Developing "Neurolinguistics in Elementary School" Textbook to Support Lectures in the Master of Elementary Education

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Abstract

This study aims to develop a textbook "Neurolinguistics in Primary Schools" to support lectures in Master of Elementary Education. The book is designed to help students understand the relationship between language and the nervous system, as well as its application in learning in elementary schools. The study used the ADDIE development model, focusing on the development stage, which includes material analysis, design, and validation by experts. The validation results show that the book is of excellent quality, with a score of 96% from the material expert and 97% from the linguist. The book is considered clear, relevant, and comprehensive in meeting learning needs. Practicality tests showed that students found it easy to understand, well-aligned with classroom contexts, and directly applicable to teaching. This textbook is expected to be an essential resource for students in integrating neurolinguistics into their teaching practices, while also contributing to the overall improvement of elementary education quality.

Keywords: *Neurolinguistics; Textbooks; Primary Education; Book Development; ADDIE Model*

Introduction

Neurolinguistics is a branch of linguistics that studies and analyzes the relationship between language and the nervous system, particularly the human brain (Shuhratoyna, 2022). The discipline examines how the brain processes, understands and produces language, and how language is reflected in neurological activity (Calpan, 2018). In other words, neurolinguistics focuses on the brain's involvement in language processes (Wong, Yin & O'Brien, 2016), opening a window to understanding the biological basis of the human ability to communicate (Leikin, 2016). Neurolinguistics provides crucial insights into linguistic phenomena by exploring the connection between language and brain structure. (Hasson et al., 2018), identifying language disorders (Dronkers et al., 2017), and designing more effective learning

strategies (Zhang et al., 2023). The discipline offers deeper insights into the complexity of human language and communication from a neurological perspective.

In an era of increasingly complex and dynamic educational transformation, students in Master program of Elementary Education must develop a deep understanding of various learning aspects, including the relationship between language, neurology, and student learning processes. The students need to delve into neurolinguistic theory. Neurolinguistics, which connects language to brain structure and function, explores how neurological processes influence language comprehension, production, and acquisition.

Master students benefit from understanding neurolinguistic theory, not only for academic purposes but also for their future roles as educators. This knowledge helps them create teaching strategies that meet individual student needs, improve learning retention, and enhance language skill development. (LI, Legault & Litcofsky, 2014).

Moreover, an understanding of neurolinguistic theory also equips students with deep insight into the challenges and dynamics in the teaching and learning process at the elementary level (Bianchi, 2024). Several Course learning objectives outlined in lesson plan related to neurolinguistic material lack relevant learning resources. With this knowledge, master students can become agents of change, adapting learning strategies to align with advancements in science and technology. Understanding neurolinguistic theory is not just an academic requirement but also important step toward improving the quality of elementary education in the future.

Elementary education plays a crucial role in shaping students' basic knowledge and skills, especially in the field of language and literature (Istiq'faroh et al., 2024). Along with the development of science and technology, the understanding of the learning and teaching process is getting deeper. In the Master Program of Elementary Education, textbooks integrating neurolinguistic aspects are crucial due to the need for deeper understanding in key courses like Language and Literature, Critical Praxis of Indonesian Language and Literature, and Perspectives on Learning Theory.

Language and literature courses in primary education emphasize the importance of a basic understanding of linguistics and language as key in the learning process (Gunawan, 2020). Meanwhile, Critical Praxis of Indonesian Language and Literature Learning in Education demands the application of neurolinguistic concepts in practical classroom teaching. Understanding the relationship between neurolinguistics and the learning process is very relevant in supporting learning achievement (Zhang et al, 2023). Similarly, the course Perspectives on Learning Theory in Basic Education requires students to understand the basics of learning theory that can be applied in the context of basic education, including neurolinguistic concepts.

The development of the textbook *"Neurolinguistics in Elementary Schools"* is a crucial initiative to support the Master of Elementary Education program for students to understand neurolinguistic concepts and apply them in language and literature learning. This textbook is expected to improve students' ability to integrate neurolinguistic aspects into their teaching practices, aligning with the learning outcomes of each course.

