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Exploring H5P Through the Technology Acceptance Model: A Study in a Teacher Preparation Program

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This study explores the integration of H5P (HTML5), an open-source content creation platform, in a teacher preparation program at a medium-sized public university in the south of the USA. Conducted over five semesters, the research involved 94 undergraduate students (pre-service teachers). The study aimed to evaluate the pedagogical effectiveness of H5P as an online and face-to-face tool compared to other digital tools as perceived by the participant pre-service and in-service teachers, the perceived effectiveness of various H5P content types, the likelihood of future use by participants, and the perceived advantages and disadvantages of H5P in school education. The results of the study were analyzed using the Technology Acceptance Model. Through the lens of the Technology Acceptance Model, H5P shows strong potential for adoption due to its versatility, engagement, and accessibility. However, challenges such as time demands, internet dependence, and technological issues can hinder perceived ease of use and usefulness. Further research is suggested with the inclusion of in-service teachers.

INTRODUCTION

With the rapid development of online education there came a need for creating a learning environment that encourages a more active student-material relationship and enhanced self-regulation (Holmes et al., 2018; Major & Francis, 2020). One tool that educators can use to enhance student engagement and academic achievement is H5P (HTML5 Package). H5P is a free, open-source content collaboration framework that enables educators to create interactive content, which can be seamlessly embedded into platforms such as Moodle (moodle.com). The framework offers 60 customizable content applications, including interactive presentations, quizzes,

timelines, audio recordings, and flashcards (H5P.org). Users can easily integrate H5P content into various learning management systems (LMS), such as Moodle, Canvas, Blackboard, and websites, making it a versatile tool for enhancing digital learning environments. Studies suggest that integrating interactive video content like H5P can enhance student engagement, improve understanding of subjects, and foster critical thinking skills (Kakish et al., 2024; Briggs, & Doran, 2024).

H5P allows for adaptive interactions within videos, offering opportunities for deeper student engagement. For instance, educators can embed prompts within videos that encourage students to test their understanding of the material. If a student answers a question incorrectly, the tool can guide them back to the relevant section of the video, reinforcing their understanding of the concept. This adaptability supports a more personalized learning experience, aligning with Ellis and Goodyear's (2013) constructivist approach to education. By simplifying the process of creating interactive materials, H5P empowers educators and instructional designers to craft engaging, assessment-rich learning settings, which is especially critical in online asynchronous learning environments.

Recent research underscores the effectiveness of interactive tools. Ploetzner's (2024) meta-analysis found that interactive videos—including embedded questions and tasks—are more effective for enhancing retention and comprehension than non-interactive videos. According to Kakish et al. (2024), undergraduate students overwhelmingly prefer H5P interactive video to non-interactive. With embedding game-like elements into educational presentations, H5P content can align with gamification principles to engage users and promote active learning. Research by Jhangiani & Tarry (2022) suggests that H5P's gamified features, such as quizzes with instant feedback, can make learning more enjoyable and encourage sustained participation. The gamification features of H5P are especially notable in H5P-based interactive video: it supports embedding questions (e.g., multiple-choice, true/false, fill-in-the-blank) directly into video content, enables users to receive immediate feedback, mimicking the reward systems found in games.

The interactive nature of H5P activities fosters engagement through reflection and self-regulation. This suggests that H5P's interactive features can enhance student engagement, a key aspect of constructivist learning. Some research (Abusalim et al., 2024; Wicaksono et al.,2021; Santos & Esteves, 2021), suggests that the effective use of H5P enhances student participation, motivation, academic achievement, and student confidence in language studies. A study by Jacob and Centofanti (2024) explored the impact of H5P on student learning outcomes in an online undergraduate psychology course. The researchers found that while overall engagement with H5P resources was low, students who actively interacted with the content reported positive experiences and expressed a preference for more interactive elements in future courses.

The study by Rahmi, Fajri, and Azrul (2024) examined the use of H5P-based interactive content within a blended learning environment employing a rotation model. The findings indicated that integrating H5P activities increased student knowledge, skills, and satisfaction. The study emphasized the importance of developing H5P content that aligns with course objectives and promotes active learning, consistent with constructivist approaches. Mutawa, Al Muttawa, and Sruthi (2023) investigated the effectiveness of H5P in asynchronous distance learning for undergraduate students. Their research suggested that H5P's interactive nature provides a more engaging and effective learning experience, helping to maintain student motivation and participation in line with constructivist principles.

