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Microlearning-Oriented Explainer Videos (MOEV) to Improve Students' Digital Skills in Developing Print Media for Early Childhood

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Abstract. This research was conducted to produce Microlearning-Oriented Explainer Videos (MOEV) as a learning resource for the development of students' digital competence through early childhood print media. In this study, a Research and Development (R&D) design is used in the development paradigm of ADDIE, which stands for Analysis, Design, Development, Implementation, and Evaluation. The data analysis method used was descriptive percentage analysis. The results of the expert validity test indicated that MOEV was eligible for use as the average validation score achieved by media experts was 97%, material experts was 91%, and learning design experts was 93%. Results of the practicality test showed that the practicality reached a score of 92%. The results show that MOEV is a tremendous and innovative interactive learning medium that students can explore independently to understand in depth using visual and audio materials. Further empirical validation of this research is needed to determine the long-term viability and potential scalability of MOEV to other courses.

Keyword: *developing print media, early childhood, childhood, microlearning-oriented explainer videos, moev, student digital skills*

INTRODUCTION

Digital skills are essential for students as they enhance the educational experience and prepare them to face the demands and challenges of an increasingly digitalized world of work. (Kure et al., 2023)The ability to access, manage, and create information using digital technologies is essential in an increasingly interconnected and technology-based world, making good digital skills vital for young people. Klochko & Prokopenko (2023) State that digital competence is learning to learn continuously. Liesa-Orús et al. (2020) Similarly, it was observed that digital literacy or skills learning experiences for students belong to higher-order learning objectives and are essential in higher education. This highlights the need to integrate digital skills into education to prepare learners for the evolving world of work and to enable their contribution to a technology and science-based society. One of those courses is the Early Childhood Print Media Development course, which encourages learning towards these skills.

This course is essential for ECED (Early Childhood Education Department) students as it provides the digital skills they need for creating print media to suit young children. However, many students are still struggling with the digital skills necessary for effective learning in this digital age. Betaubun (2020) noted that students' digital competencies are at a moderate level, and need serious

attention to be improved, especially in the aspect of academic literacy, which is essential for their academic life. Meanwhile, the findings of Perdana et al. (2019) showed that 9.7% of students in Yogyakarta have low digital literacy skills, which underscores the need for improved ICT teaching. Furthermore, Li et al. (2025) explored the influence of digital literacy on academic achievement in blended learning environments, finding that digital literacy plays a crucial role in enhancing students' academic performance.

Digital skills proficiency among university students and also teacher candidates is influenced by a variety of circumstances, including the constraints of a curriculum that overemphasizes theoretical components (Yafie, Anisa, et al., 2024). This is also due to the availability of resources at institutions that provide adequate practical experiences for students. (Ferri et al., 2020). Some teachers of courses using digital skills concentrate on fundamental ideas to give a solid basis for future design of print media (Firmansyah et al., 2021)This reduces the area available for practicum activities that significantly help to develop technical abilities, therefore reducing the chances for students to get practical experience in designing print media.

Safety and learning quality also motivate educational institutions to be more cautious in giving students practical experience, since mistakes in digital practices or technology-based media development can affect the security of data and devices used (Nurhayati et al., 2024). However, concerns about the calibre of instruction also affect the area available for practice since educational institutions want to make sure that the activities of practicum stay compliant with accepted academic norms. Educational institutions have to combine giving students enough practical experience with making sure the experience satisfies accepted quality criteria (Prasittichok & Smithsarakarn, 2024).

To resolve this issue, students must enhance their digital competencies via curriculum integration that prioritizes experiential learning and stresses the cultivation of technical skills with comprehensive digital literacy (Mawardi et al., 2024). Courses related to print media development, such as Print Media Development for Early Childhood, can be redesigned by adding a sustainable practicum component so that students have the opportunity to apply theory directly. Microlearning-Oriented Explainer Video (MOEV) is a very short video format that summarizes the essential information and presents it in an easily digestible way so that students can understand quickly, and a good learning strategy could be the solution to enhance digital literacy. Specifically, this microlearning development comprises a series of learning videos that separate each topic into small chunks and have been designed to be informative yet engaging. MOEV has a quick-to-understand nature and is in accordance with technology-oriented learning styles, making it easy for learners to access information anytime and anywhere (Ekayana, 2023).

