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The Role of Role-Playing: Quantitative Insights into Learning and Engagement in Design Education

Mohd Rafaei Mohd Basri[1*], Abdul Rahman Rejab[1], Nazirah Mat Russ[1], Nor Liza Abdul Jalil[1], Mohd Rifzal Mohd Shariff[1], Nur Nabila Ahmad Azam[1]

[1] Department of Architecture and Environmental Design, Centre for Foundation Studies, International Islamic University Malaysia, Malaysia

*Corresponding Author: rafaei@iium.edu.my

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Abstract: *In architectural and environmental design education, motivating students and improving learning outcomes are essential for developing necessary skills and creativity. Traditional teaching methods often fail to engage students effectively. Role-playing activities, showing benefits like increased engagement and critical thinking in various contexts, can simulate real-world scenarios, enhancing learning through experimentation. The study aims to provide data-driven insights into how different role-playing activities influence student motivation and identify the most effective methods for enhancing learning outcomes in architectural and environmental design education. This study employs a quantitative post-implementation research design to evaluate the impact of role-playing on learning outcomes and student engagement within the Department of Architecture and Environmental Design. The primary objectives are to assess how role-playing activities influence students' understanding of architectural and environmental design concepts, as well as their engagement and motivation. Data is collected through a structured questionnaire administered to students after participating in various role-playing activities within their courses. The variables include the type of role-playing activity, the students' understanding of concepts and their engagement and motivation, and the overall learning experience of the students. The post-implementation questionnaire utilises 10-point linear scale items to measure students' engagement, motivation, and perceived understanding, as well as multiple-choice and short-answer questions to assess specific learning outcomes. To achieve reliable results, a sample size of 157 students from a population of 244 is utilized, providing a 95% confidence level with a 5% margin of error. Data analysis involves descriptive statistics to summarize demographic data and questionnaire responses, and inferential statistics, including correlation analysis, to explore the relationships between the types of role-playing activities and changes in engagement, motivation, and understanding. The outcomes indicate the positive impact of role-playing on students' understanding of architectural and environmental design concepts and their engagement.*

Keywords: Design Education, Experiential Learning, Learning Outcomes, Role-Playing, Student Engagement

1. Introduction

The field of architecture and environmental design education has long grappled with the challenge of effectively engaging students and enhancing their understanding of complex concepts. One promising approach that has gained attention in recent years is the use of role-

playing activities, which allow students to simulate real-world scenarios and interact with them from different perspectives (Wang, 2020). Further, according to Wang (2020), role-playing has been shown to improve students' problem-solving skills and their ability to navigate ill-structured problems, which are often characteristic of the design process.

However, the quantitative impact of these activities on learning outcomes and student engagement in the context of architecture and environmental design education remains understudied. This research paper aims to fill this gap by conducting a comprehensive investigation into the effects of role-playing on students' understanding of architectural and environmental design concepts, as well as their overall engagement and motivation in the learning process.

In the Department of Architecture and Environmental Design, the implementation of role-playing activities has the potential to significantly impact students' learning outcomes and engagement. However, the quantitative assessment of this impact is crucial to determine the effectiveness of these activities and to inform future curriculum design. Thus, the impact of role playing on students' learning outcomes and engagement in the Department of Architecture and Environmental Design following the implementation of these activities needs to be quantitatively assessed to determine its effectiveness.

1.1 Aims

To provide quantitative insights into how role-playing influences the development of knowledge in design education.

1.2 Objectives

i. To assess student feedback on their perceptions of role-playing as a learning tool in design education.
ii. To analyse the relationships between various factors influencing overall learning outcomes.

1.3 Literature reviews

Role-playing has long been recognized as a powerful pedagogical tool in education, offering unique opportunities for active learning, engagement, and critical thinking. This literature review examines the historical evolution and theoretical frameworks of role-playing and its cognitive and affective benefits, the application in architecture and environmental design education, and a comparative analysis of its effectiveness compared to traditional teaching methods.

