

Developing HABER Pictorial Letter and Number Cards to Support Early Childhood Cognitive Learning

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ABSTRACT

This study aimed to develop and evaluate the feasibility of the Pictorial Letter and Number Card (HABER) media to support cognitive learning activities in early childhood education. The study employed a Research and Development (R&D) approach using the 4D model, consisting of the define, design, develop, and disseminate stages. The research was conducted at TK Khalifah III Makassar and involved four kindergarten teachers as participants. Data were collected through observations, interviews, questionnaires, and expert validation sheets and were analyzed using descriptive quantitative and qualitative techniques. The findings indicated that teachers required innovative instructional media and practical guidelines to support cognitive learning activities. The HABER media consists of letter cards, number cards, picture cards, and a user guidebook designed according to children's developmental characteristics. Expert validation confirmed that the product met the validity criteria. In addition, the practicality test yielded a score of 92.86%, while the teacher evaluation indicated a score of 94.9%, both categorized as very high. These findings indicate that HABER is valid, practical, and perceived by teachers as highly supportive of cognitive learning activities in early childhood education

INTRODUCTION

Early Childhood Education (ECE) plays a crucial role in establishing the foundation for children's holistic development. During early childhood, children experience a critical developmental period commonly referred to as the golden age, during which cognitive, language, physical, social-emotional, and moral development progress rapidly. Cognitive development is particularly important because it underlies children's ability to think logically, solve problems, classify objects, recognize symbols, remember information, and understand their surrounding environment (Piaget, 1964). Therefore, providing appropriate cognitive stimulation during this developmental stage is essential to support children's readiness for lifelong learning and future academic success.

One of the essential components of effective early childhood learning is the use of instructional media that correspond to children's developmental characteristics. Young children learn more effectively through concrete experiences than abstract explanations (Bruner, 1966). Consequently, instructional media help transform abstract concepts into meaningful and observable learning experiences. Previous studies have consistently reported that visual instructional media improve children's attention, motivation, participation, symbolic thinking, and early literacy skills while creating more enjoyable learning environments. Likewise, card-based learning media have been shown to facilitate early numeracy, concept recognition, and cognitive learning activities among preschool children.

Recent studies have demonstrated the educational value of flashcards and other visual learning media in early childhood education (Khamidah & Ita Sholichah, 2022). Flashcard media have been found to improve symbolic thinking and letter recognition among preschool children, while illustrated letter cards help children recognize symbols and strengthen early literacy skills (Sukarti et al., 2023). Other studies have reported that number cards effectively introduce early mathematical concepts and enhance children's cognitive learning experiences (Ekayanti et al., 2026). Furthermore, digital and augmented reality-based instructional media have recently been introduced to enrich children's interaction with visual learning materials and increase learning motivation (Azizah et al., 2026). Collectively, these findings indicate that visual and card-based instructional media provide meaningful support for cognitive learning activities in early childhood classrooms.

Despite these positive findings, several limitations remain in the existing literature. Most previous studies have focused on developing a single type of instructional medium, such as flashcards, letter cards, number cards, or picture cards separately. Consequently, teachers often need to combine several instructional media independently to support different learning objectives. In addition, previous studies have primarily emphasized children's learning outcomes while giving limited attention to the practicality of classroom implementation from teachers' perspectives. Very few studies have developed integrated instructional media accompanied by a systematic guidebook that assists teachers in implementing the media effectively across various learning themes. This limitation indicates that teachers continue to require instructional

media that are practical, flexible, and systematically organized for everyday classroom use.

Observations and interviews conducted at Khalifah III Kindergarten, Makassar, also revealed similar classroom conditions. Learning activities were still dominated by the use of Children's Worksheets (*Lembar Kerja Anak*), whereas the use of instructional media remained relatively limited. Although teachers occasionally used number cards or picture cards, these media were not systematically integrated into learning objectives and were implemented without practical instructional guidelines. As a result, learning activities tended to become less engaging, and children frequently lost attention and became less actively involved in classroom learning. Teachers also expressed the need for innovative instructional media that could facilitate cognitive learning activities while remaining practical and easy to implement.

