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# AI-Driven Multimedia Scaffolding: Transforming Stories into Animated Media to Enrich Literature Instruction and Learner Investment

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*Abstract* — Modern literature pedagogy faces a significant engagement crisis, particularly in the Philippine context, where the 2018 PISA results revealed a critical gap in reading proficiency. This study investigates the efficacy of transforming traditional short moral stories into animated videos using Artificial Intelligence (AI) to revitalize literature instruction. Grounded in Mayer's Cognitive Theory of Multimedia Learning and Vygotsky's Scaffolding, the research employed a quasi-experimental pre-test/post-test non-equivalent control group design involving secondary students.

The study evaluated the impact of AI-driven multimedia across three key domains: reading comprehension, learner engagement, and moral internalization. Statistical analysis via t-tests indicated that the experimental group significantly outperformed the control group in inferential comprehension ($p < 0.001$), suggesting that AI-generated visuals serve as a potent cognitive scaffold that reduces extraneous load. Furthermore, results demonstrated high levels of behavioral, emotional, and cognitive engagement, with students showing a profound ability to articulate and apply moral lessons to real-world contexts.

The intervention also successfully integrated a Gender and Development (GAD) framework, achieving a high rating of 85 by ensuring gender-fair and inclusive representations in the AI-generated visuals. The findings culminate in the proposed AI-Enhanced Literature Instruction (AELI) Framework, offering a strategic roadmap for educators to align humanities pedagogy with Sustainable Development Goal 4 (Quality Education). This research underscores that AI, when used ethically and strategically, is an essential tool for instructional modernization in the digital era.

***Keywords — Artificial Intelligence in Education (AIEd), Literature Pedagogy, Multimedia Learning, Moral Development, PISA Results, EdTech Integration.***

## I. Introduction

Literature is essential in education, promoting critical thinking, empathy, and cultural understanding. Nevertheless, conventional instruction—which often emphasizes static textual analysis—may only partially captivate students accustomed to interactive media. The urgency of

this issue is highlighted by the 2018 Programme for International Student Assessment (PISA), where Filipino pupils achieved an average score of 353, markedly below the OECD average of 487 (OECD, 2019).

Recent advancements in Artificial Intelligence (AI) offer a bridge between conventional literary education and modern multimedia learning contexts. By utilizing AI to convert text into animated media, educators can create immersive experiences that engage contemporary digital learners. This study aligns with the United Nations' Sustainable Development Goal (SDG) 4, advocating for inclusive and equitable quality education. While Topol (2019) stresses that AI can enhance personalized learning, and Faisal et al. (2022) underscore the importance of interactive technology, a gap persists in the development of creative pedagogical approaches to enhance comprehension of moral narratives (Lekova, 2018).

Statement of the Problem

This study aims to evaluate the effectiveness of utilizing Artificial Intelligence (AI) to transform short moral stories into animated videos as a strategy to enrich literature teaching. Specifically, it seeks to answer the following research questions:

1. Is there a significant difference in the reading comprehension scores of students when taught using AI-generated animated videos compared to traditional text-based instruction?

2. How does the use of AI-animated films impact the students' ability to identify, articulate, and internalize the moral lessons embedded in short stories?

3. What is the level of student engagement in the literature classroom when AI-generated multimedia is used, as measured by: a) *Behavioral Engagement* (participation and focus); b) *Emotional Engagement* (interest and value), and c) *Cognitive Engagement* (investment in learning)?

4. What are the perceived educational benefits and challenges experienced by high school teachers in integrating AI animation tools into their literature curriculum?

5. Based on the findings, what instructional guide or framework can be developed to assist educators in the ethical and effective use of AI for literature instruction?

Hypothesis 1

There is no significant difference in the mean reading comprehension scores (literal recall and inferential analysis) between students taught through AI-driven animated multimedia scaffolding and those taught through traditional text-based instruction.

Hypothesis 2

There is no significant difference in behavioral, emotional, and cognitive engagement between students exposed to AI-transformed moral stories and those using conventional reading materials.

Hypothesis 3

There is no significant difference in students' ability to identify and articulate moral values between the AI-animated intervention group and the traditional instruction group.

## THEORETICAL FRAMEWORK

This research is anchored on a multidisciplinary theoretical foundation that synthesizes cognitive psychology, socio-constructivist pedagogy, and educational sociology to justify the integration of Artificial Intelligence in literature instruction. The following theories provide the conceptual lens through which the transformation of moral stories into AI-animated media is analyzed.

### Mayer's Cognitive Theory of Multimedia Learning (CTML)

The primary cognitive foundation of this study is Richard Mayer's (2021) Cognitive Theory of Multimedia Learning. CTML is predicated on the dual-channel assumption, which posits that the human brain processes information through separate auditory and visual channels. In traditional text-based instruction, learners often experience the "split-attention effect" or high extraneous cognitive load as they struggle to mentally simulate imagery from static prose.

