

Enhancing the Understanding of *Fiqh al-Muamalat* by Utilising AR and AI Comics

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Abstract

This study explores the efficacy of Augmented Reality (AR) and Artificial Intelligence (AI) comics as an advent educational tool to enhance students' understanding of *fiqh al-muamalat* (Islamic Commercial Jurisprudence). The SmartMuamalatAI project was developed to rectify concerns of low motivation and limited student comprehension that is due to the consequence of traditional Islamic finance knowledge. This was bridged through the revision of complex Shariah principles towards compelling and accessible educational content. Using a quantitative pre- and post-test design with 98 students, AR-enhanced comic modules with AI-driven explanatory videos, interactive images, and realistic Islamic finance cases were developed that comprised of surveys which measures understanding, perception, and cognitive effort based on the three Course Learning Outcomes (CLOs): conceptual understanding, implementation of Shariah solutions, and contextualisation within realistic cases. The findings recommend strategic improvements across all CLOs. From the findings, the students' confidence in explaining concepts improved significantly (mean score has increased from 4.23 to 4.40). Moreover, the readiness to include Shariah-friendly options has slightly increased from 4.35 to 4.58. However, the students felt that they only exert a small amount of mental effort. Also, stress levels are staying low or medium and decreasing slightly from 71% to 69%. This means that the students were actively engaged but not too overwhelmed. The students' understanding of the core ideas like *gharar*, *riba*, and valid contracts have also slightly improved given the feedback scores. This is true especially since post-learning averages amassed over an average of 4.5. The findings suggests that AR and AI-enabled comics helped enhance understanding, interest, and thinking prowess when studying Islamic finance. Instead of only theoretical, SmartMuamalatAI proves that the

machine can grow and adapt easily by combining religious lessons with technological focused teaching to speed up deep, valuable, and learned based education experience.

Keywords: Augmented Reality (AR), Artificial Intelligence (AI), Digital Pedagogy, *Fiqh al-Muamalat*, Islamic Finance

Introduction

The use of digital technology has changed higher education from a conventional mode of teaching and learning to one that has enhanced the education experience through the integration of augmented reality (AR) and artificial intelligence (AI). Notably, having AR and AI means that educators can become immersive in their teaching/learning methods around concepts that students may be grappling with to facilitate deeper understanding. In this paradigm, the understanding of the capability of AR technology and AI to translate intangible concepts into experiential elements, increase motivation, and induce active learning makes evident the need to explore these technologies in the context of *fiqh al-muamalat* education. The significance of this research not only lies in increasing academic achievement but also in bringing value to teachers and the Islamic finance industry by developing graduates who can make well-informed ethical financial choices. Research on the *fiqh al-muamalat* class illustrates ongoing challenges related to students' academic performance, meaning their ability to engage with the discipline remains limited (Nordin et al., 2023; Nordin et al., 2024). For students preparing for daily financial choices (decision-making) in their post-education lives, their limited understanding of concepts is constraining their potential to transfer this limited interactive experience into their futures, making achieving desired educational outcomes near impossible. Text-heavy instruction is still the preferred method in the classroom, which disadvantages digital-native learners, particularly in grasping abstract constructs, such as *riba* and *gharar*, where visualisation is hard to imagine and engagement cannot be sustained. Therefore, learning patterns need a change, whereby students can use innovative, AI-responsive, engaged learning pedagogies into learning, which may begin to provide a more tangible interaction with concepts in the group method while explicitly mapping back to the course learning outcomes (CLOs) for Islamic finance.

To offer solutions, SmartMuamalatAI provides a professional standard for teaching *fiqh al-muamalat*, capturing students' attention and offering an alternative medium for education that reduces cognitive load and generates a desire to talk through learning, focusing on financial education while supporting ethical thinking, inclusion and access. Research shows AR improves engagement and supports different types of learners by facilitating interactivity with virtual overlays of data merged with real-world environments (Avila-Garzon et al., 2021); in teaching, AR improves learner motivation and deepens understanding of difficult, abstract ideas by allowing them to see and actively engage in real-world simulations of the concepts involved (Che Musazaki et al., 2022). These effects translate into higher academic performance, including meta-analytic gains, particularly in science (Kalemkus & Kalemkus, 2023). AR also enables collaborative and distance learning by allowing students to work together in shared virtual spaces, strengthening group engagement (Radu et al., 2021). Complementing AR, artificial intelligence (AI) provides adaptive, data-driven tutoring and feedback that personalise learning and improve achievement across subjects. At present, available data suggests that AI-based intelligent tutoring systems and adaptable platforms can personalize learning or instruction, provide instant feedback, and improve student participation or performance. Recent studies show that AR technology has

the ability to explain complex concepts, enable collaborative learning, and improve learning processes by integrating virtual data with real-world contexts (Chen et al., 2020; Bond, 2024). The aim of SmartMuamalatAI innovation aims to leverage these advantages to make the topic itself related to Islamic law easier to understand so that learning outcomes in courses can improve. Together, these capabilities explain how the innovation operationalises the course CLOs and supports scalable, inclusive Islamic finance education.

