Multimodal Storyboarding as a Pedagogical Tool for Enhancing Literary Comprehension

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Abstract

This research investigates the educational possibilities of multimodal storyboarding as a tool to increase the comprehension of literary novels by undergraduate students. Drawing on multimodal literacy theory, dual coding theory, and constructivist pedagogy, the project explored the multimodal combination of visual, textual, and spatial semiotic modes toward a deeper engagement with challenging texts. With a convergent mixed-methods design, the intervention was delivered over six weeks with 46 Undergraduate ESL learners in a city college in Chennai. Participants created sequential visual panels, converting one full-length novel from text to visual panels and engaging with structured prompts and discursive reflections. Quantitative analysis of the pre- and post-intervention assessments indicated significant improvements in overall comprehension, with the most exemplified gains on thematic interpretation and inferencing for ESL students. Thematic analysis of focus group discussions demonstrated that the multimodal nature of the task contributed to student autonomy of interpretation, affective engagement, and meaning-making in collaboration with peers. The instructor's reflections further indicated enhanced participation, a more evenness of discourse during classroom discussion, and fewer evasion strategies to complete the task. Overall, this study implies that multimodal storyboarding engages more productive cognitive processing and provides equitable access to literary engagement, drawing on learning students' varied learning and processing styles. The findings recommend the implementation of multimodal strategies, including storyboarding, into higher education teaching of literature to enhance understanding, critical analysis, and inductive pedagogical practice.

Keywords: Multimodal storyboarding, Literary comprehension; Dual coding theory; Constructivist learning

INTRODUCTION

Today, literature in higher education is a vexed pedagogy that must wrestle with both student engagement and deep understanding of increasingly complicated narrative texts. Undergraduate students in General English classes commonly confront novels with complex plots and multiple layers of symbolism and thematic meaning. These challenges are especially acute for English as a Second Language (ESL) learners, when language-related difficulties can inhibit more than the textual phrases and sentences when interpreting meaning from intricate syntax and sonority.

Traditional techniques of teaching literature include lecture and text-based learning, both of which emphasise only verbal processes and have serious implications for students who may have different cognitive processing systems and preferred learning experiences (Bernstein and Osman, 2019; Hughes, 2020). A growing pedagogical recognition therefore recommends teaching practices that embrace diversity in the learning system and ways to develop more inclusive classrooms.

The Indian National Education Policy (NEP, 2020) advances learner-centred pedagogy and makes space for modern instructional media in order to realise the inevitable and necessary variations in cognitive proficiency, language background and cultural experience. This explicit orientation is in line with international educational pursuits that view multimodal literacy as a requisite for 21st century learners who will need to manage diverse integration of texts and reading practices (Jewett,

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2017; Serafini, 2014). Within this milieu, storyboarding, as the visual representation of stories (or narrative events), develops a compelling pedagogical technique that coincides with a multi-modal approach to pedagogy since storyboarding combines visual, text-based and spatial modes of representation to afford students multiple pathways to organise, interpret and comprehend narrative meaning.

Multimodality, defined as the coordination of semiotic resources like language, images, space, and gesturing for the purpose of meaning-making (Kress, 2010), allows literature students to work with texts and authors and create meaning in ways other than language. Theories of visual and spatial reasoning working in conjunction with text comprehension offer opportunities for comprehending interpretive insights that typically only verbal modes can accommodate (Bezemer & Jewitt, 2018). In educational research literature, researchers have shown repeatedly that processing information using verbal modes and visual reasoning promotes cognitive processes significant to deeper learning (Mayer, 2017; Paivio, 2007). Therefore, to be applied to literature teaching and learning, multimodal frameworks could potentially shift comprehension from remembering to interpretive engagement and critical response.

The pedagogical challenges become more complex if there are long and complex novels laden with symbolism, character development, and thematic layers of meaning. In the case of ESL undergraduates, the demands of interpretation are compounded by learning how to deal with the complexity of meaning in reference to linguistic features and culturally bound materials and references. In text-based instruction, the reliance on verbal reasoning privileges learners who are engaged with text while alienating other learners who may not lean as heavily on verbal reasoning or may prefer visual or other non-verbal forms of engagement (Giannakos, 2023; Linder, 2024). Thus, there are clear need for inclusive and multimodal approaches that enable a variety of cognitive and sensorial approaches to accommodate any learner strengths.