1.3.1 Theoretical Foundations and Pedagogical Benefits of Role-Playing in Education

The use of role-playing in education can be traced back to the early 20th century, with roots in the experiential learning theories of scholars such as John Dewey (Swell, 1968). Over time, role-playing has been further developed and integrated into various educational contexts, drawing on a range of theoretical frameworks, including social constructivism, situated cognition, and the concept of the "zone of proximal development" (Wang, 2020).

Numerous studies have highlighted the cognitive and affective benefits of role-playing in education. Wang (2020) highlighted that by actively engaging students in experiential learning, role-playing can foster deeper understanding, promote critical thinking, and enhance motivation and engagement. Through role-playing, students can explore their emotions, gain insight into their attitudes and values, and develop problem-solving skills (Wang, 2020).

The effectiveness of role-playing in education has been compared to more traditional teaching methods, such as lectures and textbook-based instruction. Advocates of role-playing, as mentioned by Mercado (2000), argue that it can provide unique rewards for both students and instructors, offering a more dynamic and engaging learning experience. Role-playing has been shown to be particularly effective in addressing ill-structured problems, where students must navigate complex, real-world scenarios (Wang, 2020).

Overall, the research literature suggests that role-playing is a valuable and versatile pedagogical approach that can enhance student learning, engagement, and critical thinking in a wide range of educational contexts.

1.3.2 Role-Playing in Architecture and Environmental Design Education

Role-playing has been recognized as a valuable tool in educational contexts, particularly in subjects that involve complex problem-solving and the development of interpersonal skills, according to Burton-Wilcock (2010) and Radford and Stevens (1988). In the field of architectural and environmental design education, role-playing has been utilized to enhance students' understanding of design concepts and foster their creativity and problem-solving abilities.

According to Wang (2020), one of the key benefits of role-playing in design education is its ability to expose students to ill-structured problems, which are often characteristic of real-world design challenges. Role-playing allows students to interact with designed scenarios and adopt different personas, enabling them to navigate complex situations and explore multiple solutions (Wang, 2020; Radford & Stevens, 1988).

Case studies and examples of role-playing applications in design education have demonstrated its positive impact on student learning. As highlighted by Radford and Stevens (1988), role-playing has been used to simulate the interactions between various stakeholders, such as clients, architects, and community members, allowing students to better understand the complexities of the design process and the diverse perspectives involved. Furthermore, role-playing has been shown to enhance students' understanding of architectural and environmental design concepts, as they are required to consider the implications of their design decisions from the perspective of different users or stakeholders (Radford & Stevens, 1988).

In addition to improving conceptual understanding, role-playing has also been identified by Radford and Stevens (1988) and Wang (2020), as a valuable tool for developing problem-solving skills and fostering creativity in design students. By immersing themselves in unfamiliar roles and scenarios, students are challenged to think outside the box, consider alternative viewpoints, and develop innovative solutions to complex design problems (Radford & Stevens, 1988).

Overall, the literature review suggests that role-playing is a powerful pedagogical approach in architectural and environmental design education, with the potential to enhance student learning, problem-solving abilities, and creativity.

1.3.3 Empirical Evidence and Practical Implications of Role-Playing Activities in Education

Role-playing has emerged as a valuable pedagogical approach in educational settings, offering unique opportunities for active learning and engagement. Quantitative studies have

demonstrated the effectiveness of role-playing in enhancing learning outcomes and student engagement.

Researchers have found that role-playing exercises can provide students with thought-provoking and realistic learning experiences relevant to their future roles and responsibilities. Through role-playing, Wang (2020) claimed that students can explore their feelings, gain insights into their attitudes, values, and perceptions, and develop problem-solving skills and attitudes. Moreover, role-playing can enable adult learners to concentrate on learning, increase their participation in the learning process, and deepen their understanding of the subject matter (Wang, 2020).

Assessment methods and feedback mechanisms are crucial in ensuring the effectiveness of role-playing activities. Past studies have noted the importance of proper guidance and facilitation to help learners personally experience different cases or problems and develop their perspective-taking abilities (Wang, 2020).

Challenges and limitations in implementing role-playing in educational settings include the need for careful planning, the potential for overly scripted or unrealistic scenarios, and the difficulty in ensuring consistent and meaningful feedback (Sogunro, 2004). However, according to Sogunro, best practices have been identified, such as providing clear instructions, allowing for reflection and debriefing, and integrating role-playing activities into the broader curriculum (2004).