Methods

This study used a development research approach to develop new products or improve existing ones with clear accountability. The ADDIE model used consisted of five stages: Analysis, Design, Development, Implementation, and Evaluation (Molenda, 2015). However, the focus of this research was on the Development stage because this study aimed at producing valid learning materials based on validator assessments. The stages of this development research are as follows:

1. Analysis

At the analysis stage, an analysis of product development is carried out with a focus on material analysis and learning needs analysis.

a. Material Analysis

Material analysis begins with an in-depth review of the existing curriculum documents in the Master Program of lementary Education Study. This includes analyzing Graduate Learning Outcomes, Course Learning Outcomes, and Sub Course Learning Outcomes. This information becomes the basis for detailing the material to be presented in the neurolinguistics book.

b. Learning Needs Analysis

The learning needs analysis started with interviews with the course lecturers. To understand specific and contextualized learning needs, interviews were conducted with the language team at the Master of Basic Education. This interview was designed to gain direct insight into the needs of students in the Master of Basic Education.

2. Design

After going through the analysis stage, the design stage aims to produce neurolinguistic textbooks that are in accordance with the needs and curriculum of the Master of Basic Education Study Program. The design process can be divided into several steps, which include:

a. Determining the Content of Appropriate Materials in Neurolinguistics Books

1) Identify the results of the material analysis that was carried out in the previous stage.
2) Select and compil book content by considering graduate learning outcomes, course learning outcomes, and relevant sub-course learning outcomes.
3) Design the structure of the book to suit the learning stages, ensuring logicality and continuity in the presentation of the material.

b. Fill in some material chapters with authors

1) The team of authors have expertise and experience in the field of neurolinguistics. One of them is a doctor who contributed his writing to this neurolinguistics book.
2) There are clear guidelines and limitations for writers regarding the material they will write about.
3) Set realistic deadlines for material collection to keep the writing process on track.

c. Book Review with Team through FGD

1) Conduct internal reviews with the book development team to ensure that the content is in line with quality standards and curriculum needs.
2) Provide constructive feedback to the author for improvement and refinement.
3) Ensure that the book covers aspects of neurolinguistics that are relevant and useful for Master Program of elementary Education students.

d. Book Cover Design

1) Determine an attractive and representative cover design for the book.
2) The design to the theme and purpose of the book, it may involve elements that reflect neurolinguistic concepts.
3) Ensure relevant information such as title, author, and synopsis on the back of the book cover.

3. Development

a. Development Results: The development phase produced a neurolinguistic book in elementary school. The neurolinguistic book became the main product developed, while the validation score provides an overview of the level of validity in terms of material feasibility, language, presentation, and graphics.

b. Validity Test: The validity test of children's storybooks was conducted by expert validators on material, language, presentation, and graphics. Validators were asked to provide an assessment of the quality of the book developed, as well as provide suggestions for improvement.

c. Assessment and Suggestions: The validators gave a general assessment of the neurolinguistics book and provided constructive suggestions regarding the development of the book. This feedback became the basis for product improvement and refinement before the implementation stage.

d. Product specifications: Contains 10 chapters on neurolinguistics, in accordance with the ISBN standard

Thus, these stages include material and media analysis, neurolinguistic book design in elementary school, and product development by involving material, language, presentation, and graphic experts to ensure the quality and validity of the resulting learning book.

Results and Discussion

Research Results

1. The Development Process of the Book "Neurolinguistics in Elementary School"

At the analysis stage of the development of the book "Neurolinguistics in Elementary Schools", two main analyses were carried out, namely material analysis and learning needs analysis. Material analysis begins with an in-depth review of the curriculum documents of the Master of Basic Education Study Program, including analysis of Graduate Learning Outcomes), Course Learning Outcomes, and sub CLO. Information from this document became the basis for detailing and determining the material to be presented in the neurolinguistics book.

Next, a team of authors with expertise in neurolinguistics was formed. The review process was conducted through FGDs with the book development team and material and language experts to ensure the content met quality standards and provide constructive feedback to the authors. The head of the research team, Dr. Nurul Istiq'faroh, M.Pd., together with Dr. Hendratno, M.Hum. from UNESA, held a Focus Group Discussion (FGD) on June 15, 2024. This discussion aims to compile a book "Neurolinguistics in Elementary Schools," which is expected to be a learning material in the "Language and Literature in Elementary Education" course so that students can apply the principles of neurolinguistics in the classroom. This collaboration also involved Ari Susandi, M.Pd., a lecturer form the Elementary school teacher education study program from Universitas Muhammadiyah Lamongan, and dR. Rosydina Robi'aqolbi, dr., M.Kes., from Al-Islah College of Al-Quran and Science.

