condition (M = 4.17, SD = 1.15) had higher scores than those in the "Documentary" condition (M = 3.69, SD = 1.06), $t(62)$ = 1686, p < .05, d = .42. Furthermore, in the Demotivation dimension (Motivation), the

189

students in the "Video Game" condition (M = 2.04, SD = 1.04) had lower scores than those in the "Documentary" condition (M = 2.68, SD = 1.17), t(60)= -2.283, p < .05, d = .57 (greater demotivation with the Documentary).

Finally, the researchers also assessed the relationships between motivation and self-efficacy (Table 2).

Table 2. *Correlations Between Self-efficacy and Motivation by Condition*

	Condition	Controlled	Autonomous	Demotivation
Video Game	Mastery Experience	-.088	.635**	-.342*
	Vicarious Experience	.046	**.849****	-.341
	Social Persuasions	.042	**.546****	.040
	Physiological State	-.314	**.645****	**-.588****
Documentary	Mastery Experience	.033	**.528****	-.327
	Vicarious Experience	.328	**.827****	.068
	Social Persuasions	.139	**.740****	.039
	Physiological State	**-.439***	-.047	**-.547****

**. The correlation is significant at the .01 level (bilateral).
*. The correlation is significant at the .05 level (bilateral).

It is autonomous motivation that has more significant correlations and a higher and more direct force (r > .5) in both conditions (Video Game and Documentary). This is not so however with the physiological state (self-efficacy) in the "Video Game" condition. In other words, in the group that played the video game, when any of the self-efficacy dimensions increase, autonomous motivation also increases. In addition, the demotivation factor correlates negatively with two dimensions of self-efficacy in the "Video game" condition. In other words, this means that when the experience of mastery and physiological state decreases, the demotivation will increase. Finally, in the group that watched the documentary, the dimensions of controlled motivation and demotivation correlate inversely with the physiological state.

4. Discussion

This study aimed to identify the influence of an educational video game based on a Peruvian historical character, on the knowledge, motivation, and self-efficacy of ninth grade students from different schools in Lima. For this purpose,

the video game "Mariano: The Last Dream" was incorporated as pedagogical material and compared with audiovisual material, more frequently used in history instruction.

In the first place, intra-group results show that, in both groups, students showed an improvement in their knowledge about the historical character. This finding was expected to some extent since none of the students had prior knowledge about the character. Thus, regardless of the support material, teaching them about this subject was expected to improve their knowledge.

Additionally, both groups had similar studied variables before starting the intervention, which enabled the researchers to define whether the subsequent differences should be considered. In this case, after the intervention, the groups had significantly different scores on the knowledge test, especially the group that played the video game. This means that the video game as a pedagogical tool used in the classroom has a more positive influence than other traditional tools, such as audio-visual media (documentary). These findings are consistent with previous studies, such as those by Evaristo et al. (2016), Guerrero et al. (2021), and Hoy (2018). It is important to mention that both history classes were similar, the only difference was the tool used: the video game or the documentary. This result may indicate that the characteristics of the tool are important for achieving educational objectives. The video game used in the study was designed with pedagogical requirements and learning objectives established. The students had to interact with different symbols that were shown in different aspects throughout the game (music, cinematics and graphics) and use the information to pass each level. There were also activities in the history class that were designed for the students to analyze the information in the video game and the documentary and draw their conclusions about Mariano Melgar. This reflects the importance of the role of the teacher for guiding learning.

There were no significant differences between the groups in their motivation to learn history. However, the students that watched the documentary saw their autonomy reduced and their demotivation increased. Hence, it should be emphasized that, although playing a video game did not cause a change in motivation, it did not reduce students' autonomous motivation, unlike the documentary. This may indicate that the traditional means of teaching history limit students' autonomy, which may produce a diminished interest in the subject. This concurs with the point made by Wei et al. (2019) regarding prolonged exposure to a controlling context, which gives priority to content presentation to the detriment of autonomy. This in turn can lead to students' losing interest in the subjects taught at school and feeling discouraged.

