

# Beyond the Textbook: Exploring Digital Games to Enhance South African Pre-Service Teachers' Mastery of Industrialisation Concepts in History Education



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## ABSTRACT

Situated in the context of an increasing demand for interactive, student-centred education, this study examines the potential of digital games to enhance students' application of industrialisation by fostering active learning and critical engagement. This study aimed to explore the views of how a group of pre-service teachers' (PST's) engagement with a gamified environment in applying their knowledge about industrialisation in History Education. A mixed methodology was employed with twenty-one students who were registered for a History Education module focusing on how History can be taught with Information and Communication Technologies. The Self-Determination Theory (SDT) provided the foundation for understanding how gamification can support student motivation, perspective, engagement, and game design in relation to industrialisation. Data was collected through a questionnaire consisting of open and closed questions and Likert-type questions. The findings support the key factors: student motivation, student engagement, student perspectives and game design. The students demonstrated increased interest, motivation, and an acute historical understanding of the aspects of industrialisation, such as technological advancements and socio-economic and environmental changes. Interestingly, the students highlighted topics related to colonialism and the lack of African representation in the game, thus illustrating how a gamified experience can support deeper conceptual understanding. Essentially, gamification facilitated the application of content and critical thinking by enabling students to explore the complexities of industrialisation in a gamified environment with challenging, problem-solving scenarios. This study contributes to educational innovation by illustrating how gamification can positively impact knowledge acquisition, skill development, and student satisfaction compared to traditional learning methods.

*Keywords: Gamification, History Education, historical literacy, Industrialisation, PSTs*

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## INTRODUCTION

Given the present identity of university students- Gen Z, who are digital natives who have grown up surrounded by technology,<sup>1</sup> it is imperative that teachers transform their pedagogy to utilise digital tools and platforms.<sup>2</sup> These students instinctively turn to digital solutions to learn, communicate and solve

<sup>1</sup> Cecilia Ka Yuk Chan, "Students' Perceptions of 'AI-Giarism': Investigating Changes in Understandings of Academic Misconduct," *Education and Information Technologies*, 2024, 1–22.

<sup>2</sup> Shefaly Shorey et al., "Learning Styles, Preferences and Needs of Generation Z Healthcare Students: Scoping Review," *Nurse Education in Practice* 57 (2021): 103247.

problems, rendering traditional teaching methods increasingly ineffective. To ensure meaningful engagement and optimal learning outcomes, educators must not view digital integration as an optional add-on but as a fundamental necessity that aligns with students' experiences and their natural way of processing information. These students are more inclined to favour multimodal learning than traditional lecture-driven formats.

History Education is one of the most interactive disciplines, promoting collaboration and multiperspectivity to enhance historical literacy among students equipped to apply their knowledge in the real world. Gamification, integrating game-like elements into non-game environments, has attracted considerable interest in education as a strategy to improve learner motivation and engagement.<sup>3</sup> Numerous studies have investigated the effectiveness of gamification in improving student motivation and engagement. It has been shown that integrating game-like elements such as leaderboards, levels, and rewards promotes intrinsic and extrinsic motivation in learners. Intrinsic motivation stems from an individual's interest and enjoyment of the learning activity, which can be increased through well-designed game elements that provide a sense of autonomy, competence and connectedness.<sup>4</sup> Extrinsic motivation, on the other hand, can be encouraged by implementing points, badges and other tangible rewards that incentivise learners to actively participate and progress through the learning content.<sup>5</sup> Many studies around gamification in education centre on STEM or STEAM-related disciplines.<sup>6</sup>

This paper explores the potential of gamification to enhance the learning experience among pre-service History teachers' on the topic of Industrialisation. Gamification can be used effectively when recreating historical settings in Industrialisation lessons, as it gives students the opportunity to immerse themselves in the past and deepen their understanding of the subject matter. Creating game-like experiences that recreate historical contexts allows students to actively engage with the learning content and develop a stronger connection to the events and processes they are studying.

While game-like experiences that recreate historical contexts can engage students and deepen their understanding, they also run the risk of simplifying or trivialising complex historical events and processes. In addition, self-determination plays a critical role in game-based learning as it builds human drive and personality.<sup>7</sup> Careful design is necessary to ensure that games do not sacrifice accuracy or nuance in favour of entertainment value. Teachers must strike a balance between creating an engaging learning environment and maintaining the integrity and educational value of the historical content. This case study seeks the answer: How do History PSTs view historical content knowledge within a gamified learning environment? Hence, understanding PSTs experiences of using a game to build Industrialisation content knowledge.

This research paper contributes to the current body of knowledge by demonstrating how digital gamified learning environments can enhance pre-service teachers' understanding and application of industrialisation concepts in History Education. It provides empirical evidence that games support deeper conceptual understanding through increased student motivation and engagement while developing critical thinking as students identify gaps in African representation. The findings extend Self-Determination Theory by illustrating its practical application in History education, offering teachers a framework for designing interactive learning experiences that cultivate historical literacy through problem-solving scenarios rather than traditional teaching methods.

<sup>3</sup> Ian Glover, "Play As You Learn: Gamification as a Technique for Motivating Learners," in *Proceedings of EdMedia 2013--World Conference on Educational Media and Technology*, ed. J. Herrington, A. Couros, and V. Irvine (Victoria, Canada: Association for the Advancement of Computing in Education (AACE), 2005).

<sup>4</sup> Jared R. Chapman and Peter J. Rich, "Does Educational Gamification Improve Students' Motivation? If so, Which Game Elements Work Best?," *Journal of Education for Business* 93, no. 7 (October 3, 2018): 315–22, <https://doi.org/10.1080/08832323.2018.1490687>; Eilidh Jack, Craig Alexander, and Elinor M Jones, "Exploring the Impact of Gamification on Engagement in a Statistics Classroom," *Teaching Mathematics and Its Applications* 44, no. 1 (March 7, 2025): 93–106, <https://doi.org/10.1093/teamat/hrae009>.

<sup>5</sup> Chapman and Rich, "Does Educational Gamification Improve Students' Motivation? If so, Which Game Elements Work Best?"

