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# Unlocking the Potential of Game-Based Learning for Soft Skills Development: A Comprehensive Review

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## Abstract

Soft skills are critical for undergraduate students to succeed in the workplace, but there exists a gap between the skills possessed by undergraduate students and those required by the industry. This review explores the use of game-based learning (GBL) for developing soft skills among undergraduate students. The review aims to answer four research questions that cover essential aspects of GBL, such as its theoretical foundation, skill development, game design elements, and assessment methods. Following the Preferred Reporting for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, we selected 24 journal articles with empirical results from Scopus databases spanning 2017 to 2023, applying inclusion and exclusion criteria to finalize 18 articles for review. The review identified potential challenges in using GBL for soft skills development, such as the exploration of least developed soft skills, effectiveness of theoretical foundation adoption, game design elements development, and validation of assessment methods. This study aims to provide recommendations for game designers and educators to enhance GBL for soft skills development. The study proposes integrating established learning theories with emerging technologies and social media to provide a personalised learning experience, exploring generative AI in soft skills games, designing open-ended or sandbox game environments to develop innovation skills, incorporating in-game assessment features to assess self-management skills, aligning game rewards with learning objectives, encouraging peer-to-peer assessment, and collaborating with psychometricians to align captured data with the intended soft skills assessment. The study also highlights limitations and suggests future studies to address them, such as adopting emerging technologies to address limitations. Overall, the study contributes to the understanding of GBL for soft skills development and provides valuable insights and recommendations for future research and practice in this domain.

**Keywords:** game-based learning, soft skills development, educational technologies, teaching strategies.

## INTRODUCTION

### Background of the Research

The purpose of the study is to examine the review of empirical studies on the adoption of game-based learning (GBL) in soft skills development. Soft skills, also known as people or personality skills, are essential among undergraduate students (Dell'Aquila et al., 2017; Martín-Hernández et al., 2021). Undergraduate students need to foster the soft skills to effectively manage their interactions and emotions with their co-workers in the workplace (Dell'Aquila et al., 2017; Li, 2022; Martín-Hernández et al., 2021). However, a current study reported that there is still a gap in skills between undergraduate students and workers in the industry (Li, 2022). Higher education plays a vital role in identifying the gap and training the students with the skills required by the current industry (Li, 2022). Games have been known as an effective method for teaching undergraduate education because they are more engaging and motivating compared to traditional learning methods (Krath et al., 2021; Martín-Hernández et al., 2021; Subhash & Cudney, 2018). The purpose of the study is to review the past research on using games to develop soft skills, identify the gap, and discover the potential of transferring GBL techniques to address the challenges of learning soft skills among undergraduate students. This review aims to answer several research questions as follows.

### Research Questions

The first question, "What is the GBL approach used in developing soft skills?" examines the theoretical foundation and approach to identify the determinants and processes involved in learning soft skills (Krath et al., 2021). It is important to consider these theories originating from social psychology to inform the design of game-based interventions for learning soft skills (Krath et al., 2021).

The second question, "What are the soft skills developed when adopting GBL?" aims to identify the typical soft skills that can be learned through games and determine whether they align with the recent soft skills required by the current trends and industries. Besides, the gaps in the least explored soft skills will be investigated to identify the potential and challenges of applying these soft skills in GBL.

The third question, "What are the game design elements that are commonly applied in soft skills games?" explores the common game elements identified in soft skills games in terms of feedback, challenge, and reward, which serve as instruction for the students (Krath et al., 2021). Through the exploration of the game elements, game designers may identify the gaps and guidance needed when designing soft skills games.

The fourth question, "What are the assessment methods that are commonly applied in assessing soft skills through games?" examines whether these assessment methods align with the specific soft skills targeted and if they provide reliable and validated results of skill development, contributing to a comprehensive understanding of the impact of GBL on soft skills acquisition (Zainuddin et al., 2020).

In summary, the research questions investigated in this literature review cover a range of essential aspects related to using a game-based learning approach in developing soft skills. They provide a clear view for examining the theoretical foundations, skill development, game design elements, and assessment methods in the context of GBL.

## LITERATURE REVIEW

### Introduction to Game-based Learning (GBL)

A game is an interactive activity that consists of rules, goals, and challenges (Prensky, 2001). Games have the potential to assist students in achieving goals and various pathways of progress and adapt to complex tasks easily (Krath et al., 2021). Besides, games can help students in supporting each other through in-game social activities (Krath et al., 2021). Games can be aligned with the learning theory to facilitate the learning process. The alignment of games with the learning theory is called game-based learning (GBL) (Prensky, 2001; Krath et al., 2021). GBL has been applied successfully in previous research to enhance the learning process of undergraduate students. There are a few main factors that contribute to the success of applying GBL among undergraduate students. Firstly, game elements such as rewards and penalties are effective in motivating undergraduate students (Subhash & Cudney, 2018). Next, game elements such as badges, leaderboards, scores, or grades can be used to track the learning process of undergraduate students (Krath et al., 2021; Zainuddin et al., 2020). Another critical point is that the game assessment plays a crucial role in assessing students' performance. The standard game assessments are knowledge tests, self-reporting, and in-game performance (Subhash & Cudney, 2018).

### Challenges of GBL Adoption

Soft skills, also known as personal skills, are a collection of personalities, traits, attributes, habits, and attitudes that can be applied to various job types (Dell'Aquila et al., 2017). Psychologist Goleman (1995) defined soft skills as a combination of competencies that contribute to how individuals manage their relationships with others and themselves (Dell'Aquila et al., 2017). Unlike cognitive skills and hard skills, soft skills are non-cognitive skills that describe an individual's personality, which cannot be measured by intelligence quotient (IQ) tests (Kautz et al., 2017). Soft skills focus on the thinking process rather than empirical results (Dell'Aquila et al., 2017; Kautz et al., 2017). Soft skills games, also known as 21st-century competency games, are educational games that foster soft skills such as problem-solving, argumentation, systems thinking, and collaboration (Jan & Gaydos, 2016). Compared to content mastery games, soft skills can be delivered through the adoption of game design elements and simulation of a virtual environment to the students (Jan & Gaydos, 2016; Kapp, 2012; Krath et al., 2021). Students may learn soft skills through engagement, participation, and measurable performance improvement in the game context (Krath et al., 2021). However, adopting GBL in soft skills development poses some challenges, as follows.