Regarding self-efficacy, no significant differences were found before the intervention. After the intervention, there were only differences in one type of self-efficacy. Specifically, vicarious experience was lower in the group that watched the documentary compared to the group that played the video game. This may be because in the former, students do not interact directly with the content presented, and in the latter, students experience a higher degree of interaction with the content (Larsen & James, 2022). Moreover, the correlations suggest a significant relationship between autonomous motivation and the different types of self-efficacy evaluated in this study.

There is evidence of a positive trend between motivation and self-efficacy, also found in other studies, such as those of Kryshko et al. (2022), Tisza et al. (2021), and Lin and Wang (2021). This may be because video games have the potential to alter physiological states due to the experience of immersion. Hence in the case of the documentary, there would be no correlation since it is a passive medium that does not necessarily influence the student. Additionally, video games generate an immersion experience, which could help students reach a state of flow (Abuhamdeh, 2020).

Flow can be seen as an emotional state that encompasses the person as a whole due to the interaction with an immersive activity (Csikszentmihalyi, 2000; Leroy, 2021). This leads to a person's attention being directed toward the activity they are engaged in, bringing them high levels of enjoyment (Csikszentmihalyi, 2000; Nguyen et al., 2021; Özhan & Kocadere, 2020). Also, flow can be beneficial in the educational context because students have a positive experience with the class content, and, consequently, with their learning (Bressler et al., 2021; Nakamura & Csikszentmihalyi, 2014).

5. Conclusions

Both groups showed improvements in their knowledge about a historic figure (Mariano Melgar). However, the students in a class which used a video game as a pedagogical tool showed better performance and less demotivation than the students in a class in which they watched a documentary. For these findings to be replicated, video games must be incorporated into the class in an articulated manner, otherwise, there is a risk of wasting the benefits they can provide. Furthermore, the purpose of this study was not to identify students' level of immersion while playing video games. However, in light of the results, future studies should address this variable, as it may provide more evidence of the functionality and usefulness of video games as educational materials.

References

Abd-Alrazaq, A., Ahmed, A., Alali, H., Aldardour, A. M., & Househ, M. (2022). The effectiveness of serious games on cognitive processing speed among older adults with cognitive impairment: systematic review and meta-analysis. *JMIR serious games*, *10*(3), e36754. https://preprints.jmir.org/preprint/36754,

Abuhamdeh, S. (2020). Investigating the "flow" experience: Key conceptual and operational issues. *Frontiers in Psychology*, *11*, 158. https://doi.org/10.3389/fpsyg.2020.00158

Aguirre, P. (Prod.). (2016). Bicentenario: camino a la libertad. Lima, Perú: Teve Perú.

Ahmadi, A., Ziapour, A., Lebni, J. Y., & Mehedi, N. (2021). Prediction of academic motivation based on variables of personality traits, academic self-efficacy, academic alienation, and social support in paramedical students. *Community Health Equity Research & Policy*, *43*(2), 195-201. https://doi.org/10.1177/0272684X211004948

Aiken, L. (1996) *Tests psicológicos y Evaluación* (8th ed.). Prentice Hall.

Almagro, M., & Cerezo, D. (2020). The construction of national identities. *Theoretical Economics, 15*(2), 763-810. https://doi.org/10.3982/TE3040

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control.* Freeman.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Adolescence and education, Vol. 5: Self-efficacy and adolescence* (pp. 307-337). Information Age Publishing.