<sup>6</sup> Jack, Alexander, and Jones, "Exploring the Impact of Gamification on Engagement in a Statistics Classroom."

<sup>7</sup> Richard M Ryan and Edward L Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being," *American Psychologist* 55, no. 1 (2000): 68.

## LITERATURE REVIEW

The study of industrialisation is crucial for understanding the transformative effects of modernity, including socio-economic, political and technological changes. Industrialisation arguably represents one of the most significant shifts in human History since it explains the transition from agrarian economies to urbanised, mechanised societies.<sup>8</sup> This transition brought advances in technology and productivity, consequently improving people's lives and making the manufacturing processes more convenient. However, industrialisation also introduced social challenges such as class divisions, labour exploitation, and environmental degradation.<sup>9</sup> Researchers emphasise that industrialisation is a key topic that supports historical skills such as critical thinking and problem solving, as it requires students to analyse the complex causes and consequences of large-scale technological and social change.<sup>10</sup>

When applied to the history discipline, gamification involves applying game design elements and principles to educational activities in the history classroom to actively meet learning outcomes and develop historical literacy.<sup>11</sup> Gamification integrates game mechanics with historical learning experiences to make history lessons more interactive, immersive, and enjoyable for students, fostering a deeper understanding and appreciation of the subject matter.<sup>12</sup>

One key aspect of gamification in History is the incorporation of narratives and experiences. Games often feature compelling storylines that immerse players in historical contexts, allowing them to assume different roles and perspectives. Using gamification, educators can create engaging scenarios encouraging students to explore and analyse events from multiple viewpoints by integrating narratives and accounts into history lessons.<sup>13</sup> Furthermore, gamification facilitates active learning by providing students with opportunities to problem-solve, collaborate, and make decisions within historical contexts. Through interactive simulations and decision-making exercises, students can explore the complexities of historical events and develop critical thinking skills.<sup>14</sup> Through gamification, students can make strategic decisions based on historical evidence, fostering analytical thinking and historical inquiry.<sup>15</sup>

Moreover, gamification promotes a sense of achievement and progress through the use of feedback mechanisms and progression systems. By advancing through levels, earning points or coins and unlocking achievements, students receive immediate feedback on their performance and feel a sense of accomplishment.<sup>16</sup> This increased motivation encourages students to actively participate in learning activities and strive to develop their historical literacy and skills.

While gamification has several benefits in promoting and understanding History, several factors must guide the gaming process to ensure constructive engagement. Educators must ensure that gamified activities align with lesson objectives and promote meaningful learning experiences rather than simplified engagement.<sup>17</sup> Essentially, research on gamification offers a favourable stance that the strategy can be used to enhance students' historical literacy by using game design principles to engage students in interactive and immersive learning experiences.

<sup>8</sup> Pat Hudson, *The Industrial Revolution* (Bloomsbury Publishing, 2014).

<sup>9</sup> Peter N. Stearns, *The Industrial Revolution in World History*, ed. Peter N. Stearns (Routledge, 2020), <https://doi.org/10.4324/9781003050186>; Jake Okechukwu Effoduh, "The Fourth Industrial Revolution by Klaus Schwab," 2016.

<sup>10</sup> Thorstein Veblen, *Imperial Germany and the Industrial Revolution* (New York: Routledge, 2022), <https://doi.org/10.4324/9780429337727>; Timothy Teo et al., "Initial Teacher Training for Twenty-First Century Skills in the Fourth Industrial Revolution (IR 4.0): A Scoping Review," *Computers & Education* 170 (September 2021): 104223, <https://doi.org/10.1016/j.compedu.2021.104223>.

<sup>11</sup> Marina Moseikina, Saken Toktamysov, and Svetlana Danshina, "Modern Technologies and Gamification in Historical Education," *Simulation & Gaming* 53, no. 2 (April 25, 2022): 135–56, <https://doi.org/10.1177/10468781221075965>.

<sup>12</sup> Matthew Briggs, "Transforming History Through Gamification," 2022, <https://scholarworks.calstate.edu/concern/projects/n296x558n>.

<sup>13</sup> María Martínez-Hita, Cosme Jesús Gómez-Carrasco, and Pedro Miralles-Martínez, "The Effects of a Gamified Project Based on Historical Thinking on the Academic Performance of Primary School Children," *Humanities and Social Sciences Communications* 8, no. 1 (May 17, 2021): 122, <https://doi.org/10.1057/s41599-021-00796-9>.

<sup>14</sup> Reginald Govender, "Teaching and learning using virtual labs: Investigating the effects on students' self-regulation," *Cogent Education* 10, no. 1 (February 19, 2023): 1–14, <https://doi.org/10.1080/2331186X.2023.2172308>

<sup>15</sup> Mario Corrales Serrano, "Gamification and the History of Art in Secondary Education: A Didactic Intervention," *Education Sciences* 13, no. 4 (April 12, 2023): 389, <https://doi.org/10.3390/educsci13040389>.

<sup>16</sup> Seham Aljraiwi, "Effectiveness of Gamification of Web-Based Learning in Improving Academic Achievement and Creative Thinking among Primary School Students," *International Journal of Education and Practice* 7, no. 3 (2019): 242–57, <https://doi.org/10.18488/journal.61.2019.73.242.257>.

<sup>17</sup> Moseikina, Toktamysov, and Danshina, "Modern Technologies and Gamification in Historical Education."

