

Game-based Interactive Approach and Students' Learning Outcomes in Teaching Food and Beverage Services

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Abstract

Under the Universal Access to Quality Tertiary Education Act of 2017, the law declares that quality education is an inalienable right of all Filipinos and establishes it as State policy to protect and promote students' right to quality education at all levels, including tertiary. This study aimed to determine the effectiveness of the game-based interactive approach in students learning outcomes in teaching Food and Beverage Services. The study used a quantitative method of research specifically the pre-experimental research design in the conduct of the study. The researcher employed the one group pretest-posttest design to measure the differences between the pre-test and posttest results to determine the treatment's effect on the 1st year DHRS college students. The result of the study revealed that there is a significant improvement on the pre-test and post-test in students' performance, engagement levels and skill acquisition after the implementation of the game-based approach. In the game-based learning stages, it is positively related to performance but not significantly related to engagement level and skill acquisition. However, the game-based approach allows the students to have a conducive environment and participate actively in the learning process through the use of the interactive tasks and simulated experiences. The study recommends more seminars may be conducted on the use of game-based to enhance the learning process. The school may come up with more simulations and hands-on activities for the students to improve their learning experience. And further research is needed to investigate alternative game-based learning approaches, specifically for situations where tools and equipment are limited.

Keywords: Game-Based Interactive Approach and Kolb's Experiential Learning Theory

1. Introduction

In the present era, education encounters difficulty, including shifts in curricula, global expectations, teacher growth, educational quality, inadequate facilities, and instructional materials. Strengthening the quality of education involves a key focus on upgrading instructional materials to provide meaningful and engaging educational experiences that foster competence, innovation and creativity. Consequently, teacher education institutions exert considerable effort to equip every student with enhanced competence to confront the challenges inherent in the teaching profession.

Providing quality education is one of those most given utmost importance nowadays. According to Universal Access to Quality Tertiary Education Act of 2017, the law declares that quality education is an inalienable right of all Filipinos and establishes it as State policy to protect and promote students' right to quality education at all levels, including tertiary (Republic Act No. 10931 Sec. 2). Additionally, in light of the Republic

Act No. 10968 also known as Philippine Qualifications Framework, the state's constitutional mandates to 384 promote the right of all citizens to quality and accessible education at all levels (PQF Act of 2018 Sec. 2). However, it is always a challenge for us, educators, to provide quality education due to numerous difficulties we encounter in this volatile, uncertain, complex and ambiguous world.

Should the teacher fall short in conveying meaningful concepts across various subjects, students may find it challenging to fulfill their learning requirements and actively participate in the classroom learning process. To equip students to become adept learners, it is crucial to proactively integrate suitable techniques and strategies into their educational curriculum. The implementation of the most effective strategies has the potential to unlock students' creativity and logical thinking, thereby optimizing the learning experience. These strategies should align with the lesson objectives and cater to the learners' abilities. Effective teaching strategies in food and beverage services are essential in preparing the students to respond swiftly as they work, amidst varying hospitality industry needs. Deep engagement, retention and practical application are often not as strong when learners experience a traditional approach with its reliance on lecture centered teaching strategies, demonstrations or static assessment. The game-based interactive approach is an interesting solution.

Therefore, several studies and literature showed, discussed, and disseminated that providing a game-based teaching method may be of help to increase and/or to at least help contribute to providing quality education since learners will be able to familiarize themselves with practices and experiences they are exposed to in the community. Games and simulations in higher education have the potential to bring about beneficial cognitive, behavioural, and affective outcomes that increase student engagement with complex ideas (Vlachopoulos, D., Makri, A., 2017). In the specific context of hospitality education, simulations and games have been actively implemented with reported benefits such as reduced training costs, increased learner motivation, and improved engagement, according to a study by Koelling et al. (2020). Studies that focus directly on food and beverage services instruction are still emerging, for instance, Nonado (2023) utilized gamification through platforms like Kahoot and Mentimeter in teaching Food and Beverage Services to Filipino Grade 9 students. In general, his findings show that there was some increased academic performance and retention to the experimental groups when taught using gamified teaching strategies compared against traditional approaches. While other recent research has also yielded positive results surrounding game-based learning in technical-vocational education for food and beverage services with the study by Cobar & Capilitan (2025), which found that students belonging to an experimental group who received instruction using a number of educational games all performed significantly better, had more significant increases in grade point averages from entry to exit than their traditional counterparts.