The FGD was held in the Hall of Al-Islah College of Al-Quran and Science, with two expert validators present, namely Amiruddin Hadi Wibowo, M.Pd., from Universitas Wijaya Kusuma Surabaya as the linguist, and Dr. Elza Amelia Firdaus as the material expert. Both provided critical and constructive views to ensure the developed book has high quality and strong relevance.

Figure 1: FGD on Neurolinguistic Book Development in Elementary School

The team revised the input from the experts based on the FGD results. Furthermore, the book was published in the publisher "Alifba Media" IKAPI Member No. 409 / JTI / 2024. Within a few days, the ISBN came down with the number 978-623-10-1377-4 and entered the printing process.
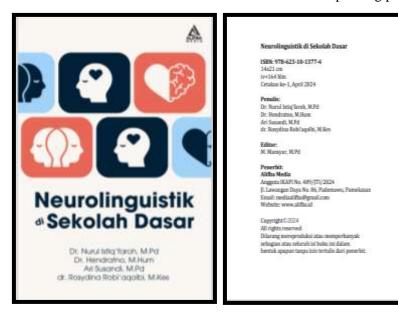

Figure 2. Book Cover of Neurolinguistics in Elementary School

2. Feasibility Results of Book Development "Neurolinguistics in Elementary School"

Answering the second problem formulation, the following are the results of the feasibility of developing the book "Neurolinguistics in Elementary Schools".

The results of the feasibility of developing the book "Neurolinguistics in Elementary Schools" based on the assessment of material experts and linguists show that this book is rated very well in various relevant aspects. Based on the material expert's assessment, the book obtained a total score of 29 out of 30, with a percentage of 96%, which is categorized as very good. The clarity of the material received the maximum score, indicating that the book content is presented clearly and easily understood by the target readers, students from Master Program of elementary Education. The accuracy of the content is also rated very well, reflecting that the neurolinguistic topics discussed are very suitable for learning needs in elementary schools. In terms of the completeness of the material, although there is little room for

additions, the material is considered to cover the important aspects required. The presentation of the material is well-integrated and flows logically and consistently. Its strong alignment with the curriculum received the highest rating, indicating that the book fully suit to the current curriculum standards.

Meanwhile, the assessment results from linguists showed a total score of 34 out of 35, with a percentage of 97%, which also categorized as the excellent category. The suitability of the content with the purpose of the book is considered very appropriate, with the presentation of material that is clear and relevant to the curriculum and learning needs. The clarity of the language also received a maximum rating, indicating that the language used is not only clear and easy to understand, but also in accordance with good and correct language rules, which are important for reaching elementary school students. The relevance of the material to neurolinguistic concepts and interactive engagement were also rated as excellent, with the book providing activities that encourage student participation. The comprehensiveness and accuracy of the material and its practical usefulness in the learning context also received the highest ratings, indicating that the book is able to provide useful practical guidance for teachers in the field. The only slightly lower aspect is the design and layout, although it remains in the good category with a score of 4 out of 5, suggesting that the design could be slightly improved to make it more attractive and easy to read for the target readers. Overall, both the material experts and linguists rated the book as highly suitable for use in neurolinguistic learning in basic education, with only a little room for improvement in some minor aspects.

3. The practicality of the development of the book "Neurolinguistics in Elementary School"

Answering the third problem formulation, the following are the results of the practicality of developing the book "Neurolinguistics in Elementary Schools"

The practicality of the book "Neurolinguistics in Elementary Schools" was measured using instruments that cover various aspects such as readability, content clarity, material relevance, ease of understanding, and practical application in the classroom. The following are the results of practicality filled in by 20 respondents (Master Program of elementary Education students)

Table 1. The practicality of the book "Neurolinguistics in Elementary Schools"

No.	Statement	Score				
		1	2	3	4	5
1	This book is easy for students to read and understand.				2	18
2	The explanations of neurolinguistic concepts in this book are clear and detailed.				9	11
3	The examples given are relevant to conditions in elementary schools.				7	13
4	This book helped me understand how neurolinguistics is applied.				6	14
5	The illustrations and pictures in the book help in understanding the material.				3	17
6	The language used in this book is easy to understand.				2	18
7	This book provides practical strategies that can be applied immediately.				1	19
8	The material presented is in accordance with the applicable curriculum.				2	18
9	This book piqued my interest to explore neurolinguistics further.					20
10	This book helps improve the professional competence of educators.					20
Total					40%	60%

