



A Structured ADDIE Approach to Multimedia Learning Development with Lectora Inspire

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Abstract

This study aimed to develop and evaluate multimedia learning based on the Lectora Inspire application using the ADDIE instructional design model. The research employed a Research and Development (R&D) approach encompassing the stages of analysis, design, development, implementation, and evaluation. The developed multimedia integrated text, images, audio, animations, and interactive quizzes to support secondary school learning. Data were collected through expert validation sheets, teacher practicality questionnaires, student response questionnaires, and a criterion-referenced learning outcomes test administered during a small-group trial. Quantitative data were analyzed using descriptive statistics in the form of percentages and mean scores, while qualitative feedback was used for product refinement. The results show that the multimedia achieved a very high level of validity, with average scores of 92% from media experts, 90% from subject-matter experts, and 88% from teachers. Student responses indicated a high level of engagement, with 89% of students providing positive feedback. Learning outcomes evaluation revealed that most students achieved the predefined mastery criteria after using the multimedia. These findings indicate that Lectora Inspire-based multimedia developed through the ADDIE model is valid, practical, and supportive of learning outcomes achievement. The study contributes to digital pedagogy by presenting a structured and replicable multimedia development framework applicable across subject areas.

Keywords: ADDIE Model; Instructional Multimedia; Learning Outcomes Achievement; Lectora Inspire

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INTRODUCTION

Education is a deliberate and systematic process aimed at creating learning conditions that enable students to actively develop their potential. Nevertheless, classroom instruction in many contexts remains predominantly dominated by conventional approaches, such as chalk-and-talk and verbal explanations, with limited integration of demonstrations, experiments, or instructional media (Firman, 2020). These practices tend to restrict multisensory engagement, which may result in reduced learning effectiveness.

In response to rapid technological advancements, information and communication technology (ICT)-based learning media provide significant opportunities to enhance instructional interactivity, learner motivation, and overall learning effectiveness (Arsyad, 2015). From a constructivist perspective, learning emphasizes active student involvement in the process of knowledge construction, while teachers assume the role of facilitators who design supportive and meaningful learning environments (Trianto, 2020). Accordingly, the integration of multimedia learning becomes increasingly important in promoting self-directed exploration and facilitating deeper understanding through active knowledge construction.

One promising tool for developing interactive digital learning materials is Lectora Inspire, an authoring software that enables educators to design multimedia-based instruction without requiring advanced programming skills. A growing body of research has demonstrated the effectiveness of Lectora Inspire across various subject areas. For instance, Siregar (2023) reported that learning media developed using Lectora Inspire achieved high validity and contributed to improved student learning outcomes in biology. Similarly, Rajagukguk (2024) confirmed its effectiveness in mathematics instruction implemented through a Problem-Based Learning approach. In the context of chemistry education, Syarpin (2022) found that Lectora Inspire effectively supported learning through the use of multiple representations, while Dahlia (2022) verified the feasibility of its application in geography learning.

Although these studies consistently indicate that Lectora Inspire contributes positively to student learning outcomes, most of them focus on subject-specific applications and place limited emphasis on the systematic instructional development process or on the integration of multimedia features designed to enhance interactivity across disciplines. Addressing this gap, the present study develops and validates multimedia learning materials based on Lectora Inspire using the ADDIE instructional design model. Furthermore, this research examines both expert validation and student responses to provide a comprehensive evaluation of the developed product. The novelty of this study lies in demonstrating the strategic application of Lectora Inspire as a generalizable digital learning tool that can be effectively implemented in secondary education across subject domains.

Previous studies on Lectora Inspire have demonstrated its effectiveness in improving learning outcomes in specific subjects such as biology, mathematics, and chemistry. However, these studies rarely emphasized the systematic development process or the integration of multimedia features that enhance interactivity across multiple disciplines. Consequently, there remains a gap in demonstrating how Lectora Inspire can be strategically applied as a generalizable tool for digital pedagogy. This study addresses the gap by combining the ADDIE model with Lectora Inspire to produce a structured, cross-disciplinary multimedia learning product, thereby offering both theoretical and practical contributions to the field of educational technology.