## CONCEPTUAL FRAMEWORK

Gamification employs game-like elements and design strategies across different scenarios to enhance learning experiences.<sup>18</sup> Using game elements in non-game environments keeps users engaged, creating an interactive environment that supports learning.<sup>19</sup> Implementing gamification in various contexts has demonstrated its advantages in facilitating learning.<sup>20</sup> Gamification involves integrating game elements into real-world activities, a process called Human-Focused Design, since it focuses on creating an experience that incorporates human emotions, feelings and motivations.<sup>21</sup> While there are many benefits of using gamification in education, a study conducted reported that the use of accomplishment badges, leaderboards and points often results in negative effects such as lack of effect, worsened performance and lack of motivation.<sup>22</sup> Furthermore, ethical issues of manipulation and focus on the end goal rather than the learning result cause a lack of understanding and irrelevance.<sup>23</sup>

Ryan and Deci's Self-Determination Theory is based on human drive and personality. Motivation in SDT refers to people feeling energised, activated, or inclined to engage with the tasks at hand.<sup>24</sup> Many studies have adopted the use of SDT as a framework in gamification for examining students' motivation and engagement in learning.<sup>25</sup> Limantara et al. identified four factors that influence gamification's implementation: *Motivation*, *Engagement*, *Student perspective* and *Game design*.<sup>26</sup> These factors are defined as follows: "*Motivation*: Taking action with the intention of achieving or getting something done, with a substantial impact on success and performance; *Engagement*: When learning or being taught, an individual's level of attention, curiosity, enthusiasm, optimism, and passion; *Student Perspective*: Students' perspectives on gamification and *Game Design*: the process of developing game material and rule."<sup>27</sup>

Ryan and Deci's Self-Determination Theory emphasises the importance of intrinsic motivation, which aligns with the concept of gamification in education.<sup>28</sup> Limantara et al. factors align closely with the principles of SDT, as motivation and engagement are central components of the theory.<sup>29</sup> When implementing gamification strategies, it is crucial to consider additional factors beyond motivation and engagement. Understanding how these factors interact can provide valuable insights into the effectiveness of using gamification in educational settings. While motivation and engagement are essential components of both SDT and gamification, other factors are at play in the implementation of gamification, such as feedback mechanisms, reward systems, and individual differences, which should also be considered in understanding its effectiveness in educational settings. Hence, the student perspective and game design are also influenced by the SDT. By acknowledging the multifaceted

<sup>18</sup> Georgios Lampropoulos et al., "Augmented Reality and Gamification in Education: A Systematic Literature Review of Research, Applications, and Empirical Studies," *Applied Sciences* 12, no. 13 (July 5, 2022): 6809, <https://doi.org/10.3390/app12136809>.

<sup>19</sup> Sebastian Deterding et al., "From Game Design Elements to Gamefulness," in *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* (New York, NY, USA: ACM, 2011), 9–15, <https://doi.org/10.1145/2181037.2181040>.

<sup>20</sup> Milagros Torrado Cespón and José María Díaz Lage, "Gamification, Online Learning and Motivation: A Quantitative and Qualitative Analysis in Higher Education," *Contemporary Educational Technology* 14, no. 4 (July 31, 2022): ep381, <https://doi.org/10.30935/cedtech/12297>; Reginald G Govender and Desmond W Govender, "ROBOPROG: Learning of Flowcharts through a Gamified Experience," *Int. J. Bus. Manag. Stud* 12 (2020): 612–24.

<sup>21</sup> Yu-kai Chou, *Actionable Gamification: Beyond Points, Badges, and Leaderboards* (Packt Publishing Ltd, 2019).

<sup>22</sup> Cláuvín Almeida et al., "Negative Effects of Gamification in Education Software: Systematic Mapping and Practitioner Perceptions," *Information and Software Technology* 156 (April 2023): 107142, <https://doi.org/10.1016/j.infsof.2022.107142>.

<sup>23</sup> Tae Wan Kim and Kevin Werbach, "More than Just a Game: Ethical Issues in Gamification," *Ethics and Information Technology* 18, no. 2 (June 12, 2016): 157–73, <https://doi.org/10.1007/s10676-016-9401-5>.

<sup>24</sup> Ryan and Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being."

<sup>25</sup> Klaudia Bovermann and Theo J. Bastiaens, "Towards a Motivational Design? Connecting Gamification User Types and Online Learning Activities," *Research and Practice in Technology Enhanced Learning* 15, no. 1 (December 10, 2020): 1, <https://doi.org/10.1186/s41039-019-0121-4>; Stavroula Karra, Vasiliki Karampa, and Foteini Paraskeva, "Gamification Design Framework Based on Self Determination Theory for Adult Motivation," in *International Workshop on Learning Technology for Education in Cloud* (Springer, 2019), 67–78; Jonna Koivisto and Juho Hamari, "The Rise of Motivational Information Systems: A Review of Gamification Research," *International Journal of Information Management* 45 (April 2019): 191–210, <https://doi.org/10.1016/j.ijinfomgt.2018.10.013>.

<sup>26</sup> Natalia Limantara et al., "Factors Influencing the Implementation of Gamification for Learning in Information Systems Education," *International Journal of Emerging Technologies in Learning (IJET)* 17, no. 08 (April 26, 2022): 32–41, <https://doi.org/10.3991/ijet.v17i08.29777>.

<sup>27</sup> Limantara et al., "Factors Influencing the Implementation of Gamification for Learning in Information Systems Education."

<sup>28</sup> Ryan and Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being."

<sup>29</sup> Limantara et al., "Factors Influencing the Implementation of Gamification for Learning in Information Systems Education."

relationship between SDT and gamification, educators can better assess the effectiveness of using gamification in educational settings. Figure 1 depicts a visual representation of the conceptual framework adopted in this study from Ryan and Deci's SDT, and the four factors outlined by Limantara et al.

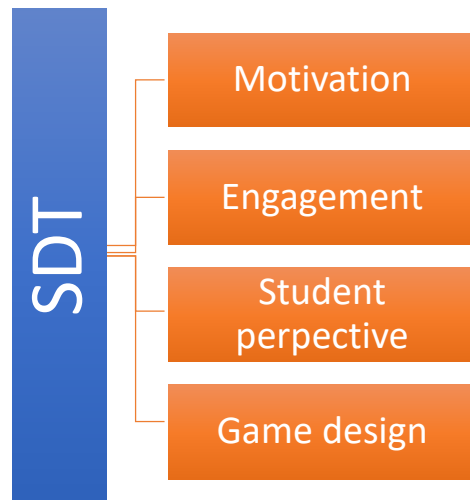


Figure 1: Unlocking Engagement: SDT and Gamification's Key Factors  
 Note. Created by Authors

**METHODOLOGY**

This case study aimed to explore the History of PSTs, applying their historical literacy through a gamified environment. To accomplish the purpose of this study, voluntary participation, while ensuring the participants' anonymity, was open to PSTs on a campus on which the researchers are based (convenience sampling) who were to complete the topic of industrialisation (purposive sampling). The necessary ethical clearance was obtained from the institution before any data was collected. Through convince and purposive sampling, twenty-one students accepted the invitation and participated. Over four weeks, participants were made to engage with the mobile game Evony: The King's Return (referred to as the *app*).