Significantly, at present most interventions are in the form of competitive dynamics or gamified quizzes rather than interactive pedagogies which make particular use of narrative immersion, decision-making and emotionally resonant scenarios. Introducing narrative elements into educational games can enrich levels of engagement, foster experiential learning, and improve memory retention. For other domains, encountered similar examples where games were also used as a means for teaching ethics education in software engineering (Michalis and Vasiliki 2019) or story-based nutrition apps for children Riccardo et al. (2025) demonstrate that story-based GBL yields substantial benefits which augment learning outcomes.

The game-based interactive approach merges contexts with problem-solving tasks in simulated service scenarios. Within the same sandbox environment, learners arc together narratives, learn through service-related decision-making experiences with customers and deal with real-life consequences. This immersive strategy aims not only to enhance knowledge recall, but also to develop procedural fluency, situational judgment, and motivation qualities vital to excellence in food and beverage services. This study supported the few Global Sustainable Developmental Goals specifically SDG - 4 Quality Education, SDG 9 - Industry Innovation, and Infrastructure and; SDG 17 - Partnerships for the Goals.

The researcher observed the school setting, instructional practices are largely limited to the traditional teaching methods such as lectures, textbooks, and worksheets. No form of game-based instructional materials were observed and being utilized in classroom instruction. This gap in instructional strategies highlights the

need to explore alternative approaches, such as game-based learning, to enhance student performance, 385 engagement levels and skill acquisition.

By these observations, the researcher was encouraged to pursue this study to determine the effectiveness of a game-based interactive approach on students' learning outcomes, specifically the students' performance, engagement levels and skill acquisition in teaching food and beverage services. In doing so, this research sought to contribute to both the theoretical and practical dimensions of innovative hospitality education.

1.1. Background of the Study

The hospitality industry, especially the food and beverage services industry needs professionals who can cater to diversified customer needs most proficiently with quality service. In the technical-vocational field of study, there are a significant number of practical competencies such as table reservation, welcoming the guests, seating the guests and taking orders not only theoretical elements that students learn. Traditional teaching methods typically lectures, demonstrations, and written exercises often fail to engage students fully or provide opportunities for active, experiential learning. Food and Beverage Services, which leads to an NCII assessment, is a technical-vocational program that is supervised and accredited by the Technical Education Skills and Development Authority (TESDA) that trains the students. It covers the different core competencies wherein candidates will do the following: first is preparing the dining room/restaurant area for service; second is greeting guests and taking food and beverage orders; third is promoting food and beverage products; fourth is providing food and beverage services to guests; fifth is providing room service; and lastly, receiving and handling guest concerns (F&B NCII Curriculum Guide, 2019). Additionally, students are appropriately trained on how to greet and address issues from guests. Students' abilities in bar management and operation, as well as the mixing and creation of drinks, are further enhanced by the Food and Beverage Services NCII curriculum. If you want to work in the hospitality industry, then you may be thinking about a career in management in the food and beverage industry or positions requiring in-depth knowledge of the sector. There are several requirements for success in the food and beverage service industry, and it may be a highly fulfilling area to work in (The Insider, 2023).

Progress in educational technology has brought new techniques onto the scene such as game-based learning (GBL) which have shown substantial potential to help them acquire different kinds of skills, engage and motivate learners. Through game-based learning, students can engage in a simulated learning environment where they are able to input decisions and solve scenarios safely with controlled consequences. Learning is made tangible as students work through that parallel the real-life scenarios of food and beverage service.

According to Batsaikhan (2021) Game-based learning (GBL) is an active learning strategy that is an intersection between game elements and the learning environment, using strategies typically reserved for games to encourage and enhance learning, practice, and assessment. An example of this is interactive storytelling defined by Hoguet (2014) as the art of telling stories enhanced with technological, social or collaborative interactive features to offer content adapted to new behaviors in a promptly changing cultural ecosystem.