H5P stands out as an assessment tool due to its significant advantages over similar approaches. While creating interactive multiple-choice quizzes or images in tools like PowerPoint is possible, the time, effort, and skill required cannot compare to the ease and versatility of H5P. H5P offers numerous benefits over traditional assessment tools found in platforms like Google Classroom and Moodle quizzes. Its emphasis on interactivity, visual appeal, and flexibility provides a distinct edge. With support for content types such as drag-and-drop activities, interactive videos, image hotspots, and branching scenarios, H5P goes beyond conventional quizzes to encourage active learning and real-time feedback.

Additionally, H5P delivers instant feedback on learner responses, with the ability to include custom explanations for each answer choice. This feature enhances formative learning by allowing students to self-correct in real time. Although platforms like Google Forms and Moodle quizzes offer similar functionality, they often require more complex setups. H5P's design is not only user-friendly but also highly engaging.

Unlike Google Classroom and standard Moodle quizzes, which rely on continuous internet access, H5P also has the potential to function offline (this will be elaborated on later). This makes it a versatile and accessible tool for diverse educational contexts.

In summary, H5P provides a versatile and accessible platform for creating interactive, student-centered learning experiences, with the potential to improve educational outcomes while supporting best practices in instructional design.

Purpose of the Study

Given the growing popularity of H5P applications in education, this study focused on the potential of H5P use in teacher preparation programs. It seems logical that pre-service teachers, as current and future users and promoters of H5P applications in school education, would benefit from integrating features such as interactive videos, branching scenarios, quizzes etc. Pre-service teachers can design lessons that promote active learning,

encouraging student participation and interaction with content. To improve the content and pedagogies of the course on technology integration in school education and to determine the amount of H5P activities in the course, students were assigned to design multiple H5P projects as part of the course. At the end of the semesters, students were offered a post-course survey to collect data about their experience studying H5P in the course and their vision of its potential as a teaching and learning tool in schools. The results of the study were interpreted using the Technology Acceptance Model (Davis, 1989).

The study primarily explored the potential efficacy of H5P in school settings rather than its effectiveness as a learning tool within teacher preparation programs. While some studies have reported improved college student outcomes and enhanced knowledge through the use of H5P in college courses (Sinnayah et al, 2021; Zeller et al, 2021; Wilkie, & Zakaria, 2017), these findings are generally based on observational designs or self-reported outcomes. Conversely, a study utilizing a research and control group (Jacob & Centofanti, 2024) found no correlation between H5P use and academic results. However, this same study highlighted that the participants reported positive subjective experiences when engaging with H5P resources

Setting and Participants

The study was conducted at the end of a technology-in-education online course over five semesters (2022-2024) at a medium-sized public university in the south of the USA. The course was delivered asynchronously with the assignments expected to be completed 2 times a week using Moodle as LMS. The participants were undergraduate students in a teacher preparation program (pre-service teachers). Ninety-four participants volunteered to participate in the online survey on Qualtrics, which was approved by the university's Institutional Review Board (IRB). The students had been exposed to H5P as part of their course activities (quizzes, interactive videos, flashcards, crosswords); they were also required to review the sample H5P and those that had been designed by the students of the same course previously offered, after which the students were required to design their own H5P's. In other words, the participants had been exposed to H5P as part of their learning material and as active designers of the tool.

Limitations

The study was originally aimed at receiving feedback from the students on the design and use of H5P in education. As the data obtained from the survey suggested certain patterns, the results were analyzed and interpreted for possible dissemination. The number of participants (94) may not be sufficient for major generalizations and recommendations. The gender, the age and the academic status of the participants were not included in the study.

Research Questions

The research questions in the study were:

1) What is Perceived Usefulness (PU) of H5P as compared to other digital tools according to the participant students?
2) What is the Behavioral Intention to Use (BI) H5P in the future teaching according to the participant students?
3) What is Perceived Ease of Use (PEOU) designing and applying H5P projects in school education according to the participant students?

Results of the Survey

To answer research question 1, "What is Perceived Usefulness (PU) of H5P as compared to other digital tools according to the participant students?" the students were asked: "As compared to the regular online-based tools (assignments, forums, labels, etc.), I, as a student, rank H5P teaching effectiveness as: more effective – just as effective – less effective." The results are summarized in Table 1.

Table 1

Student Ratings of H5P Teaching Effectiveness Compared to Other Online Tools

Degree of Effectiveness	%	n
More effective	39%	36
Just as effective	58%	55
Less effective	3%	3

Table 2: Students compared the effectiveness of H5P to standard online tools such as assignments, forums, and labels.