Barclay, P. A., & Bowers, C. (2020). Associations of subjective immersion, immersion subfactors, and learning outcomes in the revised game engagement model. In P. A. Barclay & C. Bowers (Eds.), *Learning and Performance Assessment: Concepts, Methodologies, Tools, and Applications* (pp. 957-968). https://doi.org/10.4018/978-1-7998-0420-8.ch044

Boom, K. H., Ariese, C. E., Hout, B., Mol, A. A., Politopoulos, A., & Hageneuer, S. (2020). Forthcoming. Teaching through play: Using video games as a platform to teach about the past. In S. Hageneuer (Ed.), *Communicating the past in the digital age* (pp. 27-44). Ubiquity Press. https://doi.org/10.5334/bch.c

Bozgun, K., & Baytemir, K. (2021). Academic Self Efficacy and Dispositional Hope as Predictors of Academic Procrastination: The Mediating Effect of Academic Intrinsic Motivation. *Participatory Educational Research*, *9*(3), 296-314. https://doi.org/10.17275/per.22.67.9.3

Bressler, D. M., Shane Tutwiler, M., & Bodzin, A. M. (2021). Promoting student flow and interest in a science learning game: a design-based research study of School Scene Investigators. *Educational Technology Research and Development*, *69*(5), 2789-2811. https://doi.org/10.1007/s11423-021-10039-y

Byusa, E., Kampire, E., & Mwesigye, A. R. (2022). Game-based learning approach on students' motivation and understanding of chemistry concepts: A systematic review of literature. *Heliyon, 8*(5), 1-10. https://doi.org/10.1016/j.heliyon.2022.e09541

Calderón, A., Meroño, L., & MacPhail, A. (2020). A student-centred digital technology approach: The relationship between intrinsic motivation, learning climate and academic achievement of physical education pre-service teachers. *European Physical Education Review*, *26*(1), 241-262. https://doi.org/10.1177/1356336X19850852

Carrasco, C. J. G., Martínez, P. M., Medina, J. R., & Sánchez, J. J. M. (2021). Perceptions on the procedures and techniques for assessing history and defining teaching profiles. Teacher training in Spain and the United Kingdom. *Educational Studies*, *47*(4), 472-490. https://doi.org/10.1080/03055698.2019.1707069

Cook, K., Villanueva Alarcón, I., & Jacob, G. (2022). Usefulness of Digital Serious Games in Engineering for Diverse Undergraduate Students. *Education Sciences*, *12*(1), 1-30. https://doi.org/10.3390/educsci12010027

Cuenca, J. M., Cáceres, M. J., & Estepa, J. (2021). Teacher training in heritage education: Good practices for citizenship education. *Humanities and Social Sciences Communications, 8*(1), 1-8. https://doi.org/10.1057/s41599-021-00745-6.

Cutting, J., Cairns, P., & Kuhn, G. (2020). Nothing else matters: Video games create sustained attentional selection away from task-irrelevant features. *Attention, Perception, and Psychophysics*, *82*(8), 3907-3919. https://doi.org/10.3758/s13414-020-02122-y

Chen, P. Y., Hwang, G. J., Yeh, S. Y., Chen, Y. T., Chen, T. W., & Chien, C. H. (2021). Three decades of game-based learning in science and mathematics education: an integrated bibliometric analysis and systematic review. *Journal of Computers in Education*, *9*, 1-22. https://doi.org/10.1007/s40692-021-00210-y

Csikszentmihalyi, M. (2000). *Beyond Boredom and Anxiety. Experiencing flow in work and play* (25th anniversary edition). Jossey-Bass.

Deci, E., & Ryan, M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry, 11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

Delgado, B., Martínez, M. C., Rodríguez, J. R., & Escortell, R. (2019). La autoeficacia académica y la inteligencia emocional como factores asociados al éxito académico de los estudiantes universitarios. *Revista Electrónica Gestión de las Personas y Tecnología*, *12*(35), 46-60. https://dialnet.unirioja.es/servlet/articulo?codigo=7836899

Dolighan, T., & Owen, M. (2021). Teacher efficacy for online teaching during the COVID-19 pandemic. *Brock Education Journal*, *30*(1), 95-95. https://doi.org/10.26522/brocked.v30i1.851

Espinosa, E. O. C., Ruiz, J. A. C., & Mercado, M. T. C. (2020). Autoeficacia académica del alumnado de los posgrados en administración en tiempos del COVID-19. *Propósitos y Representaciones,* 8(SPE3), 567. https://doi.org/10.20511/pyr2020.v8nSPE3.567

