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Examining Open University Malaysia's learners' satisfaction with HTML5 package in an ODL environment

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ABSTRACT

This study explores the satisfaction levels of Open University Malaysia (OUM) learners with HTML5 package (H5P)-developed interactive content in open and distance learning (ODL). The research objectives include examining learners' perceptions of H5P-generated content in terms of usability, interactivity, and relevance, and assessing learners' satisfaction levels with H5P in terms of overall effectiveness and engagement. Despite the extensive research on H5P across various educational contexts, its particular use in ODL remains underexplored. This paper offers an in-depth perspective on how H5P enhances learner experiences in ODL, as well as highlights critical factors that affect learner satisfaction. This will be beneficial for instructional designers and educators who seek to improve engagement within self-instructional materials. The findings indicate that 85% of participants reported higher levels of engagement with H5P content, according to quantitative data. Additionally, according to 80% of students, interactive materials created using H5P enhanced their comprehension of the material. This suggests that H5P holds promise as an effective tool for enhancing learner engagement and satisfaction in ODL contexts. The study contributes to the growing body of literature on technology-enhanced learning by providing insights into the use of interactive content tools like H5P in ODL environments.

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1. INTRODUCTION

The digital revolution has significantly transformed the landscape of education, especially with the rise of open and distance learning (ODL) platforms. In this digital era, the integration of interactive and engaging content has become increasingly essential to enhance the overall learning experience, particularly in ODL settings [1]. One notable tool that has gained prominence in facilitating interactive content creation is HTML5 package (H5P) [2]. H5P is an interactive content plugin tool that integrates with Moodle learning management system (LMS), allowing educators to create engaging, interactive materials for online classes [3]. This paper aims to delve into the perceptions, experiences, and satisfaction levels of learners utilizing H5P in an ODL setting. By exploring these aspects, we seek to contribute valuable insights to the ongoing discourse surrounding the effectiveness of interactive content tools in fostering positive learning outcomes. Despite the growing adoption of H5P in educational contexts, there remains a gap in empirical research concerning learners' satisfaction with this tool, particularly within the framework of ODL [4]. Issues such as technical difficulties are also important considerations in the overall performance of learners learning in an

H5P setting [5]. Hence, there is a need to assess learners' satisfaction from all aspects, to ensure this learning tool will achieve its desired objectives.

The following are the research questions: i) What are the perceptions, experiences, and satisfaction levels of learners regarding the use of H5P in an ODL setting? and ii) What are the learners' satisfaction levels with H5P in terms of overall effectiveness and engagement? The research objectives are as follows: i) to examine learners' perceptions of H5P-generated content in terms of usability, interactivity, and relevance; and ii) to assess learners' satisfaction levels with H5P in terms of overall effectiveness and engagement. Understanding learners' perceptions, experiences, and satisfaction levels regarding H5P in an ODL setting is crucial for informing best practices in online education. To achieve this goal, the study will employ a mixed-methods approach, combining qualitative interviews and quantitative surveys to gather comprehensive data on learners' experiences with H5P.

ODL has emerged as a flexible and accessible mode of education, offering learners the opportunity to pursue their studies at their own pace and convenience. With the rapid advancement of digital technology, ODL institutions like Open University Malaysia (OUM) have embraced various online platforms and tools to deliver high-quality educational experiences to a diverse range of learners. Prior to 2016, OUM provided learners with printed modules but later transitioned from printed modules to portable document format (PDF)-based modules in May 2016, which were later converted into hypertext markup language (HTML). In 2022, the university developed H5P-based modules, as in Figure 1 as supplemental learning materials, while still retaining the main PDF-based modules. This study uniquely explores H5P's impact on learner satisfaction in ODL at OUM, an area that remains underexplored. By providing quantitative evidence on engagement (85%) and comprehension improvement (80%), it offers critical insights for instructional designers on optimizing interactive content to enhance learner experience in self-instructional ODL settings.

Figure 1. H5P elements implemented

2. LITERATURE REVIEW

In recent years, there has been a growing interest in the integration of interactive content tools, such as H5P, in ODL environments. This can be seen by research conducted regarding the effectiveness of H5P for undergraduate students in Kuwait University [6], research which compares traditional online and interactive H5P activities in a wind energy subject for master's in renewable energies [7], and regarding the effectiveness of H5P for undergraduate students [8]. Other studies on H5P were also conducted in different countries in the world. For instance, three studies conducted in Indonesia demonstrate that interactive and culturally relevant digital learning materials, such as H5P content and 5M activity-based modules, are highly effective in self-paced learning environments. Participants, including Indonesian general practitioners and university students, showed strong acceptance and positive perceptions of these tools, which were linked to improved learning outcomes, enhanced engagement, and validated through reliable assessment instruments, highlighting their potential to enhance digital education across diverse contexts [9]–[11].