In conclusion, the empirical evidence and practical implications of role-playing activities in education are substantial. Quantitative studies have demonstrated the positive impact of role-playing on learning outcomes and student engagement, while assessment methods and feedback mechanisms play a crucial role in maximizing the benefits of this pedagogical approach.

1.4 Hypotheses of the study

Based on the study objectives and the existing literature, the following hypotheses are proposed:

H1: Role-playing activities have a positive impact on students' understanding of architectural and environmental design concepts (Wang, 2020; Mercado, 2000).

H2: Role-playing activities enhance students' engagement and motivation in the learning process (Wang, 2020).

H3: There is a positive correlation between the implementation of role-playing activities and students' overall learning experience, including their understanding of concepts and level of engagement (Wang, 2020).

2. Methodology

This study employed a quantitative approach to examine the impact of role-playing activities on students' engagement, motivation, and understanding of concepts.

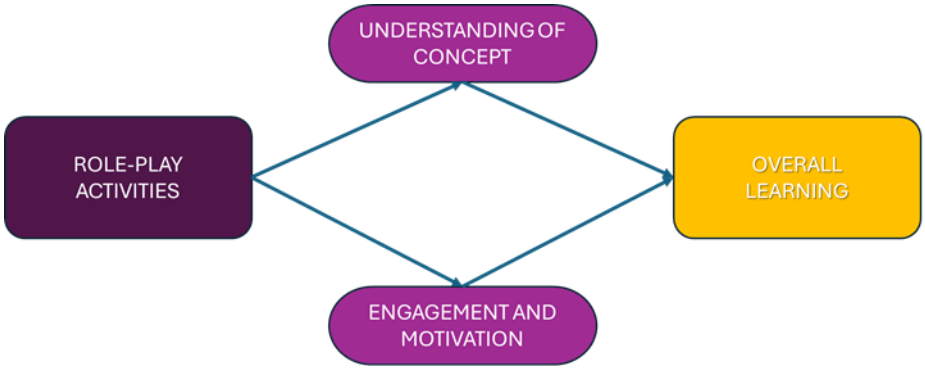

Figure 1: Research model.

Sampling Technique and Instrumentation:
Stratified Random Sampling is employed to select samples this study. This technique involves dividing the population into subgroups (strata) based on characteristics relevant to the study and then randomly selecting samples from each stratum. In this case, the strata were different courses within the Department of Architecture and Environmental Design where role-playing activities are implemented. This ensures representation across various course contexts, allowing for a more balanced view of how role-playing impacts different groups of students.

The primary instrument used in this study was a post-implementation questionnaire. This structured questionnaire included 10-point scale items to measure students' engagement, motivation, and perceived understanding of concepts (Wang, 2020; Crow & Nelson, 2015). Additionally, the questionnaire gathered demographic information about the participants.

Participants and Sampling Frame
A sample of 157 students from a total population of 244 was selected to participate in this study. This sample size provides a 95% confidence level with a 5% margin of error (Moreno-Guerrero et al., 2020).

The sampling frame includes all students enrolled in courses within the Department of Architecture and Environmental Design who have participated in role-playing activities. By targeting students who have directly experienced role-playing, the sampling frame provides a defined population that aligns well with the study's objectives of assessing the impact on understanding, engagement, and motivation in design education.

Data Collection Procedures
After the role-playing activities were completed, the post-implementation questionnaire was administered to the students to measure their engagement, motivation, understanding of concepts, and overall experience (Wang, 2020; Crow & Nelson, 2015; Moreno-Guerrero, et al., 2020).

Data Analysis
The data collected through the questionnaire was analysed using a combination of descriptive and inferential statistics. Descriptive statistics, such as mean, median, mode, and standard deviation, were used to summarize the demographic data and responses to the questionnaire items (Wang, 2020; Moreno-Guerrero, et al., 2020).

Inferential statistics, including advanced statistical analysis, were employed to explore the relationships between the type of role-playing activities and changes in students' engagement,

motivation, and understanding (Wang, 2020; Crow & Nelson, 2015; Moreno-Guerrero, et al., 2020).