Evaristo, I., Navarro, R., Vega, V., & Nakano, T. (2016). Uso de un videojuego educativo como herramienta para aprender historia del Perú. *RIED. Revista Iberoamericana de Educación a Distancia*, *19*(2). http://creativecommons.org/licenses/by/4.0

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). SAGE. http://sutlib2.sut.ac.th/sut_contents/H124897.pdf

Filippello, P., Buzzai, C., Costa, S., Orecchio, S., & Sorrenti, L. (2020). Teaching style and academic achievement: The mediating role of learned helplessness and mastery orientation. *Psychology in the Schools*, *57*(1), 5-16. https://doi.org/10.1002/pits.22315

Galleguillos, P., & Olmedo, E. (2019). Autoeficacia y motivación académica: Una medición para el logro de objetivos escolares. *European Journal of Investigation in Health, Psychology and Education*, *9*(3), 119-135. https://doi.org/10.30552/ejihpe.v9i3.329

Gkora, V., & Stathopoulou, A. (2022). Learning disabilities and reading comprehension of students in primary school and the role of ICTS. *Eximia*, *5*(1), 350-367. https://www.eximiajournal.com/index.php/eximia/article/view/165

González, J. M., Franco, J. G., & Español, D. (2022). Educating in History: Thinking Historically through Historical Reenactment. *Social Sciences*, *11*(6), 256. https://doi.org/10.3390/socsci11060256

Gouseti, A., Abbott, D., Burden, K., & Jeffrey, S. (2020). Adopting the use of a legacy digital artefact in formal educational settings: opportunities and challenges. *Technology, Pedagogy and Education*, *29*(5), 613-629. https://doi.org/10.1080/1475939X.2020.1822435

Guerrero, C., Sánchez, R., Escribano, A., & Vivas-Moreno, V. (2021). Active teachers' perceptions on the most suitable resources for teaching history.

195

Humanities and Social Sciences Communications, *8*(1), 1-8. https://doi.org/10.1057/s41599-021-00736-7

Hanham, J., Lee, C. B., & Teo, T. (2021). The influence of technology acceptance, academic self-efficacy, and gender on academic achievement through online tutoring. *Computers and Education*, *172*, 104252. https://doi.org/10.1016/j.compedu.2021.104252

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77, 81–112. ttps://doi.org/10.3102/003465430298487

Herrera, D., & Matos, L. (2009). Desarrollo del concepto de motivación y su representación en distintas aproximaciones teóricas. In D. Herrera (Ed.), *Teorías contemporáneas de la Motivación: Una Perspectiva Aplicada* (pp.17-37). Fondo Editorial PUCP.

Howard, J.L., Bureau, J.S., Guay, F., Chong, J.X.Y., & Ryan, R. M. (2021). Student motivation and associated outcomes: A meta-analysis from self-determination theory. *Perspectives on Psychological Science*, *16*(6), 1300-1323. https://doi.org/10.1177/1745691620966789

Hoy, B. (2018). Teaching History With Custom-Built Board Games. *Simulation & Gaming*, *49*(2), 115-133. https://doi.org/10.1177/1046878118763624

Huang, C. L., Luo, Y. F., Yang, S. C., Lu, C. M., & Chen, A. (2019). Influence of Students' Learning Style, Sense of Presence, and Cognitive Load on Learning Outcomes in an Immersive Virtual Reality Learning Environment. *Journal of Educational Computing Research, 58*(3), 596-615. https://doi.org/10.1177%2F0735633119867422

Hügel, S., & Davies, A. R. (2022). Playing for Keeps: Designing Serious Games for Climate Adaptation Planning Education With Young People. *Urban Planning*, *7*(2). https://doi.org/10.17645/up.v7i2.5113