Specifying Microlearning-Oriented explainer videos (MOEV) as a pedagogical shape, since MOEV are presented in a short, engaging, and digestible video format. Research by Sultan et al. (2022) Found that students more easily absorb and remember information learned through bite-sized content than through traditional means. Interactive multimedia-based learning tools are also convenient and practical in augmenting educational outcomes (Noriska et al., 2021). This is in accordance with the results of Riyanto & Yunani (2020), which states that the use of video media can improve students' understanding of topics that require visualization. In other studies, it has been found that Microlearning-Oriented Explainer Videos can increase student engagement and enthusiasm, which will be related to the level of learning achievement in various subjects, one of which is robotics (Ekayana, 2023)Nonetheless, earlier studies indicate that the microlearning approach is not yet adaptive and mobile-based; it is unstructured and does not fulfill the whole school year scope as per the curriculum.

This research presents innovation by concentrating on the creation of Microlearning-Based Explainer Videos (MOEVs), which amalgamate microlearning principles with video content, addressing a deficiency in the current literature concerning effective digital learning instruments for early childhood education. This research employed a systematic methodology for validity and practicality testing, distinguishing it from prior studies, and confirming that MOEV is both

successful and feasible for application in a learning environment. This study demonstrates a substantial enhancement in digital abilities among college students post-implementation, offering empirical evidence of MOEV's efficacy in advancing digital competencies within educational settings.

This research aims to develop Microlearning-Oriented Explainer Videos (MOEV) in early childhood print media development courses to improve students' digital competencies. This research specifically aims to: 1) develop MOEV-based early childhood print media development materials that meet the eligibility criteria; 2) develop MOEV content to present learning materials that meet the eligibility criteria; and 3) test the practicality and effectiveness of using MOEV in improving students' digital skills.

METHOD

Research Design

The research and development (R&D) design was used in this study with Ghirardini's ADDIE framework, as cited in Bąkała & Bąkała (2020). This framework consists of analysis, design, development, implementation, and evaluation to develop educational video content. Figure 1 shows the modified development process.

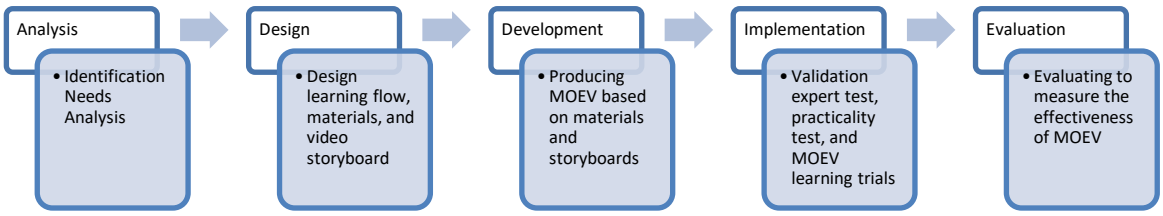

Figure 1. MOEV Development Flow

Figure 1 outlines the MOEV development process using the ADDIE framework, consisting of five stages: Analysis (needs identification), Design (learning flow, materials, and storyboard creation), Development (producing MOEV based on the design), Implementation (expert, practicality, and learning trials), and Evaluation (measuring the effectiveness of the MOEV). This systematic approach ensures the creation of compelling educational video content.

Research Subject

The study involved a total of 30 respondents, specifically students from the Early Childhood Education Teacher Education (PGPAUD) program at the State University of Malang (UM) during the odd semester of 2024/2025. Purposive sampling was used to select the research sample.