LITERATURE REVIEW

Learning Media

Learning media is often interchangeably defined with the term "teaching aids" or "communication media," in which communication is believed to run smoothly and effectively if aided by communication media. Implicitly, it suggests that learning media includes tools physically used to deliver instructional content, such as books, tape recorders, films, slides, photos, pictures, graphics, television, and computers. In other words, media are components of learning resources or physical means containing instructional material within the student's environment that can stimulate students to learn (Arsyad, 2015).

Functions of Learning Media

According to Asyhar (2021), learning media are not merely teaching aids but also function as a learning strategy. As a strategy, learning media serve multiple functions, as outlined below:

- a. Media as a source of learning

Learning media as a source of learning is a component of the learning system that includes messages, people, materials, tools, techniques, and environments that influence student learning

outcomes. In this case, Edgar Dale views learning resources as broadly defined experiences. Learning experiences can take many forms, such as reading, internet searching, discussion and Q&A, listening to audio media, and others. These unlimited experiences encompass anything that can be experienced, triggering learning events.

b. **Media as a motivational tool**

Learning media can stimulate students' learning motivation. The use of learning media makes lessons more engaging and captures students' attention. Teachers can encourage students by sparking interest and fostering hope in their learning process.

Definition of Learning Multimedia

Multimedia is media that integrates two or more elements such as text, graphics, images, photos, audio, and animation in an integrated manner. Multimedia is divided into two categories: linear multimedia and interactive multimedia.

- a. Linear multimedia is multimedia that has no control tools that can be operated by the user; it runs sequentially.
- b. Interactive multimedia is multimedia equipped with control tools that allow users to decide the next process (Daryanto, 2016).

Characteristics of Media in Learning Multimedia

According to Daryanto (2016), as one component of the learning system, the selection and use of learning multimedia should consider other elements such as objectives, materials, strategies, and evaluation. The characteristics of learning multimedia are:

- a. Having more than one converging medium, for example combining audio and visual elements.
- b. Being interactive, meaning it accommodates user responses.
- c. Being independent, meaning it provides sufficient ease and completeness of content so that users can learn without others' guidance.

Lectora Inspire Application

Lectora Inspire is a computer program (software) that functions as a tool for developing electronic-based learning. It is an e-learning authoring tool developed by Trivantis Corporation. Lectora is used to create online training courses, assessments, and presentations. It can also convert Microsoft PowerPoint presentations into e-learning content. Lectora Inspire enables fast and simple online course development (Mas'ud, 2021).

It is considered relatively easy to use, as it is not overly complex, and it supports graphics, animations, and more advanced feedback compared to other media (Bouato, 2020). Some key characteristics that distinguish Lectora Inspire from other media include:

- a. Ready-to-use templates for lesson material design.
- b. Availability of images, animations, and animated characters.
- c. Faster performance than web-based applications, as it is not dependent on internet connectivity.
- d. Automatic installation of supporting software such as Flypaper, Camtasia, and Snagit.
- e. Ability to integrate Flash, video, images, or screen captures.
- f. Core functions such as creating chapters, sections, pages, inserting images, audio, animations, quizzes, and publishing content.

According to Toharudin, (2023) additional benefits include:

- a. More interactive learning systems.
- b. Integration of images, audio, video, and animations into one unit
- c. Ability to visualize abstract concepts.
- d. Relatively simple and flexible storage.
- e. Capability to bring large objects into the classroom.
- f. Displaying objects not visible to the naked eye.

Meanwhile, Mas'ud (2021) highlights Lectora Inspire's advantages compared to other e-learning authoring tools:

- a. Easy to use, even for those unfamiliar with programming.
- b. Multifunctional, usable for websites, interactive e-learning content, and product/company presentations.
- c. User-friendly multimedia creation features (audio and video).
- d. Comprehensive templates.
- e. A media library that assists users.
- f. Ability to convert PowerPoint into e-learning content.
- g. Provides question types with scoring at the end of evaluations.

