

AI-Assisted Multimodal Transformation of Selected E-books For Reading Comprehension

May Ann B. Sotaso, LPT^{1*} & Anthony R. Parlero, PhD²

^{*1-2}University of Saint Anthony

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Abstract: In today's language classrooms, reading comprehension remains a core literacy skill but it's even harder to master in digital environments. Conventional text-based instructional materials often lack interactivity and multimodal support, which limit learner engagement and slow comprehension development. With the emergence of artificial intelligence and multimodal technologies, instructional resources can now be transformed into dynamic, interactive, and learner-centered materials that integrate visual, auditory, and interactive elements. Grounded in the materials development principles of Brian Tomlinson and supported by multimedia and multimodal learning perspectives, this study responds to the need for pedagogically sound, technology-enhanced resources in language instruction within the Philippine educational context.

This study aimed to design, develop, and evaluate an AI-assisted multimodal e-book toolkit intended to enhance the reading comprehension and engagement of Grade 7 students. The study specifically examines the content of the multimodal features integrated into the selected e-books through AI-assisted transformation, evaluates the relevance of the developed material in supporting students' reading comprehension and engagement, and determines the appropriateness of the multimodal elements in facilitating language learning and comprehension development. Moreover, it investigates the effects of the developed multimodal materials on students' reading comprehension, particularly in enhancing learner engagement, understanding of texts, and overall language learning experiences. Additionally, the scaffolded activities, interactive learning tasks, and assessment components, including the pre-test and post-test, were systematically aligned with the learning competencies prescribed in the revised Department of Education curriculum to ensure instructional relevance, curriculum consistency, and pedagogical appropriateness.

The study employed a Developmental Research Design approach guided by the ADDIE instructional design model, encompassing the phases of Analysis, Design, Development, Implementation, and Evaluation. The participants consisted of forty (40) Grade 7 learners from Universidad de Sta. Isabel of Pili, Inc. during the School Year 2025–2026. The developed AI-assisted e-book toolkit was pilot-tested in an authentic classroom setting to assess its usability, clarity, engagement, and instructional value. Data were collected using a researcher-developed survey questionnaire validated by experts in English education and instructional materials development, adapted from the Department of Education LRMSD Evaluation Template for non-print materials. Descriptive statistical tools, particularly the weighted mean, were utilized to analyze the data and determine the level of acceptability of the developed instructional material.

The findings revealed that the multimodal features integrated into the AI-transformed e-book were highly evident, coherent, and pedagogically appropriate. Participants strongly agreed that visual supports, interactive prompts, multimedia elements, and scaffolded activities were effectively incorporated and significantly contributed to their understanding of the text. The use of the AI-assisted e-book was found to enhance students' reading comprehension by improving their ability to interpret ideas, think critically, and engage actively with the material. Moreover, the results indicated a high level of learner engagement, with students reporting increased motivation and sustained attention during reading tasks. Among the multimodal features, visual aids, interactive questioning, and structured scaffolded activities emerged as the most helpful in supporting comprehension and higher-order thinking skills. These findings affirm that the support of artificial intelligence and integration multimodal design fosters meaningful learning experiences and supports cognitive processing.

The study concludes that AI-assisted multimodal e-book toolkits are effective instructional resources that enhance reading comprehension, learner engagement, and higher-order thinking skills. The AI-assisted transformation of traditional e-books into interactive and learner-centered materials supports contemporary language learning and multimedia cognition theories. Furthermore, purposeful multimodal integration and sound pedagogical design maximize the instructional effectiveness of digital learning resources. It is therefore recommended that educators integrate AI-assisted multimodal materials into language instruction, that instructional designers continuously refine multimedia and interactive elements based on learner feedback, and that future research explore broader applications and long-term impacts of AI-enhanced instructional tools across diverse educational contexts.

Keywords: *ai-assisted, multimodal transformation, selected e-book, reading comprehension, language instruction, ADDIE model.*

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Introduction

Reading comprehension remains one of the most significant literacy skills to address in secondary education. It enables learners to construct meaning, analyze information, and apply knowledge across disciplines. In the digital era, comprehension is no longer occurs solely through printed text but increasingly through multimodal platforms that integrate visuals, audio, hyperlinks, and interactive features.