A Malaysian study found that management information system (MIS) e-learning materials developed with H5P in Moodle using integrated strategies improved graduate student outcomes by 75%, while related research highlighted how Web 2.0 tools like gamification and LMS can enhance online teaching quality through structured approaches [12], [13]. As in Lithuania, a study found that interactive H5P videos effectively supported group preparation for university physics labs, performing comparably to traditional lectures in learning outcomes, and were well-received by students as an alternative instructional

method [14]. A research in Canada [15] reveals that H5P interactive content enhanced dental hygiene students' learning experiences in an oral biology course, improving performance on related exam questions and promoting active, self-directed learning, with students expressing satisfaction and interest in similar content for other courses.

In United Kingdom [16], a study found that using H5P as an interactive online alternative to traditional laboratory classes in a biomedical cell biology unit at Manchester Metropolitan University resulted in comparable student assessment outcomes, with positive feedback and an upward trend in first-class marks, suggesting its potential to enhance learning and complement traditional practical classes. Meanwhile in Australia [17], a research reports on the use of H5P as a platform for self-paced, self-directed learning in first-year physiology courses, highlighting the developmental process of embedding H5P activities within an online LMS and evaluating student perspectives on their effectiveness. A study in Germany developed two approaches for transforming a lecture-based otolaryngology curriculum into interactive videos using H5P in Moodle, finding that outsourcing video processing to technicians significantly reduced medical professionals' working time without compromising content quality, offering an efficient workflow for flipped classroom and blended learning formats [18].

These show that H5P offers educators an easy to use and user-friendly platform [19] to create and share interactive content seamlessly across different online learning platforms, including LMS and virtual classrooms. H5P has emerged as a versatile and user-friendly tool for creating interactive content in ODL environments [2] and fostering an active learning environment [15]. H5P virtual simulation significantly improved social work students' skills, highlighting its value in fostering realism, engagement, and real-world readiness [20]. Additionally, H5P can offer personalized learning, in that it has feedback features for the students [21]. The flexibility and accessibility of H5P make it particularly well-suited for ODL settings, where learners may have diverse needs and preferences. The effectiveness of H5P in enhancing academic achievement and student confidence has been recognized by educators [22]. However, empirical research on learners' satisfaction with H5P in the ODL context is limited. Existing studies have primarily focused on the usability and technical aspects of H5P, overlooking the broader aspects of learner satisfaction and engagement.

While the potential benefits of integrating H5P into ODL environments are evident, empirical research on learners' satisfaction with this tool remains limited. Existing studies have primarily focused on the technical aspects of H5P, such as a supporting component [23], overlooking the broader aspects of learner satisfaction and engagement [6]. Besides being suitable for teaching mathematics [24], H5P activities are especially useful to enhance knowledge in science subjects through repeated practice [20]. Interactive H5P video experiments in physics improved engagement, collaboration, and simulated real lab experiences [25], and attaching on-the-spot questions within each video can further capture the learners' interest [26]. Students also tend to perform significantly better on exam questions with interactive H5P content [27] that can be done via video podcast as well [28]. Meanwhile, a study [29] examines massive open online courses (MOOC) video behavior (N=1,238), finding H5P quizzes altered viewing patterns. A survey (N=707) showed 67% found quizzes helpful, with note-taking and subtitles valued. Interviews offered further insights. In different studies, traditional online activities were compared with H5P in courses on Wind Energy and stereoisomers. H5P showed slight improvements in scores, motivation, and engagement, though grade differences were not statistically significant. Differences in comprehension were observed, but no link to learning style was found. Future research could explore more interactive features and cognitive impacts [30].

Therefore, there is a pressing need for research that explores learners' perceptions, experiences, and satisfaction levels regarding H5P in the context of ODL. This research seeks to address this gap by conducting a thorough investigation into learners' satisfaction with H5P in an ODL setting. By employing a mixed-methods approach that combines quantitative surveys and qualitative interviews, this study aims to provide a comprehensive understanding of the factors influencing learner satisfaction and engagement with H5P-generated content. The findings of this research have the potential to inform best practices for the design and implementation of technology-enhanced learning environments in ODL, ultimately contributing to the improvement of learner satisfaction and success in online learning.