To answer research question 2 "What is the Behavioral Intention to Use (BI) H5P in the future teaching according to the participant students?" the participants were asked: "How likely will you use H5P projects in your future teaching?" with choices of "Absolutely! – Likely – I am not sure – I will not use H5P in my teaching." The results are presented in Table 2:

Table 2
Student Likelihood of Using H5P in Future Teaching

Degree of Certainty	%	n
Absolutely!	45%	42
Most likely	37%	35
Likely	14%	13
I am not sure	4%	4
I will not use H5P in my teaching	0%	0

Table 2: Participants responded to the question, "How likely are you to use H5P in your future teaching?"

To answer research question 3, "What is Perceived Ease of Use (PEOU) designing and applying H5P projects in school education according to the participant students?" the participants were asked the open-ended question "What are the advantages and disadvantages of designing and using H5P in school teaching?"

The participants' responses were analyzed and systematized using methods of thematic analysis (Boyatzis, 1998). The responses were systematically coded by tagging short phrases or words related to the research question. Coding was done by assigning labels to relevant segments of the text (words, phrases, sentences) that relate to the research question. The codes were grouped into broader themes that capture patterned responses or meaning across the data (for example, use, benefits, advantage, etc.). The themes were refined based on coherence and relevance to the research questions.

The following patterns were identified (illustrated with the quotes from the responses):

Advantages of H5P in School Education as Perceived by the Participants:

- Changing Teaching Methods: "The highly interactive character of H5P projects can change the way we teach to keep students involved by adding additional interactive elements".
- Versatility: "H5P can be used online, in face-to-face and blended teaching with various purposes, such as tests, memory joggers, and fun gamified activities".
- Effectiveness: "H5P is effective in gauging student knowledge".
- Familiarity: "It allows students to learn through technology familiar to them, as today's students are comfortable with computers".

- Open-Source Platform: “It provides a free, open-source platform for creating interactive and engaging content”.
- Ease of Use: “Its key strengths are ease of use, and multiple types of interactivities.”
- Engagement: H5P increases engagement by integrating interactive elements into educational materials”, “H5P makes interactivity natural for students”.
- Bite-Sized Learning: “H5P enables activities to be presented in smaller, bite-sized chunks”.
- Building on Ideas: “H5P allows educators to build on others’ ideas or videos”.
- Instant Feedback: “Students receive immediate feedback”.
- Fun Learning: “H5P offers enjoyable experiences for both teachers and students”.
- Active Learning: “H5P promotes active learning”, “Its active character stimulates knowledge retention”.
- Adaptability: “It supports individual learning needs”. “I can see H5P as custom-made”.

Disadvantages of H5P in School Education:

- Technological Problems: “Issues such as internet outages or software problems may arise”.
- Time and Effort: “H5P can be time-consuming to design and integrate into lessons, requiring additional work and training for teachers”. “Teachers can be a bit too conservative and busy to integrate H5P”.
- Internet Reliance: “H5P depends on internet access, and not all students have reliable internet at home, requiring in-class time for assignments”.
- Blocked Content: “Some school systems may block H5P content or websites”.
- Assessment Accuracy: “Students might get answers right away or look up information, making it hard to gauge true understanding”.

Discussion

The study includes data from the pre-service teachers’ perceptions of the effectiveness and applicability of H5P in their academic practice and future employment of the tool in their school teaching. The respondents have dealt with H5P as recipients of assignments in H5P (quizzes, interactive videos, interactive images, flashcards etc.) and as active designers of H5P-based

teaching activities. The data obtained in the study is consistent with the Technology Acceptance Theory (TAM). The technology acceptance model (TAM) is an information systems theory that explains how to encourage users to accept and utilize new technology (Davis, 1989). The model was widely applied to study the readiness of the pre-service teachers in teacher preparation programs to use technology in their future teaching (Teo, 2010; Teo & Noyes, 2012; Teo & van Schaik, 2012). The studies confirm that TAM is a robust model for explaining pre-service teachers' behavioral intentions to use technology. Perceived usefulness and perceived ease of use significantly influence attitudes, which in turn impact the intention to use technology. To analyze the results of the following components of TAM were applied: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Use (ATU), and Behavioral Intention to Use (BI). TAM posits that PU and PEOU influence users' attitudes (ATU) and ultimately their intention to use the technology (BI) (Davis,1993).

TAM can serve as a suitable framework for the acceptance and active implementation of H5P in school education. The TAM framework for analyzing the use of H5P in MOOC courses was applied by Rahadiani, et al. (2023). The study finds that the participants perceived the usefulness of the H5P content as high, especially the interactive video. Abusalim et al (2024) finds that the participating students perceived the use of H5P content in an online course as "enjoyable" because of its interactive nature. In another study students from various backgrounds showed a high level of acceptance and positive perceptions of leveraging H5P interactive content in the self-paced MOOC which suggests potential new uses of H5P interactive content, such as interactive videos with pop-up questions, to substitute for synchronous learning (Rahadiani et al., 2024). The respondents' perception of H5P-based gamification activities as effective and easy to use can be a good predictor of sustained application of the platform in school education. This assumption can be supported by the study by Vanduhe et al. (2020), which posits that sustained training of instructors in technology-based gamification activities may lead to their effective use by the trainees in the future.