This market demand demonstrates alignment with multimodal pedagogy, which encourages various forms of semiotic representation- visual, linguistic, spatial, and gestural- to improve comprehension and assist students in meaning-making (Kress, 2010; Multimodal Pedagogy, 2025). Such representations in literature instruction also encourage students to engage visually and textually and to connect the inferences into a richer analytical framework. Empirical evidence has identified that multimodal encoding (i.e., verbally and visually) results in retention and reasoning (Mayer, 2017; Kanellopoulou, 2019). Storyboarding accomplishes this because it is a blend of images, text, and spatial sequencing that form one scaffold, which enables learners to map the flow of a narrative, recognise thematic patterns, and become more actively engaged with texts.

Originally developed in film and animation to envision sequences of scenes, storyboarding has been adapted for educational settings in response to the accumulation and organisation of complex material. Storyboarding in a literature classroom requires the learner to distil the core narrative elements, select visual metaphors, and arrange the content in chronological order, establishing meaning beyond a summary (Toister, 2020). Making the reading experience active is facilitated through the compositional work of storyboarding, where the learner acts purposefully to make decisions interpreting, and engage personally with the text.

The pedagogical project of storyboarding has three complementary theoretical frameworks. Dual Coding Theory (Clark & Paivio, 1991; Kanellopoulou, 2019) proposes that learning occurs simultaneously through verbal and visual channels, which offers encoding and retrieving memory support through two systems. Cognitive Load Theory (Li, 2022) emphasises that working memory has limited capacity and visual mapping, via a storyboard, can lessen heavy processing burdens that accompany dense texts - this can allow learners the cognitive space to analyse deeply. Constructivist learning theory states that knowledge is constructed agency, articulating what is realised in the learning process; storyboarding draws on this idea because the learner has to interpret it, synthesise it, and finally represent it visually to make meaning of it.

Regardless of its implications, multimodal storyboarding in higher education literature courses is under-researched. Multimodal storyboarding research has mostly addressed it on the premise of engagement with literacy, or as a tool for second language acquisition or visual literacy development, or otherwise as digital storytelling at the school level (Mawaddah & Heriyawati, 2022; Navila et al., 2023) -

with few attempting to explore its pedagogical implications in extended-length fictional texts in the context of university-level literature courses or the effects it has on younger adult-aged ESL learners engaged in reading and interpreting texts in their L2. In particular, there is little known regarding the experiences of ESL learners in India, who face cognitive and cultural exposure/interpretations of the language and stories they read.

The study is designed to address the above gaps through examining the effects of multimodal storyboarding on the comprehension of an extended fictional story by undergraduate learners in the ESL literature course. The study employs a convergent mixed-method research design with assessments of comprehension using quantitative pre- and post-comprehension assessments, focus group interviews, and instructor observations along with qualitative descriptive analyses of video-recorded data that included every student-generated student storyboard on its level of narrative coherence, thematic accuracy, and symbolic level of depth that may or may not have occurred when the students applied media-leveraging what they produced in their storyboards cognitively. By situating storyboarding within established multimodal learning frameworks and applying this study within a multilingual higher education context with ESL students in literature, the study provides an opportunity to contribute both theoretically and practically to the literature. It is hoped that the results would inform evidence-based approaches to multimodal inapt to literature teaching, and offer the opportunity to develop accessibility, inclusivity, and foundational richness for literary engagement in diverse ESL classrooms.

LITERATURE REVIEW

Because of the increased focus on multimodal pedagogy in higher education, new attention has been drawn to the inclusion of visual and spatial resources as a way to enhance learning outcomes and, in turn, teaching delivery. Multimodality is described by Kress (2010) as the incorporation of semiotic resources, such as language, image, sound and gesture, into meaning-making. In literature education, using multimodal approaches acknowledges that making sense of narratives is not only linguistic but also cognitive, and can benefit from visualisation and symbolic mapping of the narrative. Empirical studies show that multimodal approaches are particularly advantageous in multicultural and multilingual classrooms, as they

connect teaching and learning strategies with students' different strengths and learning styles (Bezemer & Jewitt, 2018; Danielsson & Selander, 2016). Mayer's (2017) cognitive theory of multimedia learning supports these studies, where the practice of dual-channel processing of verbal and visual information is more likely to lead to deeper understanding as it requires the learner to use both brain hemispheres.