Data Collection Technique

This study used expert validation and practicality test instruments to obtain data. This research involved one material expert, one media expert, and one instructional design expert to ensure the quality of MOEV. Material experts are lecturers or early childhood experts, media experts are educational technology lecturers or print media content development experts, and instructional design experts understand microteaching and have experience designing interactive and practical digital learning materials. A total of two trial sessions were conducted with students to evaluate the practicality and effectiveness of the MOEV. Table 1 shows the design of the expert validation instrument.

Table 1. Data Collection Technique and Research Instrument

No	Dimension	Aspects	Item	Instrument	Scale
1	Material Expert	Quality and Appropriateness of Material	1-4	Questionnaire	Ordinal (1-4)
		Clarity and Accuracy of Material	5-8		
		Visual Presentation of Material	9-12		
		Relevance and Applicability of Material	13-15		
2	Media Expert	Design	1-5		
		Content Accuracy	6-10		
		Clarity and Ease of Use	11-15		
		Technology Requirement	16-20		
3	Instructional Design Expert	Learning Objectives	1-5		
		Instructional Strategies	6-10		
		Learner Assessment	11-15		
4	User Instruments	Focus on One Concept	1-3		
		Simplicity and Consistency	4-6		
		Short Duration	7-9		
		High Product Quality	10-12		
		Advanced Material Support	13-15		

Source: (Ningsih et al., 2023), (Yafie, Pramono, et al., 2024), (Mayer, 2021)

Data Analysis Technique

The results of the validity test were obtained from the results of the field test conducted using a questionnaire. Descriptive percentages were used to assess the data obtained from the validity test findings. Table 2 contains the results of the analysis that has been done.

Table 2. Validation Criteria of MOEV

No	Criteria	Validation Level
1	86% - 100%	Very Valid
2	70% - 85%	Fairly Valid
3	60% - 69%	Less Valid
4	0% - 59%	Invalid

Source: (Sihotang et al., 2023)

The field test, carried out with a questionnaire, produced the practicality test's findings. The results of the practicality test were evaluated using descriptive percentages. Table 3 contains the results of the analysis.

Table 3. Practicality Criteria of MOEV

No	Criteria	Practically Level
1	86% - 100%	Very Practical
2	70% - 85%	Fairly Practical
3	60% - 69%	Less Practical
4	0% - 59%	Non Particular

Source: (Sihotang et al., 2023)

Initially, the validity and dependability of the study tools were checked to see how well Microlearning-Oriented Explainer Video (MOEV) improved the students' digital abilities. Cronbach's Alpha was used to gauge the instrument's dependability and internal consistency, and the Kolmogorov-Smirnov test was used to examine the validity of normal data distribution. (Rahmawati et al., 2020). Using the independent t-test, the pretest and posttest data from the student groups were examined once the instrument underwent validation and reliability confirmation. This study aims to find whether students' digital competencies differ significantly both before and during MOEV's introduction (Cahyani & Subiantoro, 2021)This approach ensures that improving digital competency is really related to using MOEV in education.

FINDINGS

Result of the Development of MOEV

Following significant development cycles, a complete suite of Microlearning-Oriented Explainer Videos (MOEV)- based teaching materials has been polished for presentation. The two types of movies in this MOEV bundle are meant to be fascinating and useful tools for education. Videos fall into two main types: instructional and explanatory.