These findings are consistent with Siregar (2023), who reported increased student outcomes through Lectora Inspire in biology, and with Rajagukguk (2024), who confirmed its success in mathematics through problem-based learning. However, unlike these studies that were subject-specific, this research emphasizes the structured ADDIE-based process and cross-disciplinary applicability, thereby extending the scope of multimedia integration. This novelty provides a broader contribution to digital pedagogy and instructional design.

RESEARCH METHODS

Research Design

This study employed a Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE framework was selected due to its systematic and iterative nature in designing, developing, and evaluating instructional multimedia (Branch, 2009; Dick & Carey, 2009).

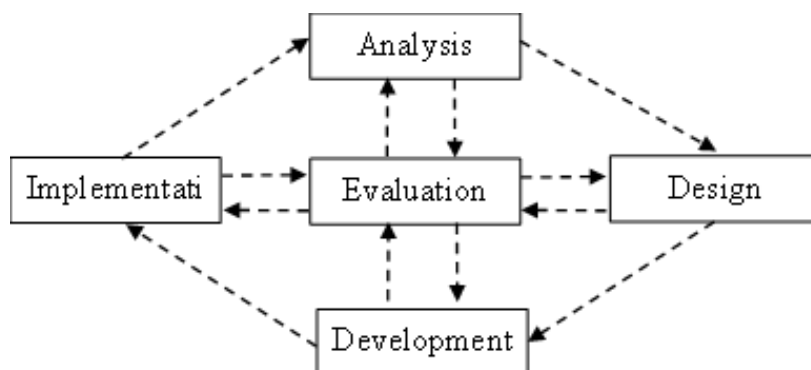


Figure 1. ADDIE Development Model Plan

Research Subjects

The research subjects in this study comprised multiple stakeholder groups selected according to their respective roles in the development and evaluation process of the learning media. Specifically, six experts were involved in the validation stage, consisting of three media experts and three subject-matter experts, who provided professional judgments regarding the content accuracy, instructional design, and technical quality of the developed product.

Furthermore, three secondary school teachers participated in the practicality assessment to evaluate the usability, clarity, and applicability of the learning media in classroom settings. In addition, twenty secondary school students were involved in a small-group implementation to examine the feasibility of the media and to assess students' learning outcomes following its use. The inclusion of these participants enabled a comprehensive evaluation covering validity, practicality, and initial effectiveness of the developed learning media.

Research Instruments

To support the evaluation of product quality and students' learning outcomes, several research instruments were employed in this study (Arsyad, 2015). First, expert validation sheets were used to assess the validity of the developed multimedia, covering aspects of content accuracy, instructional design, language clarity, interactivity, and technical quality. These instruments enabled systematic expert judgments to ensure that the product met pedagogical and technical standards prior to implementation.

Second, a teacher practicality questionnaire was administered to measure the ease of use, instructional suitability, and classroom applicability of the multimedia product. This instrument provided insights into teachers' perspectives regarding the feasibility of integrating the multimedia into regular instructional practices.

Third, a student response questionnaire was utilized to collect data on students' perceptions of engagement, learning motivation, and ease of independent learning while using the multimedia. The questionnaire aimed to capture learners' experiential responses to the product during the implementation phase.

Finally, a learning outcomes test in the form of a criterion-referenced achievement test was administered to measure students' cognitive learning outcomes after using the multimedia. The test items were aligned with the learning objectives defined during the design stage and focused on conceptual understanding and application. Content validity of the test was ensured through expert judgment to confirm the appropriateness and relevance of the assessment items.

Research Procedures

The research procedures in this study were structured according to the ADDIE instructional design model, which consists of five sequential stages: Analysis, Design, Development, Implementation, and Evaluation. This model was selected to ensure a systematic and iterative process in developing and evaluating the multimedia learning product. During the analysis stage, learning problems were identified through an examination of learner characteristics, curriculum requirements, and instructional needs. This stage also involved the formulation of learning objectives to align the multimedia development with curricular standards.