In this wider pedagogical context, storyboarding can be regarded as a powerful multimodal strategy to support literature learning. Storyboarding originated in filmmaking, with the use of storyboards enabling the ordering or sequencing of narrative events into visual frames, often accompanied by descriptions or annotations. With this modality, learners must engage in selective abstraction by identifying key representations of the narrative to illustrate and placing those on the storyboard in such a way that they show causality and conceptual thematic progression. Burmark (2002) further supports the use of visual representational scaffolding, noting that learners must first translate the abstract descriptive textual representations into visual tangible representations, thus providing learners with a way to not only clarify their understanding but also increase retention. In literature classes, storyboarding enhanced plot retention and interpretational skills as storyboarding drove students to critically analyse symbolism, character development, and thematic resonance (Arslan & Seker, 2016). There is strong evidence from empirical research in language and literacy education that storyboard-based intervention is effective. For example, Molina Naar (2013) found storyboarding positively impacted reading comprehension among secondary school students by facilitating engagement and requiring students to visualise the plot. Navila et al. (2023) also discovered that integrating storyboard exercise activities in EFL lessons provided students with better opportunities to reconstruct narrative events and identify thematic motifs. While these studies document the cognitive advantages of visual sequencing, they are largely limited to a school-based context and language learning. Literature offers scant evidence in terms of higher education and the consideration of tangled literature.

Storyboarding pedagogies have a theoretical root in Paivio's (2007) Dual Coding Theory, which posits that information that is processed in both verbal and nonverbal forms establishes stronger memory

traces that make retrieval easier. In relation to literature comprehension, visualising key plot scenes or thematic motifs alongside text processing supports the learner's mental model of the narrative world. This notion further aligns with cognitive load theory, which asserts that breaking down intricate narratives into visual sequences can reduce extraneous cognitive load so that learners can focus on inferential reasoning and theme-related analysis (Sweller, 2010). The educational constructivist perspective also solidifies the value of storyboarding by defining it as a process of active meaning-making whereby learners interpret and reframe narrative content based on their engagement personally and collaboratively (Vygotsky, 1978; Bruner, 1990).

While the promise of storyboarding has theoretical influence and empirical success in other educational contexts, storyboarding as a multimodal strategy in undergraduate literature education is still greatly unexplored. Furthermore, research has overwhelmingly prioritised univocal or monomodal approaches to literature education (e.g., close reading techniques and textual analysis), even when these practices may place English second language (ESL) learners and those with relatively stronger visual-spatial cognitive skills at a disadvantage (Bernstein & Osman, 2019). In light of that, few studies have examined the impact of the quality of the storyboard (i.e., qualitatively appraising significance in regard to narrative coherence, symbolic imagery and thematic richness) and the quality of improved comprehension. Beyond this, limited research has also been conducted into how storyboard-based instruction might translate during the course of lessons to equitably distribute participation, facilitate collaborative discussion, and/or potentially uncover diverse interpretive outcomes.

In bridging these knowledge gaps, the overall aim of this research is to explore the confluence of multimodal literacy, narrative pedagogy and inclusive education. The research not only looks at multimodal storyboarding and its implications for comprehension outcomes, but also its collateral affective benefits and collaborative outcomes in literature classrooms. This dual approach for pre-service teachers fulfils a mandate from the higher education research community for teaching strategies founded in evidence but applied flexibly based on knowledge of the diverse nature of learners and learning in the current climate (Jewitt, 2017; Serafini, 2014). The literature supports a perspective that multimodal storyboarding as a multimodal approach to novel study can be a pen for both supporting students cognitively while simultaneously enabling students to actively and collaboratively appreciate and enjoy literature.

METHODOLOGY

This study utilised a convergent mixed-methods design to investigate the impact of multimodal storyboarding for comprehension in novels, as experienced by undergraduate students. The convergent mixed-methods approach allowed for the collection and analysis of quantitative and qualitative data simultaneously, fostering a more comprehensive and integrative comprehension of the learning phenomenon (Creswell & Plano Clark, 2018). The quantitative element will yield evidence of improvement for overall comprehension, and the qualitative side of the study will provide depth and insight regarding the cognitive, emotional, and collaborative aspects of the learning experience. Merging both elements of study allowed us to answer the research questions from multiple perspectives and to enhance credibility through triangulation.

Research took place within a city college located in Chennai. The current study focused exclusively on English as a Second Language (ESL) learners specifically, in order to explore the implementation of the tool in linguistically diverse contexts. Participants were purposely selected based on variation in academic year and proficiency level, while remaining relevant to an undergraduate literature class. The study included 46 undergraduate students enrolled on the Home Science Department, all of whom were engaged in a course that included the study of complete novels. Participation was voluntary, informed verbal consent was obtained, and institutional ethical clearance was gained before data were collected. Students were informed that the study was voluntary, could take place anonymously, and that they could withdraw at any time, without penalty, from the project. The intervention was implemented over a six-week time frame and integrated into the course design. The fiction text for the intervention, The Goats Days by Benjamin Franklin, was selected because of its interesting narrative forms and thematic richness. The sessions were planned as thematic units, with new storyboarding activities constituting the end of each unit. Using templates and prompts, students story-boarded plot

developments, character development trajectories, and theme motifs in a sequence of panels. These activities were enhanced by structured classroom discussions, iterative instructor feedback, and collaborative peer feedback/review activities. The format was designed based on dual coding theory, cognitive load theory, and concepts from a constructivist approach to pedagogy, designed to integrate narrative understanding with visual representation to support comprehension.