Research indicates that gamified and story-driven learning approaches improve knowledge retention, critical thinking, and practical application of skills across various fields (Nonado, 2023; Cobar & Capilitan, 2025; Qian & Clark, 2016). However, in the context of Food and Beverage Services education, limited studies have explored the effectiveness of interactive storytelling as a teaching strategy. While there is ample research on quiz-based gamification and simulations, existing work often leaves the narrative out of context to actual service situations that include learning or decision making.

Recognizing this gap, one way to address it is through an innovative teaching strategy such as game-based interactive approach; thereby making it a fascinating area of study. This approach combines problem-solving and experiential learning to help improve performance, provide more student engagement levels, as well as skill acquisition that is essential in preparing students for the real-world hospitality challenges.

2. Methodology

This chapter outlines the research design utilized by the researcher in the study. This section covers the386 research design, survey respondents, sampling technique, research instrument, validation of instruments, data gathering procedure, and statistical treatment of the study.

2.1 Research Design

This study employed a pre-experimental research design, specifically the one group pretest-posttest design. Pre-experimental design assumes only one group and lacks random assignment, yet it can provide useful insights into the potential effects of an educational innovation (Creswell and Creswell, 2018). According to Campbell and Stanley (1963), the one-group pretest-posttest design measures the differences between the pretest and posttest results to determine the treatment's effect. This design was chosen by the researcher because it allows to measure the extent of change in students' performance, engagement and skills before and after the implementation of the intervention and to determine the effectiveness of the game-based interactive approach in teaching Food and Beverage Services (FBS). The researcher set parameters such as they were 1st year DHRS students enrolled in FBS course, regardless of their sex, age and performance in FBS course, they had undergone the pre-test that the researcher utilized to measure the initial performance, engagement level and skills of the students, implementing the Game-Based Learning activities as the instructional intervention and conducting a posttest to assess any significant improvement in their learning outcomes after the treatment then answered the perception survey in terms of Kolb's Experiential Learning Theory.

2.2 Respondents of the Study

This study was conducted in Dalubhasaan ng Lungsod ng Lucena. The respondents of the study were the first-year DHRS college students enrolled in the Food and Beverage Services course, who were purposely selected. The selected school provided a controlled environment suitable for implementing game-based instructional strategies and assessing student outcomes.

2.3 Population and Sampling

The participants of the study were the students enrolled in the DHRS with a FBS course during the academic year 2025-2026. Purposive sampling technique was used in this study since the selected 50 students were directly involved in the subject content and competencies targeted by the Game-Based Learning approach. The same group of students participated in the pretest, in the implementation of the intervention, and in the posttest.

2.4 Data Gathering Procedures

In order to gather the needed data, the following steps and protocols were adhered to by the researcher. The researcher secured an approval from the school administration and informed consent from the students. The instruments were validated by experts in Food and Beverage Services and educational research. First, in the pretest administration the students completed a pretest to establish baseline knowledge and skills in Food and Beverage Services prior to the intervention. Second the implementation of instruction, the game-based interactive story approach was used for over a 10 days session. The researcher introduced the GBL activities, with this the students participated in these tasks. Third part of the intervention, they answered the posttest administration, to measure any improvement in students' learning outcomes and their engagement and performance were observed using the four-point Likert scale engagement and the skill acquisition rubric. Fourth, the respondents answered

the perception survey in terms of Kolb's Experiential Learning Theory. Lastly, responses from pretest and posttest were analyzed and compared statistically.

2.5 Research Instrument

In order to facilitate the gathering of data, the researcher crafted a self-made questionnaire based on the literature gathered and analyzed in this research. The research utilized the following instruments: The research instrument developed in this research is composed of four sets. These are the four-point Likert scale to determine the effectiveness of game-based interactive using Kolb's experiential learning theory and the students completed multiple-choice, the pretest and posttest to measure performance, covering one of the FBS competencies, the table reservation. Lastly, an engagement level and skill acquisition rubric used, to measure the students' engagement and skills in taking table reservation before and after the implementation of game-based interactive approach. All instruments are validated by subject matter experts and pilot-tested to ensure reliability and clarity.