With the rapid advancement of artificial intelligence (AI) in education, instructional materials are increasingly being transformed into adaptive and multimodal digital resources. Research on digital reading environments indicates that comprehension outcomes are influenced by the balance of cognitive load, the effectiveness of multimedia integration, and the level of learner engagement. The integration of AI into educational materials enables automated feedback, adaptive questioning, and enhanced multimodal presentation, thereby creating opportunities for more effective language instruction.

In the Philippine context, Republic Act 10533, also known as the Enhanced Basic Education Act of 2013, promotes learner-centered and technology-integrated instruction aligned with the development of 21st-century skills. As a result, educational institutions are encouraged to adopt innovative instructional tools that support literacy development and increase student engagement in learning.

Despite global advancements in AI-supported digital instruction, limited localized research in the Philippines has systematically examined the multimodal transformation of selected e-books through artificial intelligence, particularly for language instruction at the junior high school level. While several studies have explored the effectiveness of digital reading platforms, many have primarily focused on comparisons between print-based and digital reading formats or have examined the general adoption of e-learning technologies in educational settings. Other investigations have addressed multimedia-based instruction. However, these often lack a structured instructional design framework to guide the development and implementation of digital learning materials.

Furthermore, only a limited number of studies have documented the complete instructional development process involved in creating AI-integrated e-books using established instructional design models such as ADDIE. Similarly, there remains a lack of empirical evidence examining how AI-transformed multimodal features influence students' reading comprehension and engagement during language instruction. In addition, existing research seldom identifies which specific multimodal components such as visual elements, audio support, interactive activities, or embedded multimedia are perceived by students as the most helpful in facilitating language learning. These limitations highlight the need for a systematic investigation that integrates instructional design, artificial intelligence, and multimodal learning principles in the development of digital instructional materials.

In response to these research gaps, this study develops and evaluates the AI-Assisted Multimodal Transformation of Selected E-Books for Reading Comprehension using the ADDIE instructional design model. Through this approach, selected e-book materials are transformed into multimodal learning resources that

incorporate AI-supported features designed to enhance the learning experience of Grade 7 students.

The study specifically examines the content of the multimodal features integrated into the selected e-books through AI-assisted transformation, evaluates the relevance of the developed material in supporting students' reading comprehension and engagement, and determines the appropriateness of the multimodal elements in facilitating language learning and comprehension development. It further examines the systematic process by which these e-books are transformed into AI-assisted multimodal materials using the ADDIE instructional design model and various digital development tools. Moreover, the study investigates the effects of the developed multimodal materials on students' reading comprehension, particularly in enhancing learner engagement, understanding of texts, and overall language learning experiences.

By grounding the transformation process in established instructional design theory and validating the developed materials through empirical investigation, this study contributes to the advancement of technology-enhanced literacy instruction. Ultimately, it aims to provide insights that support the development of innovative digital learning resources and promote improved reading comprehension practices within the context of Philippine secondary education.

The study aimed to answer the following questions:

1. What e-books can be transformed into multimodal materials with an AI tool in terms of:
 - a. Content
 - b. Relevance
 - c. Appropriateness
2. How are these e-books transformed into multimodal materials with an AI tool?
3. What are the effects of the developed materials to students' reading comprehension?
4. What are the validation results of the developed materials in terms of:
 - a. Content Quality
 - b. Instructional Quality
 - c. Technical Quality

Methodology

Research Design

This study utilized a Developmental Research Design approach guided by the ADDIE instructional design model, which encompasses the phases of Analysis, Design, Development, Implementation, and Evaluation. Through this approach, the study was able to establish a structured process for transforming traditional reading materials into an AI-assisted multimodal instructional resource intended to enhance reading comprehension and learner engagement among Grade 7 learners.

Participants

The participants of this study consisted of forty (40) Grade 7 students enrolled at Universidad de Sta. Isabel of Pili, Inc. during the School Year 2025–2026. These participants were selected from a total population of 271 Grade 7 students officially enrolled in the institution. The participants served as the primary evaluators and intended end-users of the developed AI-Assisted Multimodal of Selected E-Books for Reading Comprehension.