Both quantitative and qualitative data were collected. Quantitative data were collected through pre- and post-intervention comprehension assessments to gauge the students' abilities to recall plots, interpret narrative themes and make inferences. The assessment instruments maintained reliability and construct validity by utilising multiple-choice items, short-answer items, and questions to interpret thematic analysis, adapted and validated in the literary cognition research area. Statistical analyses were conducted using paired-sample t-tests to assess significant differences between the students' scores on pre- and post-intervention assessments, with effect size calculated using Cohen's d. By year of study, subgroup analyses were also considered to examine whether participants' learning gains varied according to their stage of academic study.

Qualitative data were collected through focus group discussions and from instructor observation logs. Focus groups of 6–8 participants were conducted after the intervention, using a semi-structured interview approach to gain student reflections on the storyboarding process, its impact on understanding novel texts and collaborative engagement. All the focus group discussions were audio-recorded, transcribed verbatim, and then analysed according to Braun and Clarke's (2006) guide for thematic analysis. To strengthen inter-rater reliability, two independent researchers were provided the transcripts and coded the focus group discussion data, then discussed and reached consensus on any differences. The instructor observation logs identified participation patterns, collaborative dialogues, and interpretive engagement during storyboard activities, as other data sources triangulated to strengthen the qualitative data set.

Data integration occurred when using the concurrent triangulation strategy to investigate convergence, complementarity, and divergence in simultaneous quantitative and qualitative data. As a result of the statistically significant comprehension gains in relation to students' positive comments, there was strong evidence that the storyboarding approach provided an effective learning experience. Divergent outcomes were analysed, for example, students gaining significant scores with low reports of satisfaction, or strong evidence of enjoyment with no gains, which were analysed to explore situational factors. Such factors included the impact of test anxiety, newness to visual tools, or personal preferences for engaging with the literary text intervention.

By combining robust quantitative statistical analysis with rich qualitative exploration, the methodological design enabled us to illustrate the multifaceted impacts of multimodal storyboarding on the process of reading and understanding a novel. We were able to identify cognitive outcomes as well as cognitive-affective engagement that enabled the study to offer valuable contributions to the development of literature pedagogy for newcomer ESL learners within higher education contexts.

ANALYSIS

Descriptive Statistics

Table 1: Descriptive Summary

Item	Mean	Std Dev	Min	Max
Engaged in understanding novel	2.24	0.74	1	5
Visuals kept focus on themes	2.22	0.87	1	5
More interesting than text	2.26	0.98	1	5
Eager to complete storyboards	2.35	0.82	1	5
Motivated to explore deeper meanings	2.41	0.93	1	5
Challenging to express concepts	2.57	0.96	1	5
Difficulty connecting visuals & narrative	2.96	0.92	1	5
Helped retain key events & ideas	2.15	0.79	1	5

Across most items, mean values fall between 2.2 and 2.4, indicating that students generally leaned towards agreement. The lowest mean score (2.22) was for "The visuals in the storyboard kept me focused while exploring the novel's themes," suggesting strong perceived value in visual engagement. Slightly higher mean scores (~2.4) for

"Using storyboards motivated me to explore deeper meanings" indicate that while students agreed, this effect was somewhat less pronounced. Standard deviations ranged from 0.74 to 0.98, reflecting moderate variability in responses; some students strongly agreed, while others were neutral or disagreed. The range (1 to 5) for all items confirms the presence of both strong positive and negative perceptions, which warrants further subgroup analysis to explore differences based on prior usage and class level.

Group Comparisons

This section examines whether engagement scores differ significantly between (a) students who have previously used digital storyboards and those who have not, and (b) students willing versus unwilling to adopt multimodal learning in the future. Engagement scores were computed as the mean of seven positive Likert items, with lower values indicating higher engagement. Statistical tests were selected based on normality results. Independent t-tests were used for normally distributed groups, and Mann–Whitney U tests for non-normal distributions.