2.6 Statistical Treatment of Data

In order to process the data gathered in this study, the researcher used the following statistical treatments such as descriptive statistics specifically the mean, standard deviation, frequency, and percentage. One sample t-test was also applied to find the significant difference in the pretest and posttest scores of the respondents in their performance, engagement levels and skill acquisition. To determine the significant relationship between the perceived game based interactive approach and post test scores of the respondents Pearson r was used at .05 level of significance.

3. Results and Discussion

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter explains how the data were analyzed and how they were interpreted. These are presented in tables and organized according to the objectives of the study regarding the effectiveness of game-based interactive approach and student's learning outcomes in teaching Food and Beverage Services.

Figure 2.

Distribution of Respondents According to Age

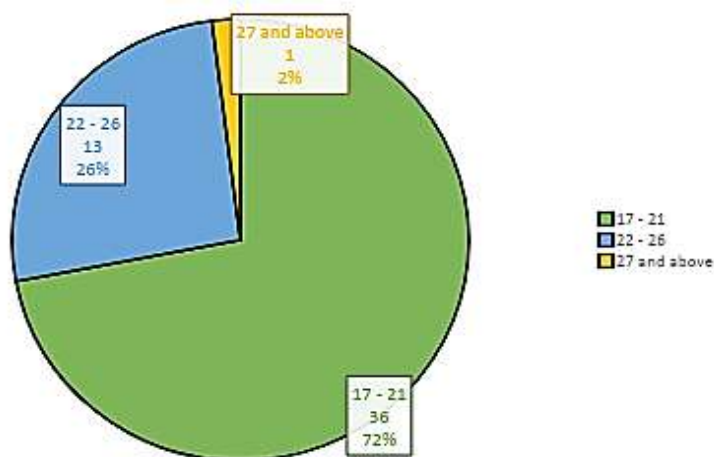


Figure 2 shows the distribution of the respondents according to age. The largest group consisted of 388 respondents aged 17-21 years old with 36 individuals or 72% of the total sample. This is followed by the 22-26 years old with 13 respondents (26%), and 27 years and above with only 1 respondent (2%). These age distributions indicate that most of the participants are young adults.

Figure 3.

Distribution of Respondents According to Sex.



Figure 3 shows the distribution of respondents according to sex. 33 or 66% are male, out of the 50 respondents included in the study, while the female is 17 or 34%. This only means that the male respondents slightly outnumber female respondents in this study, although female respondents are also adequately represented in the study. The inclusion of respondents from both sexes helps improve the reliability and inclusiveness of the findings, since opinions and experiences from different groups are considered. The distribution also implies that the study is not limited to a single sex, making the results more representative and applicable to the target population.

Moreover, the distributions show a balanced representation of both sexes, which helps ensure that the findings are fairly reflective of both male and female perspectives in relation to the study.

Table 1. Respondents Perception on Game-Based Interactive Approach (Concrete Experience)

Indicators	Mean	SD	VI
The game-based interactive approach placed me in realistic service-environment contexts.	3.82	0.39	SA
I felt that the game-based interactive approach gave me “hands-on” experience rather than just listening or reading.	3.82	0.39	SA
I actively engage in the game-based interactive scenario relating to table reservation in food and beverage services.	3.74	0.44	SA
I made real-time decisions during the game-based interactive approach that mirrored what happens in actual table reservation in food and beverage operation.	3.72	0.45	SA
I experienced service situations in the game that I had not previously encountered in my training or classroom.	3.62	0.49	SA
Over-all	3.74	0.43	SA

Legend: 1.0 – 1.49 Strongly Disagree (SD); 1.5 – 2.49 Disagree (D); 2.5 – 3.49 Agree (A); 3.5 – 4.0 Strongly Agree (SA)

Table 1 shows the perception of the respondents in the game-based interactive approach in terms of Concrete Experience (CE) which has a total mean of 3.74 and 0.43 accordingly which is interpreted as *strongly agree*. With this, the students were remarkably able to apply what they have learned into action. As discussed by Rahmat et al., (2020) that CE is the stage in which students directly feel and witness the tasks given to them, with this, Taneja, et. Al. (2023) highlighted in their study, that CE has been an effective tool in educational processes in higher education institutions as it gives students an opportunity to experience the actual process of the subject matter.