Ijaz, K., Ahmadpour, N., Wang, Y., & Calvo, R. A. (2020). Player Experience of Needs Satisfaction (PENS) in an Immersive Virtual Reality Exercise Platform Describes Motivation and Enjoyment. *International Journal of Human-Computer Interaction*, *36*(13), 1195-1204. https://doi.org/10.1080/10447318.2020.1726107

Kaiser, L.-M., Grobmann, N., & Wilde, M. (2020). The relationship between students' motivation and their perceived amount of basic psychological need satisfaction - a differentiated investigation of students' quality of motivation regarding biology. *International Journal of Science Education, 42*(17), 2801-2818. https://doi.org/10.1080/09500693.2020.1836690

Kessner, T. M., & Harris, L. M. (2022). Opportunities to practice historical thinking and reasoning in a made-for-school history-oriented videogame. *International Journal of Child-Computer Interaction*, *34*, 100545. https://doi.org/10.1016/j.ijcci.2022.100545

Kline, R. (2013) Exploratory and confirmatory factor analysis. In Y. Petscher & C. Schatsschneider (Eds.), *Applied Quantitative Analysis in Education and the Social Sciences* (pp. 171-207). Routledge. https://doi.org/10.4324/9780203108550

Kryshko, O., Fleischer, J., Grunschel, C., & Leutner, D. (2022). Self-efficacy for motivational regulation and satisfaction with academic studies in STEM undergraduates: The mediating role of study motivation. *Learning and Individual Differences*, *93*(102096), 1-12. https://doi.org/10.1016/j.lindif.2021.102096

Larsen, A., & James, T. (2022). A sense of belonging in Australian higher education: the significance of self-efficacy and the student-educator relationship. *Journal of University Teaching & Learning Practice,* 19(4) https://ro.uow.edu.au/jutlp/vol19/iss4/05

Leroy, R. (2021, May 8). *Immersion, Flow and Usability in video games* [Conference session]. Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems, Yokohama. https://doi.org/10.1145/3411763.3451514

Li, Q., Cho, H., Cosso, J., & Maeda, Y. (2021). Relations Between Students' Mathematics Anxiety and Motivation to Learn Mathematics: a Meta-Analysis. *Educational Psychology Review*, *33*(3), 1017-1049. https://doi.org/10.1007/s10648-020-09589-z

Lin, C. H., Zhang, Y., & Zheng, B. (2017). The roles of learning strategies and motivation in online language learning: A structural equation modeling approach. *Computers & Education*, *113*, 75-85. https://doi.org/10.1016/j.compedu.2017.05.014

Lin, Y. J., & Wang, H. C. (2021). Using virtual reality to facilitate learners' creative self-efficacy and intrinsic motivation in an EFL classroom. *Education and Information Technologies*, *26*(4), 4487-4505. https://doi.org/10.1007/s10639-021-10472-9

Los, R., & Schweinle, A. (2019). The Interaction between Student Motivation and the Instructional Environment on Academic Outcome: A Hierarchical Linear Model. *Social Psychology of Education*, *22*(2), 471-500. https://doi.org/10.1007/s11218-019-09487-5

Lou, N. M., & Noels, K. A. (2020). "Does My Teacher Believe I Can Improve?": The Role of Meta-Lay Theories in ESL Learners' Mindsets and Need Satisfaction. *Frontiers in Psychology*, *11*(1417), 1-15. https://doi.org/10.3389/fpsyg.2020.01417

Maheshwari, G. (2021). Factors affecting students' intentions to undertake online learning: an empirical study in Vietnam. *Education and*

197

Information Technologies, *26*(6), 6629-6649. https://doi.org/10.1007/s10639-021-10465-8

Maheu, M. A., Cossette, S., Dubé, V., Fontaine, G., Mailhot, T., Lavoie, P., Cournoyer, A., Balli, F., & Mathieu-Dupuis, G. (2018). Effectiveness of serious games and impact of design elements on engagement and educational outcomes in healthcare professionals and students: a systematic review and meta-analysis protocol. *BMJ Open*, *8*(3), 1-7. http://dx.doi.org/10.1136/bmjopen-2017-019871

Martinez, L., Gimenes, M., & Lambert, E. (2022). Entertainment video games for academic learning: a systematic review. *Journal of Educational Computing Research*, *60*(5), 1083-1109. https://doi.org/10.1177/07356331211053848

Matos, L. (2010). *Perfil de estudiantes de primer año de la Universidad Peruana de Ciencias Aplicadas*. Lima: UPC.