In this regard, SmartMuamalatAI allows students to connect with the practical aspects of *fiqh al-muamalat*. This innovation demonstrates significant improvement in students' learning by enabling the students to grasp the knowledge and apply Shariah principles in Islamic finance. In addition, this innovation is substantial to the educator or lecturer who teaches the subject of *fiqh al-muamalat*. The AI-AR teaching aid enables the lecturers to bring abstract concepts of Islamic finance into an engaging learning environment in the classroom and to reduce the time required to prepare for the lesson. This integration of technology requires a well-versed approach to ensure its compatibility with conventional teaching methods so that these methods do not adversely affect the critical thinking skills possessed by these scholars.

Additionally, this innovation helps the community raise a generation of young people who understand how to manage money in ways that are both ethical and in line with Shariah principles. These graduates make informed and responsible choices concerning consumers and professionals in financial systems, hence advocating for fairness in financial systems. In this context, education's main focus is not only to focus on learning within classroom settings but also equip young graduates with the ability to practice these principles in their lives towards contributing a positive impact in their communities. Because of the time saved in developing traditional slideshow presentations or even e-cards, teachers can actually spend time engaging their students in in-depth discussions on these topics, using case studies from the real world. Not only is teaching more efficient in such an aspect, it is also enjoyable for teachers themselves. Furthermore, it is safe to state that such an innovation is more focused on integrating the aspect of teaching with nurturing young generations who comprehend the principles associated with managing money in terms associated with the principles of Islam. Such graduates are well-informed and responsible decision-makers concerning consumers or professionals in financial systems. Thus, they are advocates for equal treatment in financial systems within their professional lives. This innovation will greatly benefit the participants and significantly contribute to society by addressing the underlying need for financial education within Shariah-compliant guidelines, which could lead to a more equitable financial system.

Literature Review

Integration of Augmented Reality (AR) and Artificial Intelligence (AI) in Education

Contemporary issues in the area of learning technology highlight the transnational power of Augmented Reality (AR) and Artificial Intelligence (AI) in teaching and learning processes. At the same time, both technologies have made significant impact on the delivery of education, more specifically on the flexibility, the possibilities of personalising the content, and learners' engagement. Thus, AR is seamlessly incorporated into physical environments, in which case digital elements assist in enhancing a learner's ability to interact and visualise (Abdalrahim, Baroum, Zaho, & Abdullah, 2024). In other words, AR is also proved to motivate students inspiring their retention and participation. For example, proves that AR can significantly

motivate secondary students in Islam providing education with Arabic language using smart interactive learning material which suits their cultural and spiritual perspective. In addition, Ahmad et al. found that AR applications support the ability to memorize the Quran in hearing-impaired learners, which highlights its flexibility for special educational requirements. Unlike AR, AI has sophisticated adaptative learning systems that aid in the personalisation of educational experiences through content adjustment based on the learner's pace and ability. This adaptative trait contributes to improved cognitive and psychomotor learning results. According to Andri Nirwana et al., chatbots and intelligent tutoring systems powered by AI engage deeply in Islamic educational settings, especially in Quranic recitation and praying. Some scholars, however, like Matos et al. (2025), and Lucero Baldevenites (2024), believe that the integration of AI in education must grapple with ethical concerns about data privacy, algorithmic transparency, and readiness on the part of teachers for AI-enabled teaching.

AR and AI Applications in Islamic Financial Education

Artificial intelligence can assist students in understanding difficult topics in Islamic finance by converting the same Shariah rules into lessons. Kismawadi (2025) states that AI improve the efficiency of Islamic banks to spot risk and vet every deal for Shariah approval. The software checks for new information and flags any events that are conflicting with the preset rules of Islamic law. According to Rabbani et al. (2022), if transparency matters in Islamic finance, so does fairness and respect for the strict adherence to Shariah guidelines. Due to this, the ethical aspects are the aspects that shape each AI function. On top of that, Kismawadi (2025) claims that prioritising people when using AI is not optional and its important, rather it reveals how such tools can support value-driven business growth. Altogether, these elements help balance tech advances alongside religious-based financial objectives.