Data Gathering Procedure

The primary data-gathering instrument was a researcher-developed survey questionnaire designed to evaluate the

acceptability, usability, and instructional value of the AI-integrated Reading Comprehension E-Book Toolkit developed for Grade 7 learners. Data gathering was facilitated through Google Forms, which served as the primary platform for the administration and distribution of the research questionnaire.

Moreover, the data gathered from the survey questionnaires were analyzed using descriptive statistical methods to determine the participants' overall evaluation of the AI-Assisted Reading Comprehension E-Book Toolkit. In analyzing the collected data, the weighted mean was employed to determine the average rating assigned by the participants for each evaluation criterion included in the survey questionnaire.

Results and Discussion

Table 1 presents the E-Books Transformed materials.

Book Title	Book Description
The Cat Library	<p>This heartwarming and socially conscious narrative centers on Ms. Salvacion, a retired librarian who transforms her home into a unique "Cat Library" to care for the stray and unwanted cats of her community. Believing that there is a perfect human for every cat, Ms. Salvacion invites the public to come to her home to take out cats to "borrow" instead of books. This wonderfully-written tale from an award-winning author will melt your heart with its examination of animal welfare, empathy, and community support, showing you that even the smallest gestures of love can lead to human and animal healing.</p> <p>Author: Eugene Y. Evasco Illustrator: Jared C. Yokte</p>
Ponyang and the Secret of the Cave	<p>Recognized as the grand prize winner of the 12th Romeo Forbes Children's Story Writing Competition, this enthralling mystery tells the story of a little girl Ponyang, who always seems to run away as soon as her school classes are done. The close friend Potpot, suspicious and curious, tries to find out what her secret is and to her surprise she discovers one big secret in a cave just around the corner. Perfect for children 8-12 years old this story has both adventure and suspense but also teaches the values of friendship, trust and finding out the great beyond.</p> <p>Author: Melvin John B. Atole Illustrator: Anthony Palomo (and featured artists)</p>
Here be Dragons	<p>An award-winning selection from the Romeo Forbes Children's Writing Competition. An intelligent and surreal adventure featuring Isabella, an eleven-year-old who loves maps more than anything. Her life changes when she encounters Mr. Strabo, a mysterious map-maker with the ability to draw anything, including "atypical topographies" or mappings of abstract and emotional ideas like "heaven", "hell", "happiness", "sadness" and "lost love." With the help of this map, she can learn how to overcome her most challenging fears, and come to know her true self. Complete with playful surrealist drawings, this book is a journey for kids into expanded imagination and emotional intelligence.</p> <p>Author: Victor Fernando R. Ocampo Illustrator: Jon Jaylo</p>
The Rocking Horse	<p>As the very first publication from CANVAS by the Romeo Forbes Children's Story Writing Competition, this heartfelt story tackles the themes of sadness, longing and memory with tenderness. The story focuses on Chisco, a small boy in frail health who has inherited his mother's joyful spirit and keen awareness of nature, particularly the magnificent kamagong tree outside his window. He forms a magical bond to the natural world and his past; the day he receives a wondrous wooden rocking horse as a present. As the collaborative work of a renowned children's book author and a brilliant artist, this monumental book gives us comfort as we come to see how love and life are transmitted.</p> <p>Author: Becky Bravo Illustrator: Elmer Borlongan</p>

Table 1 presents the four selected e-books utilized in the development of the AI-assisted multimodal toolkit, namely The Cat Library by Eugene Y. Evasco, Ponyang and the Secret of the Cave by Melvin John B. Atole, Here Be Dragons by Victor Fernando R. Ocampo, and The Rocking Horse by Becky Bravo. Each literary work presents unique themes and narrative structures that contribute to the development of

learners’ linguistic, cognitive, and affective skills. The selected stories encompass themes of compassion, friendship, self-discovery, emotional literacy, resilience, and family values, which are essential components of holistic language education.