McFadyen, N. (2021). Leveling up: A teacher's personal journey of bringing video games into a school and classroom. *Ludic Language Pedagogy*, *2*, 86-94. *https://doi.org/10.55853/llp_v2Pg5*

Megagianni, P., & Kakana, D. (2021). The educational value and impact of serious games in cognitive, social and emotional development in middle childhood: perceptions of teachers in Greece. In Tsiatsos, T., Demetriadis, S., Mikropoulos, A. & Dagdilelis, V. (Eds.), *Research on E-learning and ICT in education* (pp. 129-145). Springer, Cham. https://doi.org/10.1007/978-3-030-64363-8_8

Ministerio de Educación (MINEDU). (2016). *Currículo Nacional.* Lima, Perú

Moreta, C., & Ocaña, J. (2021). Regulación emocional, autoeficacia y su relación en el estrés de los estudiantes universitarios de Tungurahua [Undergraduate thesis, Pontificia Universidad Católica del Ecuador]. Repositorio PUCESA. https://repositorio.pucesa.edu.ec/handle/123456789/3114

Nakamura, J., & Csikszentmihalyi, M. (2014). The concept of flow. In *Flow and the foundations of positive psychology* (pp. 239-263). Springer. https://doi.org/10.1007/978-94-017-9088-8_16

Nguyen, T. V. T., Weinstein, N., & Ryan, R. M. (2021). The possibilities of aloneness and solitude: developing an understanding framed through the lens of human motivation and needs. In R. J. Coplan, J. C. Bowker & L. J. Nelson (Eds.), *The Handbook of Solitude: Psychological Perspectives on Social Isolation, Social Withdrawal, and Being Alone* (pp. 224-239). https://doi.org/10.1002/9781119576457.ch16

Özhan, Ş. Ç., & Kocadere, S. A. (2020). The Effects of Flow, Emotional Engagement, and Motivation on Success in a Gamified Online Learning

Environment. *Journal of Educational Computing Research*, *57*(8), 2006-2031. https://doi.org/10.1177/073563311882315

Patterson, T., Han, I., & Esposito, L. (2022). Virtual reality for the promotion of historical empathy: A mixed-methods analysis. *Theory & Research in Social Education*, *50*(4) 553-580. https://doi.org/10.1080/00933104.2022.2118091

Peura, P., Aro, T., Räikkönen, E., Viholainen, H., Koponen, T., Usher, E. L., & Aro, M. (2021). Trajectories of change in reading self-efficacy: A longitudinal analysis of self-efficacy and its sources. *Contemporary Educational Psychology*, *64*(101947), 1-15. https://doi.org/10.1016/j.cedpsych.2021.101947

Reeve, J. (2002). Self-Determination theory applied to educational settings. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 183-203). University of Rochester Press.

Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist*, *56*(1), 54-77. https://doi.org/10.1080/00461520.2020.1862657

Reeve, J., Cheon, S. H., & Yu, T. H. (2020). An autonomy-supportive intervention to develop students' resilience by boosting agentic engagement. *International Journal of Behavioral Development*, *44*(4), 325 - 338. https://doi.org/10.1177/0165025420911103

Rosenthal, S., & Ratan, R. A. (2022). Balancing learning and enjoyment in serious games: Kerbal Space Program and the communication mediation model. *Computers & Education*, *182*(104480), 1-44. https://doi.org/10.1016/j.compedu.2022.104480