3. METHOD

The study adopted a mixed-methods approach, combining an online survey and interviews to collect data from a diverse group of learners who have interacted with H5P content across various educational settings. The purpose of this survey is to obtain OUM learners' feedback on H5P for quality improvement purposes. The survey was conducted from 2 November 2023 until 27 February 2024 (more than three months) in dual languages of English and Malay as Malay is the national language of Malaysia. The survey measured satisfaction levels, engagement, and perceived learning outcomes, while interviews provided deeper insights into learners' experiences and preferences. The sample included 125 participants from university level, ensuring a broad understanding of H5P's impact across different field of studies. This

research uses the methodology by providing questionnaires to learners of OUM using Google Form. The combination of quantitative surveys and qualitative interviews allows for a comprehensive investigation of learners' perceptions, experiences, and satisfaction levels regarding the use of H5P.

3.1. Participant selection and data collection

The participants for this study are ODL learners enrolled in courses that utilize H5P-generated content. Purposive sampling is employed to ensure diversity in terms of age, educational background, and prior experience with online learning [23]. Table 1 explains the data collection used for this research. Collection of data made using mixed-methods of quantitative and qualitative, then followed by triangulation and integration.

Table 1. Three data collection methods

Data	Gathering	Analysis
Quantitative	A structured online survey is developed to collect quantitative data on learners' satisfaction with H5P. The survey includes Likert-scale questions assessing various aspects of learner satisfaction, such as usability, interactivity, relevance, and overall satisfaction with H5P-generated content. Additional demographic information, including age, gender, educational background, and prior experience with online learning, is also collected.	Descriptive statistics, including means, frequencies, and percentages, are used to analyze the quantitative survey data. This involves calculating measures of central tendency and dispersion to summarize participants' responses to Likert-scale questions. Comparative analysis is conducted to identify any significant differences in satisfaction levels based on demographic variables.
Qualitative	Semi-structured interviews are conducted to gather qualitative data on learners' experiences and perceptions regarding the use of H5P. The interviews are designed to explore in-depth the factors influencing learner satisfaction and engagement with H5P-generated content. Open-ended questions are used to encourage participants to share their thoughts, experiences, and suggestions for improvement.	Thematic analysis is employed to analyze the qualitative interview data. This involves identifying recurring themes, patterns, and categories within the interview transcripts. Data coding is performed to systematically organize and categorize participants' responses. Themes are then derived through a process of data immersion, coding, and interpretation, with inter-coder reliability established through independent coding and consensus discussions.
Triangulation and integration	Quantitative and qualitative data are triangulated to provide a comprehensive understanding of learners' satisfaction with H5P. Triangulation involves comparing and contrasting findings from both data sources to corroborate or refute emerging themes and patterns. Integration of quantitative and qualitative findings enhances the validity and reliability of the study, providing a more nuanced and holistic understanding of learners' experiences with H5P.	

3.2. Limitations

Several limitations are inherent in this study, including potential biases associated with self-reported data, sample representativeness, and generalizability of findings to broader populations. Additionally, the reliance on OUM learners enrolled in courses that utilize H5P-generated content may limit the applicability of findings to other educational contexts. Despite these limitations, the mixed-methods approach adopted in this study provides a robust framework for investigating learners' satisfaction with H5P in an ODL setting. By combining quantitative surveys and qualitative interviews, this research aims to provide valuable insights for educators, instructional designers, and policymakers seeking to optimize the integration of interactive content tools in ODL environments.

4. RESULTS AND DISCUSSION

HTML package collectively represents a significant evolution in web development and online content creation, offering a more interactive, engaging, and accessible web experience. HTML5, as the latest version of the HTML, provides the structural foundation for web pages, introducing new elements, attributes, and behaviors that allow for more diverse and rich content. Quantitative data revealed that 85% of participants reported higher engagement levels with H5P content compared to traditional learning materials. Furthermore, 80% of learners felt that interactive content developed with H5P helped improve their understanding of the subject matter. Qualitative findings supported these results, with many learners emphasizing the role of interactivity in maintaining their interest and facilitating a deeper understanding of course content. The findings suggest that H5P-developed content significantly enhances learners' satisfaction and educational outcomes. The interactivity element of H5P not only engages learners but also aids in better retention of information. However, the study also identified areas for improvement, such as the need for more diverse and complex interactive activities to cater to advanced learners.