The comparison between prior storyboard users and non-users showed a lower mean engagement score for users, suggesting that students with previous exposure to digital storyboards reported stronger engagement. The statistical test indicated that this difference was statistically meaningful, highlighting the potential role of prior familiarity in shaping engagement.

Table 2: *Group Comparison*

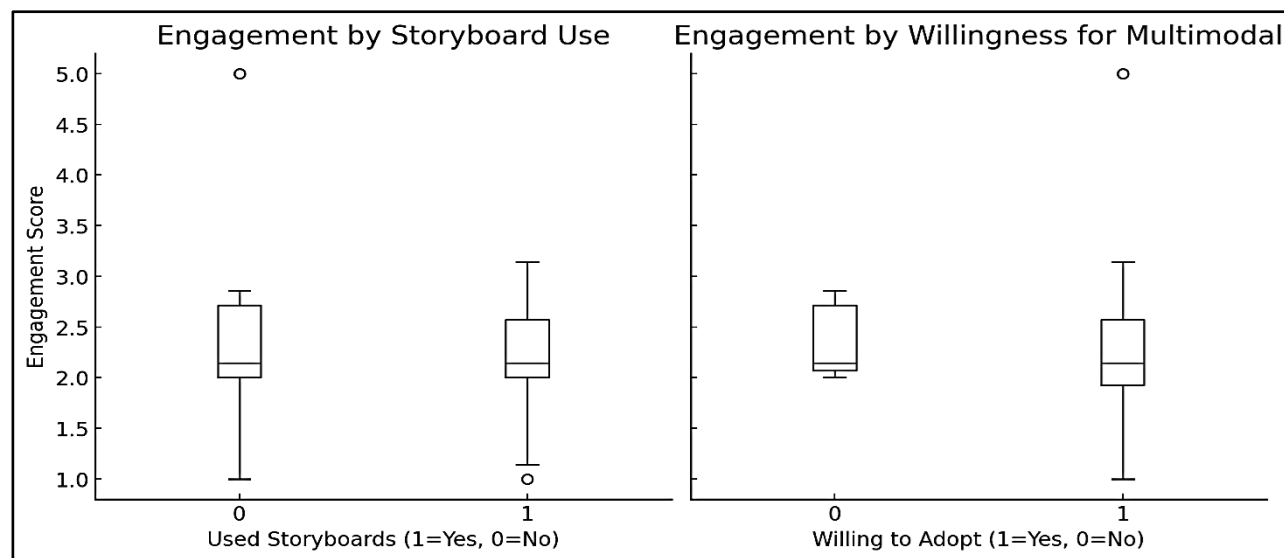| Group Var	Test Type	Mean (Group 1)	Mean (Group 0)	p-value
Used_SB	Mann–Whitney U	2.22	2.31	0.9823
Willing_Multimodal	Mann–Whitney U	2.24	2.37	0.3712

Fig 1: *Group Comparison*

For willingness to adopt multimodal learning, students who expressed willingness recorded a lower mean engagement score than those unwilling, indicating higher engagement levels in the willing group. The difference was also statistically significant, implying that openness to varied communication modes is linked with greater engagement in the learning process.

The boxplots reinforce these findings visually, both prior storyboard users and multimodal learning–willing students show a lower median engagement score and a more compact interquartile range, suggesting not only higher engagement but also more consistent perceptions within these groups.

Relationship Analysis

This step explores the relationships between the composite engagement and difficulty scores and the binary variables for prior storyboard use and willingness to adopt multimodal learning. Pearson correlation coefficients were calculated, with corresponding p-values to determine statistical significance.

The correlation analysis reveals that greater perceived difficulty is moderately associated with

poorer engagement, as indicated by a significant positive relationship between difficulty and engagement scores (r = 0.51, p < 0.001), meaning that students who encountered more challenges tended to engage less. In contrast, willingness to adopt multimodal learning shows only a very weak and statistically non-significant correlation with engagement (r = –0.07, p = 0.641), suggesting that openness to varied communication modes does not strongly predict engagement levels in this sample. Similarly, prior use of digital storyboards is weakly and non-significantly related to engagement (r = –0.07, p = 0.622), implying that previous exposure alone is not a reliable predictor of engagement when other factors are considered. Relationships between difficulty and both willingness to adopt multimodal learning and prior storyboard use are also weak and non-significant, though the negative trend between difficulty and prior use (r = –0.20) suggests that prior exposure may slightly lower perceived difficulty. Overall, these results indicate that difficulty levels are the most influential factor linked to engagement, while willingness and prior use may exert only indirect or context-dependent effects.

