Development of Color Coding Media for the Development of Early Childhood English

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Abstract
This study aims to develop Color Coding media as an instructional tool to enhance the English language skills of children aged 5–6 years at a selected early childhood education center. The research employed a Research and Development (R&D) methodology using the ADDIE model, which includes five systematic stages: analysis, design, development, implementation, and evaluation. The participants were kindergarten-aged children, and data were gathered using validation instruments completed by subject-matter experts in content, media, and design, alongside student-based evaluation tools. The validation process yielded results indicating a "Very Worthwhile" classification from material experts (96%), media experts (84.16%), and design experts (95.71%), suggesting no major revisions were necessary. Product trials conducted with students resulted in an average score of 83.03%, categorizing the media as "Very Feasible." These outcomes suggest that Color Coding media holds strong potential as an innovative and effective tool for improving early childhood English language proficiency, particularly in letter recognition, early writing skills, and foundational vocabulary acquisition. The practical implications of this research support the integration of visual-based media into early language curricula, offering a playful and engaging learning experience for young learners.

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1. Introduction

The development of language is a critical component of a child's growth, particularly during the early stages of life. In this stage, children are in a critical period of development, during which they begin to acquire language skills, including English as a global language. The possession of proficient language skills has been demonstrated to facilitate communication processes and exert a favorable influence on the developmental outcomes of children (Fadlan et al., 2021). Studies have demonstrated that children who acquire a foreign language from an early age exhibit superior intellectual aptitude, exhibit enhanced academic prospects in language, and demonstrate more optimal social development. Furthermore, the students' capacity to interact across linguistic and cultural boundaries will be enhanced. Consequently, upon reaching maturity, these individuals will possess the necessary qualifications to achieve remarkable accomplishments (Novitasari et al., 2023).

A number of factors have been identified as contributing to children's learning of English vocabulary. Among these factors, support from friends has been identified as a significant motivator in the learning process. The role of friends in this regard has been found to be particularly important, as they can provide encouragement and assistance that can facilitate the learning process. Conversely, pedagogical activities play a pivotal role in vocabulary introduction to children. Teachers often encounter students who struggle with the pronunciation of recently taught vocabulary. Additionally, students may become distracted by their own activities, such as engaging in conversation, rather than focusing on the teacher's instruction. Furthermore, there is an absence of specific indicators that can be utilized to assess children's English development (Pertiwi et al., 2021).

The results of preliminary observations revealed challenges in the effectiveness of English language instruction for children aged 5-6 years at a local kindergarten. The English learning activities at this institution were primarily limited to repetitive number recognition exercises, which led to a lack of student engagement and interest. This narrow instructional focus did not offer sufficient opportunities for children to explore or internalize English vocabulary meaningfully. The approach relied heavily on passive methods such as listening and repetition, without the support of interactive or stimulating media. The absence of structured, play-based learning tools hindered students' ability to grasp and retain new language concepts. Consequently, the development of children's English proficiency remained limited due to the lack of suitable and engaging instructional media.

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In English teaching at the early childhood education level, children are introduced to simple vocabulary that is relevant to their environment. The teaching method used is through directed play, thus, children can learn using an approach that they recognize and enjoy (Triyanto & Astuti, 2021). In learning English, the media used must be fun and can stimulate language development. One example is the Color Coding medium. Color Coding is a game method that uses colors to group information, which can help children remember vocabulary as well as practice their pre-writing skills. Integrating coding in early childhood education can significantly improve literacy competence from an early age (Lia, 2022).

Color Coding employs the use of color to group information, thereby facilitating the retention of vocabulary and the execution of pre-writing activities by children. This medium utilizes color because early childhood is typically drawn to bright and striking hues. The use of color has been demonstrated to enhance memory in children, stimulate interest in learning materials, facilitate the conveyance of information, and enliven the presentation of educational content. Furthermore, color has been demonstrated to influence an individual's emotional state. For instance, green and blue have been shown to induce a sense of calm, while orange has been observed to foster a sense of cheerfulness (Damayanti et al., 2020). The utilization of color coding in the introduction of English to children has been demonstrated to facilitate the learning process through the use of colors. The utilization of color in data representation has been demonstrated to facilitate information grouping, thereby enhancing its perceptibility and memorability. In the domain of Color Coding media, the utilization of specific colors for categories (e.g., red for the letter "a") has been demonstrated to facilitate children's comprehension of the concept, enhance their attention, and augment their interest in learning.

