

Fostering Self-Regulated Learning with H5P Technology: The Pedagogical Experiences of Educational Professionals

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Abstract: This qualitative study examined the perspectives of educational professionals on integrating H5P technology to foster self-regulated learning (SRL) in blended learning environments at a post-secondary institution in Ontario, Canada. Using a phenomenological approach, data were collected through semi-structured interviews with five educators, five instructional designers, and five educational technologists, and analyzed thematically through the lens of Zimmerman's SRL framework. The findings highlight key challenges in fostering learners' motivational processes (e.g., self-efficacy and autonomy), metacognitive processes (e.g., monitoring and planning), and behavioural processes (e.g., strategy execution) within blended contexts. The study evaluated the pedagogical applications, limitations, and potential of various H5P tools, such as interactive books, branching scenarios, and drag-and-drop activities, in supporting SRL. While advancements in H5P functionalities were noted, significant gaps were identified in aligning the technology with SRL best practices. These



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insights contribute to bridging gaps in literature and practice by offering actionable recommendations for optimizing H5P to enhance learners' SRL strategies. This research provides valuable implications for educators, instructional designers, and policymakers, laying the groundwork for future studies on leveraging educational technologies to support SRL in blended learning environments.

Keywords: *self-regulated learning; H5P technology; motivational; metacognitive; behavioural; pedagogy; blended learning*

Favoriser l'apprentissage autorégulé avec la technologie H5P : Les expériences pédagogiques des professionnels de l'éducation

Résumé : Cette étude qualitative a examiné les perspectives des professionnels de l'éducation concernant l'intégration de la technologie H5P pour favoriser l'apprentissage autorégulé (AAR) dans des environnements d'apprentissage hybride au sein d'un établissement postsecondaire en Ontario, Canada. En adoptant une approche phénoménologique, des données ont été recueillies à travers des entretiens semi-structurés auprès de cinq enseignants, cinq concepteurs pédagogiques et cinq technologues éducatifs, puis analysées thématiquement à travers le cadre de l'AAR de Zimmerman. Les résultats mettent en lumière des défis clés pour encourager les processus motivationnels des apprenants (par exemple, l'auto-efficacité et l'autonomie), les processus métacognitifs (par exemple, la planification et l'auto-observation) et les processus comportementaux (par exemple, l'exécution de stratégies) dans des contextes hybrides. L'étude a évalué les applications pédagogiques, les limites et le potentiel de divers outils H5P, tels que les livres interactifs, les scénarios à embranchements et les activités de glisser-déposer, pour soutenir l'AAR. Bien que des progrès aient été observés dans les fonctionnalités de H5P, des lacunes importantes ont été identifiées quant à l'alignement de la technologie avec les meilleures pratiques de l'AAR. Ces résultats contribuent à combler les lacunes dans la littérature et la pratique en offrant des recommandations concrètes pour optimiser H5P afin d'améliorer les stratégies d'AAR des apprenants. Cette recherche fournit des implications précieuses pour les enseignants, les concepteurs pédagogiques et les décideurs, en jetant les bases d'études futures sur l'utilisation des technologies éducatives pour soutenir l'AAR dans des environnements d'apprentissage hybride.

Mots-clés : *Apprentissage autorégulé ; technologie H5P ;
motivationnel ; métacognitif ; comportemental ; pédagogie ;
apprentissage hybride*

Introduction

Overview of H5P Technology and Blended Learning Environments

H5P technology is an open-source authoring tool that enables educators to create and embed HTML5-based interactive content within learning management systems (LMS). This technology has gained traction in blended and online learning environments for its ability to enhance learner engagement and interactivity (Singleton & Charlton, 2019). In Ontario's post-secondary institutions, where blended learning continues to grow as a dominant instructional approach (Johnson & Seaman, 2021), H5P was adopted to foster self-regulated learning (SRL). However, despite its potential, educators have faced challenges in leveraging H5P to support SRL effectively, particularly in fostering learner autonomy, enabling progress monitoring, and encouraging task completion (Carlisle-Johnston & Fernlund, 2020).

SRL is a cornerstone of student success in blended learning environments, where learners are required to independently manage their learning through motivational, metacognitive, and behavioural strategies (Zimmerman, 2011). Zimmerman's cyclical model of SRL emphasizes the importance of processes like goal-setting, self-monitoring, and self-reflection, all of which are essential for achieving desired learning outcomes (Kemp & Grieve, 2014). While H5P's interactive features, such as quizzes, branching scenarios, and image hotspots, have the potential to align with these processes, educators have reported difficulties in translating this potential into meaningful SRL outcomes. Challenges

at an Ontario post-secondary institution were attributed to the use of the features and capabilities of H5P technology in fostering motivational strategies (e.g., learner autonomy), metacognitive processes (e.g., progress monitoring), and behavioural strategies (e.g., task completion), thereby limiting its effectiveness in promoting SRL (Carlisle-Johnston & Fernlund, 2020).

