



Tactile Flipbook Magic: A multisensory framework for enhancing phonics decoding skills in primary education

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Abstract

Traditional learning methods often face difficulties in concretizing the abstract relationship between sounds and letters. This community service program addresses an important challenge in teaching foundational phonic decoding skills to early childhood learners at SD Angkasa 01 Halim Perdanakusuma. The purpose of this activity is to design, implement, and evaluate the impact of "Flipbook Magic," an interactive tactile medium, on students' decoding abilities and teachers' pedagogical competence. The methodology used follows a four-stage collaborative model, which includes needs analysis, collaborative medium creation process with teachers, direct implementation in grade II through co-teaching sessions, and evaluation with mixed methods (quantitative and qualitative). The results from the structured observation checklist showed a significant increase in students' decoding skills. The percentage of students able to blend CVC patterns independently increased from 20% to 80%, while 40% of students successfully blended target CVCC/CCVC patterns independently and another 40% succeeded with teacher assistance. Qualitatively, the use of this medium significantly increased student engagement and participation in learning. In addition, the applied mentoring model successfully empowered teachers, with more than 90% of teachers showing the ability to use the medium independently and integrate it into lesson plans. The program concludes that Flipbook Magic, combined with a partnership-based empowerment approach, is an effective strategy to improve early literacy learning. Therefore, schools are advised to adopt similar practice-based learning tools and collaborative professional development models to maintain sustainability and expand the improvement of phonics education.

Keywords: Early literacy; Phonics instruction; Tactile learning media; Flipbook

Tactile Flipbook Magic: Pendekatan multisensori untuk mengakselerasi keterampilan dekoding fonik siswa sekolah dasar

Abstrak

Metode pembelajaran tradisional sering kali mengalami kesulitan dalam mengonkretkan hubungan abstrak antara bunyi dan huruf. Program pengabdian kepada masyarakat ini menangani tantangan penting dalam pengajaran keterampilan dasar dekoding fonik kepada peserta didik usia dini di SD Angkasa 01 Halim Perdanakusuma. Tujuan kegiatan ini adalah untuk merancang, mengimplementasikan, dan mengevaluasi dampak "Flipbook Magic", sebuah media taktil interaktif, terhadap kemampuan dekoding siswa serta kompetensi pedagogik guru. Metodologi yang digunakan mengikuti model kolaboratif empat tahap, yang meliputi analisis kebutuhan, proses penciptaan media secara kolaboratif bersama guru, implementasi langsung di kelas II melalui sesi co-teaching, serta evaluasi dengan metode campuran (kuantitatif dan kualitatif). Hasil dari daftar periksa observasi

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terstruktur menunjukkan adanya peningkatan signifikan pada keterampilan dekoding siswa. Persentase siswa yang mampu menggabungkan pola CVC secara mandiri meningkat dari 20% menjadi 80%, sementara 40% siswa berhasil menggabungkan pola target CVCC/CCVC secara mandiri dan 40% lainnya berhasil dengan bantuan guru. Secara kualitatif, penggunaan media ini secara signifikan meningkatkan keterlibatan dan partisipasi siswa dalam pembelajaran. Selain itu, model pendampingan yang diterapkan berhasil memberdayakan guru, dengan lebih dari 90% guru menunjukkan kemampuan menggunakan media secara mandiri dan mengintegrasikannya ke dalam rencana pembelajaran. Program ini menyimpulkan bahwa Flipbook Magic, yang dikombinasikan dengan pendekatan pemberdayaan berbasis kemitraan, merupakan strategi yang efektif untuk meningkatkan pembelajaran literasi awal. Oleh karena itu, sekolah disarankan untuk mengadopsi alat pembelajaran berbasis praktik serupa serta model pengembangan profesional kolaboratif guna menjaga keberlanjutan dan memperluas peningkatan pendidikan fonik.

Kata Kunci: Literasi awal; Pembelajaran fonik; Media pembelajaran taktil; Flipbook

1. Introduction

Early literacy development, particularly phonics-based decoding skills, is widely recognized as a fundamental foundation for students' long-term academic success (Dessemontet et al., 2019). Decoding—the ability to map letters to sounds and blend them into words—is a strong predictor of reading fluency and comprehension (Castles et al., 2018; Ehri, 2005). Extensive research has demonstrated that early mastery of decoding significantly influences later reading achievement and overall academic performance (Mesmer & Griffith, 2005; Quiroz et al., 2010; Snow et al., 1999).

This community service program was conducted in collaboration with SD Angkasa 01 Halim Perdanakusuma, an elementary school in Jakarta that serves early-grade learners. As a partner institution, the school plays a critical role in supporting foundational literacy development, particularly in Grade 2, where students are expected to transition from basic letter recognition to more complex phonics decoding skills. The collaboration reflects the principles of university–community engagement, which emphasize mutual benefit and capacity building (Bringle & Hatcher, 1996; Jacoby, 2015).