The present study addresses these limitations by developing the Pictorial Letter and Number Card (HABER) media. Unlike conventional flashcards that generally focus on a single learning objective, HABER integrates letter cards, number cards, and picture cards into a single instructional package designed to support multiple cognitive learning activities, including symbol recognition, picture matching, object classification, and simple problem-solving tasks. Moreover, the HABER media is accompanied by a teacher guidebook that provides systematic implementation procedures, allowing teachers to apply the media consistently across different learning themes and classroom contexts. The integration of various learning components together with practical implementation guidance represents the primary novelty of this study and distinguishes HABER from previously developed card-based instructional media.

Therefore, this study aimed to develop the Pictorial Letter and Number Card (HABER) media and to evaluate its validity, practicality, and teacher-perceived effectiveness as an instructional medium for supporting cognitive learning activities in early childhood education.

LITERATURE REVIEW

Early childhood cognitive development involves children's ability to recognize, understand, and use information from their environment. Learning activities that involve recognizing symbols, counting, classifying, and matching objects can provide opportunities for children to develop these abilities. Therefore, instructional media should be designed to support children's active participation and be appropriate to their developmental characteristics. Visual instructional media can help connect abstract concepts with concrete representations. In the context of early childhood education, pictorial cards combine visual images with symbols to provide learning experiences that children can observe and manipulate. (Bruner, 1966) emphasized the role of representation in learning, which provides a theoretical basis for considering the use of visual and symbolic materials in instructional activities.

HABER was developed as an instructional medium that integrates letter cards, number cards, picture cards, and a guidebook. The combination is

intended to support teachers in organizing learning activities involving letter and number recognition, counting, sequencing, and matching quantities with numerical symbols. The guidebook also provides structured instructions for implementing the media in classroom activities.

Based on these considerations, the development of HABER focuses on producing instructional media that are valid, practical, and perceived by teachers as supportive of children's cognitive learning activities. The present study therefore examines the product's validity, practicality, and teacher-perceived effectiveness.

METHODS

Research Design

This study employed a Research and Development (R&D) approach to develop the Pictorial Letter and Number Card (HABER) media for early childhood learning activities. The development procedure adopted the 4D model proposed by (Thiagarajan et al., 1974) , which consists of four stages: define, design, develop, and disseminate. The R&D approach was selected because the study focused on developing and evaluating an instructional media product before its wider implementation. The define stage was conducted to identify the learning needs and problems related to the availability of instructional media for cognitive learning activities in early childhood education. Information was obtained through observation and interviews with kindergarten teachers. The analysis focused on teachers' needs for instructional media that could support activities involving symbols, numbers, pictures, classification, and simple problem solving.

The design stage involved planning the components and visual characteristics of the HABER media. The product was designed as an integrated learning package consisting of pictorial letter cards, number cards, picture cards, and a guidebook. The picture cards contain an illustration accompanied by the name or description of the object, while the number cards present numerical symbols that can be associated with corresponding quantities or pictures.

The guidebook was developed to provide teachers with directions for using the cards systematically during classroom activities. The develop stage involved producing the initial HABER prototype and evaluating it through expert validation. The validation focused on the content, format, language, instructions, and suitability of the product for early childhood cognitive learning activities. Revisions were made based on the validation results before the media was implemented in the classroom. The disseminate stage involved the use of the revised HABER media in a kindergarten classroom. The purpose of this stage in the present study was limited to examining teacher responses and the perceived support of the media for cognitive learning activities. Therefore, the study did not claim direct improvement in children's cognitive development.

Participants and Implementation

The classroom implementation involved four Group B kindergarten teachers and 15 children. The teachers used the HABER media directly during learning activities with the children. The implementation was conducted in two

sessions, with each session lasting approximately 45 minutes. During the implementation, teachers used the letter, number, and picture cards according to the activities provided in the HABER guidebook. The activities were designed to involve children in recognizing symbols, associating numbers with quantities or pictures, matching pictures and symbols, arranging numbers, and engaging in simple cognitive problem-solving activities. The involvement of children in the implementation served as the classroom context in which teachers used the product. However, because the study did not employ a direct child-level cognitive assessment, children's cognitive development was not analyzed as an outcome variable.