The results of the practicality of the development of the book "Neurolinguistics in Elementary Schools" based on the assessment of 20 respondents (Master program of Elementary Education students) showed that this book was considered very practical. Most respondents (90%) strongly agreed that this book is easy to read and understand, and the language used is easy to understand. The explanation of neurolinguistic concepts in this book was considered clear and detailed by the majority of respondents (55% strongly agreed, 45% agreed). The examples provided are relevant to conditions in elementary schools, with 65% of respondents strongly agreeing. The book also helps in understanding the application of neurolinguistics (70% strongly agreed), and the illustrations and pictures in the book help in understanding the material (85% strongly agreed). The book provides practical strategies that can be applied immediately (95% strongly agreed) and is in line with the current curriculum (90% strongly agreed). In addition, all respondents (100%) strongly agreed that this book would interest them in exploring neurolinguistics further and would help improve their professional competence as educators.

Thus, It can be concluded that the book "Neurolinguistics in Primary Schools" is considered very practical by Master of Primary Education students. The book is easy to read and understand, with clear and understandable language. The explanation of neurolinguistic concepts is considered detailed and relevant to conditions in elementary schools. This book also helps in understanding the application of neurolinguistics, equipped with illustrations that support the understanding of the material. The practical strategies presented can be directly applied in the classroom and the material presented is in accordance with the applicable curriculum. In addition, this book is able to attract readers to explore neurolinguistics further and improve the professional competence of educators.

Discussion

The discussion in this research emphasizes the importance of understanding neurolinguistics in the context of elementary education, aligning with various theories on brain function in language acquisition and use.Neurolinguistics, which studies the connection between the brain and language, is especially valuable for educators as it helps them understand how students process language and information during lessons. (Hedayat, Raissi & Asi, 2020). This is supported by research showing that knowledge of how the brain works in processing language can help educators develop more effective and adaptive learning strategies (Wilson & Conyers, 2020).

The textbook "Neurolinguistics in Elementary Schools" developed in this study is expected to be the main source for Master of Elementary Education students to understand neurolinguistic concepts in depth, especially related to how students' brains at the elementary level process language and how educators can apply these concepts in daily teaching. This is in accordance with brain-based learning theories which suggest that educational approaches that consider neurological processes will be more effective in improving student learning outcomes (Amjad, Tabbasam & Abbas, 2022).

Furthermore, the results showed that the book was rated very well by experts in terms of clarity of material, accuracy of content, and relevance to the applicable curriculum. This reflects that the book has met the quality standards as teaching materials that are suitable for learning needs in basic education. The integration of the material presented in this book is also in accordance with Vygotsky's theory of the zone of proximal development (ZPD), where learning that is tailored to the cognitive capacity of students will be more effective in helping them achieve their optimal potential (Margolis, 2020).

In terms of practicality, this book is considered very practical by Master Program of elementary Education students, especially in terms of readability and ease of application of material in the classroom. This is in line with the principles of developing effective teaching materials, namely teaching materials must be easy to understand, relevant to real situations in the classroom, and can be applied directly in the learning process (Puspitarini & Hanif, 2019). The illustrations and practical examples presented in this

book are also considered to help students understand and apply neurolinguistic theory, in accordance with a contextual and experience-based learning approach.

Thus, the development of the book "Neurolinguistics in Primary Schools" not only fulfills the academic needs of Master of Primary Education students, but also makes an important contribution in improving the quality of language and literature teaching in primary schools. This book provides a strong scientific foundation for prospective educators in integrating knowledge about neurolinguistics into learning practices, which in turn is expected to improve the quality of basic education in the future.

Conclusion

The development of the textbook "Neurolinguistics in Elementary Schools" aims to support lectures in the Master of Basic Education Study Program, especially in understanding the relationship between language and the nervous system, as well as its application in the learning process. The results showed that the book was rated as excellent and practical by material, language, and student experts. In terms of feasibility, this book is considered relevant to the curriculum, clear in the delivery of material, and complete and accurate in the coverage of neurolinguistic topics. The practicality of this book was also highly rated, with the majority of Master Program of elementary Education students considering this book easy to understand, relevant to real conditions in the classroom, and providing learning strategies that can be directly applied.

This textbook is expected to be an important reference source for students and prospective educators in developing neurolinguistic-based learning strategies. This knowledge not only strengthens students' pedagogical skills, but also supports them in designing more effective, adaptive and developmentally appropriate learning for students at the primary level. Overall, this book contributes to improving the quality of teaching in basic education and is expected to be an important tool in efforts to improve the professional competence of future educators.

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