4.1. Learners' demographic

The information of the learner's demographic in terms of age is presented in Figure 2. Based on Figure 2, the largest age group, at 51.2%, is the 21 to 30 age group. This is followed by the 31 to 40 age group, at 35.2%. The 41 to 50, 51 to 60 are both 6.3% each and only 1% is 61 and above. None of the respondents were 20 years old and below. The pie chart in Figure 3 shows the distribution of learners by gender. The "female/*wanita*" portion is much larger, occupying approximately 80.8% of the pie chart, while the "male/*lelaki*" segment is much smaller, occupying approximately 19.2% of the pie chart. Hence, female respondents outnumber male respondents by a ratio of 4:1.

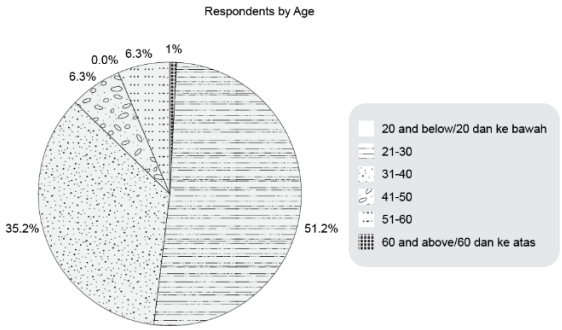

Figure 2. Age of the survey respondents

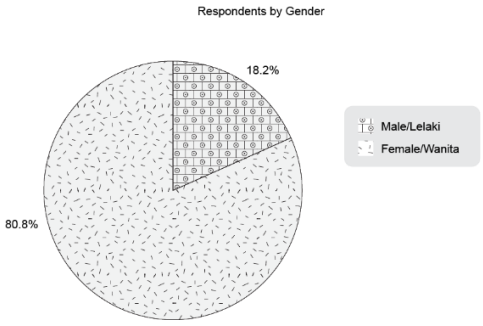

Figure 3. Gender of the respondents

4.2. Results of the research questions with close ended questions

Figure 4 shows the results of the survey questions sent to the participants. The line graph shows the percentage of respondents who use different devices to access the learning materials. The x-axis shows the different devices, while the y-axis shows the percentage of respondents who use each device. The most popular device for accessing learning materials is the laptop/*komputer riba*, with 79.2% of learners using it. The next most popular devices are the handphone/*telefon bimbit* (55.2%) and the personal computer/*komputer peribadi* (20%). The least popular devices are the tablet or iPad (16%) and others (0%). As respondents could choose more than one device to access the H5P, thus the percentage has totaled up to more than 100%. Figure 5 reports how often learners access learning materials in a semester. The x-axis shows "the percentage of learners who accessed the materials". The y-axis shows the frequency or how often the learners accessed the materials from 1 time to 5 times per semester. Most of the respondents answered "5 times a week or more per semester", with 84 (67.2%) of learners selecting this option. Thirty-three (26.4%) of the learners responded, "4 times per semester", and 8 (6.4%) said "3 times per semester". None of the learners accessed less than three times per semester.

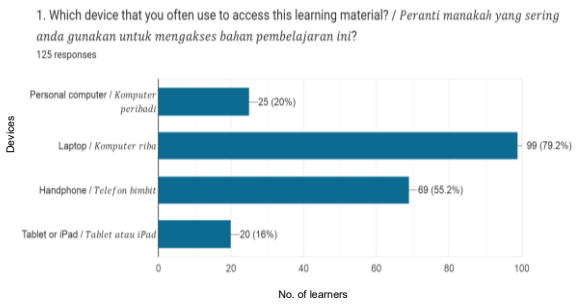

Figure 4. Device used to access H5P learning material

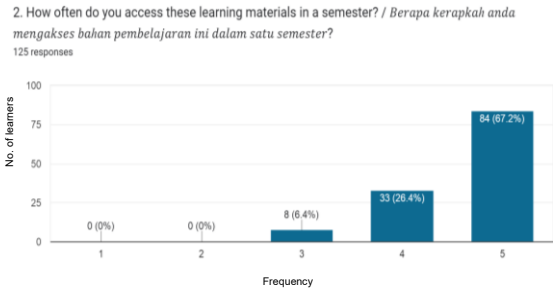

Figure 5. How often the learners access the H5P

Figure 6 illustrates the overall 5-scale Likert that was filled-in by the respondents; 84 (67.2%) respondents, agreed that the learning material was visually attractive by giving a rating of 5. The balance 31 (24.8%) and 9 (7.2%) learners each provided with ratings of 4 and 3 respectively. From Figure 7, it highlights that the total of 85 (68%) learners found that the H5P was well laid out and gave this item a rating of 5. It

was followed by 30 (24%) learners with a rating of 4, 7 (5.6%) learners with a rating of 3. Then 2 (1.6%) learners gave a rating of 2 and finally, only 1 (0.8%) learner gave a rating of 1.