A two-step process involving induction and deduction was carried out to prepare the questionnaire and the analysis. Data was collected via an online questionnaire based on SDT and four key factors of gamification (Table 1), based on 13 research publications from Limantara et al., hence inductive in nature. The publications were derived from four databases: ACM Digital Library, AIS eLibrary, IEEE Xplore and SpringerLink, which focused on using gamification in learning, particularly at an undergraduate level. The following table outlines the 29-item questionnaire (comprising open-ended, close-ended and Likert-type questions) to gauge students' views on using a gamified environment when learning about industrialisation. The analysis followed a deductive thematic process, as the existing factors guided the findings and discussion.

**Table 1:** Tool design

| Key factors       |      | Statement/question   |
|-------------------|------|--|
| <b>MOTIVATION</b> | Mot1 | What was your total no. of daily rewards?                                    |
|                   | Mot2 | Approximately how many "keep" levels did you have?                           |
|                   | Mot3 | Approximately how many "monarch" levels did you have?                        |
|                   | Mot4 | Simple, fast installation with confirmation                                  |
|                   | Mot5 | Rate your tutorial experience (i.e. when opening the app for the first time) |
|                   | Mot6 | How likely are you to recommend the app to a friend or colleague?            |
|                   | Mot7 | How likely are you to continue using this app in the future?                 |

|                            |      |  |
|----------------------------|------|--|
| <b>ENGAGEMENT</b>          | Eng1 | How long have you been using the app?  |
|                            | Eng2 | It is visually appealing and does not have much textual information.                     |
|                            | Eng3 | Meaningful/engaging sound effects  |
|                            | Eng4 | Aesthetic and minimalist design  |
|                            | Eng5 | Feedback during gameplay:  |
|                            | Eng6 | Engagement   |
|                            | Eng7 | Which app feature is most valuable to you?   |
| <b>STUDENT PERSPECTIVE</b> | Stu1 | Relevance to industrialisation:  |
|                            | Stu2 | Historical accuracy:   |
|                            | Stu3 | Effectiveness of the app:  |
|                            | Stu4 | Historical skills:   |
|                            | Stu5 | Level of cognitive skills:   |
|                            | Stu6 | What challenges have you encountered while using the app?                                |
|                            | Stu7 | Do you have any additional comments or feedback for us?                                  |
| <b>GAME DESIGN</b>         | Gam1 | Easy-to-understand instructions in English with a clear, logical order of panels/windows |
|                            | Gam2 | Clearly marked icons and menus appear.   |
|                            | Gam3 | Common theme used  |
|                            | Gam4 | Prevention of errors or help users avoid making  |
|                            | Gam5 | Shortcuts are available instead of accessing via the menu.                               |
|                            | Gam6 | The help tab is available with a detailed explanation.                                   |
|                            | Gam7 | Customisation  |
|                            | Gam8 | Usability  |

## PRESENTATION OF FINDINGS AND DISCUSSION

The findings and discussions will be addressed together for coherence. Being aligned to a case study, a deductive thematic analysis was carried out as the analysis started with pre-defined or existing themes, namely Motivation, Engagement, Student perspective and Game design. In addition, descriptive statistics were sought to determine the modal values and percentages. Hence, the analysis is approached with a specific framework consisting of four key factors that will lead to discussion.

In addition, items STU6 and STU7 allowed for open-ended responses that were unpacked and were appropriate to strengthen the findings. James expresses that learning through play encourages learning, especially self-initiated learning.<sup>30</sup> Using game design elements in non-game contexts has emerged as a promising approach to enhance learning and engagement across various domains.<sup>31</sup> The participants had varying perspectives regarding the game design elements and historical narratives evident in the game. Student motivation, student engagement, student perspectives and game design were identified as the key themes.

### Motivation

Existing research suggests that gamification can positively impact cognitive processing and create meaningful learning experiences. Gamification leverages the intrinsic motivation and engagement associated with games, which can lead to improved focus, persistence and depth of learning.<sup>32</sup> The

<sup>30</sup> James Paul Gee, "Learning by Design: Good Video Games as Learning Machines," *E-Learning and Digital Media* 2, no. 1 (March 1, 2005): 5–16, <https://doi.org/10.2304/elea.2005.2.1.5>.

<sup>31</sup> Leonardo Caporarello, Massimo Magni, and Ferdinando Pennarola, "Learning and Gamification: A Possible Relationship?," *EAI Endorsed Transactions on E-Learning* 4, no. 16 (December 19, 2017): 153488, <https://doi.org/10.4108/eai.19-12-2017.153488>; Anant Vaibhav and Pooja Gupta, "Gamification of MOOCs for Increasing User Engagement," in *2014 IEEE International Conference on MOOC, Innovation and Technology in Education (MITE)* (IEEE, 2014), 290–95, <https://doi.org/10.1109/MITE.2014.7020290>.

<sup>32</sup> Mageswaran Sanmugam et al., "Gamification and Serious Games:-The Enigma and the Use in Education," in *ISQAE 2014 3rd International Seminar on Quality and Affordable Education*, 2014. [https://www.researchgate.net/publication/280387235\\_Gamification\\_and\\_Serious\\_Games\\_-\\_The\\_enigma\\_and\\_the\\_use\\_in\\_Education#fullTextFileContent](https://www.researchgate.net/publication/280387235_Gamification_and_Serious_Games_-_The_enigma_and_the_use_in_Education#fullTextFileContent).

relationship between the economy and industrialisation was also evident in the game, as one participant stated that they,

"had to play this game virtually every day in order to acquire enough coins and tasks to modernise the structures" (PST 5).