The Perceived Usefulness (PU) parameter of the H5P as believed by the participating pre-service is reflected in table 1 with almost all respondents indicating that the tool is either more effective or just as effective as other digital tools. The open-ended responses regarding the advantages of H5P in teaching also suggest that H5P is a versatile tool, valuable for various content types (quizzes, games, videos), making it highly useful for different educational needs and contexts. The respondents also consider useful such features of H5P as engagement and interactivity, immediate feedback and ease of use.

In line with the Perceived Ease of Use (PEOU) component of the TAM theory, the respondents noted the following advantages of H5P: 1. The tool can be easily integrated across learning management systems (LMS) such as Moodle and Canvas, which is critical in TAM for fostering positive user attitudes. 2. H5P's have user-friendly design reducing the learning curve for new users.

Another important component of TAM theory is Attitude Toward Use (ATU) (Davis, 1993). ATU refers to a user's overall positive or negative feelings about using a particular technology. In relation to ATU the respondents believe that high engagement may positively influence users' attitudes, as students are more likely to enjoy the interactive approach compared to static content, which could lead to a favorable attitude toward H5P.

In the Technology Acceptance Model (TAM), Behavioral Intention to Use (BI) refers to the likelihood that a person will adopt and use a specific technology. BI serves as a critical predictor of actual technology usage and reflects the user's readiness to engage with the system (Scherer & Teo, 2019). Table 2 suggests a high degree of enthusiasm of the respondents regarding the future use of H5P in their teaching. As assumed from the open-ended responses, participants also believe that immediate feedback can lead to higher behavioral intentions to use H5P, as both instructors and students see value in a system that supports efficient learning.

Applying the TAM model to the disadvantages of the H5P tool as perceived by the pre-service teacher participants, the time-intensive process of creating H5P content can negatively impact perceived ease of use, making it less attractive to educators with limited time (Perceived Ease of Use, Attitude Toward Use and Behavioral Intention). If teachers perceive content creation as overly complex or time-consuming, it may result in a negative attitude toward H5P, lowering their intention to use it regularly.

Limited internet connectivity or unreliable access can reduce H5P's perceived usefulness and ease of use, particularly in areas with connectivity issues. This barrier as well as compatibility problems or software bugs might deter users from fully adopting H5P for consistent classroom use (Perceived Usefulness reducing the Behavior Intention to use).

Finally, educators may feel skeptical about using H5P for assessments, as accuracy issues, particularly in cases where students may look up answers might affect student learning outcomes and grades, leading to reluctance or lower intention to rely on H5P assessments (Attitude Towards Use and Behavior Intention).

Other studies confirm the perceived usefulness and positive attitude toward use of H5P. Thus, in the study involving preservice students suggested that H5P was perceived as useful for developing critical thinking skills

(Sari et al., 2023). In another study involving preservice teachers, the participants perceived interactive H5P activities as easy to do and more motivating than the traditional online activities (Gil-García et al., 2023). The survey data suggests that participants are enthusiastic about H5P's potential while acknowledging certain challenges. In terms of the TAM, the respondents perceive H5P as an effective technology tool and H5P, with its interactive features and ease of use, is increasingly recognized as a tool that can enhance student engagement and support active learning (Chao & Chien, 2021). Based on their teaching experience and theoretical knowledge of constructivist theories studied in the teacher preparation program (Bruning et al.,1999), the participants identified the positive effects of the tool. Learners actively engage with content rather than passively receiving information. H5P's interactive elements, such as drag-and-drop activities, quizzes, and interactive videos, promote active engagement. Learners interact with the material, making decisions and receiving immediate feedback, which aligns with the active learning principle of constructivism. H5P activities can be designed to provide scaffolding and immediate feedback (Jacob & Centofanti, 2024).

Time constraints, indicated by the participants as a challenge for implementing H5P in schools, have been a longstanding issue in technology adaptation in schools (Laferrière et al., 2013; Francom, 2020). It is unclear whether this challenge will persist, but the growing affordability of the internet, even in underprivileged areas in the U.S. and developing countries (Gupta et al., 2023), offers hope. With the growing ease of designing and applying H5P, these challenges may diminish in the future.