Data Collection Instruments

Data were collected through observation, interviews, expert validation sheets, a teacher response questionnaire, and a teacher-based evaluation sheet. The teacher response questionnaire consisted of 15 statements concerning teachers' perceptions of the usefulness, attractiveness, practicality, safety, and potential support of HABER for cognitive learning activities. Responses were provided by four teachers using a four-point response scale. In addition, a teacher-based evaluation sheet consisting of five statements was used after the implementation. The evaluation addressed teachers' perceptions of the extent to which HABER supported cognitive learning activities, including number recognition, use of numerical symbols, ordering numbers, and matching quantities with numerical symbols. Expert validation was conducted to examine the quality of the instruments and the developed media. The validation instruments used a four-point rating scale. The validation covered aspects such as instructions, content, language, format, illustrations, layout, and usefulness of the guidebook.

Data Analysis

The quantitative data obtained from the validation sheets and teacher responses were analyzed descriptively using percentage scores. The percentage was calculated using the following formula (Sugiyono, 2022) :

$$P = \frac{X}{X_{\max}} \times 100\%$$

Where P represents the percentage score, X represents the total obtained score, and Xmax represents the maximum possible score. The results were then interpreted according to the category used in the respective evaluation instrument. The teacher response questionnaire produced an overall percentage of 92.86%, indicating a very positive teacher response to the HABER media. The teacher-based evaluation produced a percentage of 94.9%. Because this score was obtained from teacher evaluations rather than direct measurements of children's cognitive outcomes, it is referred to in this study as teacher-perceived effectiveness. The quantitative findings were complemented by information obtained from observations and interviews to describe how HABER was used

during classroom activities and how teachers perceived its usability and contribution to cognitive learning activities.

RESULTS

Needs Analysis for the Development of HABER Media

The needs analysis was conducted as the initial stage of the HABER media development process. Classroom observations and interviews with teachers at Khalifah III Kindergarten, Makassar, were conducted to identify the existing learning conditions, the instructional media used by teachers, and the teachers' needs for media that could support children's cognitive learning activities. The findings indicated that classroom learning was still largely supported by Children's Worksheets (Lembar Kerja Anak), while the use of varied instructional media remained limited. Teachers had used number cards and picture cards occasionally; however, their use was not yet systematically integrated with learning objectives and was not supported by a structured guidebook.

The teachers therefore needed instructional media that was attractive, practical, and adaptable to children's learning activities, as well as a guidebook that could provide clear procedures for implementation. To ensure that the needs analysis instrument was appropriate for collecting the required information, the instrument was reviewed by experts. The validation covered three aspects: instructions, language, and content. The mean scores obtained for the three aspects were 4.00, 3.80, and 3.50, respectively, resulting in an overall mean of approximately 3.77. These results indicate that the needs analysis instrument was considered valid for identifying teachers' needs related to the development of HABER media.

Table 1. Validation Results of the Needs Analysis Instrument

No.	Assessment	Mean	Category
1	Instructions	4.00	Valid
2	Language	3.80	Valid
3	Content	3.50	Valid
Overall Mean		3.77	Valid

Source: Expert validation data.

Design and Development of HABER Media

Based on the results of the needs analysis, the researchers developed the Pictorial Letter and Number Card (HABER) as an integrated instructional medium. The HABER media consists of letter cards, number cards, picture cards, and a teacher guidebook. The letter cards are designed to introduce children to letter symbols, while the number cards support activities involving number recognition, counting, and number sequencing. The picture cards provide visual representations that can be associated with letters, numbers, and objects familiar

to children. The cards are arranged using a reusable display system, allowing teachers to replace and combine cards according to the learning activity.

One example of the HABER implementation is the association between a number card and a corresponding quantity of objects. For example, the number “3” can be presented together with a picture showing three cows. This activity enables children to connect numerical symbols with visual representations and quantities. The media is also accompanied by a teacher guidebook that provides information about the components, objectives, procedures, learning activities, and possible implementation of HABER. The guidebook is intended to help teachers use the media systematically rather than simply presenting the cards as conventional flashcards. The development of HABER therefore emphasizes three characteristics: integration, flexibility, and systematic implementation. The integration of letters, numbers, and pictures allows the same media package to be used for various cognitive learning activities, while the guidebook provides teachers with practical guidance for classroom implementation.

The HABER media was developed as an integrated learning package consisting of pictorial letter cards, number cards, picture cards, and a user guidebook. Unlike conventional flashcards that generally present a single type of learning content, HABER combines letter, number, and picture representations within one learning package. This integration is intended to provide teachers with flexible media that can be used in various cognitive learning activities, including recognizing symbols, matching pictures with symbols, identifying numbers, counting objects, and solving simple problems.