In a much more general sense, Augmented reality (AR) implementation is still in its infantile phase when relating to Islamic finance scenarios. However, it has tremendous potential in its application. It helps visualise abstract ideas through illustrations or simulations. General concepts like *riba*, *gharar*, and *'aqd* can be daunting to materialise, but AR can simulate the concepts into interactive experiences. By doing so, the Islamic contracts and financial transactions can be demonstrated through AR, additionally helping learners to understand and apply it in real-world contexts.

Synergizing AR and AI for Enhanced Learning Outcomes

When it's deliberately combined, AR and AI can become an exemplary interactive model that can mix both aspects of visualisation and smart personalization respectively. According to Arrojula et al. (2025), this can become a secure, personalised, and engaging learning environment which allows students to take control of their own learning and nurtures more active participation. Furthermore, Lampropoulos (2023) and Tursunova et al. (2024) stated that by using AR and AI at the same time, many aspects can be improved such as students' performance. This is because the AR and AI can improve emotional engagement and cognitive skill. It has also been applied in Islamic education. For example, in Quran memorisation systems and religious learning platforms, AR and AI can fit their content to the learners' pace and understanding (Ahmad et al., 2019; Andri Nirwana et al., 2025).

In Islamic financial education, teachers can create digital modules to explain the Shariah finance transactions through AR visuals. While using AI, the implementation can change how

topics are personalised based on each learner's understanding. These newfound advancements help with fixing abstract problems and motivational challenges that usually occurs while teaching *fiqh al-muamalat*.

Challenges and Ethical Considerations

Although the prospect of AR and AI in learning is promising, there exists various challenges. Matos et al. (2025) and Lucero Baldevenites (2024) identified ethical concerns regarding protection of data, inclusion, and bias among AI algorithms. Educators require technical knowledge and ethical awareness to manage these tools effectively (Arrojula et al., 2025). Furthermore, equitable access to technology is a constant challenge in mostly developing countries that obstructs any large-scale adoption of AR and AI-learning platforms. In Islamic education, these requires ethical considerations as well as Shariah compliance during the implementation of the technology, in line with the *maqasid al-shariah* (Rabbani et al., 2022).

AR and AI could revolutionise how Islamic finance is educated which can turn rote verbal learning into something hands-on and easy to grasp. Visuals brought alive by AR can grasp attention better, whereas AI shapes lessons based on how everyone learns. When blended carefully and guided by the traditional teaching rooted in Islamic values, this potent combination both improves thinking skills and character growth. In due time, the resulting learning outcome can bring out strong ethical norms, solid vision following Shariah-compliant principles, capable of progressing to match the Islamic education objectives.

Theoretical and Conceptual Framework

The link between Augmented Reality (AR), Artificial Intelligence (AI), known learning ideas, especially Cognitive Load Theory (CLT) and the Cognitive Theory of Multimedia Learning (CTML) can create a basis where technology can improve learning power. Through this, AI can adjust instantly based on how each individual performs, whereas AR nurtures understanding through combining immersive visuals, mental activity, and hands-on involvement.

Twabu (2025) claims that AI can help make learning easier by following ideas from Cognitive Load Theory (CLT). It does this by changing how lessons are taught so students do not get too tired or overwhelmed. With algorithms that can change the speed, order, and difficulty of tasks, AI helps learners' study at a pace that feels right for them (Nurjanah & Retnowati, 2024). Augmented Reality (AR) also helps by mixing digital illustrations with real-life scenes, which makes hard or abstract topics easier to view and understand (Geng & Yamada, 2020; Altmeyer et al., 2024). In learning *fiqh al-muamalat*, AR can illustrate ideas like *riba* and *gharar* in simple, visual ways so students can see how the ideas work instead of just memorising the rules.

CTML fits well with how AR and AI work together in teaching. Instead of only joining ideas, AI tools change sounds and visuals to match each learner, helping to reduce the mental load (Brünken et al., 2004; Twabu, 2025). At the same time, AR apps that follow CTML ideas, like showing and saving information in real time, make lessons easier to be understood and remembered (Candido & Cattaneo, 2025). When both AR and AI are used together, they help students learn facts and skills better through small realtime changes, keeping learning steady and more interesting.