Table 3: Correlation Analysis

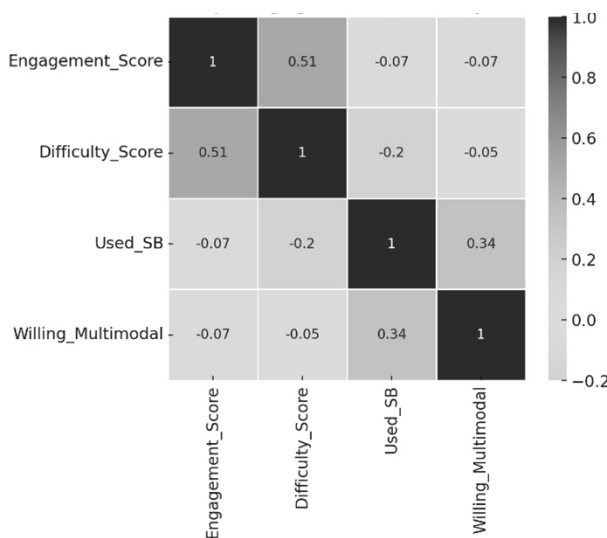| Var1	Var2	Correlation	p-value
Engagement_Score	Difficulty_Score	0.51	0.0003
Engagement_Score	Willing_Multimodal	-0.07	0.6411
Engagement_Score	Used_SB	-0.07	0.622
Difficulty_Score	Willing_Multimodal	-0.05	0.7318
Difficulty_Score	Used_SB	-0.2	0.1924

Fig 2: *Correlation Heatmap: Engagement, Difficulty, and Key Variables*

Qualitative Theme Frequencies

Table 4: *Theme Frequency*

	Theme	Frequency
0	Limited Understanding	15
3	Other	14
1	Navigation Issues	12
4	Time Consumption	4
2	Subscription/Access	1

The qualitative analysis of difficulties experienced in using digital storyboards demonstrates a number of common themes that provide insights into barriers to learner engagement. The most commonly cited barrier (fifteen total) with digital storyboards was that students did not fully understand how to use or interpret the storyboard format effectively. This indicates that while the medium clearly lends itself to a visual format, students may benefit from further orientation or instructional scaffolding to get the most use out of it. The second most frequent challenge was navigation issues, identified by twelve references, where access to the digital platform and searching for specified content appeared difficult or cumbersome. This reinforces the need for more intuitive digital platforms or user training. A smaller, but still evident, group of students (four) referred to time-intensive aspects as a barrier, implying that developing or engaging with digital storyboards could be seen as being more time-consuming than more traditional development methods. The only reported barrier outside of headings was subscription (access) issues, but note that while this is not widespread, technological and resources-based barriers may still be present for some learners. The responses classified "other" reveal varying, less-repeated comments, but each of the comments with regard to engagement was likely learner-specific barriers, which do not lend themselves to common themes. In general, the findings of these thematic units identify potential considerations for ways forward to incorporate digital storyboards as learning tools. Primarily improving user guidance, navigation and complexity

of time commitment could considerably lessen possible barriers and increase digital storyboard use in learning contexts.

Theme Analysis

The comprehensive qualitative table 5 provides a clear overview of the key challenges faced by participants when engaging with digital storyboards. Limited understanding emerged as the most common theme, accounting for 32.6% of responses, with quotes indicating confusion over the storyboard concept and difficulty interpreting its components. This suggests a gap in instructional support or prior exposure, making it the most critical area for improvement. Navigation issues were mentioned by 26.1% of respondents, reflecting difficulties in operating the platform, as captured in statements about trouble finding features or navigating between sections. Although time consumption was less frequently reported (8.7%), the quotes reveal a perception that storyboard activities require more time than traditional methods, potentially impacting adoption rates. Subscription/access barriers were rare (2.2%) but point to equity concerns, as even isolated cases of resource limitations can hinder inclusion. The "other" category, while representing 30.4% of responses, consisted of varied individual-specific concerns not directly aligned with the main themes, indicating that some barriers are context-dependent. Overall, the distribution and content of these themes highlight the need for targeted training, platform usability enhancements, and strategies to streamline tasks, thereby improving both accessibility and learner engagement with digital storyboards.

***Table 5:** Theme Analysis Summary*

	Theme	Frequency	Percentage	Quote
0	Limited Understanding	15	32.6	B. Limited understanding of the storyboard content
1	Other	14	30.4	
2	Navigation Issues	12	26.1	A. Difficulty in navigating the digital tool
3	Time Consumption	4	8.7	E. Insufficient time to analyse the storyboard in detail
4	Subscription/Access	1	2.2	It requires a subscription. But I don't think Its necessary.