Figure 1. Design of the HABER Media

Figure 1 shows the design of the HABER media, which consists of two main card formats: number cards and picture cards. The number cards present numerical symbols in large and visually prominent forms, while the picture cards present illustrations of familiar objects accompanied by their corresponding names. For example, the picture card presents an illustration of cows accompanied by the word “SAPI.” This combination provides visual and symbolic representations that can be used in activities such as recognizing numbers, identifying objects, associating pictures with words, and matching quantities with numerical symbols. The two card formats are designed to be used flexibly according to the learning activity. Number cards can be used to introduce and recognize numerical symbols, while picture cards can support object recognition and the association between visual representations and written

words. The integration of these components allows teachers to use the same media for different cognitive learning activities.



Figure 2. HABER Media User Guidebook

Figure 2 presents the HABER user guidebook developed as a complementary component of the media. The guidebook provides practical guidance for teachers in implementing learning activities using HABER. The combination of the cards and guidebook represents the main feature of the product, as teachers are provided not only with visual learning materials but also with guidance for their classroom use. The development of HABER therefore emphasizes three main characteristics: integration, flexibility, and systematic implementation. The integration of letters, numbers, and pictures allows the same media package to be used for various cognitive learning activities, while the guidebook provides practical guidance for classroom implementation.

One of the main advantages of the HABER media is its flexibility. The picture cards can be adapted according to the learning themes being implemented, allowing teachers to use the same media in various learning activities. Through activities such as recognizing symbols, matching pictures, classifying objects, and solving simple problems, the HABER media provides concrete and meaningful learning experiences for children. The development of thematic and flexible instructional media is essential in early childhood education because it enables teachers to adjust learning activities according to children's needs and developmental characteristics. Therefore, the HABER media was designed as an alternative instructional medium that can support cognitive development through engaging and enjoyable learning activities,

Validity of the HABER Media and Supporting Instrument

The validity assessment involved two experts in early childhood education. The validation was conducted on the supporting instruments used in the development and evaluation of HABER, including the needs analysis instrument, HABER guidebook, Teacher Response Questionnaire (TRQ), and HABER media evaluation instrument.

The results showed that all instruments obtained mean scores within the valid category. The guidebook received an overall mean score of approximately

3.58, while the Teacher Response Questionnaire and HABER evaluation instrument obtained mean scores of approximately 3.60 and 3.57, respectively.

Table 2. Validation Results of the HABER Development Instruments

No.	Instrument	Mean Score	Category
1	Needs Analysis Instrument	3.77	Valid
2	HABER Guidebook	3.58	Valid
3	Teacher Response Questionnaire (TRQ)	3.60	Valid
4	HABER Evaluation Instrument	3.57	Valid

Source: Expert validation data.

The validation results indicate that the instruments were considered appropriate for use in the subsequent stages of the development process. The guidebook validation covered components of the book, format, content, language and writing, illustration and image layout, and usefulness. The validation results showed that these components were generally rated positively by the experts.

The validation of the Teacher Response Questionnaire also indicated that its instructions, response aspects, and language were appropriate for collecting teachers' responses to the HABER media. Similarly, the HABER evaluation instrument was considered appropriate in terms of instructions, assessment aspects, and language.

Practicality of the HABER Media

The practicality of the HABER media was assessed through the Teacher Response Questionnaire, which consisted of 15 statements completed by the four participating teachers after the implementation of the media. The results showed an accumulated score of 92.86%, which was categorized as Strongly Agree in the original assessment criteria. The high percentage indicates that teachers responded positively to the developed media and considered HABER suitable for use in classroom learning activities.

Table 3. Teacher Responses to the HABER Media

No.	Indicator Aspect	Mean Result
1	Number of statement	15
2	Number of teacher respondent	4
3	Percentage	92.86%
Category		Strongly Agree

Source: Teacher Response Questionnaire.

The teachers' positive responses indicate that HABER was considered easy to implement and relevant to classroom learning activities. The availability of the guidebook also supported teachers in understanding the procedures for using the media. Thus, the practicality finding suggests that HABER can be

implemented by teachers as an alternative instructional medium without requiring complicated classroom procedures.