This setup mixes human learning and AI together. AI feedback helps students think more and build their skills better. Nwobodo et al. (2025) said that when AI tools are used in AR, it can help improve memory by watching how users interact. Similarly, Gatsakou (2024) found that game-like or fun features in AI can make learning more engaging. Wang et al. (2026) also mentioned that using feedback based on CTML ideas in VR can help students think at a higher level, showing that AI feedback can make it easier to understand and apply knowledge, even in subjects like Islamic finance.

Alsaffar (2025) suggested AI-powered multimedia tools can shape custom learning routes using tech features, mental processes, and teaching methods. With that being said, great AR setups must consider user predetermined knowledge and understand how devices affect mental effort - otherwise it might lead to susceptible mental overload (Nurjanah & Retnowati, 2024; Altmeyer et al., 2024). Taken together, this framework shows that AR paired with AI – with framework based on CLT and CTML, can build flexible, tailored, and mentally efficient learning spaces. This is particularly suited to teaching difficult, abstract subjects such as *fiqh al-muamalat*.

Methodology

This study utilised a quantitative research design through a survey method in assessing the understanding, perception, and cognitive engagement of students in *fiqh al-muamalat*. It sought to quantify the effectiveness of SmartMuamalatAI, an AR-AI-based comic, as an innovative learning tool to enhance the learning experience and conceptual understanding of Shariah-compliant financial principles among students.

Thus, 69 students participated in the pre-survey, and 65 students completed the post-survey following the instructional intervention. The reduction in the number of respondents was because of normal attrition or partial submissions. The survey, "Students' Level of Understanding and Perception toward AR- and AI-Based Comics in the Learning of Muamalat and Islamic Finance," was created to measure students' learning outcomes in relation to the Course Learning Outcomes (CLOs) of the course. Specifically, the CLOs are: (CLO1) to explain *fiqh al-muamalat* issues under the Shafie school; (CLO2) to propose Shariah-compliant solutions to sales and purchase contracts in the contemporary scenario; and (CLO3) to discuss practical applications of *fiqh al-muamalat* in modern financial systems.

The questionnaire for the survey was designed to map on to these CLOs and examine students' conceptual understanding, ethical awareness, and ability to apply Shariah principles to real-life scenarios. The questionnaire was shared online using Google Forms for several weeks so it would be accessible to everyone. The questionnaire consists of four main parts, each made to get different types of answers about how students learn.

- (a) Part A dealt with demographic information.
- (b) Part B consisted of comprehension questions in True/False format, which were designed to assess students' conceptual understanding of key *fiqh al-muamalat* that examine students' understanding of fundamental Islamic financial principles.
- (c) Part C was a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) which assessed students' attitudes and perceptions towards the use of the AR–AI comic.

(d) Part D focused on cognitive or mental effort to evaluate critical thinking and analytical effort required to comprehend the content of the AR–AI comic.

The main research instrument was the SmartMuamalatAI comic module, an AR–AI learning tool specially developed to support this research. The module had 14 thematic parts, each addressing real-life Islamic financial issues on the basis of *fiqh al-muamalat* principles. The titles include: (1) *Leaves Turned into Money*, (2) *Maryam's Story: Tricked and Deceived*, (3) *Riddles by the Lake*, (4) *Oh, Pak Samad's Coconut Milk!*, (5) *Cheap Goods: A Hidden Catch Behind the Bargain?*, (6) *A New Sofa for Our Home*, (7) *The Mystery of the Scoop Toy*, (8) *The Wrapped Gold Bar Promotion: A Story from the Gold Shop*, (9) *The Shine of TikTok Gold Coins: The Subtle Trap Behind the Promotion*, (10) *Forex: Real Profit or Just a Scam?*, (11) *The Haunted Mystery Box!*, (12) *Insurance vs. Takaful: A Mission to Save the World and the Hereafter!*, (13) *Beware of Get-Rich-Quick Schemes!*, and (14) *Syahir's Surprise! Dad Spent Using a Credit Card*.

Each implementation part includes AR tags that trigger animated clips, AI-made video explainers, or short quizzes once scanned on a phone or digital devices. Instead of reflecting scoring responses, the AI tool replies right away with tailored hints to strengthen understanding. Over four weeks, this system were operated in an undergraduate class on Islamic finance, mixing physical comic pages with AR–AI layers to boost comprehension of core ideas.

As per purposive sampling, the participants were chosen based on voluntary consent as students who enrolled in the course. Additionally, the research was endorsed and received ethical clearance from UniSZA's Ethics Committee. Participants were informed of the objectives of the study, ensuring their response remains anonymous, confidential, and commanding the right to withdraw at any moment without repercussion. Data were collected and analysed online altogether to maintain privacy and integrity.