Table 1.a E-Book Content

Criteria	M _w	VI
1. The content of the e-book is clearly presented and easy to understand.	3.67	SA
2. The audio narration accurately supports the ideas presented in the text.	3.42	SA
3. The videos included in the e-book provide meaningful explanations of the lesson content.	3.52	SA
4. The interactive activities are aligned with the concepts discussed in the reading materials.	3.65	SA
5. The organization and presentation of content make the lessons easier to follow.	3.50	SA
6. The integration of text, images, audio, and video enriches the delivery of lesson content.	3.48	SA
GRAND MEAN	3.54	SA

Legend: 3.25-4.00 Strongly Agree (SA), 2.50-3.24 Agree (A), 1.75-2.49 Disagree (DA), 1.00-1.74 Strongly Disagree (SD)

Table 1.a presents the respondents’ evaluation of the content of the AI-transformed multimodal e-book. The data indicates that the participants strongly agree with the quality and effectiveness of the content integrated into the AI-transformed multimodal e-book, as evidenced by the grand mean of 3.54. This finding implies that the developed material successfully delivered instructional content in a manner that was clear, engaging, and supportive of learners’ understanding. The consistently high ratings suggest that the content components of the e-book were appropriately designed to facilitate meaningful learning experiences among Grade 7 learners.

Table 1.b E-Book Relevance

Criteria	M _w	VI
1. The themes and lessons presented in the e-book are relevant to my learning experiences.	3.45	SA
2. The e-book helps me connect the stories and lessons to real-life situations.	3.38	SA
3. The multimodal features increase my interest in reading the selected e-books.	3.48	SA
4. The content motivates me to participate actively in reading and learning activities.	3.35	SA
5. The e-book helps me maintain focus and engagement during reading lessons.	3.25	SA
6. The e-book makes learning English more meaningful and enjoyable.	3.58	SA
GRAND MEAN	3.42	SA

Legend: 3.25-4.00 Strongly Agree (SA), 2.50-3.24 Agree (A), 1.75-2.49 Disagree (DA), 1.00-1.74 Strongly Disagree (SD)

Table 1.a presents the respondents’ evaluation of the relevance of the AI-transformed multimodal e-book. The findings infer that the selected e-books were perceived as highly relevant instructional materials for Grade 7 language learning. The overall grand mean of 3.42, interpreted as Strongly Agree, suggests that the respondents recognized the developed multimodal e-books as meaningful, engaging, and connected to their learning needs and experiences. This indicates that the transformed e-books successfully addressed learners’ interests while supporting language development and reading comprehension.

Table 1.c E-Book Appropriateness

Criteria	M _w	VI
1. The content of the e-book is appropriate for the reading level of Grade 7 learners.	3.58	SA
2. The language used in the e-book is suitable for my age and level of understanding.	3.58	SA
3. The multimodal features appropriately support the meaning of the text.	3.67	SA

4. The activities included in the e-book are appropriate for achieving the lesson objectives.	3.67	SA
5. The multimedia elements are suitable for the topics and themes presented in the stories.	3.52	SA
6. The e-book appropriately supports the development of English language skills.	3.58	SA
GRAND MEAN	3.6	SA

Legend: 3.25-4.00 Strongly Agree (SA), 2.50-3.24 Agree (A), 1.75-2.49 Disagree (DA),

1.00-1.74 Strongly Disagree (SD)

Table 1.c presents the respondents' evaluation of the appropriateness of the AI-transformed multimodal e-book. Findings infer that the AI-transformed multimodal e-books were highly appropriate instructional materials for Grade 7 learners. The grand mean of 3.60, verbally interpreted as Strongly Agree, indicates that the respondents perceived the transformed materials as suitable for their developmental characteristics, language proficiency, learning needs, and curriculum requirements. This suggests that the integration of multimodal features was carefully designed to complement the content and enhance learners' understanding without compromising the instructional integrity of the selected e-books.

Table 2. E-Book Application Development Tools



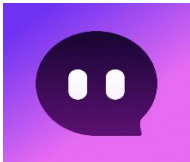


Name	Icon	Function
Ren'Py		Ren'Py was the main tool used during the development of the multimodal e-book application. The Integrated Development Environment (IDE) gave the researcher the means to develop interactive and engaging interfaces; manage the e-book's contents, integrate rich media elements; and implement the overall functionality of the digital learning material.
Luvvoice		Luvvoice was utilized as a text-to-speech (TTS) medium to create the auditory component of this software. It transformed text input into audio to enable learners to hear readings, assist pronunciation, listening and also accessibility.
Easemate		EaseMate was employed as an AI-based image-to-video tool. EaseMate converts images into a form of video, therefore making it the multimodal element of the e-book which was aimed to boost the learner's engagement and comprehension.
Pixabay		Pixabay was used to gather royalty free sound effects and audio used in the e-book application. These audios were used as back-grounds sounds, a narrating device, and interactive features. These sounds increased learner interest, aided narration and enriched the overall multimodal experience.
Krita		Krita was used for creating, editing, and enhancing digital illustrations and graphical elements. These drawing and image-editing applications helped develop visually appealing materials that complemented the content and improved the overall presentation of the e-book.