### *Effectiveness Compared to Traditional Learning Methods*

A previous study found that students who experienced a traditional learning approach to skill development scored higher on the knowledge test (Subhash & Cudney, 2018). Although the learning experience improved, it did not significantly enhance learning performance among undergraduate students (Subhash & Cudney, 2018). This can be found from the evidence where some established learning theories were not addressed to be integrated with GBL in past research (Krath et al., 2021). Learning theory serves as a foundation that a researcher should refer to build a learning experience to scaffold the knowledge and skills. Without the reference to an established learning theory, the game only serves as an instrument for increasing motivation and knowledge; there is a tendency for knowledge acquisition is fail.

### *Integration with curriculum and assessment*

There is much evidence showing that undergraduate students adopted GBL, but the students were only assessed at low cognitive levels (Petri & Wangenheim, 2017; Qian & Clark, 2016). Low cognitive levels mean the literacy level is limited to a method similar to students' worksheets and focuses on facts memorisation (Qian & Clark, 2016). This can be seen where most games available in the market lack integration with the curriculum and assessment (Dell'Aquila et al., 2017). The market-driven games were designed mainly to cater to the general audience from a wide range of ages, expertise levels and cultures to generate profits. Therefore, it is challenging to find a suitable game unless it is designed and customised for specific students. The customisation of game design is challenging as it involves interdisciplinary collaboration between game designers and educators who have deep knowledge of game design theory and learning (Qian & Clark, 2016).

### *Validity and reliability of GBL performance*

A previous study showed that the GBL adoption results were based on participants' self-report feedback (Tay et al., 2022). The self-report, which focuses on self-survey and questionnaires that are answered by the participants themselves, lacks reliability and validity. The actual performance was not assessed by the educators but was based on the self-perception of the students. Educators are unable to identify the underlying challenges faced by the students in the process of learning. The self-report results may possess bias where the students underestimated or overestimated their performance based on their perspectives.

## Potential soft skills development required by undergraduate students

According to the World Economic Forum (WEF), the top 10 skills required in the year 2025 can be categorised into four main categories: problem-solving, self-management, working with people, technology use and development (Whiting, 2022). Among all the skills, critical thinking and problem-solving have consistently been identified as crucial skills by employers in the past and are expected to

remain in high demand in the industry over the next five years (Whiting, 2022; Li, 2022). Additionally, this year, a new category of soft skills has emerged: self-management competencies, which include active learning, resilience, stress tolerance and flexibility (Whiting, 2022; Li, 2022). These soft skills are considered life-long skills, and undergraduate students need to equip themselves with these abilities to deal with the uncertainties of the changes in workplaces.

## METHODOLOGY

### Research Design

The review was conducted according to the Preferred Reporting for Systematic Reviews and Meta-Analysis (PRISMA) guideline, which is a recognised and widely used methodological approach. It is worth noting that other game-based related research, such as Tay et al. (2022) and Krath et al. (2021), have also adopted the PRISMA guideline, which further validates its relevance and suitability for this type of review. Before searching and examining journal articles, a set of inclusion and exclusion criteria is defined to assess the validity and applicability of the articles. These criteria help to ensure that the selected articles are relevant and align with the research objectives. By defining these criteria, the validity and reliability of the included articles can be assessed, enhancing the overall quality of the review.

### Search Process

#### *Identification*

The inclusion was applied to ensure the game or GBL approach that was involved was not obsolete. Therefore, the systematic review was conducted from 2017 to 2022. Another criterion that was important to the focus of this study was the research participants. The focus of this study is the use of games as a learning tool for undergraduate students in developing soft skills. Only English articles were included. Based on the results, a second screening was processed to exclude duplicate papers, non-experimental publications, non-empirical studies, non-meta-analysis, conference papers, thesis, reviews, non-undergraduate students such as pre-school, primary and secondary students, and GBL research unrelated to soft skills. The search strategy consisted of retrieving journal articles using a combination of keywords based on inclusion criteria in Scopus. The appropriate keywords were identified using an online thesaurus, previous studies and phrases found in the articles. The search started with a search string of the keywords: "soft skills," "game," and "undergraduate" ("soft skills" AND "undergraduate" AND ("game" OR "GBL")) is shown in Table 1.

**Table 1:** Main keywords and synonyms used in searching articles

| Section | Main Keywords | Synonyms |
|---|---|---|
| The effects of game-based learning on soft skills development among undergraduate students | Effects | influences, impact |
| | game-based learning | serious game, gamification, educational game, video game |
| | soft skills | social skills, 21st century skills. Interpersonal skills, people skills |
| | undergraduate | higher education |

The search process was carried out on the above-mentioned primary database by using the Boolean operators based on the keywords as shown in Table 2.

**Table 2:** Boolean operators are used to search articles from the Scopus database

| Database | String |
|---|---|
| Scopus - Search according to article title, abstract, keywords | (influence* OR impact* OR effect) AND (“serious game*” OR “game-based learning” OR “gamification” OR “educational game” OR “video game”) AND (“soft skill” OR “social skill*” OR “21st century” OR “interpersonal” OR “people skill*”) AND (“undergraduate*” OR “higher education”) |

***Screening***

Twenty-four papers were identified in the research after systematically reviewing the screening date and abstract. After the abstracts were read, they were rescreened using the inclusion and exclusion criteria depicted in Table 3.

**Table 3:** Inclusion and exclusion criteria for searching articles

| Criterion | Inclusion | Exclusion |
|---|---|---|
| Language | English | Other language |
| Paper type | Journal | Conference, book, report |
| Article type | Research Article | Review article |
| Participants | Undergraduate | Master's and PhD students, kindergarten, primary, and high school students. |

### *Eligibility*

Full papers were screened at this stage. After removing paper duplication and excluding papers that did not include empirical results of GBL, 18 papers were shortlisted. An outline of the entire review is depicted in the following Table 4.

**Table 4:** Paper analysis after the screening process

| Publisher | Paper found | Paper Eligible |
|---|---|---|
| Scopus | 24 | 18 |

## RESULTS

Appendix A illustrates the application of theoretical foundations, games, elements, skills, and assessment in adopting different types of GBL approaches. Based on the findings, some studies did not report the theoretical foundation or game elements that were used to develop soft skills. The details of the analysis can be found in the section on the theoretical foundation of GBL, game elements and soft skills assessment.