Proposed strategies for overcoming the limitations of H5P in educational environments

Internet issues: the best and simplest strategy is using the Lumi app (https://lumi.education/). It is a free, offline desktop application that allows teachers to create and edit H5P content and play H5P activities directly without a server. These are the steps: 1. Download and install Lumi. 2. Open or import .h5p files.3. Launch the activity directly within the app. 4. Use it in class by projecting your screen or sharing locally.

The best H5P activities to use offline are: Interactive Video, Course Presentation, Drag and Drop, Flash Cards, Timeline, Question Sets, Image Hotspots, Memory Game, Crossword.

Improving the accuracy of assessments. H5P is a versatile assessment tool, but its effectiveness relies on thoughtful integration into the instructional design framework. It must align seamlessly with both learning objectives and instructional strategies. Beyond its standard use for testing or

monitoring academic progress, H5P's interactive capabilities should be leveraged to foster student knowledge and understanding across all levels of Bloom's taxonomy (Eberly Center, 2025).

Enhancing the accuracy of H5P assessments necessitates fully utilizing its interactive potential (Jacob & Centofanti, 2023; Rahmi et al., 2024; Corbet, 2022). This includes crafting pedagogically sound questions that are tightly aligned with learning objectives and framed in concise, clear language. Effective questions should also stimulate higher-order thinking skills, such as analysis, synthesis, and evaluation, moving beyond simple recall of facts. Ultimately, developing well-crafted questions for H5P assessments is grounded in established best practices and recommendations rather than empirical studies.

CONCLUSIONS AND IMPLICATIONS

This study on H5P in a teacher preparation program concluded that H5P is perceived as highly effective tool for enhancing digital learning environments. The tool is believed to be easy to use and likely to be applied by the respondents in the future. Most participants indicated they are willing to use H5P in their future teaching, with none stating they would not use it. Participants noted several advantages, including increased engagement, versatility, ease of use, and the ability to provide instant feedback. The main disadvantage was the lack of time for teachers to design and integrate H5P, alongside potential technological issues such as internet outages. The data were collected from the participant pre-service teachers whose Perceived Usefulness and Behavior Intention to use H5P in school teaching may be biased by lack of teaching experience. Pre-service teachers tend to believe more strongly in the positive impact of technology on classroom instruction and student learning. A study by Spaulding (2013) found that pre-service teachers showed significantly higher levels of agreement on the benefits of technology for teaching and learning than their in-service counterparts. Pre-service teachers often exhibit enthusiasm for incorporating technology into their future teaching practices (Yildiz Durak, 2021). Perceived Usefulness and Behavior Intention to use H5P in school teaching among the participants of the study may be explained by their recent exposure to the technology during their college years. In-service teachers' perceptions of educational technology often vary depending on factors such as teaching experience, access to professional development, and institutional support. Current research on their perceptions of H5P is notably limited, highlighting the need for further investigation.

Implementation of H5P in school settings remains largely unexplored, with existing studies primarily focusing on college and university environments. Although pre-service teachers in related studies have shown enthusiasm for H5P as an innovative teaching tool, its adoption faces familiar barriers, including time constraints, teaching overload, the learning curve, and lack of familiarity with the platform.

Research on H5P adoption by college instructors has revealed that, while participants initially recognized its potential, they required institutional and technical support to overcome traditional challenges (Orias, 2024). Similarly, in-service teachers may encounter practical and systemic obstacles that hinder the adoption of new tools like H5P. These barriers, along with hesitancy stemming from unfamiliarity and limited time, merit deeper exploration (Habók & Nagy, 2016).

To address the issue of implementing H5P in teaching practices it is critical to enhance teacher preparation programs with training in H5P use. The study of 2019 in Ukraine reported that students in teacher training programs were enthusiastic and apprehensive of learning the use of H5P despite the fact that the platform is totally in English (Skvortsova et al., 2019). The enthusiasm of pre-service teachers suggests that early exposure to such tools fosters a positive attitude toward technology. Teacher training curricula can integrate H5P and similar platforms from the outset, ensuring familiarity and reducing hesitancy when entering the profession. The demonstrated effectiveness of H5P in engaging pre-service teachers suggests that teacher training programs should incorporate hands-on sessions with interactive tools like H5P. Educators can be trained to design dynamic content using such tools, promoting skill development that aligns with modern pedagogical methods like blended learning and flipped classrooms.

The study's findings underscore the need for targeted professional development that focuses on the use of H5P and similar technologies. Policies can advocate for online workshops or summer certification programs that equip in-service teachers with practical knowledge and strategies for integrating such tools into their classrooms effectively.

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