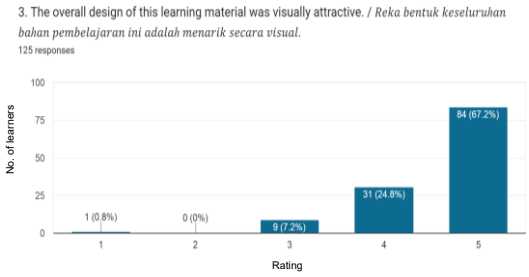

Figure 6. Satisfied with visual attractiveness

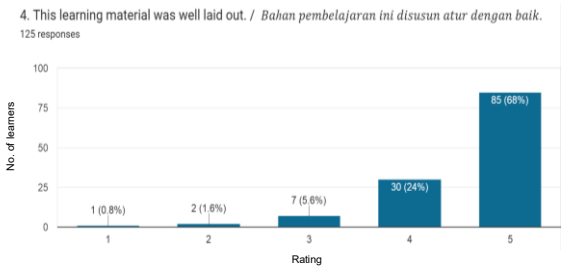

Figure 7. Satisfied with lay out

4.3. Results of the research questions with open ended questions

The results of the open-ended questions to respondents are listed in Table 2. Out of the 125 learners' that took part in this survey, overall, 93 (73.8%) were "very satisfied", followed by 23 (18.3%) were "satisfied". This shows that choosing H5P was the right path and appreciated by OUM's learners.

Table 2. Results of the combination of both closed and open-ended questions

No.	Questions	Results and among the comments
12	(a) Do you find the learning material user friendly?	121 (96.8%) responded "yes" 6 (4.8%) responded "no"
	(b) Feedback if the answer is no	1. Less related to the module 2. Slides are not very interesting and boring 3. The screen is not full enough for smartphone use 4. Current learning material is not offline friendly 5. The module is not sufficiently related to the subject for me to answer questions
13	Do you think that the H5P learning material is engaging?	Not attractive It is engaging but still lacks some material and sources Nothing extraordinary Dislike
14	What would you suggest to improve this learning material (if any)?	Give clear and concise explanations with specific examples for better understanding Many more videos from international Prefer the learning material in Malay or both languages (English and Malay) Provide extra notes I think the tab arrangement and design need to be more specific and not confusing Need to have games so that learning becomes easier going *(pembelajaran santai)* Server that can accommodate larger quotas Add more questions/tests and materials Show library reference for related course Need to update contents More visual aid (pictures, GIF or videos)
15	(a) Overall satisfaction rating	1. 93 (73.8%) very satisfied 2. 23 (18.3%) satisfied 3. 8 (6.3%) neutral 4. 1 (0.8%) dissatisfied 5. 1 (0.8%) very dissatisfied
	(b) Feedback for answer	1. Helps to do assignments by providing clear guidelines 2. A more effective learning material 3. Easy to access from various device 4. Attractive design, well-organized and easy to understand

5. CONCLUSION

Even though H5P has been widely studied in various educational settings, its specific application in ODL is less explored. The research delves in the application of H5P in ODL by assessing its usability, interactivity, relevance, and overall effectiveness and engagement. It provides a holistic view of how H5P

contributes to learner experiences in ODL and identifies key factors influencing satisfaction. This comprehensive approach is valuable for instructional designers and educators aiming to enhance engagement in self-instructional materials. The study verifies a significant level of learner satisfaction with H5P-created interactive content, particularly regarding its visual appeal and design. This underscores the importance of integrating interactive digital tools like H5P in educational curricula to foster engagement and improve learning outcomes. Laptops and handphones are the two main devices to access H5P learning materials; hence, instructional designers need to take this into consideration. Improvements can be made to ensure learners access the materials more than five times per semester. Future studies should explore the long-term impacts of H5P content on learning and how it can be optimized to cater to a wider range of learning preferences and needs.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [SAB], upon reasonable request.

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