By investigating the impact of role-playing activities on various aspects of student learning, this study aims to provide insights into the effectiveness of this pedagogical approach and its potential implications for enhancing educational outcomes.

3. Results and Discussions

This section presents the study findings on how various role-playing activities impact student motivation, understanding, and knowledge in architectural and environmental design education. It also explores changes in student engagement, motivation, and understanding as a result of these activities. It begins with a basic statistical analysis using SPSS for descriptive statistics to meet the first objective. For the second objective, more advanced statistical analysis is performed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to gain deeper insights.

3.1 Descriptive Analysis

For this study, univariate descriptive analysis was utilized, as demonstrated in the following tables and figures.

Gender Distribution: The gender distribution of the respondents is presented in Table 1.

Table 1: Gender frequency distribution of respondents

Gender	Frequency	Percentage (%)
Female	95	61
Male	62	39
Total	**157**	**100**

Out of all respondents, ninety-five were female (61%) and sixty-two were male (39%). This data indicated that majority of the respondents are female.

Respondents' feedback on their experience with role-playing activities: The mean score was used to assess the feedback, offering an average measure on the activities, understanding of the concept, engagement and motivation, and overall learning satisfaction in design education.

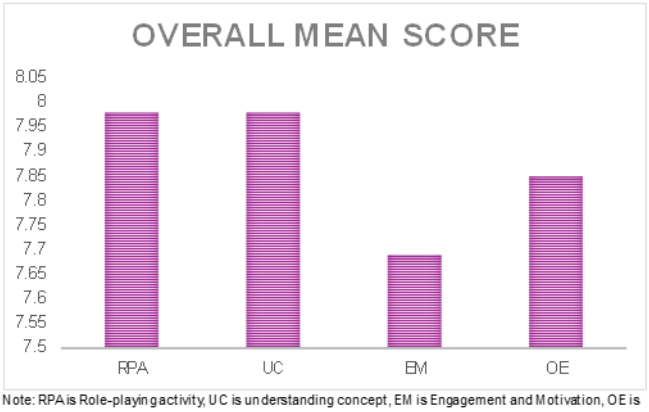

Figure 2: Overall mean score of students' feedback towards role-playing activities in design education

Majority of the students have positive feedback towards the implementation of role-playing activities in design education The mean value of 7.98 (RPA) and UC, 7.69 (EM), and 7.85 (OE) are relatively high typically above the midpoint of the range of numerical scale 1 to 10 as depicted in Figure 2. This suggests that the values are toward the higher end of the range of numerical scale.

3.2 Advanced Statistical Analysis

To address the second objective of this study, Partial Least Squares Structural Equation Modelling (PLS-SEM) was utilized. This advanced statistical analysis included an evaluation of both the measurement model and the structural model using PLS-SEM. The analysis was conducted with the help of SmartPLS software, ensuring a comprehensive examination of the relationships between the variables in the study.

Full model of role-playing activities in relation to design education

The full model for this study was developed using SmartPLS by running the PLS algorithm with the path weighting scheme. As illustrated in Figure 3, the model includes both the measurement model and the structural model. The measurement model (i.e., outer model) shows the relationships between manifest variables (i.e., items/indicators), represented by rectangular shapes, and their latent variables (i.e., constructs), represented by oval shapes. While structural model (i.e., inner model) depicts the relationships among the latent variables. The full model of this study consists of four latent variables: role-playing activities, understanding concept, engagement and motivation, and overall learning. All four latent variables, which are first-order constructs, were measured reflectively using a total of thirteen manifest variables. This comprehensive approach allows for a detailed examination of the relationships among the constructs and provides a robust framework for analysis.