Existing research on H5P has primarily focused on its ability to enhance engagement and interactivity, with limited exploration of its role in supporting SRL. Studies such as those by Jacob and Centofanti (2023) and Sergio-Ramon et al. (2021) highlight this gap, noting that while H5P offers interactive potential, it has not been systematically evaluated for its impact on SRL. Furthermore, while barriers to SRL in blended learning environments, such as fast-paced courses, cognitive overload, and delayed feedback, are well-documented, they are underexplored from the perspective of educators using H5P technology. Research has shown that SRL-promoting practices, including offering learners choice, facilitating self-assessment, and supporting collaboration, can significantly enhance motivation, metacognition, and behavioural regulation (Perry, 2013). While these practices have been effective in traditional classrooms, their integration into H5P-based blended environments remains largely unexamined. This gap underscores the need for research to identify how H5P can be optimized to implement SRL-promoting practices effectively, addressing both the limitations reported by educators and the broader challenges learners face in blended learning environments. By bridging these gaps, this study seeks

to contribute to the growing body of knowledge on leveraging educational technologies like H5P to promote SRL in post-secondary education.

Purpose and Significance

This study explored the pedagogical experiences of educational professionals at a post-secondary institution in Ontario, Canada, in using H5P technology to foster SRL in blended learning environments. It specifically aims to:

- Identify effective H5P features that support SRL processes, such as goal-setting, self-monitoring, and self-reflection;
- Assess the challenges and barriers faced by educators and learners when implementing H5P in blended learning contexts; and
- Propose instructional strategies and best practices for optimizing the use of H5P to enhance learning outcomes.

The significance of this study lies in its contributions to both theory and practice. Theoretically, it advances understanding of SRL by demonstrating how interactive digital tools like H5P influence key SRL processes in blended learning. Unlike studies that focus on generalized digital tools, this research narrows its scope to H5P's features, such as interactive books, branching scenarios, and image hotspots, to illustrate their specific effects on fostering learner autonomy and engagement. This fills a gap in SRL literature by exploring the intersection of technology and pedagogy in greater detail. Practically, the study provides actionable insights for educators, instructional designers, and policymakers on effectively integrating H5P into blended learning environments. By identifying

both the benefits and challenges of using H5P, it offers a roadmap for improving its implementation and ensuring it meets the diverse needs of learners. Furthermore, the findings present useful guidelines for professional training for educators and support the creation of H5P templates specifically designed to enhance SRL.

Additionally, the study has significant future implications. It proposes strategies to enhance the functionality of H5P, laying the groundwork for future research to evaluate its long-term impact on SRL and blended learning outcomes. Furthermore, it highlights the need to design more learner-centred educational technologies that incorporate adaptive learning and real-time feedback mechanisms. These insights are vital for fostering innovation in educational technology and ensuring alignment with contemporary pedagogical goals. Overall, this study bridges the gap between theory and practice by offering a comprehensive understanding of H5P's potential to enhance SRL in blended learning contexts. It not only informs current practices but also opens new avenues for research and development in digital education.

Problem Statement and Rationale

SRL is critical for learner success in blended and online learning environments. However, numerous challenges impede the development of SRL skills, including learners' difficulties with maintaining motivation, managing tasks, and employing effective metacognitive strategies. Existing literature highlights persistent barriers to SRL, such as fast-paced courses, cognitive overload, and a

lack of timely feedback, which collectively hinder learners' ability to take control of their learning processes. These issues are particularly pronounced in blended learning environments, where the balance between face-to-face and online components demands higher levels of learner autonomy and self-discipline. Addressing these challenges is imperative to fostering successful learning outcomes in post-secondary education.

Amid these challenges, the use of educational technologies has grown significantly, particularly during the global pandemic, which accelerated the adoption of tools designed to support learning in blended and online contexts. H5P technology, a tool widely adopted for its interactive and engaging features, offers the potential to address some of the challenges associated with SRL. However, the pedagogical experiences of educators at a post-secondary institution in Ontario, Canada, reveal that H5P has not fully supported learners' motivational, metacognitive, and behavioural self-regulation (Carlisle-Johnston & Fernlund, 2020). Educators reported concerns regarding the tool's ability to enhance key SRL processes such as learner autonomy, task management, and self-reflection. These challenges indicate a pressing need to evaluate whether and how H5P can be effectively leveraged to overcome barriers to SRL and optimize learning outcomes in blended environments.

This study was undertaken to examine the pedagogical affordances and limitations of H5P technology in fostering SRL. It responds to gaps in existing literature, which have largely focused on general barriers to SRL in online and blended learning environments without exploring specific tools like H5P from the

educators' perspective. By evaluating H5P's features and limitations, this study aims to provide practical insights for educators, instructional designers, and technology developers. It contributes to aligning educational technologies with best practices in SRL, addressing both learner and educator challenges, and offering strategies to enhance the design and implementation of H5P for improved SRL outcomes.

Research Questions

This study evaluated the pedagogical experiences of educational professionals concerning the use of the features and capabilities of H5P technology to promote learners' motivational, metacognitive, and behavioural SRL strategies within blended educational settings. Hence, the main research question for this study is:

What are the pedagogical experiences of educational professionals using H5P technology to promote learners' motivational, metacognitive, and behavioural self-regulated learning strategies within blended learning environments at Richmond Hill College?