While another claimed,

"Technological advancements are a driving factor behind economic success, and the game rewards players who use technology to develop stronger, more efficient cities" (PST 13)

Applying game elements like challenges, rewards, and feedback can help students become more eager to learn, enhance their skills, and open new levels of understanding.<sup>33</sup> The majority of participants were found to have reached between 3-7 levels (Table 2).

**Table 2: cross-tabulation of levels/rewards mapped against motivation**

| Levels/rewards | Mot1   | Mot2   | Mot3   |
|----------------|--------|--------|--------|
| <3             | 20.00% | 10.00% | 5.00%  |
| 3-7            | 40.00% | 50.00% | 55.00% |
| 8-10           | 20.00% | 25.00% | 20.00% |
| >10            | 20.00% | 15.00% | 20.00% |

*Note.*Mot1, Mot2 and Mot3.

A student noticed that,

"The bounty cave in the game is rich in diamonds, which is an improvement towards industrialisation as it would be mined, and those diamonds would bring a lot of money for industrialising the country" (PST 8)

And another stated,

"Tax payments are made to the conquered states where the stronger state controls the economy for the good of its development" (PST 3)

In terms of the Evony app setup and tutorial (Table 3), there were mixed findings, with 30% (Mot4 satisfied + Mot4 very satisfied) and 45% (Mot5 satisfied + Mot5 very satisfied), respectively. While there were 40% (Mot4 dissatisfied + Mot4 very dissatisfied) and 30% (Mot5 dissatisfied + Mot5 very dissatisfied). This is likely due to device compatibility issues since the app's requirements are CPU: Snapdragon 660 Octa Core 2.2 GHz or equivalent; GPU: Kyro 260 or equivalent; RAM: 3GB; Storage: 100MB, and OS: iOS 10/Android 4.1 and up.<sup>34</sup>

**Table 3: Installation and tutorial experience**

| Statement                          | Mot4   | Mot5   |
|------------------------------------|--------|--------|
| Very dissatisfied                  | 5.00%  | 5.00%  |
| Dissatisfied                       | 35.00% | 25.00% |
| Neither dissatisfied nor satisfied | 30.00% | 25.00% |
| Satisfied                          | 15.00% | 35.00% |
| Very satisfied                     | 15.00% | 10.00% |

It was found that only 15% would not use the app or recommend the use of the app (Mot 6, Mot 7, Table 4). 55% (likely + very likely, Table 4) of students would recommend the app, while 50% reported they

<sup>33</sup> Maja Videnovik et al., "Game-Based Learning in Computer Science Education: A Scoping Literature Review," *International Journal of STEM Education* 10, no. 1 (September 6, 2023): 54, <https://doi.org/10.1186/s40594-023-00447-2>.

<sup>34</sup> The Cryd's Daily, "Evony: The King's Return Requirements," 2025, <https://www.thecrydsdaily.com/p/evony-kings-return-requirements.html>.

would continue using the app. History is often perceived as a dry, fact-based subject. Gamification can remedy this perception by making learning more active, involving and enjoyable.<sup>35</sup> A substantial number of students held a neutral view of Mot6 and Mot7. These findings are similar to Table 3 neutral responses and are likely a result of the first engagement of the app, which has resulted in an undecided impression of the app.

**Table 4: Usage of the app**

| Statement     | Mot6  | Mot7  |
|---------------|-------|-------|
| Very unlikely | 10.0% | 10.0% |
| Unlikely      | 5.0%  | 5.0%  |
| Neutral       | 25.0% | 35.0% |
| Likely        | 45.0% | 45.0% |
| Very likely   | 15.0% | 5.0%  |

**Engagement**

Most students spent 5 hours or more of gameplay (Table 5). This is an indication that the app was engaging. Through gameplay, the breaking down of content into smaller, achievable goals, providing real-time feedback and unlocking new levels of difficulty, gamification fosters a sense of progression and accomplishment.<sup>36</sup> Engagement nurtured through the use of points, leaderboards, and digital badges can also encourage healthy competition and recognition of student achievements.<sup>37</sup> Some participants also acknowledged the role of governance and the military in the process of industrialisation and modernity. For example, a participant commented,

"As the game progresses, the soldiers conquer other territories with the intention to gather resources for the development of their farming methods into more technological ones" (PST 13).

Similarly, another stated,

"As I continued to play the game, I noticed that soldiers gained quests to utilise to develop and train the forces in order to prevent attack, which also portrays industrialisation" (PST 12)

Gamification elements like storylines, challenges, and badges can increase social interactions and community formation in online learning environments.<sup>38</sup>

**Table 5: Eng1 summarising the hours of gameplay**

| hours       | %     |
|-------------|-------|
| < 1hr       | 25.0% |
| 1hr - 3hrs  | 10.0% |
| 3hrs - 5hrs | 25.0% |
| > 5hrs      | 40.0% |

The overall visualisation (Eng 2), sound effects (Eng 3) and design (Eng 4) of the app were favoured (Table 6).

<sup>35</sup> Stefan Piasecki, "Gamification in Educational Contexts," *International Journal of Advanced Pervasive and Ubiquitous Computing* 11, no. 2 (April 1, 2019): 41–67, <https://doi.org/10.4018/IJAPUC.2019040104>.  
<sup>36</sup> M. Givi Efgivia et al., "Analysis of Behaviorism Learning Theory, STEM Learning Model and Gamification," 2021, <https://doi.org/10.2991/assehr.k.211020.029>.  
<sup>37</sup> Mohd Hishamuddin Abdul Rahman et al., "Gamification Elements And Their Impacts On Teaching And Learning – A Review," *The International Journal of Multimedia & Its Applications* 10, no. 06 (December 31, 2018): 37–46, <https://doi.org/10.5121/ijma.2018.10604>.  
<sup>38</sup> Mihai Burlacu, Claudiu Coman, and Maria Cristina Bularca, "Blogged into the System: A Systematic Review of the Gamification in e-Learning before and during the COVID-19 Pandemic," *Sustainability* 15, no. 8 (April 11, 2023): 6476, <https://doi.org/10.3390/su15086476>.