The design stage focused on developing instructional scenarios, organizing the multimedia structure, and determining assessment indicators and learning outcomes criteria. At this stage, the pedagogical framework and learning flow of the multimedia were systematically planned. In the development stage, the multimedia learning product was produced using Lectora Inspire. Various multimedia elements, including text, images, audio, animations, and interactive quizzes, were integrated to support learner engagement and conceptual understanding. The developed product was then subjected to expert validation and revisions based on feedback.

The implementation stage involved a small-group trial with secondary school students. During this phase, the multimedia was utilized in learning activities, followed by the administration of the learning outcomes test and the student response questionnaire to collect data on students' cognitive achievement and learning experiences. Finally, the evaluation stage encompassed both formative and summative evaluations. Formative evaluation was conducted at each ADDIE stage through expert feedback and iterative revisions to improve product quality. Summative evaluation was carried out after the implementation stage to examine the validity and practicality of the multimedia, as well as students' responses and learning outcomes achievement.

Data Analysis

Data analysis in this study employed both qualitative and quantitative techniques to comprehensively evaluate the developed multimedia and its impact on students' learning outcomes. Validity and practicality data obtained from expert validation sheets and teacher practicality questionnaires were analyzed using percentage scores. The results were then categorized into predefined validity levels, namely very valid, valid, and less valid, to determine the appropriateness and feasibility of the multimedia product.

Data derived from the student response questionnaires were analyzed descriptively using mean scores and percentages to portray students' perceptions of engagement, motivation, and ease of learning. This descriptive analysis provided an overview of learners' experiential responses to the use of the multimedia. Furthermore, learning outcomes data were analyzed using descriptive statistical methods, including the calculation of mean scores and the percentage of mastery. This analysis was conducted to examine whether students achieved the predefined learning criteria after using the multimedia. The effectiveness of the multimedia was subsequently interpreted based on the extent to which students' learning outcomes met the expected competency standards, thereby indicating the initial effectiveness of the developed learning media.

RESULTS AND DISCUSSION

Result

The validity of the Lectora Inspire-based multimedia was assessed through expert judgment involving media experts, subject-matter experts, and teachers. The validation process focused on multiple dimensions, including content accuracy, instructional design, language clarity, interactivity, and technical quality. This comprehensive evaluation was intended to ensure that the developed multimedia met both pedagogical and technological standards prior to classroom use.

The validation results of the Lectora Inspire-based multimedia is presented in Table 1. As shown in the table, the multimedia achieved consistently high validity scores across all validator groups. Media experts reported an average score of 92%, material experts provided a score of 90%, and teachers assigned a score of 88%, all of which fall into the very valid category. The practicality of the multimedia was assessed through a teacher questionnaire focusing on ease of use, clarity of navigation, instructional suitability, and classroom applicability. These results indicate that the multimedia meets the required standards in terms of content accuracy, instructional design, language clarity, interactivity, and technical quality.

Table 1. Validation results of multimedia learning

Validator Group	Average Score (%)	Category
Media Experts	92	Very Valid
Material Experts	90	Very Valid
Teachers	88	Very Valid
Student Responses	89	Very Positive

In addition, student responses were collected to examine learners' perceptions of engagement, learning motivation, and ease of independent learning following the use of the Lectora Inspire-based multimedia in a small-group trial. As presented in Table 1, the analysis indicates that students provided a highly positive response, with an average score of 89%, which falls into the very positive category. This result suggests that the multimedia was perceived as engaging, user-friendly, and supportive of students' independent understanding of the learning materials.

The positive student responses can be attributed to the interactive features embedded in the multimedia, including animations, audio explanations, and interactive quizzes. These elements appear to have facilitated active learner engagement and supported students in constructing understanding independently.

Students' learning outcomes were assessed using a criterion-referenced achievement test administered after the implementation stage of the Lectora Inspire-based multimedia. The test was aligned with the learning objectives formulated during the design phase and focused on measuring students' conceptual understanding and ability to apply the learned concepts.