Table 2 presents the software applications and digital tools utilized in the development of the AI-integrated multimodal e-book. These tools served as the technological foundation for transforming conventional e-book content into an interactive, multimedia-rich instructional material designed to support reading comprehension and language learning.

The table reveals that multiple digital applications were employed to address different components of multimodal material development.

Table 3.a Content Quality Based on LRMDS Criteria

Criteria	M _w	VI
1. Content is consistent with topics/skills found in the DepED Learning Competencies for the subject and grade/year level it was intended.	3.90	VS
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	3.85	VS
3. Content is accurate.	3.88	VS
4. Content is up-to-date.	3.82	VS
5. Content is logically developed and organized.	3.90	VS
6. Content is free from cultural, gender, racial, or ethnic bias.	4.00	VS
7. Content stimulates and promotes critical thinking.	3.80	VS
8. Content is relevant to real-life situations.	3.85	VS
9. Language (including vocabulary) is appropriate to the target user level.	3.88	VS
10. Content promotes positive values that support formative growth.	3.92	VS
GRAND MEAN	3.88	VS

Legend: 3.25-4.00 Very Satisfactory (VS), 2.50-3.24 Satisfactory (S), 1.75-2.49 Poor (P), 1.00-1.74 Not Satisfactory (NS)

Table 3.a presents the result of the curricular validation of the Multimodal Transformation of Selected E-Books Through Artificial Intelligence for Language Instruction under Content Quality. The obtained grand mean of 3.88, interpreted as Very Satisfactory, indicates that the developed instructional material possesses high content validity, curriculum alignment, and instructional relevance. The findings imply that the content of the e-book toolkit is academically sound, learner-centered, and appropriate for Grade 7 language instruction. Cultivation of essential 21st-century skills preparing students not only for academic achievement but also for lifelong learning.

Table 3.b Instructional Quality Based on LRMDS Criteria

Criteria	M _w	VI
1. Purpose of the material is well defined.	3.90	VS
2. Material achieves its defined purpose.	3.85	VS
3. Learning objectives are clearly stated and measurable.	3.88	VS
4. Level of difficulty is appropriate for the intended target user.	3.82	VS
5. Graphics / colors / sounds are used for appropriate instructional reasons.	3.85	VS
6. Material is enjoyable, stimulating, challenging, and engaging.	3.92	VS
7. Material effectively stimulates creativity of target user.	3.80	VS
8. Feedback on target user’s responses is effectively employed.	3.75	VS
9. Target user can control the rate and sequence of presentation and review.	3.78	VS
10. Instruction is integrated with target user’s previous experience.	3.88	VS
GRAND MEAN	3.84	VS

Legend: 3.25-4.00 Very Satisfactory (VS), 2.50-3.24 Satisfactory (S), 1.75-2.49 Poor (P), 1.00-1.74 Not Satisfactory (NS)

Table 3.b presents the validators’ evaluation of the instructional quality of the AI-integrated Reading Comprehension E-Book Toolkit. The grand mean of 3.84, verbally interpreted as Very Satisfactory, indicates that the developed material demonstrates strong instructional

effectiveness and pedagogical appropriateness. The results suggest that the instructional design of the e-book toolkit successfully supports meaningful learning, learner engagement, and comprehension development.

The highest mean of 3.92 was obtained by the criterion stating that the material is enjoyable, stimulating, and engaging. This finding implies that the integration of multimodal and AI-supported elements contributed significantly to learner motivation and active participation. Engaging instructional materials are essential in sustaining learners' interest and facilitating meaningful interaction with content.