To guide the investigation, the following sub-questions are posed:

1. *What H5P features are perceived as most promising in fostering SRL?*
2. *What pedagogical barriers hinder the use of H5P for SRL?*
3. *What are the growth prospects for H5P technology in supporting SRL processes?*

Literature Review

H5P Technology and Self-Regulated Learning

Interactive technologies have become integral to fostering SRL by enabling personalized learning, real-time feedback, and opportunities for reflection. These technologies leverage gamification, multimedia elements, and adaptive learning features to support key SRL processes, including goal-setting, self-monitoring, and self-reflection (Onodipe et al., 2020; Nacional, 2024). For instance, gamified tools embedded in learning management systems have been shown to increase learner motivation and engagement, leading to improved self-regulation (van Alten et al., 2020). However, their effectiveness depends on factors such as users' digital literacy, the alignment of tool design with pedagogical objectives, and the integration of SRL-promoting strategies. H5P is an open-source authoring tool that enables educators to create interactive instructional content, including quizzes, branching scenarios, interactive videos, and games. These features are designed to enhance learner engagement and provide immediate feedback, both critical components of SRL (Jacob & Centofanti, 2023). For example, branching scenarios allow learners to make decisions and explore consequences, encouraging critical thinking and self-monitoring. Similarly, drag-and-drop activities and quizzes offer opportunities for learners to assess their understanding in real time, facilitating goal-setting and self-evaluation (Singleton & Charlton, 2019). The customizable nature of H5P supports differentiated instruction, allowing educators to tailor activities to

learners' needs. This adaptability aligns well with SRL principles, as it promotes autonomy and active engagement with the content. However, while H5P's features show promise for supporting SRL, their success depends on thoughtful integration within a broader pedagogical framework.

Despite its potential, research indicates that H5P faces several limitations in promoting SRL. While it enhances engagement and offers opportunities for active learning, its impact on academic performance compared to traditional methods is inconsistent (Jacob & Centofanti, 2023). Learners often report preferring H5P for its interactivity, yet challenges such as accessibility issues, limited functionality in certain tools (e.g., drag-and-drop, crosswords), and a lack of guidance for self-reflection can hinder its effectiveness in fostering SRL (Cheng, 2024).

Additionally, the absence of features that explicitly support motivational and metacognitive strategies, such as embedded goal-setting prompts or adaptive feedback, limits H5P's alignment with SRL frameworks. For example, while learners may receive immediate feedback through quizzes, the tool does not inherently provide opportunities for goal revision or reflection, which are essential components of Zimmerman's SRL cyclical model. Current research highlights the promise of H5P in enhancing learner engagement and interactivity, but its role in promoting SRL remains underexplored (Sergio-Ramon et al., 2021; Homanova et al., 2019). This gap underscores the need for research that investigates the pedagogical affordances of H5P tools and their alignment with

SRL best practices. Addressing these gaps is critical for optimizing H5P's potential to foster effective SRL in blended environments.

Facilitating the Motivational Processes of Self-Regulated Learning

Motivational processes are critical in SRL, helping learners develop self-efficacy and autonomy as they pursue academic goals (Williamson, 2015). This involves creating goal-driven activities that emphasize mastery over task completion (Wandler & Imbriale, 2017; Zimmerman, 2011). Effective facilitation of these processes requires creating learning experiences aligned with student interests, enabling goal-setting, and helping manage distractions (Liu et al., 2021). However, barriers such as rapid course pacing, inadequate support systems, and unrealistic deadlines can weaken motivation, leading to poorer academic outcomes (Maphalala et al., 2021; Morris, 2019).

Task Scheduling and Course Pace

Fast-paced courses often limit learners' capacity to set meaningful goals, leading to surface-level engagement (Morris, 2019; Carstensen et al., 2018). While some argue that this pace encourages efficient review (Yuce-Gun, 2020), research shows it hinders SRL development, increasing reliance on instructors (Maphalala et al., 2021). Learners often adopt surface learning strategies to cope with time constraints, which are insufficient for deep knowledge application (Dolmans et al., 2015).

Inadequate Learner Support Systems

Support systems are crucial for fostering self-efficacy and SRL, helping learners identify strengths, set goals, and manage distractions (Khalid et al., 2020). While adequate support boosts motivation and reduces isolation, too much support can hinder the development of independent learning strategies (Van-Wyk, 2019). Thus, it is important to strike a balance between guiding learners and promoting autonomy (Khlaif et al., 2021).

Facilitating the Metacognitive Processes of Self-Regulated Learning

Metacognitive processes involve learners evaluating the effectiveness of their strategies and monitoring progress (Williamson, 2015). These processes include planning, self-instruction, and self-monitoring, but are often impeded by cognitive overload and heavy workloads (Shrivastav & Hiltz, 2013; Kohan et al., 2017). Cognitive overload, in particular, limits learners' ability to focus on essential tasks and self-regulate effectively (Singaram et al., 2022).

Cognitive Load of Courses

Cognitive load refers to the mental effort required for learning and can be categorized into intrinsic, germane, and extraneous loads. While intrinsic load is subject-dependent, extraneous load (irrelevant distractions) can be minimized to improve SRL. High extraneous load diminishes learners' ability to manage cognitive resources, making it difficult to prioritize important information

(Seufert, 2020). Proper course structuring can alleviate this, allowing learners to focus more effectively on their tasks (Singaram et al., 2022).

Heavy Workload

In blended learning, the workload can often increase due to numerous low-stakes assignments, leaving little time for reflection and self-monitoring (Liu et al., 2021). This, combined with distractions from external content, leads to diminished focus and impaired SRL development (Kohan et al., 2017). This reduction in focus undermines learners' abilities to set goals, seek help, and evaluate their progress (Robinson & Persky, 2020).