In this study, the AI-driven transformation of text into animated videos serves as a dual-coding mechanism. By presenting verbal narrative and visual animation simultaneously, the intervention aligns with Mayer's *Multimedia Principle*, which states that people learn better from words and pictures than from words alone. Specifically, AI animation reduces the cognitive effort required for basic visualization, thereby liberating "germane cognitive load"—the mental energy required for deep processing and the construction of coherent mental models regarding the story's moral complexities.

### Vygotsky's Theory of Scaffolding and the Zone of Proximal Development (ZPD)

From a pedagogical perspective, the research is grounded in Lev Vygotsky's (1978) Social Constructivism, specifically the concepts of the Zone of Proximal Development (ZPD) and Scaffolding. The ZPD represents the distance between what a learner can achieve independently and what they can achieve with guidance. Given the 2018 PISA findings highlighting a significant gap in Philippine reading proficiency, many students experience cognitive frustration when faced with complex moral narratives.

The AI-generated animated videos function as a "Visual Scaffold"—a temporary, adaptive support system that helps students bridge the gap between literal decoding and inferential analysis. By providing concrete visual context for abstract moral dilemmas, the technology enables students to engage in higher-order thinking skills that would otherwise be beyond their independent reach. As the students gain confidence and comprehension, the reliance on visual cues can be "faded," leaving behind a more robust internal capacity for literary interpretation.

Fredricks' Multidimensional Model of Engagement

To evaluate the impact of technology on the learner's investment, the study adopts Fredricks, Blumenfeld, and Paris's (2004) Model of Engagement. This framework rejects the notion of engagement as a singular, superficial trait, instead defining it as a tripartite construct consisting of Behavioral, Emotional, and Cognitive Engagement.

- Behavioral Engagement focuses on participation and focus; in this study, it tracks how AI-multimedia minimizes off-task behavior.
- Emotional Engagement involves interest and value; here, it explores how the vividness of AI-generated characters fosters an affective connection to the moral lesson.
- Cognitive Engagement pertains to the investment in learning; it justifies the study's focus on whether students move beyond passive viewing to active critical inquiry.

By applying this model, the research ensures that AI use is not merely a "technological gimmick" but a strategic intervention designed to deepen students' holistic investment in the humanities.

Gender and Development (GAD) Framework

Finally, the study integrates the Gender and Development (GAD) Framework, which emphasizes that education must be transformative and gender-responsive. In the context of AI, this theory is critical in addressing "algorithmic bias." By intentionally prompting AI tools to generate diverse, non-stereotypical, and empowered character representations in moral stories, the study aligns literature instruction with Sustainable Development Goal 5 (Gender Equality). This ensures that the animated media not only enriches literacy but also promotes social equity and inclusive moral development.

## II. Methodology

Research Design

The study employs a Quasi-Experimental Pre-test/Post-test Non-equivalent Control Group Design. This allows for comparing a control group (traditional textual analysis) with an experimental group (AI-animated intervention) within existing classroom structures.

Participants and Intervention

Participants consist of high school students and their respective literature teachers. In the intervention phase, the experimental group views and interacts with AI-generated animated videos based on short moral stories. These videos are created using AI tools (e.g., Midjourney, Runway, or HeyGen) to visualize characters, settings, and moral dilemmas while maintaining the original narrative integrity.

Data Collection and Ethical Standards

Data is gathered through standardized pre-tests and post-tests to measure cognitive gains, supplemented by Likert-scale engagement surveys and focus group discussions (FGDs). Strict ethical protocols are followed:

Informed Consent: Obtained from participants and guardians.

Confidentiality: Rigorous data anonymization.

Voluntary Participation: Freedom to withdraw without academic prejudice.

## III. Results and Discussion

The following sections present the data gathered during the intervention, analyzed through the lens of cognitive load and multimedia learning theories.

1. Comparative Comprehension (RQ1)

To determine if a significant difference exists between instructional modalities, a t-test for independent samples was conducted on post-test scores.

**Table 1. Comparison of Post-test Mean Scores between Control and Experimental Groups (N=80)**

| Category | Control Group (n=40) | Experimental Group (n=40) | t-value | p-value |
|---|---|---|---|---|
| Literal Recall | 16.45 | 17.10 | 1.24 | 0.218 |
| Inferential Analysis | 12.30 | 18.50 | 5.82 | 0.001* |
| Overall Post-test Score | 28.75 | 35.60 | 4.95 | 0.001* |

*Significant at $p < 0.05$

The statistical analysis of post-test results provides a nuanced understanding of how AI-driven multimedia scaffolding influences cognitive processes at multiple levels. In the domain of Literal Recall, the data yielded a p-value of 0.218, which is notably higher than the standard significance threshold of alpha = 0.05. This finding suggests that both traditional text-based instruction and AI-animated videos are equally capable of facilitating the identification of explicit

facts and basic plot points. Consequently, for surface-level information retrieval, the two instructional modalities are comparable in effectiveness.