**Table 6: Summary of Eng2, Eng3 and Eng4**

| Statement  | Eng2   | Eng3   | Eng4   |
|------------|--------|--------|--------|
| Very poor  | 5.00%  | 10.00% | 0.00%  |
| Poor       | 15.00% | 25.00% | 15.00% |
| Acceptable | 40.00% | 30.00% | 50.00% |
| Good       | 30.00% | 20.00% | 20.00% |
| Very Good  | 10.00% | 15.00% | 15.00% |

It was found that 55% of students thought the game provided specific feedback, while 40% reported limited with 5% reporting no meaningful feedback (Table 7). Learning through games can enable more personalised and adaptive learning experiences. The visualisation elements play a critical role in understanding historical events and processes.<sup>39</sup> In addition, sound effects during learning can also increase engagement and enjoyment.<sup>40</sup> History learning, complemented by immersive technologies such as digital games, can help students better visualise and contextualise historical information, making the learning experience more engaging and memorable.

**Table 7: Eng5 based on feedback received during gameplay**

| Options                         | %     |
|---------------------------------|-------|
| No meaningful provided feedback | 5.0%  |
| Limited feedback                | 40.0% |
| Specific feedback               | 55.0% |

Student engagement with the educational application revealed varied levels of interest and motivation. The majority of students (60%) showed a mild interest in the app, while 15% were highly motivated to use it. However, some resistance was observed, with 10% of students perceiving the app as an additional workload and another 10% actively avoiding its use. A small percentage (5%) viewed the app as more schoolwork and tended to be off-task when directed to use it. These findings suggest a generally positive reception but also highlight the need for strategies to address student concerns and enhance engagement across all user groups.

**Table 8: Eng6 based on student engagement interest**

| Students overall interest   | %     |
|---|-------|
| avoided the use of the app and might complain if it is used in my module                    | 10.0% |
| highly motivated to use the app   | 15.0% |
| perceived the app as "more work"  | 10.0% |
| sparked a little interest   | 60.0% |
| Student perceives app as "more schoolwork" and may be off-task when directed to use the app | 5.0%  |

The building was found to be the most common in response to Eng7 (Fig. 2). Industrialisation largely influenced the constructions and advancements of society.<sup>41</sup> The narrative of colonialism was highlighted by a few participants who believed that the game design and objective revolved around discourses of colonialism. For example, a participant mentioned,

"The game centers on city-building, expansion, and conquest, requiring players to build a thriving city and amass an army to protect it" (STU 6 & 7, PST 20).

<sup>39</sup> Sungjin Park and Sangkyun Kim, "Is Sustainable Online Learning Possible with Gamification?—The Effect of Gamified Online Learning on Student Learning," *Sustainability* 13, no. 8 (April 12, 2021): 4267, <https://doi.org/10.3390/su13084267>.

<sup>40</sup> Efgivia et al., "Analysis of Behaviorism Learning Theory, STEM Learning Model and Gamification."

<sup>41</sup> Philip Ross and Kasia Maynard, "Towards a 4th Industrial Revolution," *Intelligent Buildings International* 13, no. 3 (July 3, 2021): 159–61, <https://doi.org/10.1080/17508975.2021.1873625>; Sungkon Moon et al., "Fourth Industrialization-Oriented Offsite Construction: Case Study of an Application to an Irregular Commercial Building," *Engineering, Construction and Architectural Management* 27, no. 9 (May 9, 2020): 2271–86, <https://doi.org/10.1108/ECAM-07-2018-0312>.

Another participant reflected,

"Players must also compete with other players for resources and control of territories, which closely mirrors the competition and conflicts between colonising powers" (STU 6 & 7, PST 3).

Similarly, one participant stated,

"The game reflects these historical realities by placing players in a competitive environment where they must build their armies, claim new territories, and defend against hostile powers" (STU 6 & 7, PST 8).

While another claimed,

"The game's buildings and structures are designed to resemble those of colonial powers, such as castles, forts, and trading posts" (STU 6 & 7, PST 17).



Figure 2: A word cloud depicting features of the game's most valuable building. Note. The word cloud is based on the responses to Eng7.

### Student Perspective

Studies have found that gamification positively impacts student engagement, motivation and learning experiences. Results in increased class attendance, enthusiasm, and positive attitudes towards learning when gamification is implemented.<sup>42</sup> Student perspective was captured with STU1, STU2, STU3, STU4 and STU5 (Table 9).

Table 9: Student perspective

| Code | Statements  | %     |
|------|---|-------|
| Stu1 | App's focus has a strong connection to issues of industrialisation and is appropriate for students              | 50.0% |
|      | Limited connection to issues of industrialisation and may not be appropriate for the student                    | 5.0%  |
|      | The app's focus is related to the purpose of issues of industrialisation and is mostly appropriate for students | 45.0% |
| Stu2 | All content in the App is accurate. There are no factual errors.  | 10.0% |
|      | Most of the content is accurate but there are imprecise information   | 70.0% |
|      | The content is generally accurate, but one piece of information is clearly flawed or inaccurate.                | 20.0% |

<sup>42</sup> S Rizal Yazid, Dwi Fita Heriyawati, and Junaidi Mistar, "Unveiling Student Perspectives: Exploring The Impact Of Gamification In English Language Teaching," *English Review: Journal of English Education* 12, no. 1 (January 31, 2024): 137–48, <https://doi.org/10.25134/erjee.v12i1.9371>; Sharifah Mazlina Syed Khuzzan, Nur Syazwani Mohd Yushaa, and Mahanim Hanid, "Gamification Elements And Its Impact On Students," *Journal of Technology and Operations Management* 16, no. No.2 (December 29, 2021): 62–75, <https://doi.org/10.32890/jtom2021.16.2.6>.

|      |   |       |
|------|---|-------|
| Stu3 | App includes all material needed to gain a good understanding of the topic.                           | 20.0% |
|      | App includes most material needed to gain a comfortable understanding of the topic.                   | 60.0% |
|      | App is missing more than two key elements.  | 20.0% |
| Stu4 | App helps develop a few historical skills   | 10.0% |
|      | App helps develop historical skills   | 60.0% |
|      | App helps develop strong historical skills  | 30.0% |
| Stu5 | App encourages the use of higher order thinking skills including creating, evaluating, and analysing  | 50.0% |
|      | App facilitates the use of higher order thinking skills including evaluating, analysing, and applying | 40.0% |
|      | App facilitates the use of mostly lower order thinking skills like understanding and remembering      | 10.0% |

It was key to note that gameplay engaged higher-order thinking skills demanding cognitive activity in a masked, relaxed, fun environment (STU5, 50%) while developing historical skill knowledge (STU4, 60%). This immersive experience allowed students to gain an understanding of the era and context (STU3, 60%).