The results show that students achieved a mean learning outcome score of 83, with 85% of students meeting the predefined mastery criteria. These findings indicate that the developed multimedia supported students in achieving the expected learning competencies. When considered alongside the positive student responses and high validity scores reported earlier, the learning outcomes results further demonstrate the feasibility and initial effectiveness of the multimedia in supporting student learning.

It is important to note that the learning outcomes results are interpreted as evidence of learning achievement following the use of the multimedia, rather than as a causal comparison with other instructional approaches. Accordingly, the findings reflect the attainment of learning objectives within the context of the developed product, consistent with the purpose of research and development studies.

Discussion

Validity of the Developed Multimedia

The validation results indicate that the developed Lectora Inspire-based multimedia achieved a very valid category across evaluations conducted by media experts, subject-matter experts, and teachers. High validity scores reflect that the multimedia meets essential instructional standards, including content accuracy, alignment with learning objectives, clarity of language, interactivity, and technical quality. These findings are consistent with the principles of effective instructional media design, which emphasize the integration of pedagogical accuracy and technological reliability (Arsyad, 2015; Daryanto, 2016; Asyhar, 2021).

The effectiveness of the ADDIE model in guiding the systematic development process is evident in the strong validation outcomes. ADDIE has been widely recognized as a robust instructional design framework that supports iterative refinement and alignment between objectives, content, and assessment (Branch, 2009; Branch, 2010; Dick et al., 2009; Yusoff, 2019). Similar findings have been reported in previous studies employing ADDIE for multimedia and e-module development, which emphasize that formative evaluation at each stage contributes significantly to product validity (Silitonga et al., 2023; Srinawati et al., 2022; Mulyatiningsih, 2011).

The involvement of multiple validator groups strengthens the credibility of the validation results, as both pedagogical and technical perspectives were considered. This multi-perspective validation approach aligns with recommendations in multimedia development research, which argue that expert judgment is essential to ensure instructional quality and usability prior to implementation (Fathoni & Puspasari, 2023; Ramadhanti, 2020; Septiani et al., 2024). The results are also in line with prior Lectora Inspire-based studies across disciplines, including biology, chemistry, geography, and mathematics, which consistently report high validity when development is conducted systematically (Siregar, 2023; Syarpin, 2022; Dahlia, 2022; Rajagukguk, 2024; Inayati & Setyasto, 2024).

Practicality and Classroom Applicability

The practicality results demonstrate that teachers perceived the multimedia as very practical and easy to implement in classroom settings. This finding suggests that the multimedia design successfully balanced pedagogical requirements with technical simplicity, an essential consideration in secondary education contexts. Clear navigation, well-organized content, and integrated assessment features reduced instructional complexity and minimized the need for extensive teacher intervention.

From a pedagogical standpoint, high practicality reflects strong alignment between multimedia design and classroom realities. This supports the argument that instructional media should prioritize ease of use and relevance to instructional practices, rather than focusing solely on technological sophistication (Trianto, 2020; Harjanto & Sumarni, 2019). Similar conclusions have been reported in studies on Lectora Inspire-based media, which emphasize that user-friendly design enhances teacher acceptance and instructional feasibility (Mas'ud, 2021; Febriantto, 2023; Panjiatian et al., 2023; Purnomo, 2023).

Moreover, the practicality findings reinforce the role of digital media as instructional support tools rather than replacements for teachers. This perspective aligns with national education principles that emphasise learning technology as an educational resource that can facilitate effective teaching and learning processes (Undang-Undang Republik Indonesia Nomor 20 Tahun 2003). In this context, Lectora Inspire serves as a flexible authoring tool that enables teachers to integrate multimedia into instruction without requiring advanced programming skills.

Student Responses and Learning Engagement

The positive student responses indicate that the developed multimedia effectively supported engagement, motivation, and independent learning. Students perceived the multimedia as interesting, easy to use, and helpful in understanding learning materials. These findings are consistent with multimedia learning theory, which posits that the integration of text, visuals, audio, and interactivity can enhance learner engagement and comprehension when designed appropriately (Mayer, 2009; Clark & Mayer, 2016).