## THEORETICAL FOUNDATION OF GAME-BASED LEARNING (GBL)

This section aims to answer the first research question, "What is the GBL approach used in developing soft skills?". The GBL approach examines the theoretical foundation and approaches to identify the determinants and processes involved in learning soft skills (Krath et al., 2021). It is important to consider these theories originating from social psychology to inform the design of game-based interventions for learning soft skills (Krath et al., 2021). This section investigates how learning theory is adopted in GBL to develop soft skills among students in past research. Through the investigation, best practices can be identified for educators in scaffolding the students in soft skills development.

### Experiential Learning

Experiential learning is the most common approach used in developing soft skills for upskilling and reskilling in the industry (Li, 2022). Experiential learning, based on Kolb's (1984) constructivist learning theory, emphasises learning through personal experiences. This approach allows students to learn from their own experiences within the game, aligning with the iterative learning cycle proposed by Kolb (Morrell et al., 2020). Incorporating experiential learning in games enhances their realism and facilitates the development of soft skills (Urquidi-Martín et al., 2019). At the higher education level, experiential learning can be achieved through engaging students with hands-on industry projects (Li, 2022). This approach is practical and widely applied in many universities as a form of internship (Li, 2022). However, the challenges lie in the timing of skills mastery, where the students should be equipped with the skills before entering the internship.

In past research, experiential learning was adopted in GBL through a simulated physical escape game where participants can actively engage in solving real-life scenarios (Morrell et al., 2020). However, the preparation for the physical escape involves space and time availability, as well as money to purchase resources (Morrell et al., 2020). This limits the time taken to learn soft skills in the classroom. On the other hand, experiential learning can be adopted through playing digital games (Huang et al., 2022; Ragavan et al., 2021; Solarte et al., 2021). Compared to physical games, digital games such as computer, augmented and virtual reality platforms provide an immersive, safe, and risk-free environment to experience the challenges and decision-making processes involved in a real-world scenario (Agbo et al., 2023). The learning experience is repeatable and can be done outside the classroom. However, virtual reality platforms come with the tendency to be cybersick due to the use of a headset for long periods (Tian et al., 2022). Game designers should refer to the headset's usage guidelines in terms of time usage and space safety when designing the game (Meta, n.d.). Instead of a digital game, the gamification approach can be adopted by including game elements in the learning content without the simulation of a virtual environment (Kapp, 2012; Skritsovali, 2023; Zichermann & Cunningham, 2011). By incorporating gamification elements, educators can reinforce active learning in the classroom to ensure student learning with participation and discourage the memorisation of knowledge skills (Skritsovali, 2023; Zichermann & Cunningham, 2011). However, students will not be able to experience the immersion of the social roles in the problem-based scenario, which may affect learning engagement and knowledge acquisition.

The effectiveness of experiential learning may be influenced by personal experiences such as instructional design, learner characteristics and learning objectives. Therefore, it is suggested that self-reflection processes can be incorporated into the assessment for students to assess their performance upon game completion (Emblen-Perry, 2018; Solarte et al., 2021; Urquidi-Martín et al., 2019).

**Social Learning Theory**

The social learning theory emphasises the influence of the social environment influences on the successful learning process (Poděbradská et al., 2020). The theory was adopted from the idea of Zone of Proximal Development (ZPD) from Vygotsky in 1978, suggesting that guidance and instruction can bridge the gap between a learner's current level of development and their potential development (Kraft et al., 2021).

Social learning theory can be adopted through collaborative and competitive student activities (Poděbradská et al., 2020). Through social learning theory, students can observe and learn from different disciplines and perspectives, facilitating the development of empathy skills and adaptability (Feroz et al., 2021; Krath et al., 2021).

The social learning theory is a potential theoretical foundation that can be adopted for digital games as undergraduate students are proficient in using digital tools and social media to communicate. Many digital games are integrated with social media through competition, collaboration, and sharing of

records. Social media and academic engagement positively reduce students' cognitive load in achieving outcomes through community communication and collaboration activities (Feroz et al., 2021). However, social media should be used with proper monitoring and guidance to prevent misuse and ensure a positive impact on academic engagement and mental health.

**Self-Determination Theory**

Self-determination theory explains how human motivation originates from innate psychological needs for competence, relatedness, and autonomy (Lampropoulos et al., 2023; Martín-Hernández et al., 2021). Self-determination theory can be adopted by testing the ability of students to react autonomously and identify whether they have control of their own decisions and actions inside the game (Lampropoulos et al., 2023). Game mechanics such as rewards and progress are crucial as instructional guides, intrinsically motivating students to select more challenging tasks during the learning process (Martín-Hernández et al., 2021). In other words, self-determination theory leads to a more rewarding learning experience.

**Flow Theory**

Flow theory, originated by Csikszentmihalyi in 1975, engages students through different mental states (Zichermann & Cunningham, 2011). These mental states represent a state of complete concentration and absorption of knowledge when students immerse themselves in an educational game (Martín-Hernández et al., 2021; Zichermann & Cunningham, 2011). Past research showed that flow theory could be applied by assigning students to role-playing games and selecting their roles according to their characteristics when practising health and social work through GBL (Martín-Hernández et al., 2021). Flow theory can be adopted in GBL by adjusting the game level to align with the student's skills, enabling them to focus and learn throughout the game (Martín-Hernández et al., 2021). The ability to adjust the game level based on the student's skills further enhances the flow of experiences, making the learning experience more compelling, personalised, and effective (Martín-Hernández et al., 2021). However, the flow of the game may be interrupted by tests and quizzes (Qian & Clark, 2016). With the current technologies, in-game analytics can be applied by game designers to collect game data, analyse the performance, and dynamically adjust the game difficulty to maintain the optimal flow state (Qian & Clark, 2016). The artificial intelligence (AI) algorithm can be applied to adjust the game difficulty in real-time and provide immediate feedback to the students (Zohaib, 2018).

**Constructivist Learning Theory**

Constructivism is the foundation of learning theory, focusing on problem space. Students construct knowledge through the problems that they have identified within the learning environment. Through the constructivist approach, students can interact and integrate new information with their existing understanding of the subject matter (Wong et al., 2021). Most of the games in the market approach constructivist learning through the design of exploration, competition, collaboration, and discovery,

which has proven to improve problem-solving skills (Qian & Clark, 2016). By approaching constructivist learning theory, students can apply practical knowledge through sharing ideas and exchanging perspectives among peers, which promotes collaboration (Feroz et al., 2021). In the process of problem-solving, the constructivist learning approach is accompanied by inquiry-based learning, which requires students to make decisions, correct answers, and find facts to support the decision (Repetto et al., 2023). Therefore, educators can act as facilitators to provide summative feedback to increase awareness of the learning objective during the game session (Repetto et al., 2023).