Collected data were then subjected to descriptive statistical analysis, primarily in percentage distribution and difference of mean scores for pre-test and post-test responses. In this manner, the study sought to provide a comprehensive assessment of student experiences with SmartMuamalatAI learning. The use of descriptive statistics allowed researchers to identify trends and patterns that portrayed students' comprehension, moral awareness, and readiness to apply Shariah principles in real-world finance settings and identify the pedagogic impact of the AR–AI-based comic as an educational innovation in Islamic finance education.

Findings and Analysis

The chapter provides the pre-test and post-test findings and discussion of the survey responses. The findings are discussed under four, which are demographic, overall question, perception and cognitive response using AR-AI-comic based on *fiqh al-muamalat*. These learning gains are aligned to course learning outcomes, as described in Table 1.

Table 1

Alignment Of Survey Findings With Clos

CLO	SURVEY FINDINGS	EVIDENCE OF ACHIEVEMENT
CLO1: Exploring <i>fiqh al-muamalat</i> issues within the Shafie framework	Confidence explaining contracts improved (4.23 → 4.40)	Students show stronger ability to explain and explore concepts such as <i>bay'</i> , <i>gharar</i> , <i>riba</i> , and <i>'aqd</i> .
CLO2: Proposing Shariah-compliant solutions for contemporary sales and purchase contracts	Willingness to advise others increased (4.33 → 4.58)	Students demonstrate readiness to suggest Shariah-compliant solutions in real sales and purchase scenarios.
CLO3: Discussing real-world applications of <i>fiqh al-muamalat</i> in today's financial systems	Perceived cognitive load remained manageable (low/moderate responses: 71% → 69%).	Students find it easier to connect classroom learning with real-world Islamic financial practices.

Figure 1: Pre- vs. Post-Test Survey Results by CLO. Figure 1 illustrates the following results, with measurable improvements shown for all three CLOs. Students' average scores rose for CLO1 and CLO2, while students perceived cognitive load for CLO3 was fairly steady. This indicates that the AR–AI comic intervention enhanced students' knowledge and engagement without substantially contributing to their cognitive load.

Demographic

Table 2 illustrates the demographic breakdown of the respondents who have participated in both the pre- and post-surveys. A total of 98 students participated in the study, comprising 37 male students (37.8%) and 61 female students (62.2%). The majority of the respondents are students of the STEM Foundation Centre, University Malaysia Terengganu (UMT).

Table 2

Distribution of study respondents' demographics

Phase	Total Respondents	Male (%)	Female (%)	Field of Study	Year of Study
Pre-test	69	46.4%	53.6%	~85% of respondents from the STEM Foundation Centre	The majority in the first year of study
Post-test	65	46.2%	53.8%	~83% of respondents) from the STEM Foundation Centre	The majority in the first year of study

The gender distribution of the respondents had extremely high consistency in having an even split of male and female students between the pre-test and post-test phases. Such stability in itself tells a lot about the effectiveness of the intervention in engaging a heterogeneous sample. Interestingly, though, there was a reduction in the total number of respondents by four during the post-test phase that is probably due to respondent attrition or partial submission.

With regard to the educational background of the participants, during the pre-test, approximately 85% and during the post-test, approximately 83% were enrolled in the STEM Foundation Centre (Asasi STEM). This reveals fairly a homogeneous group for this study. The majority of the participants were first-year students, which is in the ambit of this study since they are at the introductory level of learning Muamalat and Islamic Finance principles. This consistency in gender ratio, field of study, and level of study enhances the validity of comparative study of the post-test and pre-test scores.

Comprehension of Students' Understanding of Fiqh al-Muamalat after using the AR- and AI-Based Comics

The analysis presented in Table 3 pertains to Part B, which consists of true or false questions intended to evaluate students' comprehension of *fiqh al-muamalat*. This assessment is based on the findings from the pre-test and post-test surveys, facilitating a comparison of students' understanding before and after the intervention.