Table 3.c Technical Quality Based on LRMDS Criteria

Criteria	M _w	VI
1. Audio enhances understanding of the concept.	3.80	VS
2. Speech and narration (correct pacing, intonation, and pronunciation) is clear and can be easily understood.	3.78	VS
3. There is complete synchronization of audio with the visuals, if any.	3.82	VS
4. Music and sound effects are appropriate and effective for instructional purposes.	3.75	VS
5. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.90	VS
6. Visual presentations (non-text) are clear and easy to interpret.	3.92	VS
7. Visuals sustain interest and do not distract user's attention.	3.88	VS
8. Visuals provide accurate representation of the concept discussed.	3.90	VS
9. The user support materials (if any) are effective.	3.75	VS
10. The design allows the target user to navigate freely through the material.	3.85	VS
11. The material can easily and independently be used.	3.88	VS
12. The material will run using minimum system requirements.	3.70	VS
13. The program is free from technical problems.	3.82	VS
GRAND MEAN	3.83	VS

Legend: 3.25-4.00 Very Satisfactory (VS), 2.50-3.24 Satisfactory (S), 1.75-2.49 Poor (P), 1.00-1.74 Not Satisfactory (NS)

Table 3.c presents the validators' evaluation of the technical quality of the AI-integrated Reading Comprehension E-Book Toolkit. The grand mean of 3.83, interpreted as Very Satisfactory, indicates that the developed material is technically functional, accessible, and visually effective for instructional use. The findings imply that the technical features of the e-book toolkit contribute positively to usability, learner interaction, and overall instructional delivery.

Table 3.d Other Findings Based on LRMDS Criteria

Criteria	M _w	VI
1. Conceptual errors.	3.95	VS
2. Factual errors.	3.92	VS
3. Grammatical and / or typographical errors.	3.90	VS
4. Other errors (i.e., computational errors, obsolete information, errors in the visuals, etc.).	3.88	VS
GRAND MEAN	3.91	VS

Legend: 3.25-4.00 Very Satisfactory (VS), 2.50-3.24 Satisfactory (S), 1.75-2.49 Poor (P), 1.00-1.74 Not Satisfactory (NS)

Table 3.d presents the validators' evaluation of other findings related to the developed AI-integrated Reading Comprehension E-Book Toolkit. The grand mean of 3.91, interpreted as Very Satisfactory, indicates that the material contains minimal conceptual, factual, grammatical, and technical errors. This finding suggests that the material underwent careful review, refinement, and quality assurance prior to validation.

Conclusions

The conclusions presented in this study were derived from the analysis and interpretation of the data gathered relative to the objectives of the research. These conclusions reflect the extent to which the AI-assisted multimodal transformation of selected e-books contributed to the development of an effective instructional resource for reading comprehension.

1. The selected e-books were all found to be suitable for AI-assisted multimodal transformation in terms of content, relevance, and appropriateness. Their educational value, age-appropriate themes, literary quality, and alignment with Grade 7 English competencies make them appropriate instructional resources for language learning.
2. AI and digital development tools are an effective assistant in transforming conventional e-books into instructional multimodal learning resources, since its systematic design and development makes a rich variety of multimedia elements and interactivity and allows better access to information and participation of learners.
3. The developed AI-assisted multimodal learning resources have positive effects to students reading comprehension. The combination of textual, visual, auditory, and interactive components supported learners' understanding of reading texts, promoted active participation, and facilitated meaningful engagement with language learning activities.
4. The validation results indicate that the developed multimodal materials attained a high level of acceptability in terms of content quality, instructional quality, technical quality, and overall usability. The materials were found to be educationally sound, instructionally effective, technically functional, and appropriate for use in Grade 7 language instruction.

Recommendations

The recommendations presented herein are based on the findings and conclusions of the study concerning the AI-assisted multimodal transformation of selected e-books for reading comprehension.

1. Teachers may consider selecting literary and informational e-books with strong content, relevance, and appropriateness when developing AI-assisted multimodal instructional materials to ensure alignment with learners' needs and curriculum standards.
2. Language teachers and academic coordinators may adopt systematic development frameworks, such as the ADDIE model, and utilize AI-assisted technologies in transforming conventional learning materials into interactive and multimodal instructional resources.
3. Educational institutions or school administrators may adopt the AI-assisted multimodal e-books in language learning to enhance student's reading comprehension,

reading interests and involvement in language learning activities.

4. Future researchers may expand the present study by involving larger samples size, various educational levels, more literary excerpts and even experimental design.

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