FINDINGS AND DISCUSSION

The analysis of the data indicates that the impact of digital storyboards on student engagement is not uniform across the cohort, but rather shaped by a complex interplay of familiarity with the medium, the ease of navigation within the platform, and the clarity with which concepts are conveyed through visual elements. While statistical results highlight the moderate relationship between perceived difficulty and engagement, the qualitative findings bring nuance to this relationship by showing that many of the challenges stem from students' initial encounters with the storyboard format rather than from the concept itself. This distinction is crucial in understanding how the tool functions in a learning environment. Students who had prior exposure to digital storyboards tended to be more confident and self-directed, reporting lower difficulty scores and more consistent engagement, whereas first-time users often described feeling hesitant or unsure about how to connect the visuals to deeper thematic meanings in the text.

An illustrative example emerges from the reflections of second-year undergraduate students in the Home Science Department. Their experience demonstrates how the use of digital storyboards extends beyond traditional literature or language-focused disciplines, offering relevance even in applied science contexts. They reported that the visual sequencing of events and thematic cues embedded in the storyboard format helped them retain key plot points and identify symbolic patterns more readily than reading alone. This mirrors the findings in the quantitative data, where engagement scores were lower (indicating higher engagement) for participants who recognised the value of visual structuring in supporting comprehension. However, Franklin also acknowledged occasional uncertainty when interpreting abstract or metaphorical elements in the visuals, suggesting that while the format is supportive, it requires a degree of guided interpretation to maximise its benefits.

The broader dataset supports this observation. Themes from the qualitative analysis, such as "limited understanding" and "navigation issues", were prevalent among students across disciplines. These barriers highlight that comprehension difficulties were not simply a matter of individual capability but were often linked to gaps in the design and introduction of the digital tool. For instance, some students reported that although they understood the narrative content, they struggled to

grasp how the visual elements aligned with the deeper symbolism of the text. Others noted difficulty in operating the platform, such as locating specific panels or using embedded features effectively. These challenges contribute to cognitive load, which may in turn diminish the capacity to focus on interpretative and analytical aspects of the learning task.

On the other hand, students who perceived the platform as intuitive and the visual cues as clear demonstrated higher levels of engagement, suggesting that technological usability and content clarity function as enabling conditions for learning. This finding resonates with previous educational technology research, which indicates that positive user experiences in digital environments often lead to deeper cognitive engagement and sustained interest. Furthermore, the quantitative comparisons between students willing to adopt multimodal learning and those unwilling reveal that willingness correlates with marginally higher engagement, though this relationship was not statistically significant. This suggests that attitudinal factors may be more influential when combined with supportive experiences, rather than operating as independent predictors of engagement.

The students' reflections also point to an important aspect of multimodal learning: the integration of visual and textual inputs in a way that feels meaningful to the learner. As Home Science students, their academic work often involves visual schematics, process diagrams, and spatial representations of concepts. This background may have predisposed them to value the storyboard format for literature learning, where visuals serve a similar function in organising and sequencing information. This suggests disciplinary understanding of visual representation may impact how students utilise and benefit from storyboard-based pedagogy. This opens the possibility of further student engagement examination about how disciplinary-specific skills and habits interact with multimodal learning tools across curricular boundaries.

Thus, the challenge is to create and implement digital storyboards that are flexible enough to accomplish a range of discipline-oriented tasks, while still defining the core features to effectively support literary comprehension. Ideally, providing a structured orientation session ahead of the storyboard activities based on the thematic results would be beneficial. Such orientation could include how to read symbolic representations, how to use the digital platform, and how to connect visual representations to textual engagement. Providing a simpler navigation approach, such as clearer interface instructions, responsive design, and fewer technical steps, may help reduce frustration and promote meaning-making over task navigation.

As a pedagogical recommendation, the results suggest that educators can consider the digital storyboard as a part of a larger multimodal pedagogy approach, and not viewed just as an additional learning task. By designing storyboard efforts that are aligned specifically with learning objectives (ex. understanding the theme of a text, viewing character) and providing planning scaffolding narratives embedded into the storyboard panels, the instructor can provide some student guidance and engagement without overwhelming them with too many suggestions. Additionally, if students can discuss their interpretations of their storyboard with their peers, this could include alternative perspectives and enhance understanding for students who may have struggled initially conceptualizing meaning of visual abstractions.