Facilitating the Behavioural Processes of Self-Regulated Learning

Behavioural processes in SRL involve the application of strategies to complete tasks, adjusting actions as necessary (Williamson, 2015). Key elements include collaboration and timely feedback, both of which help learners refine their strategies and manage their efforts effectively (Zimmerman, 2011). However, delayed feedback, unclear instructions, and limited collaboration hinder learners from developing effective SRL behaviours (Nasri et al., 2021).

Delayed Feedback and Unclear Guidelines

Timely feedback is essential for helping learners manage their time and strategies effectively (Kohan et al., 2017; Nasri et al., 2021). Delays in feedback prevent deep engagement with the material and hinder learners' ability to self-regulate (Mamun et al., 2020). Additionally, ambiguous assignment guidelines can

lead to frustration and impede task completion, necessitating more clarity and timely feedback in blended learning contexts (Liaw & Huang, 2013).

Lack of Collaboration

Collaboration is critical for SRL, allowing learners to share strategies, gain diverse perspectives, and reduce procrastination (Hammarlund et al., 2015). The absence of collaborative opportunities limits meaningful learning experiences and weakens SRL development (Wandler & Imbriale, 2017). Multiple interaction modalities, such as peer-to-peer and learner-to-instructor interactions, are key to enhancing engagement and promoting active decision-making (Robinson & Persky, 2020).

Summary

Interactive technologies like H5P play a significant role in promoting SRL in blended learning environments. H5P, an open-source tool, allows educators to create interactive content such as quizzes and videos, enhancing learner engagement and providing immediate feedback, which supports SRL. Facilitating SRL involves addressing motivational, metacognitive, and behavioural processes. Learners need support systems to manage course pace, set goals, and overcome cognitive overload caused by distractions and heavy workloads. Feedback timeliness, clear guidelines, and collaboration are crucial for effective SRL, enabling learners to adjust their strategies and make informed decisions. Research shows that when motivational, metacognitive, and behavioural

processes are effectively engaged, learners achieve better outcomes, with practices like self-assessment, peer collaboration, and structured feedback fostering autonomy, critical thinking, and improved performance.

Research Design and Methods

Qualitative Methodology

This study adopts a qualitative research methodology to explore the diverse perspectives of educational professionals regarding H5P technology in fostering SRL in blended contexts. Unlike quantitative methods, qualitative approaches capture the complexity of participants' experiences, offering deeper insight into the phenomena under investigation (Creswell & Poth, 2018; Busetto et al., 2020). Given the lack of existing research in this area, a qualitative approach is justified, particularly for understanding the varied educational settings in which H5P is used. This methodology focuses on participants' voices, revealing common themes and patterns crucial for understanding the role of H5P in promoting SRL.

Research Design

The study is grounded in a social constructivist framework, emphasizing the interpretive nature of participants' lived experiences, aligning with the study's qualitative focus (Creswell & Poth, 2018). A phenomenological research design is adopted to explore participants' shared experiences with H5P, distinguishing it from narrative or case study methods (Creswell & Poth, 2018;

Busetto et al., 2020). Grounded theory and ethnographic approaches were considered less relevant, as the study focuses on the pedagogical experiences associated with H5P, not the development of new theories or immersion in cultural contexts (Creswell & Poth, 2018; Busetto et al., 2020). Bazen et al. (2021) underscored the importance of a phenomenological approach to understanding a phenomenon as it is experienced by participants, which helps to strengthen the methodological framework for conducting the study.

The study employs transcendental phenomenology, beginning with the researcher's self-reflection and bracketing to minimize bias (Creswell & Poth, 2018; Moustakas, 1994; Moerer-Urdhal & Creswell, 2004; Larsen & Adu, 2021). Significant statements from interview transcripts were analyzed to uncover themes, using Moustakas (1994) method of horizontalization and imaginative variation. Several studies, including Moustakas (1994), Creswell and Poth (2018), Moerer-Urdhal and Creswell (2004), and Larsen and Adu (2021), postulated that this approach allowed for a deeper understanding of the situational context in which these experiences occurred, further contributing to the richness of both the textual (what was experienced) and structural (how it was experienced) aspects of the phenomenon. The researcher, with limited direct experience in using H5P for SRL, employed reflexive self-examination throughout the research process, ensuring the findings reflect participants' experiences without personal bias. Techniques like data triangulation, bracketing, and member checking were employed to enhance credibility.

Research Method and Participants

Semi-structured interviews were chosen as the primary data collection method to allow participants to reflect deeply on their experiences with H5P, aligning with Creswell and Poth's (2018) recommendations for phenomenological studies. To ensure relevance to the research, participants were required to have at least one year of experience in their roles as educators, instructional designers, or educational technologists, and in using H5P technology in online or blended learning environments. Purposive sampling was critical for ensuring the credibility and representativeness of the findings (Creswell & Poth, 2018; Cilesiz, 2010). Of 51 eligible individuals, 28 met the inclusion criteria, and 15 participants (5 educators, 5 instructional designers, and 5 educational technologists) ultimately consented to participate (Table 1). This sample size was considered appropriate, given the evidence of data saturation and the diverse experiences captured (Yadav, 2022; Creswell & Poth, 2018). The study's sample ensured a thorough exploration of the phenomenon across varied educational settings and disciplines, enhancing the robustness of the findings.