The interactive features embedded in the multimedia such as animations, audio explanations, and quizzes likely contributed to students' active participation. Prior research suggests that interactive multimodal environments support deeper cognitive processing by reducing cognitive load and facilitating meaningful learning (Mayer & Moreno, 2003; Moreno & Mayer, 2007). Empirical studies have similarly reported that Lectora Inspire-based multimedia increases student motivation and engagement across subject areas (Bouato, 2020; Miranti et al., 2024; Wahid et al., 2023).

In addition, the positive student responses align with findings from broader studies on multimedia and e-learning, which indicate that well-designed digital learning environments can enhance learner autonomy and self-paced learning (Lowenthal et al., 2009; Permatasari, 2018; Aloraini, 2012). These results support the view that multimedia learning, when grounded in sound instructional principles, fosters learner-centered learning environments.

Contribution to Learning Outcomes

The learning outcomes results show that most students achieved the predefined mastery criteria after using the multimedia. This indicates that the developed multimedia contributed positively to students' achievement of learning objectives. Although the findings are not interpreted as causal comparisons with other instructional approaches, they provide evidence of learning outcomes achievement following multimedia use.

The alignment between learning objectives, content presentation, and assessment embedded in the multimedia likely supported students' conceptual understanding and application. This is consistent with previous studies reporting improved learning outcomes following the use of Lectora Inspire-based media in various disciplines, including biology, chemistry, mathematics, history, and integrated science (Siregar, 2023; Syaripin, 2022; Rajagukguk, 2024; Purnomo, 2023; Inayati & Setyasto, 2024). Bibliometric and problem-solving-based studies further confirm the growing effectiveness and adaptability of Lectora Inspire in supporting student learning outcomes (Rizki et al., 2020). These findings also resonate with broader educational research emphasizing that technology-enhanced learning environments can improve academic achievement when aligned with instructional goals and learner needs (Firman, 2020; Miles et al., 2018).

Implications for Multimedia Development

Taken together, the results demonstrate that the integration of the ADDIE model with Lectora Inspire provides a structured, systematic, and replicable approach to multimedia development. Unlike many subject-specific studies, this research emphasizes the development process as a transferable framework that can be adapted across disciplines and educational contexts. The findings suggest that systematic instructional design, supported by appropriate authoring tools, can produce multimedia learning that is valid, practical, and supportive of learning outcomes. This reinforces the importance of instructional design models as foundational frameworks for scalable digital pedagogy in secondary education and beyond (Branch, 2009; Dick et al., 2009; Yusoff, 2019).

Despite the positive findings, this study has limitations. The learning outcomes evaluation was conducted in a small-group setting without comparative or longitudinal analysis. Future research should involve larger samples, diverse educational contexts, and experimental or quasi-experimental designs to further examine the effectiveness of multimedia learning. Additionally, future studies may explore the impact of Lectora Inspire-based multimedia on higher-order thinking skills, such as critical thinking and problem solving, as suggested by recent research trends (Mahmud et al., 2024).

CONCLUSION

This study concludes that multimedia learning developed using the Lectora Inspire application through the ADDIE instructional design model is valid, practical, and supportive of students' learning outcomes achievement in secondary education. The high validity scores obtained from media experts, subject-matter experts, and teachers indicate that the multimedia meets instructional, pedagogical, and technical quality standards. In addition, teacher evaluations demonstrate that the multimedia is easy to use and suitable for classroom implementation.

Positive student responses further suggest that the interactive features embedded in the multimedia, including animations, audio explanations, and quizzes, contribute to increased engagement and support independent learning. The learning outcomes evaluation shows that most students achieved the predefined mastery criteria after using the multimedia, indicating that the developed product contributes to the attainment of expected learning objectives.

The main contribution of this study lies in presenting a structured and replicable multimedia development framework that integrates the ADDIE model with the Lectora Inspire authoring tool. Rather than focusing on experimental comparisons, this research emphasizes systematic instructional design as a foundation for producing high-quality multimedia learning applicable across subject areas. Future research is recommended to involve larger samples, comparative designs, and diverse educational contexts to further examine the effectiveness and scalability of multimedia learning developed through this approach.

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