Teacher-Perceived Effectiveness of the HABER Media

The perceived effectiveness of HABER was assessed using a five-item evaluation sheet completed by the four participating teachers after the media had been implemented in classroom learning activities. The evaluation focused on teachers' perceptions of the extent to which HABER supported children's cognitive learning activities. The accumulated result was 94.9%, which was categorized as "Very Effective" according to the original assessment criteria. Because the score was based on teacher evaluation, this result is interpreted as teacher-perceived effectiveness rather than direct evidence of children's cognitive improvement.

Table 4. Teacher-Perceived Effectiveness of the HABER Media

No.	Indicator Aspect	Mean Result
1	Number of statement	15
2	Number of teacher respondent	4
3	Percentage	92.86%
Category		Strongly Agree

Source: HABER Media Evaluation Sheet Completed by Teachers.

The results indicate that teachers perceived HABER as highly supportive of cognitive learning activities, particularly activities involving number-symbol recognition, counting, sequencing, and matching quantities with numerical symbols. These activities provide opportunities for children to connect symbolic representations with visual representations during classroom learning. However, because the 94.9% score was obtained from teacher evaluations rather than direct assessments of children's cognitive performance, this finding should be interpreted as teacher-perceived effectiveness. It does not provide direct evidence that HABER caused an improvement in children's cognitive development.

DISCUSSION

The findings of this study indicate that HABER provides a flexible visual learning medium that can support teachers in organizing cognitive learning activities. The integration of number symbols, pictures, and object labels allows children to encounter concepts through concrete and visual representations before connecting them with symbolic forms. This characteristic is consistent with Bruner's view that learning can be facilitated through representations that move from concrete experiences toward symbolic understanding. In the context of HABER, children can observe familiar objects, identify their names, recognize numerical symbols, and associate quantities with numbers through the same learning package.

The findings are also in line with previous studies reporting the potential of flashcard and visual media to support early childhood learning. Previous research has shown that flashcard media can support cognitive and language development, while illustrated letter cards can assist children in recognizing symbols and developing early literacy skills. Studies involving flashcards have also reported positive outcomes in symbolic thinking and letter recognition. These findings support the present study in showing that visual and card-based media can provide opportunities for children to interact with symbols and meaningful visual information. However, HABER differs from these media because it integrates letter, number, and picture representations into one package and is accompanied by a guidebook for systematic classroom implementation.

The high teacher-response score of 92.86% further indicates that the product was considered practical and acceptable for classroom use. The guidebook appears to be an important supporting component because it provides teachers with procedures for organizing learning activities rather than requiring them to use the cards as conventional flashcards. This feature addresses the practical gap identified during the needs analysis, in which teachers reported the need for instructional media that were not only attractive but also easy to implement and adaptable to different learning activities.

The teacher-perceived effectiveness score of 94.9% should nevertheless be interpreted cautiously. The score reflects teachers' judgments regarding the extent to which HABER supported cognitive learning activities, including number recognition, counting, sequencing, and matching quantities with numerical symbols. It does not constitute direct evidence of improvement in children's cognitive development because no child-level pretest, posttest, or standardized cognitive assessment was conducted. Therefore, the present findings provide evidence of product feasibility, practicality, and perceived instructional support rather than causal evidence of cognitive improvement.

This study has several limitations. First, the classroom implementation involved only four teachers and 15 children in one kindergarten setting. Second, the evaluation of cognitive learning support relied on teacher judgments rather than direct measurements of children's cognitive outcomes. Third, the implementation was conducted in only two sessions of approximately 45 minutes each. These limitations restrict the generalizability of the findings. Future research should involve larger and more diverse samples, direct child-level cognitive indicators, and pretest-posttest or comparison-group designs to examine whether the use of HABER produces measurable improvements in children's cognitive development.

CONCLUSIONS AND RECOMMENDATIONS

The development of the Pictorial Letter and Number Card (HABER) media was conducted using the 4D development model, consisting of the define, design, develop, and disseminate stages. The developed product integrates number cards and picture cards with object descriptions and is accompanied by a guidebook to support teachers in implementing learning activities systematically. The validation results indicate that the HABER media and its

supporting instruments met the required criteria for use. Teacher responses also showed a high level of acceptance, with a practicality score of 92.86%. In addition, the teacher-based evaluation obtained a score of 94.9%, indicating that teachers perceived HABER as highly supportive of children's cognitive learning activities..

FURTHER STUDY

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