Table 3

Percentage of students' understanding of fiqh al-muamalat after using the ar- and ai-based comics

Item	Question Item	Pre-test (%)	Post-test (%)	Change (±)
S1	The sale made by an insane person is valid if he owns something of value.	82.6	87.7	+5.1
S2	The sale conducted by a child is fully valid without the supervision of a guardian.	75.4	84.6	+9.2
S3	A sale remains valid even if the seller is not present, as long as the buyer leaves payment.	63.8	80.0	+16.2
S4	Selling fish that are still in the sea is an example of <i>gharar</i> (uncertainty).	78.3	84.6	+6.3
S5	Selling a mystery box with unknown contents falls under <i>gharar</i> (uncertainty).	91.3	93.8	+2.5
S6	Selling stolen goods is invalid because the seller does not have lawful ownership.	98.6	96.9	-1.7
S7	Purchasing gold bullion on instalments with additional charges involves <i>riba</i> (usury).	7.2	15.4	+8.2
S8	In Islam, forex trading is permissible without conditions as long as there is profit potential.	95.7	93.8	-1.9
S9	Conventional insurance contains elements of <i>gharar</i> and <i>riba</i> .	73.9	86.2	+12.3
S10	<i>Takaful</i> is based on the principle of mutual assistance (<i>ta'awun</i>).	97.1	95.4	-1.7

The analysis of the findings presented in Table 3 determines a number of promising trends among students' knowledge of *fiqh al-muamalat* and Islamic finance concepts following their exposure to the AR–AI comic intervention. In general, the interactive learning approach was

found to enhance students' command of key Shariah concepts and their application in financial contexts. There were dramatic improvements in knowledge of fundamental concepts such as *gharar* and *riba*. For instance, comprehension of *gharar* was also improved considerably, with correct answers to statement S4 increasing from 78.3 per cent to 84.6 per cent, and for S5, correctness was always in excess of 90 per cent at both stages even previously. Similarly, the ability to identify the aspect of *riba* was improved in S8, where correct percentages increased from 73.9 per cent before the test to 86.2 per cent afterwards. The foregoing attests that the AR–AI comic was able to facilitate internalisation of main Islamic financial ethics, allowing students to identify prohibited aspects better within transactional contexts. The interactive platform not only captured the participation of the students but also ensured long-term conceptual retention of the key principles.

There were also notable enhancements in students' understanding of legal capacity (*ahliyyah*) and the jurisprudential conditions on the validity of contracts. Questions S1 and S2, which probe the validity of transactions entered into by an insane person and by an unsupervised child respectively, registered improvement of 5.1 and 9.2 percentage points. S3 showed an increased rise with respect to the need of the presence of the seller or agreement by the seller for a legal sale, where precise answers enhanced from 63.8 per cent to 80.0 per cent. Such improvements indicate better comprehension of the foundational conditions that constitute the law of Islamic transactions. There was improved understanding, following intervention, that valid sales must involve parties with full legal capacity and must meet some procedural requirements for validity.

In a few areas, students had consistently good levels of understanding before the intervention. Question S6, which was probing knowledge regarding the prohibition against selling stolen goods, recorded almost perfect results with 98.6 per cent of the pupils responding correctly during the pre-test and 96.9 per cent during the post-test. In the same vein, S10 question, assessing knowledge of *takaful* on the basis of the principle of *ta'awun* (mutual assistance), recorded very high accuracy levels of around 97 per cent prior to, and 95 per cent subsequent to, intervention. These results that are uniformly higher than others suggest that students had a good foundation of some ethical and legal aspects of Islamic finance, i.e., rights of ownership (*milkiyah*) and principles of cooperative *takaful*. Their stability may be accounted for in terms of a ceiling effect, as performance in these areas was already almost at its best prior to the intervention.

Yet there was one idea that remained troublesome. Question S7, on the legality of purchasing gold bullion on instalment with additional charges, continued to reflect extensive confusion. Only 7.2 per cent of the participants were correct before the intervention, and the proportion increased marginally to 15.4 per cent after the intervention. This shows that even with the help of pictures and stories from the comic, many students still struggled to truly understand how *riba* works in gold transactions, especially those in the intermediate level. A common misconception explained that a lot of students thought that any late payment or extra charge in gold transactions is always *riba*. This means that while online tools can make learning more fun, tricky topics still need teachers to explain them directly and guide discussions to fix any confusion.

Overall, the AR–AI comic made it much easier for students to understand *fiqh al-muamalat* topics, especially concepts like *gharar*, *riba*, and contract rules. The post-test showed that students were able to spot the main Islamic ideas and use what they learned in real-life examples. This shows that using stories can truly help make difficult religious ideas simpler and easier to understand. However, certain higher-level *fiqh* issues, such as those related to gold transactions and delayed payments, continued to be poorly understood. These results suggest that AR–AI comics represent an effective pedagogical instrument for initial learning and interest but need to be augmented by targeted discussion and expert-driven clarification in order to achieve thorough mastery of intricate Islamic financial jurisprudence.