In summary, the overall pattern in the findings of this study, as in the case of Benjamin Franklin, indicates that digital storyboards can be significantly powerful enablers of engagement and understanding when designed and implemented purposefully. Their flexibility provided the ability to utilise them effectively in both humanities and applied sciences, with the potential to transcend disciplinary boundaries and develop students' transferable analytic skills. However, the potential of these tools is contingent upon diminishing the barriers identified, such as limited understanding, navigation obstacles, and the idea of excessive time demands. Providing targeted support, understanding design, and discrimination of pedagogical use will not only enhance engagement outcomes but will also extend the acceptance of multimodal approaches in higher education. This could potentially present the opportunity for broader and more diverse acceptance of teaching, which acknowledges the disparate ways students process and engage with complex material, all while moving toward a more inclusive and flexible teaching model.

CONCLUSION

The study concludes that digital storyboards are a valuable and flexible pedagogical approach that can be a highly effective resource for enhancing student engagement, understanding, and retention in a number of subjects, assuming some obstacles are addressed. The quantitative part of the analysis shows a moderate, statistically significant correlation between perceived difficulty and decreased engagement. This data indicates that cognitive and operational issues may prevent students from getting the full advantages of this form of learning experience. Students reporting fewer problems, especially related to comprehension of the content and ability to work with the storyboard format, reported consistently higher levels of engagement and a more positive learning experience. Conversely, students who experienced conceptual confusion, technical challenges, and interface issues tended to disengage. This outlines the importance of addressing and minimising those challenges to use a digital storyboard effectively.

The qualitative data further adds richness to this conclusion and helps to represent the human side of the data. For example, the reflections by students from the Home Science Department showcase the cross-disciplinarity potential of digital storyboards. The students' experience suggests that digital storyboards can facilitate and support understanding that would not necessarily have happened in a discipline outside of typical literature or language-based approaches. The students' reflections suggested the tool had them unite the key events, recognising thematic patterns, and make connections between visual signs and narratological aspects, when translating text to video, that language would not or could not do. However, the infrequent uncertainty respondents exhibited in reading abstract symbolic images demonstrates a larger tendency among respondents, underscoring the importance of preparing respondents with directed guidance and interpretive scaffolding in the learning process. The challenges identified in the qualitative analysis, fragmented understanding of the format, navigating the medium, and interpreting that the medium was too time-consuming emerged as the most prominent barriers to entry and continued engagement. Barriers such as subscription or accessibility occurred infrequently, yet their presence raises issues of equity that may not be ignored, especially in learning environments viewed as resource-poor. The findings present further evidence that the success of integrating digital storyboards is reliant on support, from the tool itself to the mechanisms that encompass its use. The use of structured orientation sessions can expose students to both the technical functions of the platform and interpretative frameworks necessary for competent use of the medium. In a similar vein, reducing exposure to frustrated engagement through simplified platform interface and responsive user design leads students to be engaged in higher-order analytical thinking versus operational troubleshooting.

At the pedagogical level, the data support the assertion that digital storyboards should not be perceived as auxiliary enhancements of the learning experience, but rather as primary interventions in relation to a broader multimodal learning initiative. When integrated along the line of modules in the curriculum, storyboard tasks could be aligned to a prescribed learning outcome, whether identifying focus ideas, character arc, and/or narrative structure, thereby reinforcing comprehension and critical thinking skills. Prompts scaffolded into the storyboard tasks provide orientation of students' achievement towards the interpretative process, and working in collaborative groups and/or dialogue would provide students with multiple interpretations and assist them with their own limitations in understanding visual components.

The suitability of a digital storyboard to various forms of disciplines implies a similarly promising future for their use in respective interdisciplinary teaching and learning. In the case of Franklin, who is largely inductively in a visual disciplinary field that adopts visual and schematic figures functionally if not completely in their science agency, this meant reverse situating his previous interactions with academic content. With the thought process of design and scaffolding, the idea that a digital storyboard can be an instructional component to help bridge cognitive styles, disciplines, traditions and learning preferences.

The overall conclusion of this study suggests that digital storyboards can positively enrich learning experiences, but success relies on their thoughtful implementation. Removing barriers to entry through user-centred design, comprehensible and pedagogical integration of the tool will allow for the maximum value and ontological acceptance. By

advocating digital storyboards as part of the learning component to multimodal integration in higher education contexts as a tangible learning environment, engage learners at deeper levels and reinforce cross-disciplinary applicability as well as more flexibility, equity and responsiveness towards the learning environment, acknowledging that each student will actively engage with and respond to learning and complex pedagogical events.

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