Table 1: Descriptive Findings of Study Sample

Educational Professionals	Alias	Years of Lived H5P Instructional Experiences	Discipline / Division
Educator [1]	E1	2 years	Accounting & Finance
Educator [2]	E2	3 years	Human Resources
Educator [3]	E3	5 years	Project Management
Educator [4]	E4	2 years	E-commerce

Educational Professionals	Alias	Years of Lived H5P Instructional Experiences	Discipline / Division
Educator [5]	E5	2 years	Leadership & Management
Instructional Designer [1]	ID1	4 years	Marketing
Instructional Designer [2]	ID2	3 years	Accounting & Finance
Instructional Designer [3]	ID3	3 years	Project Management
Instructional Designer [4]	ID4	4 years	Leadership & Management
Instructional Designer [5]	ID5	2 years	Marketing
Educational Technologist [1]	ET1	3 years	Project Management
Educational Technologist [2]	ET2	2 years	Leadership & Management
Educational Technologist [3]	ET3	4 years	E-commerce
Educational Technologist [4]	ET4	3 years	Accounting & Finance
Educational Technologist [5]	ET5	5 years	Human Resources

Data Collection, Analysis, and Credibility

The in-person interviews followed a structured protocol based on Kallio et al.'s (2016) framework for conducting semi-structured interviews. Data was collected over five weeks and the voice recordings from semi-structured interviews were carefully and accurately transcribed using the NVivo Transcription software. Moustakas' (1994) transcendental phenomenological

framework guided the analysis of this study, including bracketing, horizontalization, imaginative variation, and synthesis of the essence of participants' experiences. Moustakas' transcendental phenomenological approach offered a rigorous and systematic framework for capturing the essence of participants' lived experiences (Creswell & Poth, 2018; Moustakas, 1994; Moerer-Urdhal & Creswell, 2004; Larsen & Adu, 2021). By integrating both textual and structural elements, this transcendental phenomenological approach minimized potential biases, ensuring that the research remained authentic and that participants' voices were accurately represented. The study adhered to Guba's Four Dimension Criteria (credibility, transferability, dependability, and confirmability) through techniques like data triangulation, member checking, and bracketing, thereby ensuring the findings' accuracy and authenticity (Guba, 1981).

Ethical Protection of Participants

Ethical considerations, including a thorough informed consent process, focused on safeguarding participants' privacy and confidentiality. Privacy was ensured by not collecting individual identifiers, and pseudonyms were used to maintain anonymity. Confidentiality was protected through encryption and password protection of all data collected, particularly using the Olympus DS-9000 voice recorder, which offered advanced encryption and security features to prevent unauthorized access to participant information (Olympus America Inc., 2018). This approach ensured compliance with ethical standards and protected the integrity of the data throughout the study.

Findings

The qualitative findings from interviews with educators, instructional designers, and educational technologists reveal consistent perspectives on the use of H5P technology to enhance SRL.

Facilitating Learners' Motivational Self-Regulated Strategies

Three core themes were identified within the context of promoting learners' motivational self-regulated strategies toward achieving desired learning outcomes:

- Promoting intrinsic motivation and self-efficacy;
- Fostering learners' autonomy and goal setting; and
- Inspiring preparedness for learning.

H5P Interactive Books: Promoting Intrinsic Motivation and Self-Efficacy

Several participants highlighted that H5P interactive books foster intrinsic motivation and self-efficacy by offering diverse content types for personalized learning. Instructional Designer [2] noted: "By leveraging the capabilities of H5P, the prospects of designing engaging and motivational training experiences would be limitless." However, some educators felt that these features were insufficient to fully promote intrinsic motivation. For instance, Educator [1] remarked: "It supports learners' interest, but the scope of promoting intrinsic motivation is limited." Both educators and instructional designers agreed that content types like interactive videos, quizzes, and infographics can enhance

motivation, but the lack of features such as saving progress hindered full learner engagement. Participants noted that the inability to integrate existing materials and save progress disrupted learning. Technological issues, such as error messages when integrating assistive features, were also problematic, undermining self-efficacy. Participants recommended an intuitive editor tool for easier content reuse and a "save content state" feature to enable progress monitoring and continuous training. Overall, while H5P interactive books support motivational self-regulation, participants called for significant improvements to better meet learners' needs in blended environments (Table 2).

Table 2: H5P Interactive Books: Perceived Barriers and Implications

Perspectives of Educational Professionals	Perceived Barriers of H5P Interactive Books	Pedagogical Implications
Perspectives of Educators [E1 & E2]	<ul style="list-style-type: none"> Complex and time-consuming process for integrating existing learning resources to support learners' diverse needs and interests. 	<ul style="list-style-type: none"> Inauspiciously influenced participants' ability to design learning content that yields desired educational outcomes, thus impacting learners' self-efficacy and autonomy to engage with learning content effectively.
Perspectives of Instructional Designers [ID2, ID3, & ID5]	<ul style="list-style-type: none"> Limited prospects for continuous training assessments. Software updates may result in some existing resources becoming redundant. 	<ul style="list-style-type: none"> Adversely influenced participants' ability to support learners' self-regulation and enthusiasm for learning.

Perspectives of Educational Professionals	Perceived Barriers of H5P Interactive Books	Pedagogical Implications
Perspectives of Educational Technologist [ET4]	<ul style="list-style-type: none"> • 404 Error Messages when integrating assistive and universal design features. • Inconvenience of “page focus” features. 	<ul style="list-style-type: none"> • Adequately disrupted participants’ capacity to design inclusive learning materials, adversely influencing learners’ self-efficacy.