The game offered a visual and interactive representation of the process of industrialisation. PSTs recognise that when used to teach school history, the learners would understand the advancement and complexity of the process of industrialisation and modernity. For instance, one participant claimed,

"The availability of advanced tools essential and required by the builders in order to reinvent the structures demonstrates the improvement towards industrialisation. This suggests that industrialisation requires sufficient resources and takes time" (STU 6 & 7, PST 12).

Another participant stated,

"Development comes into play when they [the player] require expert knowledge on how to build the concrete buildings, which shows they were gearing their territories towards development and advancement" (STU 6 & 7, PST 5).

While most PSTs found the game useful and ideal to use with learners when covering the topic of industrialisation (STU1, 50%), it was found that there is imprecise information in the app (STU2, 70%). Hence differing views about using the game to learn about Industrialisation. Rizal points out, the long-term effects on competency and cultural contexts must be investigated.<sup>43</sup> Participants pointed out the lack of representation of African generals in the game. For instance, one student pointed out,

"There were only two black generals who were included in the game. This means one can conclude that the game displayed bias when it comes to the representation of African generals" (STU 6 & 7, PST 13).

Similarly, another student noted,

"African generals are not well recognised in the game as they are placed under 'others' category, Which basically portrays racism towards Africans" (STU 6 & 7, PST 6).

While all the students highlighted the lack of African generals in the game, a few participants acknowledged the game makers' attempts to acknowledge the military and ethnic backgrounds of the African generals. Nonetheless, these students did not discount the lack of representation.

## Game Design

<sup>43</sup> Yazid, Heriyawati, and Mistar, "Unveiling Student Perspectives: Exploring The Impact Of Gamification In English Language Teaching."

Game elements like points and leaderboards are seen to promote competition among learners, while progress bars and achievement badges are viewed as motivators for task completion and mastery.<sup>44</sup> Hence, the design of the game is crucial for effective gamification in learning because it provides the structure and principles needed to create engaging and motivating learning experiences. It was alarming to find that 40% (GAM1, Strongly agree + Agree, Table 10) found that it was easy to understand instructions with the clear, logical order of panels/windows, while 40% were uncertain. However, 20% (GAM3, Strongly disagree + Disagree, Table 10) disagreed that a common theme was used, with 50% (GAM5, Table 10) uncertain.

Similar findings were found for clearly marked icons, and the menu appears to have 45% agreeing (GAM2, Strongly agree + Agree, Table 10) while 40% are uncertain. Effective game design should incorporate features like modality, pretraining, coaching and self-explanation.<sup>45</sup> However, 30% (GAM4, Strongly agree + Agree, Table 10) reported uncertainty around the prevention of errors or help users avoid making errors, while 25% disagreed with the help tab available with detailed explanation (GAM6, Strongly disagree + Disagree, Table 10), with 30% uncertain.

Simply introducing game components without proper planning can result in forced or gimmicked surface gamification experiences. A coherent and successful learning path, as well as a well-designed gamified learning experience, should closely examine the learning objectives.<sup>46</sup>

**Table 10: Views on game design**

| Statements                       | Gam1   | Gam2   | Gam3   | Gam4   | Gam5   | Gam6   |
|----------------------------------|--------|--------|--------|--------|--------|--------|
| <i>Strongly agree</i>            | 10.00% | 15.00% | 10.00% | 10.00% | 5.00%  | 20.00% |
| <i>Agree</i>                     | 30.00% | 30.00% | 35.00% | 20.00% | 20.00% | 25.00% |
| <i>Neither agree or disagree</i> | 40.00% | 40.00% | 35.00% | 35.00% | 50.00% | 30.00% |
| <i>Disagree</i>                  | 10.00% | 5.00%  | 15.00% | 30.00% | 20.00% | 20.00% |
| <i>Strongly disagree</i>         | 10.00% | 10.00% | 5.00%  | 5.00%  | 5.00%  | 5.00%  |

Digital technologies allow for pedagogical advances that engage learners immersed in digital lifestyles, promoting active knowledge generation and learner transformation.<sup>47</sup> The configuration of learning spaces and the creation of personalised learner models are significant, as they allow for delivering tailored knowledge experiences that account for individual differences in skills, perspectives, and cultural contexts.<sup>48</sup> It is worth noting that 60% (GAM7, Table 11) found that the app offers some flexibility in changing and customising the settings.

Digital games in learning seek to create more independent, relevant, effective, and engaging learning environments that prepare students for a rapidly digital-changing world. 40% reported that they need some assistance in how to operate the app (GAM8, Table 11). Supported by 40% being uncertain about clearly marked icons and menu appearing (GAM2, Table 11) and 40% (GAM1, Strongly agree + Agree, Table 11), it was easy to understand instructions with the clear logical order of panels/windows. The latter indicates 60% found difficulty in the instructions.

<sup>44</sup> Christopher Cheong, Justin Filippou, and France Cheong, "Understanding Student Perceptions of Game Elements to Develop Gamified Systems for Learning," 2013.

<sup>45</sup> Richard E. Mayer, "Computer Games in Education," *Annual Review of Psychology* 70, no. 1 (January 4, 2019): 531–49, <https://doi.org/10.1146/annurev-psych-010418-102744>.