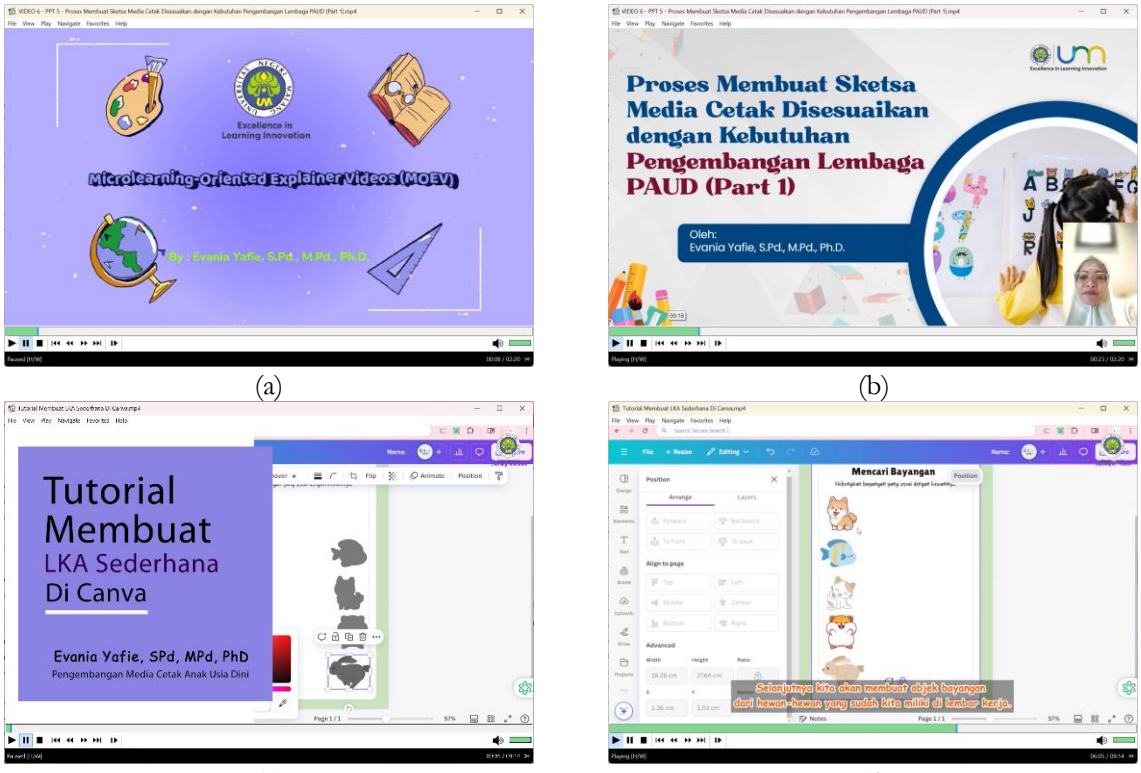

Figure 2. Result of the Development of MOEV

Figure 2 shows excerpts from MOEV films that deliver material using interesting and instructive explanatory content. This movie uses images and structured narrative to help pupils understand ideas. Furthermore, the video lessons offer sequential guidance to facilitate students' comprehension of more complex subjects.

Result of Validation Test

Table 3 below presents the results of the validation test by material experts.

Table 4. Result of Material Expert Validation Test

No	Dimension	Aspects	Percentage (%)	Description
1	Material Expert	Quality and Appropriateness of Material	94%	Very Valid
		Clarity and Accuracy of Material	94%	Very Valid
		Visual Presentation of Material	100%	Very Valid
		Relevance and Applicability of Material	100%	Very Valid
		Total	97%	Very Valid
2	Media Expert	Design	95%	Very Valid
		Content Accuracy	90%	Very Valid
		Clarity and Ease of Use	90%	Very Valid
		Technology Requirement	90%	Very Valid
		Total	91%	Very Valid
3	Instructional Design Expert	Learning Objectives	95%	Very Valid
		Instructional Strategies	90%	Very Valid
		Learner Assessment	95%	Very Valid
		Total	93%	Very Valid

Based on Table 4, the validation of various dimensions in this print media showed excellent results. The material's quality and relevance, as well as its visual presentation, achieved high scores, indicating that the content is highly valid and well-received. The design and structure also received strong validation, with content accuracy, clarity, and ease of use aligning well with the learning objectives. Overall, the print media's instructional design scored highly in all key areas, confirming that it effectively supports the learning process and objectives.

Result of User Practicality Test

Table 5 below presents the results of the user practicality test.