H5P Branching Scenario: Fostering Autonomy and Goal Setting

Participants emphasized H5P branching scenarios' potential to foster learner autonomy and facilitate goal-setting. The adaptive features allow learners to align their goals with personalized learning paths, enabling them to diagnose their learning needs. Instructional Designer [1] highlighted this, stating: “These scenarios provided opportunities to practice decision-making in various contexts . . . so by exploring different outcomes based on choices, they [faculty and staff] better understand their learning needs and adjust their goals accordingly.” However, accessibility issues and inaccuracies in the score-tracking feature were major concerns, undermining learners’ ability to trust feedback and manage their goals effectively. The score-tracking feature and inability to revisit previous learning paths were seen as significant drawbacks, limiting opportunities for reflection and goal adjustment. Educator [3] strongly asserted that: “In some cases, the score-tracking feature provided inaccurate feedback . . . that’s very troubling. If learners can’t trust the feedback, it could really undermine their autonomy and progress.”

Additionally, H5P's capacity to support inclusive learning was viewed as inadequate due to compatibility and assistive technology limitations. Participants suggested improving the score-tracking system to enhance accuracy and alignment with course structures. They also recommended adding features like penalty points and timers to promote quick thinking and problem-solving, as well as incorporating assistive technologies like text-to-speech for better accessibility (Table 3).

Table 3: H5P Branching Scenarios: Perceived Barriers and Implications

Perspectives of Educational Professionals	Perceived Barriers of H5P Branching Scenario	Pedagogical Implications
Perspectives of Educators [E3 & E4]	<ul style="list-style-type: none"> Deficiencies with score tracking features leading to inaccurate evaluation of learners' progress. 	<ul style="list-style-type: none"> Hindered learning goals, reinforces misconceptions, and adversely influences learners' ability to direct their learning.
Perspectives of Instructional Designer [ID1]	<ul style="list-style-type: none"> Inability to revert to previously completed learning paths. 	<ul style="list-style-type: none"> Neglected possibilities for learners to reflect on the outcomes of their choices which were necessary to diagnose their learning goals toward self-regulated learning and growth.
Perspectives of Educational Technologists [ET1 & ET3]	<ul style="list-style-type: none"> Browser compatibility issues. Restricted language capabilities. Risk of compromising existing resources while integrating assistive features. 	<ul style="list-style-type: none"> Adversely impacted learning goals necessary for promoting learners' autonomy to complete various tasks.

H5P Columns: Inspiring Preparedness for Learning

Some participants discussed the role of H5P columns in supporting learners' self-regulated motivational strategies, emphasizing its versatility in organizing interactive content to capture learners' attention. However, resizing multimedia elements and compatibility issues were common challenges. Instructional Designer [4] asserted: "Resizing images, videos, and text presented many hurdles . . . It's frustrating when the platform doesn't allow for customization to meet diverse educational needs." Despite these, the tool was praised for improving content readability and engagement, which helps learners prepare for tasks. Accessibility challenges, such as content visibility issues caused by ad blockers, frustrated participants. Additionally, customization limitations made it difficult to create adaptable learning materials, negatively affecting learners' engagement. Participants advocated for improvements to compatibility, accessibility, and customization. They suggested continuous cross-platform testing to minimize disruptions, as well as features like descriptive text for images to enhance inclusivity and learner engagement (Table 4).

Table 4: H5P Columns: Perceived Barriers and Implications

Perspectives of Educational Professionals	Perceived Barriers of H5P Columns	Pedagogical Implications
Perspectives of Educator [E5]	<ul style="list-style-type: none">Platform compatibility issues impeding readability and visual engagement.	<ul style="list-style-type: none">Inhibited learners' ability to effectively engage with learning content to achieve desired learning outcomes.

Perspectives of Educational Professionals	Perceived Barriers of H5P Columns	Pedagogical Implications
Perspectives of Instructional Designer [ID4]	<ul style="list-style-type: none"> Customization complexities with authoring tools to support diverse learning needs. 	<ul style="list-style-type: none"> Adversely impacted the enthusiasm of designing quality learning content to foster self-regulation and a sense of competence among diverse learners.
Perspectives of Educational Technologists [ET2, ET5]	<ul style="list-style-type: none"> Accessibility and compatibility issues that burdened the re-use and improvement of existing learning resources to meet the diverse needs of learners. 	<ul style="list-style-type: none"> Impeded the ability of learners to manage their efforts toward the completion of learning tasks.

Facilitating Learners' Metacognitive Self-Regulated Strategies

Two (2) core themes were identified within the context of promoting learners' metacognitive self-regulated strategies toward achieving desired learning outcomes:

- Fostering scaffolding; and
- Strengthening awareness of one's own thinking and evaluation of learning strategies.

H5P Image Hotspot: Fostering Scaffolding

The H5P image hotspot feature was identified by participants as essential for scaffolding learning by helping learners build skills incrementally. It was praised for making complex tasks more manageable, allowing learners to absorb information at their own pace. Educator [2] noted that it: "brings static images to

life,” allowing students to interact with content and reflect on their progress. Instructional Designer [4] further highlighted its value in creating step-by-step understanding, enabling learners to connect ideas and clarify misunderstandings. However, accessibility and limited tracking capabilities hindered its effectiveness in evaluating learning progress. Educational Technologist [3] expressed: “I use it frequently to break down complex activities which helps to make them manageable . . . especially when working with limited time during a workshop session.”