Table 2. Respondents Perception on Game-Based Interactive Approach (Reflective Observation)

Indicators	Mean	SD	VI
After implementing the game-based interactive, I reflected on how my decisions affected the outcome in service scenarios.	3.68	0.47	SA
I compared how I acted in the game with how I would act in a real food and beverage service context.	3.74	0.44	SA
I noticed the patterns in guest behavior or service flow during the implementation of game-based interactive approach and thought it.	3.68	0.47	SA
I discussed with others how the game's scenarios matched or differed the real-life service situations.	3.68	0.47	SA
The game-based interactive prompted me to think back on my reactions and the service environment in the story.	3.78	0.42	SA
Over-all	3.71	0.45	SA

Legend: 1.0 – 1.49 Strongly Disagree (SD); 1.5 – 2.49 Disagree (D); 2.5 – 3.49 Agree (A); 3.5 – 4.0 Strongly Agree (SA)

Followed by Reflective Observation with an overall mean score of 3.71 and 0.45 standard deviation which is described as Strongly Agree indicates that the respondents generally perceived the game-based interactive approach as highly effective in promoting reflecting and critical thinking during the activity. Thus, the students were able to think about and reflect on their experience. McLeod (2025) stated in his article that learning is a cylindrical process. The learners are reflecting on the new experiences they have encountered based on their existing knowledge. This is where students think discrepancies between experience and understanding and so, new learning occurs.

These findings suggest that the game-based interactive approach is an effective learning strategy for fostering reflective observation. It allows students to evaluate their actions, analyze service-related situations, and relate their experiences in the game to actual workplace scenarios. Consequently, the approach may contribute to improving critical thinking, decision-making, and practical understanding in food and beverage services. This concept is evident in the respondents' strong agreement with the indicators under reflective observation. The game-based interactive approach encouraged participants to think critically about their decisions, reactions, and behaviors within the service scenarios presented in the activity. Through reflection, the respondents were able to evaluate how their actions influenced

Furthermore, the findings of the study support the idea of Chan and Lee (2020) that reflection is both a pedagogical and andragogic approach essential to experiential learning and is a critical element of Kolb's Learning Cycle. Knowledge is absorbed from transforming experiences dealt with certain circumstances in life. "Experiences alone do not necessarily lead to learning" It has to be reflected and thought of based on existing ideas and its relevance to the next course of action. outcomes and compare their in-game responses with real-life food and beverage service situations.

Table 3. Respondents Perception on Game-Based Interactive Approach (Abstract Conceptualization)

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Indicators	Mean	SD	VI
Because of the game-based interactive, I developed a clearer understanding of the principles of good food and beverage service in table reservation.	3.82	0.39	SA
I was able to connect what happened in the game-based with service-theory I have studied (e.g., steps of service, service ethics)	3.78	0.42	SA
The game-based interactive helped me form strategies or guidelines for handling different service situations in the future.	3.68	0.47	SA
From the game experience, I could generalize that “if this happens then I will do this to ensure good service”.	3.70	0.46	SA
The game-based interactive caused me to rethink or refine my ideas about how food and beverage service should be delivered.	3.80	0.40	SA
Over-all	3.76	0.43	SA

Legend: 1.0 – 1.49 Strongly Disagree (SD); 1.5 – 2.49 Disagree (D); 2.5 – 3.49 Agree (A); 3.5 – 4.0 Strongly Agree (SA)

Also, abstract conceptualization with 3.76 and 0.43 accordingly which is verbally interpreted as *strongly agree*. Therefore, the students were able to understand the lesson and learn the theory behind it. Based on the study of Coleman, et. al. (2020), is an ability to grasp (absorb knowledge) through processing concepts from what have been experienced (concrete experience) and have been observed or reflected (reflective observation) from the abovementioned two stages. When grasping knowledge through abstract conceptualization, new learning occurs, becomes stimulated and situates new knowledge and facts with those which already exist.