Table 5. Result of User Practicality Test

No	Aspects	Percentage (%)	Description
1	Focus on One Concept	100%	Very Practical
2	Simplicity and Consistency	100%	Very Practical
3	Short Duration	92%	Very Practical
4	High Product Quality	92%	Very Practical
5	Advanced Material Support	75%	Fairy Practical
Total		92%	Very Practical

Based on Table 5, the media is highly effective in maintaining focus and consistency, with the highest scores achieved in the dimensions of focus on one concept and simplicity and consistency. The media is also efficient in terms of duration and product quality, but there is room for improvement in advanced material support, which scored in the "Fairly Practical" category. Overall, the media are efficient and ready for use in learning.

Result of Validity and Reliability Test

Table 6 below shows the results of the validity and reliability test.

Table 6. Result of Validity and Reliability Test

No	Dimension	r-count	r-table	Description	Cronbach Alpha	Description
1	Digital Literacy	0,511	0,361	Valid	0,937	Reliable
2		0,377	0,361	Valid		
3		0,758	0,361	Valid		
4		0,469	0,361	Valid		
5	Digital Communication	0,581	0,361	Valid		
6		0,643	0,361	Valid		
7		0,477	0,361	Valid		
8		0,690	0,361	Valid		
9	Digital Design Creativity	0,660	0,361	Valid		
10		0,589	0,361	Valid		
11		0,651	0,361	Valid		
12		0,485	0,361	Valid		
13	Digital Security	0,568	0,361	Valid		
14		0,566	0,361	Valid		
15		0,566	0,361	Valid		
16		0,452	0,361	Valid		
17	Digital Technology Proficiency	0,515	0,361	Valid		
18		0,401	0,361	Valid		
19		0,515	0,361	Valid		
20		0,653	0,361	Valid		

Based on the validity and reliability test results in Table 6, computed using SPSS, provides an r-table value of 0.361. Indicators are deemed valid when the r-count value exceeds the r-table. The test findings indicate that for each dimension assessed, all indicators possess an r-count value over 0.361, hence confirming the validity of all indicators. In reliability testing, variables are deemed reliable if the Cronbach's Alpha value exceeds 0.60. The test results reveal that the Digital Skill variable exhibits high reliability, as evidenced by a Cronbach's Alpha value of 0.937, confirming the instrument's robustness in this investigation.

Result of Independent Sample T-test

Table 7 shows the result of the independent sample t-test.

Table 7. Result of Independent Sample T-test

No	Dimension	Pre-test	Standard Deviation	Post-test	Standard Deviation	Gain	t-count	Sig
1	Digital Literacy	73,33	23,98	77,50	20,69	4,17	3,500	0,000
2	Digital Communication	75,00	19,70	85,83	20,25	10,83	4,160	0,000
3	Digital Design Creativity	70,83	30,36	78,33	23,42	7,50	2,700	0,000
4	Where to Go Digital	65,83	23,92	75,83	22,74	10,00	3,470	0,000
5	Digital Technology Proficiency	71,67	17,46	82,50	19,81	10,83	3,480	0,000

Based on the results of the Independent Sample T-test presented in Table 4, there is an increase in scores in each dimension after learning using MOEV, which is indicated by the

difference in average scores between the pretest and posttest. In the Digital Literacy dimension, the pretest score of 73.33 increased to 77.50 in the posttest, with a gain of 4.17. Similarly, the Digital Communication dimension increased from 75.00 in the pretest to 85.83 in the posttest, with a gain of 10.83. An increase was also seen in the Digital Design Creativity dimension, which showed a pretest score of 70.83 and a posttest of 78.33, with a gain of 7.50. The Digital Security and Digital Technology Proficiency dimensions experienced an increase in scores of 10.00 and 10.83, respectively. As a result of statistical tests, t-count values in each dimension have a significant value (sig) < 0.05 = 0.000 It shows the significant difference (P <0.05) between pretest and posttest scores on each dimension so it can be concluded that learning using MOEV effective to improvement digital skill with respect to several dimensions.