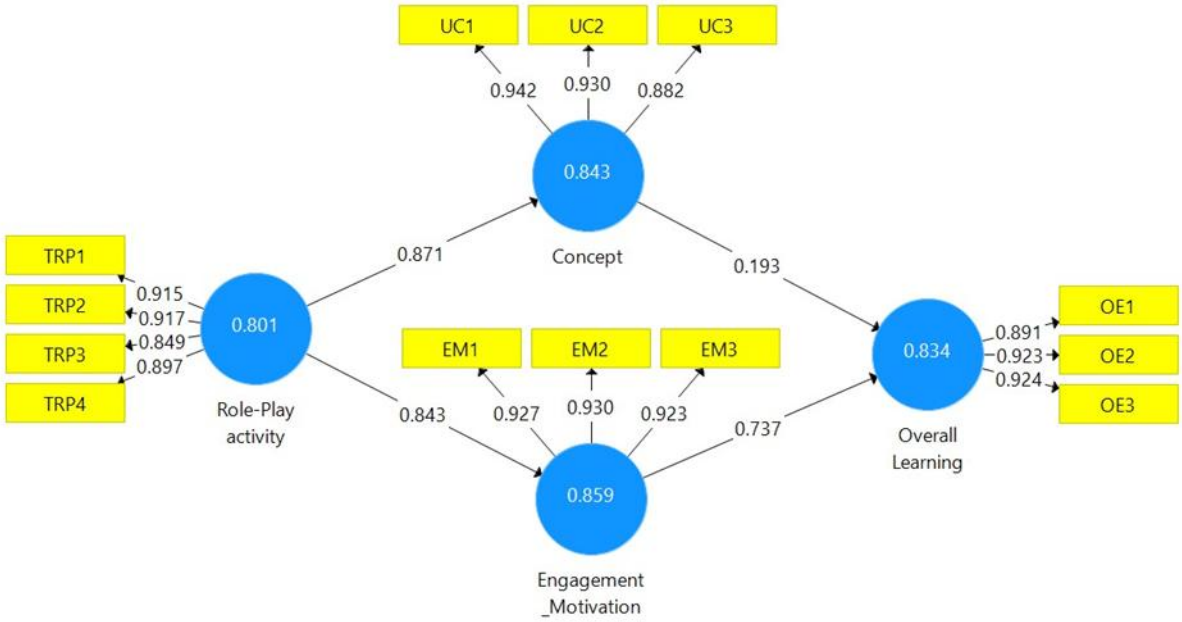

Figure 3: Full model (i.e., inner and outer model) of role-playing activity in design education -PLS algorithm

Measurement assessment model

There are two distinct criteria associated with each of the two measurement models: formative and reflective (Hair, Risher et al., 2019; Garson, 2016). To be clear, only the reflective measurement model was used in this study. Three factors should be taken into account when

assessing the reflective measurement model which are item loadings, validity (convergent and discriminant validity), and reliability (internal consistency reliability) (Hair, Risher et al., 2019).

Table 2: Summary of reflective assessment model

Reflective construct (Latent variable)	Reflective indicators (Manifest variables)	Outer loading (>0.70)	Dijkstra-Henseler's rho (pA) (0.7 ≤ pA≥ 0.9)	AVE (>0.50)	HTMT (<0.85)
Role-Playing Activity (RPA)	TRP1	0.915	0.809	0.801	Yes
	TRP2	0.917			
	TRP3	0.849			
	TRP4	0.897			
Concept (UC)	UC1	0.942	0.819	0.843	Yes
	UC2	0.930			
	UC3	0.882			
Engagement _Motivation (EM)	EM1	0.927	0.804	0.859	Yes
	EM2	0.930			
	EM3	0.923			
Overall Learning (OE)	OE1	0.891	0.818	0.834	Yes
	OE2	0.923			
	OE3	0.924			

Assessing the importance of each item's loading which indicates the dependability of each particular item is the first step. Hair, Black et el. (2010) recommend that in order to establish sufficient significance, item loadings should meet a threshold of 0.7 and a minimum sample size of 60 cases. Next is internal consistency reliability, which measures the consistency with which items within a construct represent that construct. This characteristic ensures that the items used to measure a construct yield consistent results, reflecting the construct accurately. Dijkstra and Henseler (2015) advise evaluating internal consistency using Dijkstra-Henseler's rho (pA) dependability coefficient, which has values ranging from 0.7 to 0.9 ($0.7 \leq pA < 0.9$). The validity assessment comes last. Convergent and discriminant validity are both included in validity. Convergent validity is assessed through the Average Variance Extracted (AVE), with a threshold of 0.5, indicating that the reflective constructs explain at least 50% of the variance in their items (Hair, Risher et al., 2019). Discriminant validity is typically evaluated using the Heterotrait-Monotrait (HTMT) ratio, as proposed by (Henseler et al., 2015). To confirm discriminant validity, Kline (2011) recommends an HTMT value of 0.85 or below. Table 2 provides a summary of the reflective measurement model assessment for this study.