Teaching English to early childhood, especially in terms of extensive vocabulary mastery, is done to meet their knowledge needs. The goal is so that they don't encounter difficulties when stepping into higher academic levels. (Junaida & Zannah, 2023). English language competencies provide access to a wide range of educational resources and opportunities (Junaida & Zannah, 2023). So that the introduction of English to children from an early age can accelerate the progress of their language skills. All aspects of language development, including listening, speaking, writing, and reading, have a very crucial role (Ningsih et al., 2024). Therefore, it is important to implement this learning in schools to stimulate children in preparation for their future. Early childhood children who have been equipped with English will find it easier to understand the material when they enter the elementary level. Conversely, if they do not get English language learning, the development of their language skills can be stunted.

This study was conducted in response to challenges identified in early childhood English language education. The use of color-coding media is based on the premise that visually engaging tools can enhance young learners' language acquisition. Observations in the field, coupled with the need for more innovative learning resources, prompted the researcher to develop and assess a new instructional approach. The findings are expected to contribute to the refinement of pedagogical strategies, supporting more responsive and effective methods for fostering English development in early childhood settings.

2. Method

This research was held at a local kindergarten in Bondowoso, Indonesia. This research adopts a Research and Development (RnD) approach, to develop products and validate their effectiveness (Fayrus & Slamet, 2022). By applying the ADDIE (Analysis, Design, Development, Implementation, and Evaluation*)* model, this study aims to create systematic and structured learning according to the principles of effective learning design (Triyanto & Astuti, 2021).

The development of Color Coding media to improve children's English skills at Siti Fatimah Kindergarten follows the ADDIE model (Waruwu, 2024) which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation.

At the **analysis** stage, identification of problems, needs, characteristics of students, and relevant learning objectives is carried out. This analysis aims to ensure that the media developed is truly in accordance with the conditions and needs of children in the context of English learning at kindergarten.

The next stage is **design**, which focuses on the initial design of the Color Coding media, including determining the integration of the colors used. This phase is very important because it becomes the conceptual foundation before the product is developed in real terms.

Furthermore, at the **development stage**, the media that has been designed begins to be developed into a complete product. This product was then validated by three experts, namely media experts, material experts, and design experts. Input from experts plays a very important role in improving the media to suit the learning objectives.

The **implementation** stage is carried out by applying Color Coding media in learning activities at Siti Fatimah Kindergarten. The researchers observed how children interacted with the media as well as collected feedback to find out the effectiveness of media in helping children learn English vocabulary.

Finally, at **the evaluation** stage, the product is reviewed based on the results of the student's evaluation instrument. Revisions were made to adjust the media to be more optimal in achieving learning objectives and identify aspects that still need to be improved.

The research subjects were 5-6 year old students at local kindergarten in Bondowoso, Indonesia, while the object of the research was the development of Color Coding media. The data collection technique involves validation instruments filled in by material experts, media experts, and design experts, as well as media-specific evaluation instruments. These instruments serve to document the feasibility of the resulting learning media (Lorenza, 2021). Validation is carried out by three experts: material experts, media experts, and design experts. After the data was obtained, the results of the validity test of Color Coding media were calculated using the Arikunto formula in Saputra and Mampouw (2022) as follows:

$$\text{PSA} = \frac{\sum Alternative\ answers\ selected\ each\ aspect}{\sum Alternative\ Ideal\ Answer\ for\ Each\ Aspect} \text{ x } 100\% \quad (1)$$

Description:
∑ Alternative Answers Selected Each Aspect: The percentage of the total score given by a validator (either a material expert, a media expert, or a design expert) for all statements contained in the valid instrument.
∑ Alternative Ideal Answer for Each Aspect: The maximum total number of scores that can theoretically be achieved if the Color Coding media is perfectly rated by the validator.