DISCUSSION

Development of Early Childhood Print Media Based on MOEV

Based on the results of the validity test by experts showing an average validity of 97% from media experts, 91% from material experts, and 93% from instructional design experts, it is declared that the development of Microlearning-Oriented Explainer Videos (MOEV) is valid. Results of expert validity testing indicate that Microlearning-Oriented Explainer Videos (MOEV) development is categorized as very valid. The results provide evidence that MOEV is a valid medium that can be used to enhance students' digital skills in the ECE Print Media Development course, along with aspects of content quality, instructional design, and presentation, which comply with students' digital learning needs.

The findings of this research indicate that microlearning-based video improves learning effectiveness. Also, studies by Sathiyaseelan et al. (2024) Showed micro learning videos that received positive validation from media and content experts, which translated into a warm reception by the students during the learning process. This indicates that MOEV not only serves in the perspective of material delivery but also in delivering the fun point discussed here.

Development of MOEV-Based Content Media

The video learning with the microlearning approach is done in order to maximize the effectiveness of learning. Fitria on Prasittichok & Smithsarakarn (2024)It was stated that microlearning topically delivers information in a concise and focused manner, making it very appropriate according to the characteristics of students who are currently suspected of having a shorter attention span. The balanced presentation of information through visual and verbal media is believed to increase student motivation and engagement. (Kustiawan & Yafie, 2021)Video as a learning tool not only provides information but also allows students to self-evaluate and receive constructive feedback, which in turn supports their learning process. (Hakim et al., 2023).

The practicality test, which shows that MOEV is in the convenient category with a percentage reaching 92%, provides important implications for education. This microlearning-based video not only fulfills instructional needs but is also designed with an accessible interface, thus increasing usability for students. Research indicates that simply available and understandable print media for consumers can boost learning motivation and enhance the learning process (Isibika et al., 2023). The created microlearning allows students to study in a more flexible and orderly manner, facilitating a more efficient learning process by involving brief films as a means of instruction.

Particularly with video content, microlearning has become a valuable teaching tool that fits students' needs in the modern fast digital scene. This method helps pupils to understand and remember complex subjects by breaking them down into digestible video sections. By providing knowledge attractively and understandably, using films as an instructional tool not only increases engagement but also motivates and improves academic performance (Varchenko-Trotsenko et al., 2019). Moreover, video-based microlearning provides flexibility so that students may access

materials from anywhere and at any time, therefore addressing the limitations of traditional teaching methods (Muktiarni et al., 2023). Studies show that this adaptability improves student autonomy, increases the learning process, and generates better academic performance (Leong et al., 2021). By encouraging a more positive attitude towards learning among students, this approach is likely to help improve the effectiveness and efficiency of instructional experiences, thus improving academic performance (Susilana et al., 2022). Serving to inspire and support students in their educational endeavours, video-based information is essential to the growing trend in mobile and online learning.

Practicality and Effectiveness Testing of MOEV in Improving Students' Digital Skills

All indicators in every dimension have an r-count value higher than the r-table (0.361), so all of them are certified valid according to the research results. With a Cronbach's Alpha value of 0.937, above 0.7, this research tool shows a remarkable degree of dependability. Thus, one can rely on the instrument to gauge the use of interactive tools in education. With a t-statistic of 3.480 and a significance value of 0.000, the findings of the paired sample t-test also reveal a notable rise; the posttest value exceeds the pretest value in all dimensions. This indicates that the use of Microlearning-Oriented Explainer Videos (MOEV) can effectively improve the digital skills of PAUD students.

Microlearning-oriented expainer videos (MOEV) have shown success in giving students flexible access to knowledge. This adaptability lets pupils hone their digital abilities wherever. Furthermore, MOEV's interactive learning tools improve student comprehension of the given content, therefore guaranteeing a more interesting and successful learning environment. Additionally, accessible any time and anyplace is video-based microlearning, which offers flexibility for learning (Sathiyaseelan et al., 2024)This simplicity of access helps students review material as needed, improving retention and mastery of skills and encouraging constant learning.