Participants noted that while the H5P technology supports scaffolding, the layout of image hotspots often overwhelms students with complex content, leading to cognitive overload. Limited tracking capabilities also made it difficult to measure progress effectively. Participants recommended integrating quizzes and Q&As within the image hotspot to reduce cognitive load and enhance learning outcomes. They also advocated for optimized performance tracking to provide better feedback and support metacognitive growth (Table 5).

Table 5: H5P Image Hotspot: Perceived Barriers and Implications

Perspectives of Educational Professionals	Perceived Barriers of H5P Image Hotspot	Pedagogical Implications
Perspectives of Educators [E2, E4, and E5]	<ul style="list-style-type: none"> • Designing highly complex and interactive scaffolding experiences. 	<ul style="list-style-type: none"> • Inhibited achieving desired learning outcomes geared toward knowledge construction and evaluating learning strategies.
Perspectives of Instructional Designers [ID1, ID2, and ID4]	<ul style="list-style-type: none"> • Limited performance and interaction tracking capabilities to support formative instructional goals. 	<ul style="list-style-type: none"> • Undermined the prospects of evaluating scaffolding goals and making adjustments for instructional growth.
Perspectives of Educational Technologists [ET3 and ET4]	<ul style="list-style-type: none"> • Compatibility issues that compromised proficiency in monitoring one's progress. 	<ul style="list-style-type: none"> • Impeded the accessibility and effectiveness of scaffolding experiences.

H5P Course Presentation: Strengthening Awareness and Evaluation of Learning

Seven participants emphasized the value of H5P course presentation in enhancing learners' metacognitive processes through multimedia integration, interactive quizzes, and reflective exercises. These features allow learners to critically evaluate their learning strategies and make necessary adjustments. Educator [3] emphasized that: "reflective prompts within these presentations really inspire students to actively think about their learning progress and strategies." This integration of reflection and self-assessment empowers learners to critically evaluate their learning strategies and make necessary adjustments. However, limitations in the tool's authoring capabilities and compatibility issues,

such as limited customization and inconsistent device/browser support, were seen as barriers. As Instructional Designer [3] pointed out: “The authoring features could have been better . . . these limited authoring features undermined the design and development of self-regulated activities.”

These limitations in design flexibility and the inability to adapt pre-existing resources were seen as barriers to fostering learner creativity and effective SRL. Furthermore, technical compatibility issues were a major concern, with Educational Technologist [5] noting that some features: “don’t work across different devices and browsers,” which hindered the accessibility and functionality necessary for supporting SRL. Inconsistencies with interactive video autoplay and drag-and-drop functions across different platforms also affected the smooth delivery of learning tasks, limiting learners’ ability to engage effectively with course content. Participants advocated for improvements to these features to better support self-regulation. They suggested improving browser and device compatibility, enhancing authoring capabilities, and integrating collaborative features to promote peer learning and better support for self-regulation (Table 6).

Table 6: H5P Course Presentation: Perceived Barriers and Implications

Perspectives of Educational Professionals	Perceived Barriers of H5P Course Presentation	Pedagogical Implications
Perspectives of Educators [E1 and E3]	<ul style="list-style-type: none"> Inability to integrate existing resources to optimize learners’ self-instruction and self-monitoring. 	<ul style="list-style-type: none"> Inhibited the design of learning resources that may yield desired educational outcomes.

Perspectives of Educational Professionals	Perceived Barriers of H5P Course Presentation	Pedagogical Implications
Perspectives of Instructional Designers [ID3 and ID5]	<ul style="list-style-type: none"> Limited authoring features that impede the design of self-regulation learning experiences. 	<ul style="list-style-type: none"> Undermined the prospects of learners to reflect on the effectiveness of their learning approaches and to make adjustments for better outcomes.
Perspectives of Educational Technologists [ET1, ET2, and ET5]	<ul style="list-style-type: none"> Compatibility issues that compromised proficiency in monitoring one's progress. 	<ul style="list-style-type: none"> Impeded the accessibility and effectiveness of self-regulation learning experiences.

Facilitating Learners' Behavioural Self-Regulated Strategies

The core theme identified within the context of promoting learners' behavioural self-regulated strategies toward achieving desired learning outcomes focused on promoting study habits and time management strategies.

H5P Crossword and Drag and Drop: Promoting Study Habits and Time Management

Participants noted the efficacy of H5P tools like crosswords and drag and drop in promoting study habits and time management strategies. These tools challenge learners to allocate time effectively and prioritize tasks, contributing to better task completion and critical thinking. Educators and instructional designers found that H5P crosswords and drag and drop support effective study habits by promoting information retention and conceptual understanding. The timed nature of these tasks also enhances time management by creating a sense

of urgency. Instructional Designer [5] reinforced this, stating: “Crosswords strengthen grasps of key terms and concepts, while promoting effective study habits . . . instant feedback from drag and drop fosters targeted study habits.”

Educational Technologist [3] added: “The time limit features of crosswords challenge attendees to allocate time effectively and prioritize tasks,” linking this to improved task completion and critical thinking. However, participants identified challenges, including the lack of support for peer collaboration, inconsistent crossword clues, and layout problems on mobile devices. These issues were seen as distractions that could lead to procrastination. Educator [1] commented: “Peer-to-peer collaboration in crossword and drag and drop is quite challenging . . . students miss out on valuable insights on learning strategies.” To address these challenges, participants advocated for improvements in consistency and functionality. They suggested more intuitive authoring platforms to address accessibility issues and incorporating collaborative features to foster shared learning goals.