Overall, this discussion highlights the specific learning theories employed in soft skills development. The effectiveness of theoretical foundations in GBL is evident from the various studies conducted. By understanding and utilising the theoretical foundations, educators can design GBL interventions that cater to the needs of individual students and improve the development of soft skills.

## SOFT SKILLS DEVELOPMENT

This section aims to answer the research question, "What are the soft skills developed when adopting GBL?" The breakdown of the soft skills and how they are adopted to the game elements is discovered as follows.

### Critical Thinking

Critical thinking is one of the top skills required by employers in the workplace, according to the WEF report (Li, 2022; World Economic Forum, 2020). Edward Glaser, the founder of critical thinking, proposes that critical thinking involves a thoughtful way of considering the project according to a person's experience, applying logical questioning and reasoning methods to perform a task (The Foundation for Critical Thinking, n.d). Critical thinking can be developed through the process of decision-making (Urquidi-Martín et al., 2019). The section below discusses how critical thinking skills such as questioning, thinking from different perspectives, analysing multiple solutions and quick interpretation by thinking on the spot are applied with GBL for soft skills development.

#### *Questioning*

Questioning involves the ability to ask questions during the process of solving a problem, which focuses on encouraging curiosity and asking meaningful questions (Urquidi-Martín et al., 2019). This skill aligned with the Socratic questioning methods, a learner-centred approach where the students asked different types of questions (Hsu et al., 2022). A critical thinker uses questioning techniques to encourage task execution or finding out the truth (Critical Thinking, 2019; Hsu et al., 2022). Questioning techniques encourage students to perform self-reflection and have a deeper understanding of finding out the truth (Hsu et al., 2022). For instance, students asked questions in the process of managing the resources given to them in a physical simulation game, which led them to self-reflection in finding the most optimum way to secure their resources (Urquidi-Martín et al., 2019).

### *Think from a Different Perspective*

Thinking from different perspectives involves the ability to be aware of others' feelings and make reasonable judgements from different viewpoints (Emblen-Perry, 2018; Huang et al., 2022; Urquidi-Martín et al., 2019). To understand from a different viewpoint, a critical thinker communicates with others to find solutions to solve complex problems (The Foundation for Critical Thinking, n.d). This skill can be developed by role-play as an entrepreneur or manager in the game. Students learned how to manage their business and resolve the conflicts with the team members through voting and discussion throughout the game (Emblen-Perry, 2018; Huang et al., 2022; Urquidi-Martín et al., 2019).

### *Analyzing Multiple Solutions*

Students learn how to identify multiple solutions, which leads to creative problem-solving (Almeida et al., 2021; Urquidi-Martín et al., 2019). The multiple solutions are generated with the condition that there are no fixed solutions that determine the right or wrong of the actions (Almeida et al., 2021; Urquidi-Martín et al., 2019). Each of the solutions has its advantages and disadvantages (Almeida et al., 2021; Urquidi-Martín et al., 2019). In other words, the game design might not be competitive as the mechanics focus on making different decisions that lead to different outcomes. The solution can be discussed upon the game completion as a form of self-reflection.

### *Quick Interpretation and Thinking on the Spot*

The ability to quickly interpret information and think on the spot (Skritsovali, 2023). A critical thinker can gather information and interpret information to generate a well-rounded solution (The Foundation for Critical Thinking, n.d). This skill challenged the students on how to use their history, knowledge, and background to make the judgement based on the given situation in the game (Skritsovali, 2023). Therefore, the students were given a time limit to solve the problem in the game to assess their quick interpretation skills in a critical moment (Skritsovali, 2023).

## Problem-solving

Problem-solving is a soft skill that is commonly found adopted in GBL. Problem-solving skills adopted in GBL include computational thinking, problem identification, information analysis, and negotiation.

### *Computational Thinking*

Computational thinking involves the ability to analyse and logically solve problems; breaking them down step-by-step, which can be applied repeatedly by others (Agbo et al., 2023; Bacelo & Gómez-Chacón, 2023). This thinking skill was applied in learning programming skills and solving complex mathematical problems in games (Agbo et al., 2023; Bacelo & Gómez-Chacón, 2023).

***Problem Identification***

Problem identification involves the ability to identify the problem based on the given scenario (Huang et al., 2022). Problem identification is the process of constructing a problem space (Viale et al., 2023). Problem space refers to the possibility of searching for a solution within the scenario given (Viale et al., 2023). In GBL, problem identification can be adopted by generating a game scenario that simulates the problem, which is similar to a real-life scenario (Huang et al., 2022). Compared to the actual scenario, a similar game scenario can be experienced by the students repeatedly with different problem identification (Huang et al., 2022). Instead of generating similar scenarios, some studies practice puzzle-solving activities to learn problem identification through managing limited resources in a game with a fantasy world (Uiphanit et al., 2020).

***Analyze information***

Analyse information includes the ability to collect information and make decisions based on the data collected (Huang et al., 2022). This aligns with George Miller's information processing theory, wherein individuals gather and filter information by breaking it into parts to make decisions during problem-solving (Rosnov & Roberts, 2005). The theory suggests that with the proper training, an individual as young as a child can learn to succeed at different cognitive tasks (Rosnov & Roberts, 2005). This can be adopted in GBL by using games to identify problems, collect data and analyse information based on the data that students have collected in the game (Huang et al., 2022).

**Innovation**

Innovation is the process of creating and developing new ideas (Huang et al., 2022; Martín-Hernández et al., 2021; Thornhill-Miller et al., 2023). The theory of innovator's DNA suggests the traits of an innovator should include association techniques to make connections between the problem aligned with the critical thinking skills; questioning techniques aligned with the theory of problem identification; experimenting through prototype creation; observing techniques aligned with practising empathy, and networking aligned with the teamwork and communication skills (Dyer et al., 2011; Fronzetti Colladon et al., 2023; Solarte et al., 2021). Innovators are good at communication in a way that they express their new ideas in textual form by using positive and comprehensive language. (Fronzetti Colladon et al., 2023). For instance, utilise words concerning the product's business and marketing and reporting facts compared to non-innovators (Fronzetti Colladon et al., 2023). Besides, they are the central point of the community, bridging the ideas between different disciplines and expressing positive attitudes towards new technologies (Fronzetti Colladon et al., 2023).