Rosli, M. S., & Saleh, N. S. (2022). Technology enhanced learning acceptance among university students during Covid-19: Integrating the full spectrum of Self-Determination Theory and self-efficacy into the Technology Acceptance Model. *Current Psychology*. Advance online publication. https://doi.org/10.1007/s12144-022-02996-1

Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3-33). University of Rochester Press.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. The Guilford Press. https://doi.org/10.1521/978.14625/28806

199

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective. Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*, 1-11. https://doi.org/10.1016/j.cedpsych.2020.101860

Ryan, R.M., Rigby, C.S., & Przybylski, A. (2006). The Motivational Pull of Video Games: A Self-Determination Theory Approach. *Motivation and Emotion*, *30*(4), 344-360. https://doi.org/10.1007/s11031-006-9051-8

Sanchez, D. R., Nelson, T., Kraiger, K., Weiner, E., Lu, Y., & Schnall, J. (2022). Defining motivation in video game-based training: Exploring the differences between measures of motivation. *International Journal of Training and Development*, *26*(1), 1-28. https://doi.org/10.1111/ijtd.12233

Schirichian, V. S., Grimoni, J. A. B., & de Paula, F. V. (2022). A Quantitative Analysis of Self-Efficacy, Causal Attributions, Academic Performance, Personal Characteristics, and Life at University: An Engineering Education Outlook. *IEEE Transactions on Education*, *65*(3), 277-286. https://doi.org/10.1109/TE.2022.3168771

Shah, S. S., Shah, A. A., Memon, F., Kemal, A. A., & Soomro, A. (2021). Aprendizaje en línea durante la pandemia de COVID-19: aplicación de la teoría de la autodeterminación en la "nueva normalidad". *Revista de Psicodidáctica*, *26*(2), 169-178. https://doi.org/10.1016/j.psicod.2020.12.004

Supervía, P. U., & Robres, A. Q. (2021). Emotional regulation and academic performance in the academic context: The mediating role of self-efficacy in secondary education students. *International Journal of Environmental Research and Public Health*, *18*(11). 1-10. https://doi.org/10.3390%2Fijerph18115715

Tisza, G., Zhu, S., & Markopoulos, P. (2021, Nov. 2). *Fun to Enhance Learning, Motivation, Self-efficacy, and Intention to Play in DGBL* [Conference session]. International Conference on Entertainment Computing - ICEC 2021, Coimbra, Portugal. https://doi.org/10.1007/978-3-030-89394-1_3

Tsai, Y. L., & Tsai, C. C. (2020). A meta-analysis of research on digital game-based science learning. *Journal of Computer Assisted Learning*, *36*(3), 280-294. https://doi.org/10.1111/jcal.12430

Usher, E. L., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary Educational Psychology*, *34*(1), 89-101. https://doi.org/10.1016/j.cedpsych.2008.09.002

Vallerand, R., Pelletier, L., Blais, M., Briere, N., Senecal, C., & Vallieres, E. (1992). The Academic Motivation Scale: A Measure of Intrinsic, Extrinsic, and Amotivation in Education. *Educational and Psychological Measurement*, *52*(4), 1003-1017. https://doi.org/10.1177/0013164492052004025

Wei, Y., Wang, J., Yang, H., Wang, X., & Cheng, J. (2019, July 2). *An Investigation of Academic Self-Efficacy, Intrinsic Motivation and Connected Classroom Climate on College Students' Engagement in Blended Learning* [Conference session]. 2019 International Symposium on Educational Technology (ISET), Hradec Kralove, Czech Republic. https://doi.org/10.1109/ISET.2019.00041

Yunus, M. M., Ang, W. S., & Hashim, H. (2021). Factors affecting teaching English as a second language (TESL) Postgraduate Students' Behavioural Intention for Online Learning during the COVID-19 Pandemic. *Sustainability*, *13*(6), 1-14. https://doi.org/10.3390/su13063524

Zysberg, L., & Schwabsky, N. (2021). School climate, academic self-efficacy and student achievement. *Educational Psychology*, *41*(4), 467-482. https://doi.org/10.1080/01443410.2020.1813690