Table 4. Respondents Perception on Game-Based Interactive Approach (Active Experimentation)

Indicators	Mean	SD	VI
After the game-based interactive, I felt ready to try improved service behaviors in real service settings.	3.78	0.42	SA
I deliberately experimented with different approaches in subsequent service tasks based on what I learned in the game-based interactive.	3.72	0.45	SA
I applied strategies I developed from the game-based interactive to my next service simulation or role-play.	3.76	0.43	SA
I observed how my new behaviors in service tasks worked out and adjusted them as needed.	3.84	0.37	SA
The game-based interactive approach motivated me to plan how I would handle future service challenges differently.	3.78	0.42	SA
Over-all	3.78	0.42	SA

Legend: 1.0 – 1.49 Strongly Disagree (SD); 1.5 – 2.49 Disagree (D); 2.5 – 3.49 Agree (A); 3.5 – 4.0 Strongly Agree (SA)

Furthermore, the fourth among factors of experiential learning is the active experimentation, with the highest overall mean of 3.78 with a standard deviation of 0.42 and a verbal interpretation of *strongly agree*. This means that students during the implementation of game-based are encouraged to explore and discover different

learning experiences making them agree that this approach is effective. The findings supported by McLeod³⁹¹ (2025), who explained that in the active experimentation stage of experiential learning, the concepts developed from previous stages serve as a foundation for experimentation. Learners apply their acquired knowledge and ideas to real-world situations in order to determine possible outcomes and improve future actions. In relation to the present study, the respondents applied skills and strategies learned from the game-based interactive approach to service-related tasks and simulations, enabling them to evaluate and improve their performance through practice and experience.

Summing it up, the data from the table indicate that a game-based interactive approach is very effective as students' responses to their perception are strongly agreed. The findings suggest that the approach successfully enhanced students' engagement, experiential learning, and practical application of knowledge. This is further supported by Adipat, Laksana, Busayanon, Asawasowan, and Adipat (2021), who explained that educational games that have been adopted in recent years is a new approach to learning. Moreover, the application of games in education can promote notable improvements in both learning and education outcomes as supported by the studies of Kula (2021) and Syafii (2021). Therefore, the use of a game-based interactive approach may serve as an effective strategy in developing students' critical thinking, decision-making, and real-world service skills.

Table 5. Distribution of Pre-test and Posttest Scores in Performance

Scores	Pretest		Posttest		VI
	f	%	f	%	
33 - 40	12	24%	33	66%	E
25 - 32	26	52%	14	28%	VG
17 - 24	5	10%	3	6%	G
9 - 16	6	12%	-	-	F
0 - 8	1	2%	-	-	P
Total	50	100%	50	100%	

Legend: 0 – 8 Poor (P); 9 – 16 Fair (F); 14 - 24 Good (G); 25 – 32 Very Good (VG); 33-40 Excellent (E)

Table 5 shows the performance of the students in the pre-test and post-test. In the pretest, this table shows that the majority of the students (26 or 52%) got scores ranging from 25 – 32 which is interpreted as very good. Only 12 students (24%) obtained the Excellent level ranging from 33 – 40. Meanwhile, a small number of students fell under good (10%), fair (12%), and poor (2%), indicating that some of the learners still had limited knowledge before the intervention of the game-based interactive approach. In contrast, after the intervention, the students show a significant improvement in students' performance. A large number of students (33 or 66%) obtained post-test scores in the 33-40 range, which are interpreted as excellent. In the very good category, the number of students decreased to 14 (28%), while only a few remained in the good category (6%). In particular, no students fell under the fair and poor levels in the posttest. The results show that many students improved and the absence of students in the lowest categories in the posttest indicates a substantial improvement in students'

performance after the implementation of the game-based interactive approach. AlFarsi et al. (2020), who carried out a more thorough evaluation of game-based learning (GBL), explained that game-based and simulation-based learning have a positive effect on academic achievement in both higher education and the workplace.