Discussion and Implications

The research investigated how H5P technology can enhance SRL by facilitating motivational, metacognitive, and behavioural processes, with a focus on blended learning environments. The study emphasizes the importance of fostering intrinsic motivation, self-efficacy, autonomy, and goal-setting, aligned with Zimmerman’s (2011) model of SRL.

Motivational Processes of SRL

The research identifies H5P interactive books, H5P branching scenarios, and H5P columns as key tools to foster SRL motivation. Participants appreciated H5P interactive books for promoting intrinsic motivation and self-efficacy through personalized learning experiences. This aligns with Liu et al. (2021) and Hammarlund et al. (2015), who stress the need for engaging content to stimulate learner curiosity. However, participants noted challenges such as integrating existing resources and maintaining continuous assessments, which hampered efforts to create inclusive environments that nurture self-efficacy. Regarding H5P branching scenarios, participants praised their capacity to promote autonomy by allowing them to set realistic goals and engage with content meaningfully, echoing Wandler and Imbriale (2017). Nevertheless, the tool's limitations in tracking and reflecting on past learning choices were seen as barriers to effective goal evaluation. H5P columns were noted for their integration of learning analytics and visual engagement, enhancing learning preparedness, consistent with Khalid et al. (2020). However, platform compatibility issues reduced engagement. Participants recommended improvements in customization and tracking features to align with diverse learning styles and enhance support for SRL.

Metacognitive Processes of Self-Regulated Learning

The study highlights how H5P image hotspots and H5P course presentations support metacognitive processes by scaffolding learners'

awareness of their strategies. H5P image hotspots were particularly effective in incremental knowledge construction, enabling learners to visualize concept connections, which helped organize thoughts. From the perspective of educators, limitations in conveying complex content often caused cognitive overload, hindering knowledge construction and regulation. This aligns with Shrivastav and Hiltz (2013) and Kohan et al. (2017), who warn of cognitive overload's negative impact on metacognition. H5P course presentations, incorporating reflective engagement and gamified learning, enabled learners to assess their strategies and apply knowledge in various contexts, supporting Singaram et al. (2022). Participants, however, found authoring features and resource integration lacking, hindering self-monitoring and progress tracking. They advocated for improved authoring tools that would better integrate existing resources and support metacognitive awareness.

Behavioural Processes of Self-Regulated Learning

Fostering effective study habits and time management emerged as crucial for enhancing the behavioural processes of SRL. Echoing Wandler and Imbriale (2017), the study suggests that instructional scaffolding, supported by H5P technology, improves time management and task completion. H5P crosswords were noted for their ability to enhance active recall and foster positive study habits by reducing distractions and cognitive overload. From the perspectives of educators, issues with grid layouts created distractions which contributed to procrastination among learners. H5P drag and drop was valued for encouraging

conceptual connections and visual engagement, enabling learners to monitor their performance and foster critical thinking. However, the lack of collaborative features hindered peer-to-peer learning, which is vital for meaningful engagement, as emphasized by Robinson and Persky (2020). Participants recommended integrating collaborative features into H5P drag and drop to inspire reflection and support behavioural regulation.

Implications

The research highlights the potential of H5P technology in enhancing motivational, metacognitive, and behavioural processes of SRL, urging educators to leverage its interactive features to promote autonomy, self-efficacy, and time management. The study contributes to Zimmerman's SRL model by demonstrating how H5P supports blended learning environments, aligning with constructivism and experiential learning theories. Practical implications include encouraging educators to adopt H5P tools that support diverse learner needs, while H5P developers are urged to enhance customization, tracking, and collaborative features to support SRL more effectively. Future research should explore the long-term effects of H5P on SRL, employing pre-test and post-test methodologies to track learner progress. Comparative studies could further clarify H5P's advantages and challenges in SRL within blended learning environments, contributing to evidence-based approaches for educational technology integration.

Conclusion and Recommendations

This study highlights the significant potential of H5P technology in fostering SRL within blended learning environments. It contributes to both theoretical frameworks and practical applications, advancing SRL theory by showing how H5P enhances motivational, metacognitive, and behavioural strategies. The research underscores H5P's ability to scaffold learning, promote autonomy, manage cognitive load, and enhance self-efficacy. Educators, instructional designers, and educational leaders can use these findings to inform decisions regarding the integration and optimization of H5P for diverse learners. The study recommends improvements to H5P's features, such as better authoring tools, enhanced tracking, and increased cross-platform compatibility to support motivational and behavioural strategies. Developers are also encouraged to refine H5P functionalities to support learners' autonomy and cognitive engagement.

Future research should use pre-test and post-test methodologies to assess H5P's long-term impact on SRL, especially in motivation and autonomy. Comparative studies evaluating different educational technologies will also provide insights into effective strategies for SRL. Research into the challenges of H5P can guide its optimal use across various instructional designs, including design thinking and Universal Design for Learning (UDL). For practice, educational leaders should critically assess H5P's strengths and limitations to inform educational policies. Developers should engage with educators to

enhance H5P, while instructional designers are advised to pilot H5P tools to test their effectiveness in fostering SRL. Educators should reflect on their use of H5P features to ensure they are promoting motivation, self-regulation, and learning preparedness.

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