As depicted in Table 2 and Figure 3, all reflective indicators have outer loadings above 0.70 which demonstrate that the concept has acceptable item reliability by explaining more than 50 per cent of the indicator's variance. In addition, Dijkstra-Henseler's rho (pA) value of 0.809 (TRP), 0.819 (UC), 0.804 (EM), and 0.818 (OE) indicates the occurrence of internal consistency reliability. The AVE value of more than 0.50 denotes that the construct explains more than 50 per cent of the variance of its items with HTMT value of less than 0.85 confirmed on the convergent validity as well as discriminant validity.

Structural assessment model

The relationships between the latent variables are depicted by the structural model, also known as the inner model. The outcomes of the bootstrapping process, which was carried out with 5000 bootstrap samples, two-tailed testing, and a significance threshold of 0.05, were displayed in Figure 4. Table 3 also provides a summary of the t-values, p-values, and path coefficient.

Table 3: Summary of structural model path coefficient significance

	t-value (> 1.96)	p-value (<0.05)	Significance	Hypothesis supported?
Role-playing activity → Understanding concept	27.733	0.000	Yes	Yes
Role-playing activity → Engagement and motivation	20.459	0.000	Yes	Yes
Understanding concept → Overall learning	2.292	0.022	Yes	Yes
Engagement and motivation → Overall learning	10.665	0.000	Yes	Yes

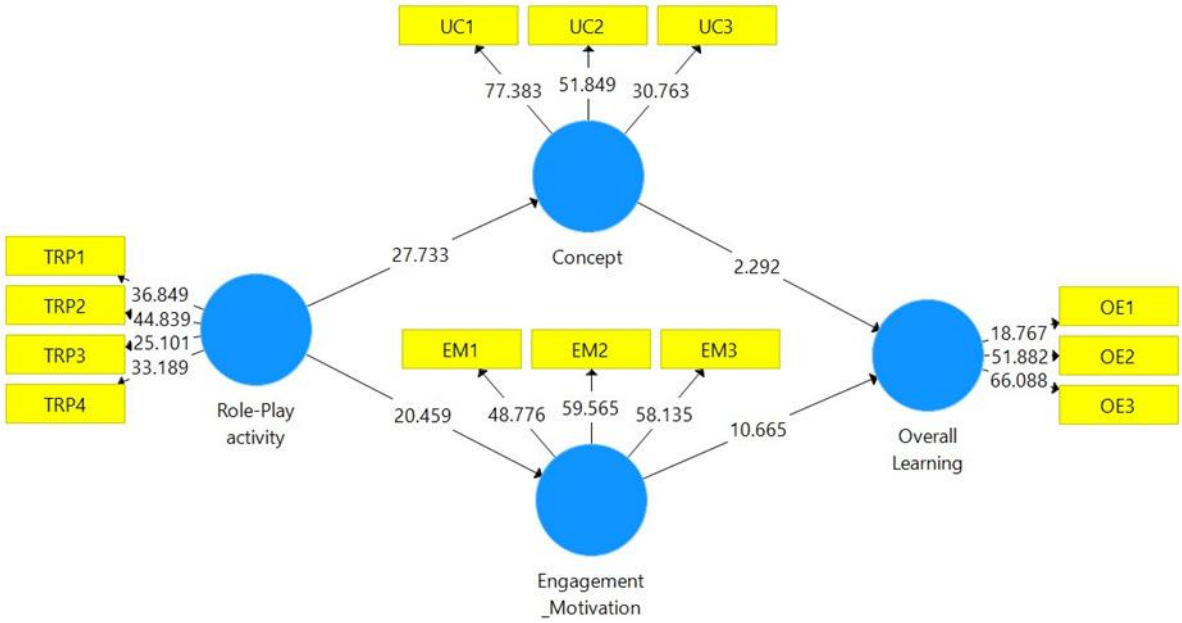

Figure 4: Bootstrapping t-value

The result indicates that the inner paths coefficients were significant and relevant where the t-values and p-values were above 1.96 and below 0.05, accordingly (Hair, Hult et al., 2017). Moreover, this research concluded that all hypotheses, including the relationship between first order constructs, were supported based on these results. This finding is consistent with Malhotra (2003), who states that hypotheses are considered supported at a significance level of 5% or less ($p \leq 0.05$).