Level of Students' Perception of the AR–AI-Based Comic Learning

The Section C finding demonstrates that the perceptions of students were improved after they used the AR–AI-based comic learning tool. During the post-test, the mean of all 11 perception items increased with the vast majority scoring above 4.5 out of 5. This demonstrates that the participants had very high satisfaction and engagement levels.

Table 4

Students' perception of the ar–ai-based comic learning

Item	Perception Item	Pre-test Mean	Post-test Mean	Change (±)
P1	The AR–AI comic sustained my interest throughout the learning process.	4.23	4.52	+0.29
P2	I am confident that I can master the topic after using this comic.	4.14	4.49	+0.35
P3	I am satisfied with the learning experience using this comic.	4.23	4.55	+0.32
P4	The AR–AI comic is easy to use without assistance.	4.09	4.63	+0.54
P5	The interface and navigation of this comic are clear and user-friendly.	4.28	4.57	+0.29
P6	This comic helps me understand the concepts of <i>muamalat</i> and Islamic Finance more quickly.	4.36	4.54	+0.18
P7	Overall, this comic functioned well during use.	4.32	4.54	+0.22
P8	I intend to avoid transactions that contradict Shariah after learning through this comic.	4.36	4.52	+0.16
P9	I plan to continue using similar digital materials for learning <i>muamalat</i> and Islamic Finance.	4.29	4.52	+0.23
P10	I will advise friends or family members to practice Shariah-compliant financial transactions.	4.35	4.58	+0.23
P11	I am confident that I can explain the main Islamic contracts (<i>aqad</i>) to others.	4.23	4.40	+0.17

Among the most significant developments was in Perception Item 1, which increased from 4.09 to 4.63, a staggering increase of 0.54 points. This indicates that users are becoming more

confident and capable when using digital learning resources. Thus, it is a testament of comic books as the way to influence independent learning, especially for students in the foundation level who are barely beginning to establish their technological expertise and academic independence. Such a boost in confidence is a massive improvement and helps to create a more vibrant learning experience.

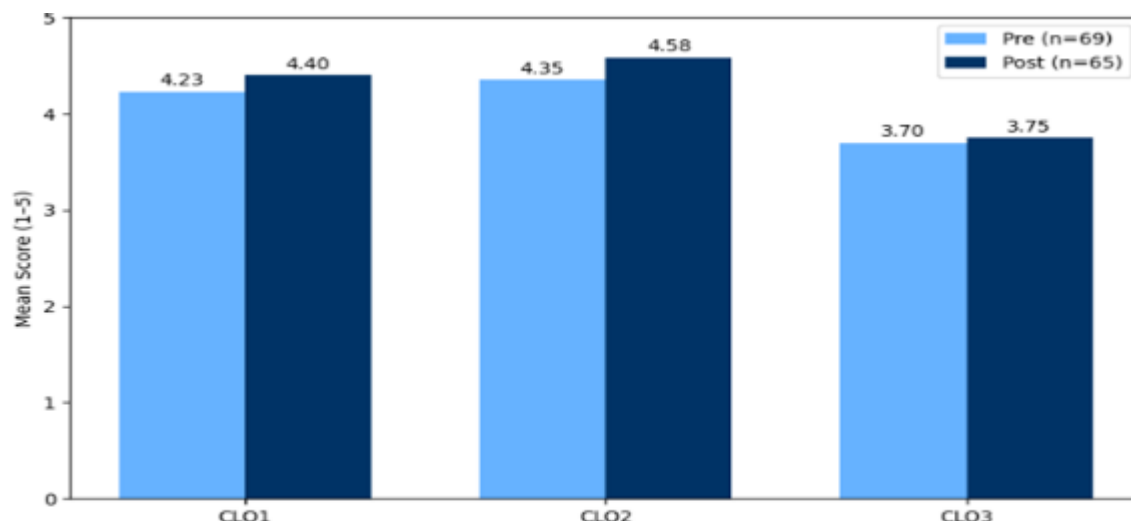
To emphasise on the recent assessment was the improvement in motivation-related items (P1 and P3), which had increased from 0.29 and 0.32 points respectively. This shows that using AR and AI together is able to help students stay more interested in learning. Also, the thinking-related parts (P2 and P6) improved, going up by 0.35 and 0.18 points. This implies that the application of visual and narrative-based learning tools can efficiently break down Islamic finance terms, such as *riba*, *gharar*, and *akad*, deducing them to be comprehensible and much easier for retention. Additionally, the moral and behaviour aspects (P8 and P10) also showed good results, going up by 0.16 and 0.23 points. This steady growth shows better thinking, stronger moral sense, and knowledge that fits well with Islamic goals through building *ilm* (knowledge), *iman* (faith), and *amal* (practice). From the Likert scale results, it is clear that the AR–AI comic made learning more fun and personal for students. On average, each item increased by about 0.27 points, which is more shows that students are learning in a deeper, more active way instead of just listening. Overall, the AR–AI comic helped students feel more motivated, satisfied, and confident in their understanding of *muamalat* and Islamic Finance. Mixing tech with Shariah ideas made the lessons easier to follow, more engaging, and helped grow real interest in Islamic financial literacy.