Higher education's student involvement and learning results have shown potential from microlearning-oriented explainer videos (Bontisesari et al., 2023). The results of the present study show notable increases in many facets of digital skills, including digital literacy, digital communication, and digital technological proficiency. With statistically significant results ($p < 0.05$), digital literacy climbed by 10.83 points, digital communication improved by 10.83 points, and digital technological competency rose by 10.83 points. Digital literacy changed by 4.17 points. Instructional video production could enhance teaching practice and digital literacy for early childhood education students (Romanenko et al., 2023).

The way these videos are made available to students provides easy access, thereby ensuring that digital perspectives are developed (Allela et al., 2020). Research indicates, however, that early childhood teachers lack digital competencies. Leong (2022), suggesting either content production and/or evaluation or problem-solving to build concurrent technical operations. Several digital literacy, social media involvement, and interactive video development training initiatives were carried out in order to help reduce this (Yafie et al., 2021)All these initiatives seek to provide early childhood educators with the right digital skills to facilitate online learning and develop efficient educational content for young children.

Particularly in generating successful print media, Microlearning-Oriented Explainer Videos (MOEV) are a valuable tool for improving the digital competency of early childhood education teacher preparation students (Sözmen et al., 2023). MOEV's main advantage is that it gives pupils stuff in short and orderly form so they can pick up knowledge quickly and use it. The microlearning approach guarantees that students acquire sufficient information about the topic in a short period to recall it and also improves practical abilities. Likewise, by using interactive media suitable for their target group, the development of visual representations in MOEV helps students to be creative and technically competent (Smolle et al., 2021). Although the requirement of digital media in early childhood education is claimed to be universal, it should be context-dependent, depending on what children need and what institutions are able to generate. (Al-Bhloly et al., 2024)Teachers

realize the need for digital skills but are often hampered by skill acquisition and available infrastructure. These results emphasize the role of MOEVs and digital media in enhancing digital literacy, especially among all education levels in early childhood education.

The microlearning-based learning process gets a big push by making the use of video for compact and purposeful information delivery. According to Sathiyaseelan et al. (2024), the effectiveness of microlearning modules varies according to the nature of the material taught, and they can truly enhance learning outcomes. The present study serves to validate and further demonstrate that MOEV can be used to deliver simplified information effectively, which is especially pertinent in learning contexts steeped with abstract ideas. Since every student has their own learning time and speed, MOEV gives them the opportunity to learn through the material. Another aspect of the diverse video offering styles is that it allows students to select the style that suits their learning requirement best for visual reception or audio reception, as well as both. There is a rationale behind this, as there has been evidence that suggests that varying styles of video can influence student engagement and information retrieval (Aquino & Kilag, 2023).

However, this particular study has not investigated the impact of Microlearning-Oriented Explainer Videos (MOEV) on long-term learning at various levels. Research by Samala et al. (2023) I found that microlearning is effective when the right time and context are used. This factor is not measured in this study, as the orientation of this research is more towards developing materials and content that meet the criteria of feasibility and practicality in an effort to improve students' digital skills in short-term learning, especially media development courses. In addition, testing carried out over a more extended period will be required to promote the transfer of learning facilitated through MOEV to long-term learning settings and multiple classes in other disciplines. Furthermore, empirical testing is required on both its effectiveness for sustaining long-term learning and its transferability, including its applicability to the diverse needs of students across different courses.

CONCLUSION

MOEV, as a microlearning-oriented explainer video, was developed and is valid and practical for enhancing students' digital skills in the Early Childhood Print Media Development subject. The results of validation media experts average 97%, material experts average 91%, and instructional design experts average 93%. For the practicality test, MOEV also calculated that it has a 92% practical level. The findings showed that MOEV is an innovative and enjoyable interactive print media, capable of facilitating student understanding through self-monitoring by interacting with the material via engaging graphics and sound technologies within the learning content. In addition to better understanding the material, it succeeds well in developing critical and creative thinking skills through this approach. Such trials have not been conducted in our research to examine how well MOEV can be sustained and implemented over a long period of learning, or in other subjects/areas. More empirical testing is needed to evaluate the potential impact of MOEV in terms of long-term retention and transferability across disciplines while being mindful of the students' various needs and heterogeneity.

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