4. Conclusion

The study aimed to evaluate the effectiveness of role-playing activities in design education through two primary objectives.

i. **Objective 1: To assess student feedback on their perceptions of role-playing as a learning tool in design education.**

The feedback from respondents regarding their experience with role-playing activities was overwhelmingly positive. The mean scores for the activities, understanding of the concept, engagement and motivation, and overall learning satisfaction were 7.98, 7.69, and 7.85 respectively. These values are significantly above the midpoint of the numerical scale (1 to 10), indicating a generally favourable perception among the majority of students.

ii. **Objective 2: To analyse the relationships between various factors influencing overall learning outcomes.**

The second objective involved a comprehensive analysis using Partial Least Squares Structural Equation Modelling (PLS-SEM). This analysis, conducted with SmartPLS software, confirmed

the reliability and validity of the measurement model. All reflective indicators had outer loadings above 0.70, ensuring acceptable item reliability, and the Dijkstra-Henseler's rho (pA) values indicated strong internal consistency reliability. The AVE values exceeded 0.50, and the HTMT values were below 0.85, confirming both convergent and discriminant validity.

The structural model assessment demonstrated that the inner path coefficients were significant, with t-values above 1.96 and p-values below 0.05, supporting all hypotheses. This result aligns with previous research, indicating that the relationships between the constructs were significant at a 5% significance level ($p \leq 0.05$).

In overall, the findings suggest that role-playing activities are highly effective in enhancing student engagement, understanding, and satisfaction in design education. The positive feedback from students and the robust statistical validation through PLS-SEM underscore the value of incorporating role-playing methods into educational practices.

Limitation of Study

This study's limitations include restricted generalizability to other fields due to its focus on design students, potential biases from self-reported data, variability in instructors' implementation of role-playing activities, and the study's short-term focus on immediate impacts rather than long-term effects. Additionally, limited diversity in role-playing types and possible sampling constraints may impact the representativeness of the findings. These factors should be considered when interpreting the results.

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References

Burton-Wilcock, D. (2010). Role play can be a valuable tool for the delivery of PSHE. *Mark Allen Group, 5*(5), 245–246.

Crow, M. L., & Nelson, L. P. (2015). The effects of using academic role-playing in a teacher education service-learning course. *Educational Studies, 26*(1), 26–34.

Dijkstra, T. K., & Henseler, J. (2015). Consistent partial least square path modeling. *MIS Quarterly, 39*(2), 297–316.

Garson, G. D. (2016). *Partial least squares: Regression and structural equation models* (3rd ed.). Statistical Associates Publishing.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Prentice Hall.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science, 43*(1), 115–135.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). Guilford Press.

Malhotra, N. (2003). The nature of knowledge and the entry mode decision. *Organization Studies, 24*(6), 935–959.

Mercado, S. A. (2000). Pre-managerial business education: A role for role-plays? *Routledge, 24*(1), 117–126.

Moreno-Guerrero, A., Jiménez, C. R., García, G. G., & Navas-Parejo, M. R. (2020). Educational innovation in higher education: Use of role playing and educational video in future teachers' training. *Multidisciplinary Digital Publishing Institute, 12*(6), 2558.

Radford, A., & Stevens, G. (1988). Role-play in education: A case study from architectural computing. *Taylor & Francis, 42*(1), 18–23.

Sogunro, O. A. (2004). Efficacy of role-playing pedagogy in training leaders: Some reflections. *Emerald Publishing Limited, 23*(4), 355–371.

Swell, L. (1968). Role-playing in the context of learning theory in casework teaching. *Taylor & Francis, 4*(1), 70–76.

Wang, S. (2020). Role-playing to enhance student ill-structured problem-solving ability. *Educational Studies, 2*(5), 376–378.