GBL can be adopted by simulating the process of generating new product ideas when running a simulated business company (Solarte et al., 2021). Game design for developing innovation skills should equipped with resources that allow customisation, followed by rewards upon the completion of a task (Solarte et al., 2021). The customisation also allows students to develop problem-identification

skills and collaborative skills in teamwork. However, students' innovation may also be limited by the resources given, where they cannot fully explore specific ideas due to constraints. Therefore, an open-ended or sandbox game environment can be given to the students to express their ideas without limitation (Urban, 2019).

**Creativity**

Creativity has remained at the top of the list of WEF's future workforce since 2015 (World Economic Forum, 2023). Creativity is a critical skill set in WEF, as employers are looking forward to workers who can create new technologies, new products, and new working processes in the workplace (Li, 2022). Creativity skills include idea generation, idea promotion and realisation (Kauffman & Beghetto, 2009; Thornhill-Miller et al., 2023; Huang et al., 2022). The process of learning creativity is affected by environment and social bias (Thornhill-Miller et al., 2023). This makes the game a potential learning environment to express creative ideas without being limited to space and bias in terms of culture and identity. In past GBL research, creativity was adopted through role-playing, where students expressed ideas based on the case study given in a digital game environment (Huang et al., 2022). Creativity can also be adopted through the process of designing one's own game for learning (Repetto et al., 2023). Brainstorming can be employed to remove social bias during the process of creating new ideas (Thornhill-Miller et al., 2023). Brainstorming is the process of generating as many ideas as possible and self-assessing the feasibility of the idea before it proceeds to the next step for commercialisation (Thornhill-Miller et al., 2023). The Alternate Uses Test (AUT) is a standardised test for creativity where the brainstormed ideas can be assessed and measured in terms of fluency, originality, flexibility, and elaboration (Thornhill-Miller et al., 2023). It is suggested that educators use the AUT test to measure creativity skills, as the standardised test is reliable and valid.

**Communication**

Organisations demand communication skills for effective company operations (World Economic Forum, 2020). Communication can be developed through teamwork collaboration (Almeida & Morais, 2023; Kinio et al., 2019; Pelser-Carstens & Blignaut, 2018; Ragavan et al., 2021; Skritsovali, 2023; Wong et al., 2021). Teamwork collaboration is one of the elements that drive the economy of a country, which includes coordination, management, and reflection (Thornhill-Miller et al., 2023). A good team member or quality possesses the ability to detect problems that can linked to a quality solution (Wong et al., 2021). In contrast, Spitzberg's communication theory focuses on individual communication skills in terms of clarity, effectiveness, and quality of conversation (Thornhill-Miller et al., 2023).

In the past GBL study, the communication skill was adopted through multiplayer games, accompanied by decision-making game activities (Almeida et al., 2021; Martín-Hernández et al., 2021; Morrell et al., 2020; Pelser-Carstens & Blignaut, 2018; Poděbradská et al., 2020; Wong et al., 2021). However, the actual assessment has yet to fulfil the requirements of the industry employers. Although there is still a gap, GBL serves as a potential tool to provide a safe environment for learning communication

skills verbally and non-verbally, accompanied by feedback generated by self-report or feedback from the facilitator (Thornhill-Miller et al., 2023).

With the emerging voice input technologies, communication skills may be learned through conversations between students and Non-Player Characters (NPC). The generative AI offers natural language conversation with context-awareness responses. The created generative AI NPC can generate decisions and pieces of advice for the students based on the collected data and trained using machine learning (ML). With the natural language processing (NLP) algorithm, generative AI can perform sentiment analysis to analyse the emotional tone and context of the conversation, which in turn helps develop communication and self-management skills. Generative AI has significantly helped underperforming students increase their productivity in the process of learning. However, generative AI applications are limited by misinformation, legal issues, and cybersecurity risks (Elbanna & Armstrong, 2023). Therefore, students must be informed before they use the game to communicate with Non-Player Characters (NPC) during the study.

**Self-management**

Well-being is emphasised as part of the Sustainable Development Goals (SDGs) to be achieved by 2030 (Martín-Hernández et al., 2021). Well-being, such as self-management, self-awareness, social competence, social awareness, and relationship management, are closely aligned with the WEF's focus on emotional skills (Bradberry, 2017). Self-management is one of the aspects of well-being where the workers can adopt to disrupted workspaces (World Economic Forum, 2023). The ability to manage oneself is a type of emotional intelligence that can determine job performance, contributing to 58% success in all types of jobs. This is proven when 90% of top performers are high in emotional intelligence (Bradberry, 2020). As self-management is a newly emerged skill required in the workforce, studies about the adoption of GBL in this area are scarce, which opens the potential for the research area in the future. However, compared to the other skills, emotional intelligence is challenging to assess. Therefore, it is believed that the facilitator, educator, and peers play an important role in assessing the self-management skills of the students throughout the game. In terms of self-assessment, self-management is adopted by letting students select the mental states in the process of decision-making when playing games (Almeida et al., 2021). A questionnaire can be designed to inquire whether students can adapt themselves to the challenges in their daily lives upon completing the game; it may also assess whether they have learned self-management and motivation through the game completion (Pelser-Carstens & Blignaut, 2018; Uiphanit et al., 2020;). Unless the identity can be kept anonymous and confidential, students may select any state that reflects their actual emotion in the game without worry of bias.

## SOFT SKILLS GAME DESIGN ELEMENTS

This section aims to answer the research question, "What are the game design elements that are commonly applied in soft skills games?". This section explores the common game elements identified

in soft skills games in terms of feedback, challenge, and reward, which serve as instruction for the students (Krath et al., 2021). Through the exploration of the game elements, game designers may identify the gaps and guidance needed when designing soft skills games. The game design elements are analysed according to game challenges, feedback, and rewards.

## Game Challenge

A game challenge refers to a task that comes with a problem space and requires students to solve it within the rules given in the game. The rules can refer to the limitation of time, resources, number of students, and space given (Kapp, 2012). As stated in the constructivism learning theory and self-determination theory, a game challenge serves as a problem space that allows a player to learn from the given scenario and motivates them to learn more by themselves. Problem space can be the actual scenario simulation as adopted from experiential learning to increase the immersive experience in the process of learning. The common game challenges found in the past GBL research in developing soft skills are as follows.