Table 6. Distribution of Pre-test and Posttest Scores in Engagement Level

Scores	Pretest		Posttest		VI
	f	%	f	%	
12 – 15	4	8	43	86	VHE
8 – 11	28	56	7	14	HE
4 – 7	16	32	-	-	ME
1 – 3	2	4	-	-	LE
Total	50	100	50	100	

Legend: 1 – 3 Low Engagement (LE); 4 – 7 Moderate Engagement (ME); 8 – 11 High Engagement (HE); 12 – 15 Very High Engagement (VHE)

Table 6 presents the distribution of the respondents' pre-test and post-test scores in terms of engagement level. During the pretest, more than half of the respondents (28 or 56%) scored ranging 8-11 which is interpreted as high engagement. Meanwhile, 16 students (32%) scored ranging 4-7 were classified under moderate engagement, 4 students (8%) students got a score ranging 12-15 under very high engagement, and only 2 or 4% fell under low engagement that scored ranging 1-3, but only a few demonstrated very high engagement. On the other hand, the posttest results show a significant improvement in students' engagement. Large majority of students, 43 out of 50 (86%) reached the very high engagement, while only 7 students (14%) stay in the high engagement category. Remarkably, there were no students classified under moderate or low engagement in the posttest.

Therefore, the result demonstrates a substantial increase after the intervention of the game-based interactive approach and the data suggest that the strategy used, the game-based interactive approach was highly effective and can enhance students' engagement, as evidenced by the movement of students from lower engagement levels (moderate and low) to higher levels (high and very high). As supported by Murillo-Zamorano et al. (2021), in the context of active learning, it explained that integrating game components with academics, digital society, and student interests promotes engagement and academic success.

Table 7. Distribution of Pre-test and Posttest Scores in Skill Acquisition

Scores	Pretest		Posttest		VI
	f	%	f	%	
12 – 15	-	-	47	94	E
8 – 11	28	56	3	6	G
4 – 7	22	44	-	-	S
1 – 3	-	-	-	-	NI
Total	50	100	50	100	

Legend: 1 – 3 Needs Improvement (NI); 4 – 7 Satisfactory (S); 8 – 11 Good (G); 12 – 15 Excellent (E)

Table 7 shows the significant improvement between the pre-test and post-test scores of the respondents³⁹³ in terms of skill acquisition. In the pre-test, the majority of the students were in the good level, with 28 out of 50 students (50%). The remaining 22 students (44%) fell under the satisfactory category. None of the students were categorized as excellent or needs improvement, it indicates that before the intervention of the game-based interactive approach, students generally demonstrated average to above-average performance but had not yet reached the excellent level. In contrast, there is a noticeable improvement in students' posttest skills. A large majority of students, 47 out of 50 (94%), achieved the excellent, while only 3 students (6%) remained in the good category. No students were classified under satisfactory or needs improvement.

As a result, in this shift in skills acquisition, there is a significant improvement after the intervention of the game-based interactive approach. Students moved from satisfactory and good to good and excellent, with most achieving excellent. This suggests that the intervention of the game-based interactive approach was highly effective in enhancing the students' skills in food and beverage services, a 2022 review of GBL in VET contexts explained that simulation technology and gamified tools have potential for attaining competency/skill outputs in addition to gaining knowledge.

Table 8. Test of Significant Difference Between Pretest and Posttest Scores of Students' Performance, Engagement Level, and Skill Acquisition

Learning Outcome	Pretest		Posttest		t	df	Sig. 2-tailed
	Mean	SD	Mean	SD			
Performance	26.76	7.90	33.70	4.21	8.3	49	<.001
Engagement Level	8.42	2.45	12.92	1.18	16.49	49	<.001
Skill Acquisition	8.16	1.93	13.38	1.32	27.45	49	<.001

Legend: $p < .01$ Significant

Table 8 presents the comparison of students' performance, engagement level, and skill acquisition before and after the implementation of the intervention.

In terms of performance, the students' pre-test mean score of 26.76 (SD = 7.90) increased to a posttest mean score of 33.70 (SD = 4.21). The calculated t-value of 8.30 with 49 degrees of freedom resulted in a p-value of < .001, indicating a statistically significant difference between pretest and posttest scores. This implies that the intervention of the game-based interactive approach significantly improved students' performance.