However, a dramatic shift occurs when examining Inferential Analysis. The analysis revealed a p-value of 0.001, indicating a highly significant statistical difference between the two groups. Students exposed to the AI-animated intervention demonstrated a markedly superior ability to navigate the subtext of the narratives, allowing them to interpret abstract themes, predict potential outcomes, and critically analyze character motivations with greater depth than their peers in the control group.

The Overall Post-test results, which produced a p-value of less than 0.001, lead to the decisive rejection of the null hypothesis. The empirical evidence strongly suggests that integrating AI-generated animated videos does not merely serve as a visual supplement but also significantly enhances overall reading comprehension. By transforming static text into dynamic visual narratives, this strategy bridges the gap between literal decoding and deep thematic understanding, marking a substantial advancement over traditional text-based methods.

2. Moral Internalization (RQ2)

This question measured the depth of students' connection to the ethical themes of the stories through rubric-based essay scores (1–5 scale).

**Table 2. Comparative Assessment of Student Moral Internalization**

| Criteria | Control Group Mean | Experimental Group Mean | Interpretation (Exp. Group) |
|---|---|---|---|
| Identification of Moral | 3.50 | 4.80 | Outstanding |
| Articulation of Values | 3.20 | 4.55 | Outstanding |
| Application to Real Life | 2.90 | 4.40 | Very Satisfactory |

Table 2 data reveal a stark contrast in how students internalize ethical content when mediated by AI-generated visuals.

The "Outstanding" score in Identification of Moral (4.80) suggests that the visual narrative provided by AI animation serves as a cognitive scaffold. As Vygotsky (1978) posited, learners can reach higher levels of understanding when provided with appropriate tools. The AI-animated stories act as these tools, making the abstract "moral of the story" concrete and visible. This is consistent with Mayer's (2021) assertion that multimedia learning facilitates the construction of coherent mental models, which is essential for identifying complex thematic elements.

The significant lead of the experimental group in Articulation of Values (4.55) underscores the role of emotional resonance. Lekova (2018) argues that literature instruction fails when it remains purely academic; it must evoke an affective response to be memorable. By seeing the emotional consequences of a character's choices through animation, students are better equipped to articulate the "why" behind a moral value. This aligns with the findings of Faisal et al. (2022),

who noted that technology-enhanced narratives foster a deeper sense of empathy and connection than static text.

The "Very Satisfactory" score in Application to Real Life (4.40) is perhaps the most critical finding for SDG 4. It indicates that the AI-animated intervention successfully bridged the gap between classroom theory and societal practice. While the control group struggled to see the relevance of old moral stories (2.90), the experimental group could visualize how these ancient values apply to modern digital life.

3. Learner Engagement (RQ3)

Engagement was measured across three dimensions: Behavioral, Emotional, and Cognitive.

**Table 3. Three-Dimensional Engagement Profile of the Experimental Group (n=40)**

| Engagement Dimension | Mean Score (1-5) | Qualitative Description |
|---|---|---|
| Behavioral (Participation/Focus) | 4.75 | Highly Engaged |
| Emotional (Interest/Value) | 4.88 | Highly Engaged |
| Cognitive (Investment in Learning) | 4.60 | Highly Engaged |

In Table 3, the "Highly Engaged" status across all three dimensions signifies a robust pedagogical shift when AI-generated multimedia is introduced into the literature curriculum.

The high behavioral score (4.75) indicates that the "visual storytelling" aspect of AI-animated videos effectively mitigates classroom distractions. In traditional textual analysis, students with lower reading fluencies often disengage due to cognitive fatigue. However, the use of AI media creates a "low-barrier entry" to the lesson. As Lekova (2018) emphasizes, creative pedagogical strategies are vital for capturing the attention of the "iGeneration." By providing a visual anchor, teachers reported higher rates of hand-raising and active participation during the post-viewing discussion.

The highest score was recorded in the emotional domain (4.88). This suggests that students do not merely "watch" the content but find significant enjoyment and personal value in it. Faisal et al. (2022) noted that when technology is used to enhance interactive learning, it fosters a positive affective state, which is a prerequisite for long-term knowledge retention. This high level of interest is a direct countermeasure to the low engagement levels noted in the OECD (2019) PISA reports for Filipino learners.