### *Puzzle challenges with multiple solutions*

The use of puzzle mechanics with multiple solutions emerges as a primary strategy for developing soft skills. Multiple choice quizzes provide different paths and options for the students to achieve learning goals (Krath et al., 2021; Morrell et al., 2020; Subhash & Cudney, 2018). Activities such as discovering hidden objects and solving problems within pressure scenarios were found to develop problem-solving, decision-making, leadership, and teamwork skills (Agbo et al., 2023; Kinio et al.; 2019; Morrell et al., 2020; Poděbradská et al., 2020; Wong et al., 2021). Puzzle challenges require participants to think critically, analyse information and make decisions under pressure. This can develop the skills of participants in quick thinking under pressure in real-world situations. Through decision-making, participants learned the consequences of their decisions in affecting themselves and others. When including decision-making mechanics, providing hints to students when they make wrong decisions was deemed necessary for the effectiveness of the decision-making system (Tay et al., 2022).

### *Quiz*

A quiz is used to assess the knowledge and understanding of the students in the process of soft skills development. Through quizzes, educators can ensure that participants grasp the fundamental knowledge required for skills development. Interacting with the virtual characters and objects to answer the quizzes has the potential to encourage active participants because it allows them to explore the learning environment to learn more. (Agbo et al., 2023; Lampropoulos et al., 2023). Noteworthy mentioned that the use of augmented reality (AR) technologies can be applied in quiz activities to increase the immersion experience of the students (Lampropoulos et al., 2023). AR technologies blend virtual and reality environments, which allows students to interact with virtual objects in an actual environment (Lampropoulos et al., 2023).

### *Role-play*

Role-play scenarios, such as those found in well-known games like World of Warcraft, immerse participants in simulated environments mirroring the real world (Dell'Aquila et al., 2017; Kapp, 2012). These scenarios provide a safe space for learning leadership skills (Dell'Aquila et al., 2017) and extend to business simulation games where students, acting as shop owners or managers, engage in managing companies, competing, or collaborating to innovate solutions (Almeida & Morais, 2023; Ragavan et al., 2021; Emblen-Perry, 2018; Huang et al., 2022; Martín-Hernández et al., 2021; Skritsovali, 2023; Solarte et al., 2021; Urquidi-Martín et al., 2019; Pelser-Carstens & Blignaut, 2018). This management process fosters the development of strategic decision-making and resource management skills. Multiplayer games with role-play scenarios encourage participants to resolve conflicts and discuss ideas from various perspectives, offering diverse challenges that enable students to acquire and refine soft skills crucial for success in their professional journeys, including leadership, communication, innovation, and adaptability to different environments (Krath et al., 2021; Prensky, 2001).

## Game Feedback

Game feedback is important in providing a sense of progress and motivating the students to learn according to the self-determination theory. There are two types of feedback commonly found in soft skill games.

### *System-generated feedback*

The incorporation of system-generated feedback serves as an immediate and automatic way to guide the participants' learning journey. The game feedback generated by systems helps correct students' misconceptions in the learning process, making them aware of their errors and making the necessary corrections (Agbo et al., 2023; Wong et al., 2021). This feedback can be continuous at every stage and allows participants to change their decision to enhance the dynamic learning experience (Ravagan et al., 2021; Huang et al., 2022; Urquidi-Martín et al., 2019). For instance, visual feedback, such as progress bars and financial performance indicators displayed at every game stage, can motivate students to track their progress and provide a sense of achievement to the students (Almeida et al., 2021; Skritsovali, 2023). Another example of system-generated feedback is a leaderboard. A leaderboard can stimulate healthy competition among students and recognise their achievements. However, it has the potential to discourage students who have lower performance as well (Lampropoulos et al., 2023).

### *Facilitator-generated feedback*

The facilitator can assess students' progress to ensure they align with the game objectives (Morrell et al., 2020; Emblen-Perry, 2018). Facilitator-generated feedback is more personalised and human-

driven, where students can receive feedback tailored to their abilities. For instance, in a business game, facilitators assess profit earned and score at the end of the game to assess participant's learning performance quantitatively (Emblen-Perry, 2018; Morrell et al., 2020; Poděbradská et al., 2020). Participants can identify the areas where they need to improve (Poděbradská et al., 2020). Meanwhile, peer voting and discussion upon the game completion can promote collaborative evaluation because it encourages students to actively participate and communicate with peers (Martín-Hernández P. et al., 2021; Solarte et al., 2021). This can encourage participants to discuss their thoughts and insights, which further reinforces their understanding of skills. However, facilitator-generated feedback does come with the drawback. Consensual Assessment Technique (CAT) is facilitator-generated feedback to assess creativity skills (Thornhill-Miller et al., 2023). However, the challenge faced by the students was that the learning environment could only be progressed with the presence of judges (Thornhill-Miller et al., 2023). System-generated feedback offers instant guidance, while facilitator-generated feedback is more personalised in ensuring each participant achieves learning objectives. The choice of feedback should align learning objectives and the soft skills types being developed. However, it is crucial to consider the context and individual learner's needs when implementing feedback strategies and their transferability to real-world situations.

## Rewards

Game rewards were identified as an important game element, serving as intrinsic motivation for students to learn (Zichermann & Cunningham, 2011). Rewards were found to increase motivation and encourage students to progress further, aligning with Skinner's reinforcement theory (Zichermann & Cunningham, 2011). Rewards indicate the winning states of the game, which gives students ego gratification (Prensky, 2001). The use of such rewards is aligned with the principles of gamification, where game design elements are applied to non-game contexts to enhance motivation and engagement. The rewards generated can be related to the role-play scenarios, such as simulated income and bank balance, which align with the simulated environment (Emblen-Perry, 2018; Veruschka & A. Seugnet, 2018).

### *Presence of Rewards*

The expected game rewards such as points, scores, and badges are given to the students upon task completion or correct decisions (Agbo et al., 2023; Huang et al., 2022; Lampropoulos et al., 2023; Poděbradská et al., 2020; Solarte et al., 2021; Wong et al., 2021). Other types of rewards, such as simulated income, bank balance, and in-game money, can also be used as a form of reward as it is related to the game context (Emblen-Perry, 2018; Veruschka & A. Seugnet, 2018). On the other hand, educators can offer tangible rewards such as shopping vouchers, which students can use in the actual world upon game completion (Skritsovali, 2023). The tangible reward should be used wisely to prevent students from forgetting the objective of participating in the reward.