For engagement level, the pretest means of 8.42 (SD = 2.45) increased to 12.92 (SD = 1.18) in the posttest. The calculated t-value of 16.49 and a p-value of < .001 shows a statistically significant difference. This indicates that the intervention was highly effective in enhancing students' skills.

As to skill acquisition, the pretest mean score of 8.16 (SD = 1.93) improved to 13.38 (SD = 1.32) in the posttest. The t-value of 27.45 with a p-value of < .001 shows a statistically significant difference. This indicates that the intervention was highly effective in enhancing student's skills using a game-based interactive approach. In conclusion, the results reveal that there is a significant difference between the pretest and posttest scores in terms of performance, engagement level, and skill acquisition. Since all p-values are less than 0.05, the null hypothesis is significant. This means that the intervention of the game-based interactive approach has a significant positive effect on students' learning outcomes. Game-based interactive approach is more effective than other approaches because it stimulates active engagement, provides immediate feedback, and let learners apply knowledge in pragmatic situations. It's integration of experiential principles makes it particularly effective in enhancing student's performance, engagement level and skill acquisition. As supported, Karl Kapp emphasized that the game-based learning approach incorporates elements such as interactivity, challenges and rewards that improve student motivation and participation. These elements make learning more conducive, especially for modern learners.

Table 9. Correlation Between Game-Based Learning and Learning Outcomes

	Performance	Engagement Level	Skill Acquisition
Concrete Experience	.375**	-.001	.058
Reflective Observation	.459	.126	.011
Abstract Conceptualization	.452***	-.064	-.114
Active Experimentation	.473***	.095	.074

Legend: * $p < .05$ significant, ** $p < .01$ significant, *** $p < .001$ significant

The results show that all the game-based learning stages of Kolb's Experiential Learning Theory are positively related to performance. This implies that students who perceived the learning stages more positively tended to have higher posttest performance. Huang et al, (2020) explained that the narrative and interactive components of educational games help students connect abstract ideas to practical applications, and improve the learning outcomes. Due to deeper processing, increased motivation, and repeated exposure to service situations, it is fair to conclude that a well-designed game-based interactive approach may enhance students' performance (as measured by tests and practical assessments) in the food and beverage services industry. In terms of engagement level, all correlations are weak and not statistically significant. This indicates that students' perceptions of learning stages did not significantly influence their level of engagement. Similarly for skill acquisition, the results reveal weak and non-significant relationships across all stages and this suggests that the respondents' perception of the game-based learning stages were not significantly related to skill acquisition. Furthermore, performance, engagement, and skill acquisition seem to be strongly correlated: game-based learning increases engagement, which in turn improves performance and skill acquisition. For instance, the VET evaluation found that GBL enhances academic performance, engagement, and skill acquisition all at once. However, there are still gaps and a lot of research still uses self-report engagement indicators instead of behavioral or observational ones. Few studies expressly use game-based interactive story approach interventions in the context of food and beverage services or hospitality vocational education (Koelling et al., 2020). Overall, the game-based interactive approach is more effective than other approaches because it promotes active participation, enhances motivation, and provides immediate feedback. Game-based interactive approach is students-centered, and experiential. These characteristics make it a more effective strategy for improving academic performance, engagement, and skill acquisition. As supported by Hafeez (2022), game-based interactive approach remarkably can enhance the student's engagement and participation because with this, the students become more active in the learning process. This study concluded that the game-based interactive approach is a more effective approach across various learning environments.

Summing it up, the findings show that the respondents' perception of game-based learning stages is significantly related to posttest performance, but not significantly related to engagement level and skill acquisition.

4. Conclusion and Recommendations

Based on the findings and results of the study, there is a significant difference between the pretest and posttest scores of the respondents to their engagement levels and skill acquisition. Moreover, game-based learning stages are not significantly related to posttest engagement level and skill acquisition but significantly related to posttest performance.

Based on the findings and conclusions of the study, the following recommendations are proposed: For the teachers or educators, more seminars may be conducted about the use of game-based to enhance the learning process. The school may come up with more simulations and hands-on activities for the students to

improve their learning experience. Further research is needed to investigate alternative game-based learning approaches, specifically for situations where tools and equipment are limited. 395

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