<sup>46</sup> John Aries I Malahito and Maria Ana T Quimbo, "Creating G-Class: A Gamified Learning Environment for Freshman Students," *E-Learning and Digital Media* 17, no. 2 (March 8, 2020): 94–110, <https://doi.org/10.1177/2042753019899805>; Andrey V Kirillov et al., "Improvement in the Learning Environment through Gamification of the Educational Process," *International Electronic Journal of Mathematics Education* 11, no. 7 (2016): 2071–85.

<sup>47</sup> Mary Kalantzis and Bill Cope, "Designs for Learning," *E-Learning and Digital Media* 1, no. 1 (March 1, 2004): 38–93, <https://doi.org/10.2304/elea.2004.1.1.7>.

<sup>48</sup> Youssra Bellarhmouch et al., "A Proposed Architectural Learner Model for a Personalized Learning Environment," *Education and Information Technologies* 28, no. 4 (April 14, 2023): 4243–63, <https://doi.org/10.1007/s10639-022-11392-y>; A A Nwabude, Francisca Nonyelum Ogwueleka, and Martin Irhebhude, "The Use of Virtual Learning Environment and the Development of a Customised Framework/Model for Teaching and Learning Process in Developing Countries," *Education* 10, no. 1 (2020): 1–12; Susan Y. H. Sun, "Student Configuration and Place-Making in Fully Online Language Learning," *Computer Assisted Language Learning* 31, no. 8 (November 2, 2018): 932–59, <https://doi.org/10.1080/09588221.2018.1466808>.

**Table 11: Views on customisation and overall usability**

| Code | Statements  | %     |
|------|---|-------|
| GAM7 | App offers complete flexibility to alter content and settings   | 15.0% |
|      | App offers limited flexibility to adjust content and settings   | 25.0% |
|      | App offers some flexibility to alter content and settings   | 60.0% |
| GAM8 | App is difficult to operate or crashes often. Content is typically confusing or contains more than one factual error. | 15.0% |
|      | I can launch and operate the app independently  | 30.0% |
|      | I need to be cued each time the app is used   | 15.0% |
|      | I need to have someone to show or model how to operate the app  | 40.0% |

### Discussion Summary

Ryan and Deci's Self-determination theory and the four Gamification factors outlined by Limantara et al. were adopted in an attempt to elicit PSTs' views of historical content knowledge within a digital gamified learning environment.<sup>49</sup> Hence, the researchers utilised the game Evony with a focus on Industrialisation. There were levels of motivation in the learning experience of industrialisation, with attention paid to monetary and taxation concepts during gameplay. The majority of participants were dissatisfied with the installation process and tutorial experience. This indicates that a pre/trial session should have been conducted prior to the actual gameplay. In addition, the game Evony may have been power-demanding depending on the smartphone/PC tablet specification on which it was installed. There were high levels of engagement because more than five hours of gameplay were recorded, while many were satisfied with the visualisation and sound effects of the game. As in education, gamification can potentially make History learning more interactive, immersive and enjoyable for students.<sup>50</sup> This is likely due to the competitiveness likened to colonialist powers related to the background of context and location of the study. In addition, it found that there was a lack of African representation. Overall, students' perspectives were positive, noting that there is room for improvement regarding the context for the game designers. While evidence suggests gamification's effectiveness, more high-quality, theory-driven research is needed to understand its impact across various educational contexts.<sup>51</sup> Future studies and research should encapsulate students' views at the school level and offer a comparative study between teachers and students. In addition, a larger sample size from differing contexts can be considered while examining the implications of gamification in the History of pedagogical innovation in higher education.

### RECOMMENDATIONS

Teachers should implement mandatory piloting sessions before formally introducing gamified learning platforms. This will allow custom tutorials and orientations based on students' and teachers' pilot session experiences. Departments within institutions that head Information Communications Technology should establish the minimum hardware technical specifications and provide alternatives for students whose devices do not support high-demand applications. Hence, it ensures equitable access across diverse socio-economic backgrounds. Institutions should establish review committees to evaluate gamified platforms for cultural sensitivity and historical accuracy before implementation. Policymakers should invest in theory-driven research frameworks that systematically examine gamification's impact across pedagogic techniques in History. Finally, curriculum designers must develop assessment rubrics that measure engagement and the depth of historical understanding achieved through gamified learning,

<sup>49</sup> Ryan and Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being"; Limantara et al., "Factors Influencing the Implementation of Gamification for Learning in Information Systems Education."

<sup>50</sup> Videnovik et al., "Game-Based Learning in Computer Science Education: A Scoping Literature Review"; Daniel Strmečki, Andrija Bernik, and Danijel Radošević, "Gamification in E-Learning: Introducing Gamified Design Elements into E-Learning Systems," *Journal of Computer Science* 11, no. 12 (December 1, 2015): 1108–17, <https://doi.org/10.3844/jcssp.2015.1108.1117>.

<sup>51</sup> Sarah Victoria Gentry et al., "Serious Gaming and Gamification Education in Health Professions: Systematic Review," *Journal of Medical Internet Research* 21, no. 3 (March 28, 2019): e12994, <https://doi.org/10.2196/12994>; Jakub Helvich et al., "A Systematic Review of Gamification and Its Assessment in EFL Teaching," *International Journal of Computer-Assisted Language Learning and Teaching* 13, no. 1 (April 26, 2023): 1–21, <https://doi.org/10.4018/IJCALLT.322394>.

ensuring that the interactive and competitive elements enhance rather than overshadow substantive historical learning outcomes in higher education settings.

## CONCLUSION

This study aimed to explore how university students engage with gamification to apply their knowledge about industrialisation in History Education. The study adopted Ryan and Deci's SDT and the four factors outlined by Limantara et al. in understanding the impact of gamification in the subject History among a group of PSTs. Through deductive analysis, four factors guided the discussion: Student motivation, student engagement, student perspectives, and game design. It was found that when games are applied to History, gamification promotes active participation, critical thinking, collaboration, and historical understanding. While there was a lack of African representation in the game used, instructors need to vet the applications to ensure there is no miscued information. Essentially, this study offers a favourable stance of gamification to the application and knowledge development of historical content. Gamification should be a recommended strategy to enhance students' historical literacy by using game design principles to engage students in interactive and immersive learning experiences.

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