### *Absence of rewards*

In contrast, certain studies opt for no explicit rewards, focusing on other methods to engage participants and foster skill development. Self-reflection is a valuable outcome, where participants receive individual self-reflection reports upon the game completion (Almeida et al., 2021; Martín-Hernández et al., 2021; Ragavan et al., 2021; Urquidi-Martín et al., 2019). Self-reflection can also be conducted in the form of a discussion for self-assessment among participants (Kinio et al., 2019; Morrell et al., 2020). With the absence of rewards, the students still gain experience from the game through self-reflection. Self-reflection is a valuable reward that increases the intrinsic motivation to perform better in soft skills. Self-reflection encourages learning to analyse their past decisions and actions critically, which leads to deeper insights and skill development. In other words, choices of rewards should be meaningful and aligned with the learning objective to avoid undermining intrinsic motivation. Game designers should design the reward carefully to prevent students from focusing solely on rewards rather than soft skills development.

## SOFT SKILLS GAME ASSESSMENT

This section aims to answer the research question, "What are the assessment methods commonly applied in evaluating soft skills through games?" Based on the results, the commonly used assessment methods include questionnaires, interviews, and in-game assessments. A suggested new method to be explored is a knowledge test (Subhash & Cudney, 2018).

### Questionnaires

Soft skills performance is typically evaluated using a designated questionnaire, either crafted for the specific learning context or adopted from existing ones (Martín-Hernández et al., 2021; Veruschka & A. Seugnet, 2018). This questionnaire gauges participants' self-perception regarding the significance of skills learned through games (Emblen-Perry, 2018; Gris & Bengston, 2021; Kinio et al., 2019; Morrell et al., 2020; Poděbradská et al., 2020; Skritsovali, 2022; Solarte et al., 2021; Urquidi-Martín et al., 2019). While some questionnaires delve into detailed skill perceptions, others assess skills more broadly. For instance, participants might be asked about their overall mastery of self-management skills when the study does not explicitly focus on that skill (Pelser-Carstens & Blignaut, 2018). Questionnaires present challenges related to self-reporting in terms of validity and reliability, as reported performance may not consistently align with actual actions. Therefore, it is recommended that an observational study be included to monitor students' behaviour and compare it with the data collected from the questionnaire (Gris & Bengston, 2021).

### Interviews

Semi-structured interviews were conducted to get the students' perceptions of the soft skills that they

have developed (Huang et al., 2022). The challenges of assessing soft skills through the self-reflection method possess the validity of skill mastery in the classroom, as was reported personally by the respondents (Thornhill-Miller et al., 2023). This possesses bias in terms of academic disciplines, gender, age, and cultural context but is low-cost and easy to apply (Gris & Bengston, 2021). Therefore, it is suggested that the researchers perform a comparative study and focus group interviews among students from different academic disciplines to obtain a more comprehensive response on the soft skills development in GBL. However, the idea is limited to the students and classroom availability due to the timetable among students. To address this issue, the educators may use online communication technologies to perform the interview discussion among the respondents.

**In-game Assessments**

In-game assessment allows responses to be collected in real-time and generates the results automatically by the game systems (Organisation for Economic Co-operation and Development [OECD], 2021). In a previous study, soft skills were measured based on the results generated by the system, such as badges, scores, grades, and profit generated in a business game (Almedia et al., 2021). Collaborative skills can be assessed through in-game assessments in multiplayer online games (OECD, 2021). The learning experience can be enhanced through peer discussions after the game session (Almedia et al., 2021).

In the current study, in-game assessment allows telemetry data to be collected in the game through patterns of choices, task completion, search behaviours, eye tracking and other biometric information (OECD, 2021). However, the design of in-game assessment presents challenges, including accessibility for students with disabilities, cost considerations, and maintaining game engagement (Gris & Bengston, 2021; OECD, 2021). Game designers and educators should collaborate with psychometricians to map student's actions with assessment performance (OECD, 2021). With current virtual reality devices technology, it is possible to capture biometric data such as haptic, audio, and eye tracking to assess performance (OECD, 2021; Meta, n.d.). Students with visual impairments may access touch-based user interfaces to measure performance. Game designers may explore integrating natural language processing (NLP) to effectively analyze communication and self-management skills in future studies (OECD, 2021).

Overall, biometric data collection may allow accurate data collection but involves more game complexity, a long development period, and high equipment costs (Gris & Bengston, 2021). It is worth noting that in-game assessment might not be as enjoyable as other games due to the activities involved in data collection and performance measurement within the game. Therefore, game designers should balance enjoyment and potential boredom to ensure players are not distracted by the data collection activities during gameplay (OECD, 2021).

### Knowledge Tests

Compared to the interview and in-game assessment, knowledge tests require the attention and guidance of educators in monitoring performance. A knowledge test, known as a traditional standardized assessment is recognized for its validity and reliability. Nevertheless, it may not be suitable to measure soft skills due to the non-content mastery nature (OECD, 2021). In a previous study, creativity skill was measured by multiple judges, resulting in more consistent results (Thornhill-Miller et al., 2023). However, these tests rely on judges' presence, potentially impacting the transferability of the soft skills when students are outside the classroom. Unlike past studies, Bloom's knowledge tests assessment for assessing soft skills are infrequently encountered. Bloom proposed the concept of higher-order thinking skills, fostering cognitive development across six levels, not limited to critical thinking skills but creativity, analytical thinking, and evaluation skills (OECD, 2021; Thornhill-Miller et al., 2023). Therefore, this opens an opportunity for educators to assess the skills more structurally and achieve consistency in students' performance. Nevertheless, assessments aligned with Bloom's taxonomy levels are limited to individual evaluation, and may not be suitable for assessing collaborative skills within a group.

## FUTURE WORKS AND RECOMMENDATIONS

Based on the findings of this study, several recommendations can be made to enhance research and practice in GBL for soft skills development. These recommendations are the practical implications that game designers and educators may follow when designing content for developing these skills.

*a)* Established learning theories can be integrated with emerging technologies and social media to enhance the learning experience. Emerging technology platforms such as VR and AR provide an immersive learning experience when engaging with problem-based scenarios. AI algorithm can be adopted to dynamically adjust the game content to provide a personalised learning experience, maintaining the flow state of the progress. Social media encourages collaboration and competition between students but must be used with proper guidance. Educators and game designers can use these technologies to address challenges to the GBL's effectiveness compared to the traditional learning method in developing soft skills.