The results of the PSA calculation will produce a percentage that shows the level of media eligibility. The higher the PSA percentage, the more feasible the Color Coding media is according to expert assessments. The feasibility assessment of a development product is based on the percentage of scores achieved, where a higher score indicates better viability. The data obtained from the validation is then analyzed to identify the strengths and weaknesses of the media. The results of this analysis are interpreted to provide specific recommendations for improvement, so that the media development process becomes more targeted and effective. This criterion is essential in the decision-making process for media validation according to Zailani (2021) as shown in Table 1.

Table 1. Validity Score Criteria

No	Score	Description
1	80 % - 100 %	Worthy, No Revision
2	60 % - 79 %	Not worth it, needs revision.
3	50 % - 59 %	Not Feasible, Needs Revision
4	0 % - 49 %	Very Unfeasible, Needs Revision

3. Results and Discussion

In this development process, data and outcomes related to the Color Coding media product for enhancing English language skills in children aged 5-6 years were collected from a selected early childhood education institution in a rural area of Indonesia. At this stage, the developers conducted a needs analysis to identify the challenges commonly faced by young learners in acquiring English vocabulary. Observations revealed that the prevailing teaching methods were often monotonous, relying heavily on listening and repetition strategies. Moreover, the limited availability of engaging and interactive learning media presented a significant barrier to effective language instruction.

Furthermore, the design of Color Coding media was carried out, including the determination of the flow of color use, namely the red circle for the letter 'a' and the yellow circle for the letter 'b'. At this stage, key codes are also created to form English vocabulary and guidelines for teachers. In the coding palette, there is a white circle shape for the letter 'e' and a yellow star shape for the letter 'y', thus forming the English vocabulary "eye" which means eye. The creation of various shapes with colors and letters from A to Z is also carried out in the design stage to facilitate the development process. In the development stage, a key code board was created as in Figure 1 and a coding palette as in Figure2.

Figure 1. Key Codeboard

Figure 2. Coding Palette

The validation of Color Coding media was then carried out with the help of three experts, including material experts, design experts, and learning media experts. The data obtained from this validation test will be a reference for the improvement of Color Coding media, as presented in the following test results:

3.1. Material Expert Validation

The material validation was carried out by Wedya Puspita, S.Pd., M.Pd., a lecturer from PGRI Argopuro University Jember. Subject matter experts assess the Color Coding media format as "Very Feasible", especially in terms of the suitability of the material with the learning objectives that have been set. Nevertheless, the completeness and quality of the study aids are categorized as "Decent". The assessment of the content of the material includes several important criteria, including the presentation of the material that is in line with the goals that have been set, the relevance of the learning objectives, the suitability of the material with the level of ability of the students, the accuracy of the media to the truth of the material, and the depth of the presentation of the material. All of these criteria are collectively rated "Very Worthy".

In addition to providing the assessments listed in the instrument, the subject matter expert also provides additional notes. He suggested that media security be maintained by providing a complete layer of duct tape on the periphery. In addition, it is recommended to create a teacher's handbook reading sheet that contains the results of the key codes on the coding palette, making it easier in the learning process.

From the data from the calculation results that have been determined, it is concluded that the Color Coding media gets a score of 96% from the validation of material experts. Furthermore, according to the criteria for this validity score is included in the category of "Feasible, No Revision Needed".

3.2. Media Expert Validation

Media validation was carried out by Muhammad Agus S., M. Pd., a lecturer from PGRI Argopuro University Jember. Media experts give a "Very Worthy" rating of several important aspects of Color Coding media. This assessment includes the consistency of forms in the media, the smoothness of the media when it is run, the accuracy of Color Coding with the specified key code, the use of proportional images, and the suitability of interactive learning media with the user's ability. All of these aspects show that the media has been well-designed and meets the expected standards.