Cognitive/Mental

Part D examines how much effort students put into understanding the AR–AI comic while learning about Muamalat and Islamic Finance. In order to obtain their feedback, this study used a five-point Likert scale for students to rate their experiences ranging from Very Low (1) to Very High (5). The method is able to assess the extent of the mental effort required for a student to comprehend the content of the comic.

Item	Response Label	Numeric Value
R1	<i>Sangat Rendah</i> (Very Low)	1
R2	<i>Rendah</i> (Low)	2
R3	<i>Sederhana</i> (Moderate)	3
R4	<i>Tinggi</i> (High)	4
R5	<i>Sangat Tinggi</i> (Very High)	5

Figure 1 below illustrates the pre- and post-survey outcomes plotted alongside the Course Learning Outcomes (CLOs). Overall, the scores have increased for CLO1 and CLO2, while CLO3 remained the same – indicating that the AR–AI comic can improve students’ understanding while keeping their mental load at healthy levels.



Note: For visual consistency, percentage data for CLO3 (71% → 69%) were converted to equivalent Likert scale values (≈3.70 → 3.75).

Figure 1: Pre- And Post-Survey Results by CLOs

The results show that in both pre-test and post-test phases, the majority of students assumed their cognitive effort was comparatively high. In the pre-test, the majority (approximately 55%) selected "High" (4) as their level of effort, while fewer reported "Moderate" (3) or lower levels. After the intervention, about 78% of students claimed their effort was "High" or "Very High," showing they were more mentally engaged with the comic's content and activities. This increase means students were thinking more deeply and paying better attention, not just finding the lessons difficult.

Most students in both stages, at approximately 71% before and 69% after, had said that their mental load felt "Low" or "Moderate." This means they did not feel tired or stressed while learning and could stay focused. The AR–AI comic helped the students think better without feeling overloaded, keeping the learning balanced and comfortable.

The results show that the AR–AI comic made students think more and try to use *fiqh* rules in daily life. The students did not just remember, they actually started to understand. The stories and visuals about *riba*, *gharar*, and *takaful* helped the students to visualise how it works in real life. It made the students think about the ideas and the good values behind each of the items.

The results show that the AR–AI comic was both interesting to use and made students think more deeply. Even though the average cognitive load increased slightly (from 3.70 to 3.75), most students still said the effort felt "low" or "moderate" (71% to 69%). This means that the comic helped the students focus more without feeling stressed. It gave a good mix of challenge and comfort, letting students think deeply and staying calm while learning tricky or challenging *fiqh al-muamalat* topics. Having teachers guide them or explain about real cases, like the gold and *riba* example, also helped clear up any confusion and made learning stronger.

Conclusion

SmartMuamalatAI shows how AR and AI can truly change how Islamic finance is taught. By linking to the course learning outcomes (CLOs) and reducing learning difficulty, it makes studying more fun for students, easier for lecturers, and more accessible for everyone. The AR–AI comic clearly helped students understand, enjoy, and connect better with topics in Muamalat and Islamic Finance. In Section B, students showed improved grasp of key Shariah ideas like *gharar*, *riba*, and *ta'awun*, even though some parts of *fiqh* were still challenging and seem to need more time. Section C showed leaps in motivation, satisfaction, and confidence, with post-test scores gaining above 4.4. This means that most students had a good experience. Section D found that students were more focused and active in learning without feeling too pressured, proving the comic helped them to ease thinking while learning. Overall, the AR–AI comic really improved how students understood main concepts, ethics, and thinking skills. The implementation fits nicely with all three CLOs: learning to understand fiqh problems (CLO1), making Shariah-compliant ideas (CLO2), and using what the students learned in real Islamic finance situations (CLO3). In short, the AR–AI comic turned into an attractive and new digital tool that made learning Islamic finance more interesting, thoughtful, and compliant with Shariah values.

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