*b)* Generative AI enables communication practice with generative AI NPCs. Educators and game designers may explore integrating generative AI in the soft skills game to practice communication and self-management skills with NPCs. However, as it is an external integration of AI tools, students should be informed about the usage to avoid misinformation or cybersecurity threats.

*c)* The development of innovation skills can be limited by the resources given in the game environment. Game designers may design open-ended or sandbox game environments with customisation mechanics for students to express their innovation skills freely. However,

developing this game genre is complex and time-consuming; educators may opt for existing commercial games with guidelines aligned with learning objectives for the students.

*d)* The importance of self-management skills increased after the COVID-19 pandemic when employers realised the importance of workers adapting to the changes in the working environment. Assessing self-management skills can be challenging, given that students may be reserved and prefer to keep their emotions private. Therefore, game designers may incorporate in-game assessment features within the game for students to reflect on their self-management capabilities. Meanwhile, many components of self-management skills were yet to be explored. Educators may explore these components to build more holistic self-management skills for the students.

*e)* Educators should carefully align game rewards with learning objectives to avoid forgetting the main learning goals. Performance reports without tangible rewards can also serve as effective motivators, encouraging students' self-reflection in life-long learning.

*f)* Peer assessment may be a suitable approach to assess soft skills performance as it promotes a comfortable environment and self-reflection among the students. Educators can encourage peer-to-peer assessment of teammates, fostering collaboration and constructive feedback. This approach minimises competition-related discouragement and creates a positive learning environment.

*g)* There is a scarcity of knowledge tests in assessing soft skills due to the non-content mastery nature of the game. However, it is suggested that Bloom's taxonomy has advantages in structurally assessing soft skills but is limited to individual assessment. Therefore, it is suitable to assess personal skills among students.

*h)* In-game assessment allows telemetry data collection, involving choices, task completion, and biometrics, which presents challenges like accessibility and cost. While biometric data promises accuracy, it introduces complexity, development time, and equipment costs. In-game assessment may lack the enjoyment of other games, demanding a balance to prevent distraction. Stakeholders are advised to collaborate with psychometricians to align captured data with the intended soft skills assessment. Game designers need to balance between fun and data collection to prevent distraction during gameplay.

## CONCLUSION

The review paper provides a comprehensive analysis of empirical studies on GBL for soft skills development, focusing on various aspects such as learning theory, soft skills, game elements, and assessment. There are only 18 papers found in the search through the Scopus database, indicating that this niche area is open for many potential future research.

The limitations identified in the findings, such as unclear measurement constructs, reliance on self-

reporting, resource limitations of games, and limited assessment of specific soft skills, offer valuable insights into the gaps and challenges in the current research landscape. These limitations provide directions for future studies to address these issues and enhance the effectiveness of GBL for soft skills development. Therefore, some suggestions for future studies, such as the adaptation of emerging technologies, can be utilised to address the gap of limitations.

It is worth noting that the exclusion of articles published in languages other than English is a limitation of the study. This highlights the importance of considering research published in different languages to ensure a more comprehensive review of the field. Overall, this review paper contributes to the understanding of GBL for soft skills development and offers valuable insights and recommendations for future research and practice in this domain.

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**Appendix A:** Integration of theoretical foundation, game types, soft skills, game elements and assessment in game-based learning

| Author | Theoretical Foundation | Game type | Soft skills | Game elements | Assessment |
|---|---|---|---|---|---|
| (Agbo et al., 2023) | Technology-mediated learning theory | Virtual reality mini-game | Computational thinking, problem-solving, critical thinking | Challenge, Feedback, Reward | Questionnaire |
| (Almeida & Morais, 2023) | Flow theory | Digital game | Leadership, teamwork, communication, decision-making, Emotional intelligence | Challenge, Feedback | In-game assessment |
| (Emblen-Perry, 2018) | Experiential learning | Digital game | Decision-making | Challenge, feedback, Reward | Questionnaire |
| (Feroz et al., 2021) | Social learning | Digital game | Decision-making, negotiation, collaboration, management | Challenge, feedback | Questionnaire |
| (Huang et al., 2022) | Experiential learning | Digital game | Problem-solving, critical thinking and creativity | Challenge, Feedback, Reward | Interview |
| (Kinio et al., 2019) | Constructivist learning theory | Physical escape room game | Teamwork and communication | Challenge, Feedback | Interview |
| (Lampropoulos et al., 2023) | Self-determination theory | Augmented reality game | Social skills | Challenge, Feedback, Reward | Questionnaire |
| (Martín-Hernández et al., 2021) | Self-determination theory, flow theory | Physical role-playing game | Teamwork engagement, team building, team competence, innovative behaviour | Challenge, Feedback, Reward | Questionnaire |
| (Morrell et al., 2020) | Experiential learning | Physical escape room game | Collaborative communication, leadership, problem-solving | Challenge, Feedback, | Questionnaire |
| (Poděbradská et al., 2020) | Social learning | Digital game | Decision-making | Challenge, Feedback, Reward | Questionnaire |

| | | | | | |
|---|---|---|---|---|---|
| (Ragavan et al., 2021) | Experiential learning | Digital game | Team building, decision making and communication | Challenge, Feedback | Questionnaire |
| (Repetto et al., 2023) | Constructivist learning theory, flow theory | Physical escape room game | Problem-solving, creativity | Challenge, Feedback, | Questionnaire |
| (Skritsovali, 2023) | Experiential learning | Gamification | Time management, teamwork, critical thinking | Challenge, Feedback, Reward | Questionnaire |
| (Solarte et al., 2021) | Experiential learning | digital game | Innovation | Challenge, Feedback, Reward | Questionnaire |
| (Uiphanit et al., 2020) | Not reported | Digital mobile game | Problem-solving, Communication, adaptability | Challenge, Feedback, | Questionnaire |
| (Urquidi-Martín, et al., 2019) | Experiential learning | Digital game | Critical thinking through decision-making | Challenge, Feedback | Questionnaire |
| (Pelser-Carstens & Blignaut, 2018) | Experiential learning | Physical board game | Teamwork, motivation and self-management, interpersonal communication and problem-solving | Challenge, Feedback, Reward | Questionnaire |
| (Wong et al., 2022) | Constructivist learning theory | Digital game | Decision-making, Collaboration, problem-solving and communication | Challenge, Feedback, Reward | Reflection |