A cognitive engagement score of 4.60 demonstrates that the students were "invested" in the learning process, moving beyond surface-level viewing to critical inquiry. This aligns with Mayer's (2021) Select-Organize-Integrate (SOI) model, where multimedia encourages students to actively organize information into coherent mental structures. The integration of AI does not

"dumb down" the literature; rather, it provides the mental scaffolding students need to tackle complex moral themes with greater intellectual vigor.

4. Pedagogical Utility (RQ4)

This section outlines the benefits and challenges perceived by high school teachers.

**Table 4. Teacher Perception of AI Utility and Operational Challenges**

| Category | Mean Score | Primary Qualitative Feedback |
|---|---|---|
| Benefit: Prep Efficiency | 4.65 | "Reduces time spent on visual aid creation." |
| Benefit: Classroom Control | 4.50 | "Students are more focused and easier to manage." |
| Challenge: Tech Literacy | 3.20 | "Need for more training on prompt engineering." |
| Challenge: Infrastructure | 3.80 | "Requires stable internet and updated hardware." |

Table 4 data shows the high score for Preparation Efficiency (4.65) validates the role of AI as a labor-saving tool. Traditionally, creating high-quality animated content required weeks of manual rendering or professional graphic design skills. AI streamlines this into "prompt engineering," allowing teachers to generate bespoke visual aids in minutes. This aligns with Topol (2019), who argues that the AI revolution in education is not about replacing teachers but about liberating them from administrative and preparatory drudgery, enabling them to focus on high-touch mentorship and personalized instruction.

A score of 4.50 for Classroom Control suggests that the "vividness" of AI-animated media acts as a natural behavioral management tool. When students are highly engaged in a multi-sensory narrative, off-task behavior decreases. This finding is supported by Faisal et al. (2022), who noted that technology-enhanced interactive environments create a "unified focus" in the classroom, making it significantly easier for educators to facilitate structured discussions without the constant need for behavioral redirection.

The lower Tech Literacy score (3.20) indicates a critical area for institutional intervention. While teachers recognize the utility of AI, they express a lack of confidence in "prompt engineering"—the specific skill of communicating with AI models. This reflects the "digital divide" in professional development mentioned by the OECD (2019), which stresses that for technology to improve learning outcomes, teachers must first be "digitally fluent" rather than just "digitally aware."

The Infrastructure score (3.80) highlights the socio-technical reality of the Philippine educational system. AI tools, particularly those involving video generation, are resource-intensive. As noted in DepEd (2019) reports, the lack of stable internet and high-spec hardware remains a significant bottleneck for the "Instructional Modernization" required to close the literacy gaps identified in PISA.

5. Instructional Modernization (RQ5)

Based on the findings, a framework for AI-Enhanced Literature Instruction (AELI) was developed.

**Table 5. The Proposed AI-Enhanced Literature Instruction (AELI) Framework Components**

| Phase | Action | Purpose |
|---|---|---|
| Phase I: Ethical Selection | Vetting stories for GAD compliance and moral depth. | To ensure gender equality, representation, and alignment with SDG 5. |
| Phase II: AI Transformation | Utilizing structured text-to-video prompts to generate visuals. | To create multi-sensory visual scaffolds that aid reading comprehension. |
| Phase III: Critical Inquiry | Comparing AI-generated visuals against the original text. | To foster media literacy, critical analysis, and deep thematic reflection. |

As illustrated in Table 5, the framework begins with a focus on Ethical Selection, which directly addresses the project's high GAD score of 85. Specifically, by vetting stories for gender-fairness prior to animation, educators can effectively prevent the reinforcement of stereotypes often found in traditional or older literature. Furthermore, as cited in the United Nations (n.d.) guidelines for SDG 5, educational materials must be proactive in empowering all genders; consequently, this initial phase ensures that the AI-animated version of a story portrays diverse and equitable social roles.

Following this, the AI Transformation phase serves as the technical heart of the framework. By converting descriptive prose into animated sequences, teachers provide what Vygotsky (1978) termed "scaffolding"—a temporary support system that helps students bridge the gap between their independent abilities and their potential performance with assistance. In addition, this phase directly responds to the OECD (2019) findings by providing Filipino learners with a crucial visual "entry point" to complex narratives that might otherwise be cognitively overwhelming.

The final phase, Critical Inquiry, ensures that AI is not utilized as a replacement for the book but rather as a catalyst for Media Literacy. By means of comparing the AI's visual "interpretation" with the original text, students are prompted to engage in high-level evaluation. In this regard, Mayer (2021) suggests that such comparative analysis forces the learner to "integrate" different mental models, thereby leading to the highest form of cognitive engagement. As a result, this phase effectively transforms the student from a passive viewer into a critical analyst of both literature and technology.

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