However, the subject matter expert also gives a "Feasible" assessment of several other aspects. This includes assistance in creating Color Coding for the development of the English language, ease in retrieving Color Coding, ease of operation of Color Coding, use of proportional letters, and font suitability. While these aspects are rated as feasible, the assessment of "Image Compatibility" indicates a "Fairly Feasible" category, which indicates there is room for improvement. In addition to the assessment listed in the instrument, the subject matter expert provided an additional note that the current media tools are not sufficient. He suggested that other aids be added and gave recommendations on where to place these aids to increase the effectiveness of the use of media in learning.

From the data from the calculations that have been determined, it is concluded that Color Coding media gets a score of 84.16% from the validation of media experts. Furthermore, according to the validity score criteria, it is included in the category of "Feasible, No Revision Needed".

3.3. Design Expert Validation

The design validation was carried out by Pascalian Hadi Pradana, M.Pd., a lecturer from PGRI Argopuro University Jember. The design expert gave a "Very Worthy" rating to several important criteria in Color Coding media. These criteria include the attractiveness of the Color Coding design, consistency in the use of titles, clarity of text, proper placement of images, and suitability of variations in type, size, and shape of letters in key codes. In addition, design experts also assessed the suitability of organizing the content of Color Coding material as an excellent aspect, showing that this media was designed with attention to detail and the effectiveness of information delivery.

However, there are several aspects that are considered "Feasible". This includes the accuracy of the use of the typeface used in the key code, the accuracy of the use of images, and the accuracy of the placement of the purpose in the creation of Color Coding. While these aspects meet the expected standards, there is still room for improvement to make the media more optimal. In addition to the assessments listed in the instrument, the design expert provides an additional note that the purpose of the media should be clear according to the child's needs. He also emphasized the importance of using words and images that are more attractive and multifunctional, so that the media can be more effective in attracting attention and supporting the children's learning process.

From the data from the calculations that have been determined, it is concluded that the Color Coding media gets a score of 95.71% from the validation of design experts. Furthermore, according to the validity score criteria, it is included in the category of "Feasible, No Revision Needed".

Testing of Color Coding media products on students showed very positive results, indicating that this media is effective in meeting students' learning needs and in accordance with the purpose of the material being taught (Syafita & Nurmairina, 2022). The aspects evaluated include students' abilities in: Identifying and pronouncing letters in English, Performing pre-writing activities, Saying basic vocabulary in English (Ministry of Education and Culture, 2022). Agreeing with previous research on children's English language development, according to Sukmawati in her research found that early exposure to English substantially supports children's language development, preparing them for better academic and career prospects in the future. This study also underlines that effective English communication skills are essential for children's interaction with the environment and peers (Sukmawati et al., 2023).

Figure 3. Field Trials Using Color Coding Media

Based on the recapitulation of the scores obtained from students after using Color Coding media, a score of 83.03% was obtained. This number puts the Color Coding media in the "Very Feasible" category, which means that it does not require further revision and is very suitable for use as a learning aid. The results of these findings show that Color Coding media is effective in helping children get to know English vocabulary in a fun and interactive way. By using this media, it is hoped that children can more easily understand and remember the vocabulary taught, thus supporting the research goal of improving early childhood English skills.

4. Conclusion

Through this research, innovative Color Coding media has been successfully developed that is effective to support the development of early childhood English (5-6 years) at Siti Fatimah Kindergarten. The development of this media is carried out through a Research and Development (R&D) approach with the ADDIE model. The validation results of three experts (material, media, and design) consistently show that *Color Coding* media is in the category of "Feasible, No Need for Revision", with a feasibility percentage of 96%, 84.16%, and 95.71%, respectively. Furthermore, field trials of students resulted in a score of 83.03%, which categorized this media as "Very Feasible" to be used as a learning aid. Thus, the Color Coding medium has proven to be effective in helping early childhood identify and pronounce letters in English, perform pre-writing activities, as well as pronounce basic English vocabulary, making it a highly recommended learning innovation for early childhood English development.

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