However, preliminary observations and discussions with the partner school revealed several challenges. Students demonstrated low proficiency in phonics decoding, particularly in blending sounds into CVC, CVCC, and CCVC word patterns. Instructional practices relied predominantly on traditional, teacher-centered methods, such as worksheets and rote memorization, which often fail to make abstract phoneme–grapheme relationships meaningful for young learners (Mesmer & Griffith, 2005). As a result, students exhibited low engagement, limited participation, and difficulty retaining phonics concepts (Ehri, Nunes, Willows, et al., 2001).

These findings are consistent with broader literature indicating that conventional phonics instruction, when delivered without interactive and meaningful engagement, may not effectively support early literacy development (Ehri, Nunes, Stahl, et al., 2001; Ehri, 2005; Pressley et al., 2001). Moreover, young learners benefit from instructional approaches that incorporate active, experiential, and multisensory learning processes (Blomert & Froyen, 2010; Connolly, 2014; Shams & Seitz, 2008).

Research in cognitive science and literacy education highlights the effectiveness of multisensory and tactile learning approaches in enhancing phonological awareness and decoding skills (Bara et al., 2007; Ehri, Nunes, Willows, et al., 2001; Ziegler & Goswami,

2005). Tactile interaction, in particular, allows learners to engage physically with learning materials, supporting deeper cognitive processing and memory retention (Chen & Chuang, 2014; Kurywczak, 1997; Sakamoto & Watanabe, 2017; Wilson, 2002). Despite this evidence, there remains a gap in the practical implementation of low-cost, classroom-friendly tactile media in phonics instruction, particularly in Indonesian elementary schools.

In response to these challenges, this community service program proposed the development and implementation of *“Flipbook Magic”*, a tactile, multisensory phonics learning tool. The intervention was designed not only to improve student learning outcomes but also to strengthen teacher capacity through a collaborative empowerment model, including co-creation, co-teaching, and mentoring. Previous studies have shown that teacher professional development embedded in classroom practice significantly improves instructional effectiveness and sustainability (Darling-Hammond et al., 2017; Desimone, 2009). Therefore, the objectives of this community service program are: (1) to design and implement Flipbook Magic as a tactile phonics learning medium; (2) to improve students’ decoding skills in CVC, CVCC, and CCVC patterns; and (3) to enhance teachers’ pedagogical competence through a collaborative partnership model.

2. Method

2.1. Participants

This community service program was conducted in a Grade 2 classroom at SD Angkasa 01 Halim Perdanakusuma, Jakarta. The participants consisted of 22 students (aged 7-8 years; comprising 12 boys and 10 girls) and their classroom teacher. The teacher (female, with 7 years of teaching experience) was the primary educator involved in the co-teaching and mentoring process. All participants were involved based on the school’s need to enhance phonics instruction in early grades.

Prior to the implementation of this community service program, formal permission was obtained from the headmaster of SD Angkasa 01 Halim Perdanakusuma. The school administration was informed about the objectives of the program, the planned activities, the roles of the university team and classroom teacher, and the procedures for data collection. Approval was granted for the use of Flipbook Magic during regular instructional time and for the collection of observational data related to students’ phonics decoding skills. All activities were conducted as part of routine classroom instruction and were designed to support, rather than disrupt, the existing curriculum. No personally identifiable student information was recorded, and all data were reported in aggregate form to ensure confidentiality. The partnership emphasized mutual benefit, with the school receiving instructional materials and pedagogical support, while the university team gained insight into authentic classroom practice.

2.2. Instruments

The study’s main quantitative result was generated using a Structured Observational Checklist developed specifically to assess Grade 2 students’ phonics decoding, with a particular focus on sound blending for CVC, CVCC, and CCVC word patterns. Checklist items were drafted to align with Grade 2 curriculum standards, then reviewed by two independent early literacy experts to establish content validity and age-appropriateness; a small pilot with non-participating students further supported item clarity and scoring

consistency. Student performance on each target word was recorded on a three-level scale (Independent, With Support, Not Yet). As the checklist results can be seen in in [Table 1](#). These pre-post observations were collected from 22 learners over five weeks, during which Flipbook Magic was used as the primary manipulative in daily 15-minute phonics instruction designed around multisensory learning principles ([Shams & Seitz, 2008](#)).

Table 1. Observable phonics skills checklist (sample for 5 students)

Student	Pre-Observation		Post-Observation	
	Can blend CVC?	Can blend CVCC?	Can blend CVC?	Can blend CVCC?
S1	No	No	Yes	With Support
S2	Yes	No	Yes	Yes
S3	No	No	Yes	No
S4	Yes	No	Yes	Yes
S5	No	No	With Support	No
% Yes	20%	0%	80%	40%

2.3. Procedures

The program used a collaborative action model with four connected phases. In Week 1, the research team met with school leaders and the classroom teacher to agree on the goals and plan. The team also observed a regular phonics lesson to understand the teacher's usual approach and identify students' main difficulties. In Week 2, the team and the teacher co-created Flipbook Magic to match the target phonics patterns (CVC, CVCC, and CCVC). The teacher then joined a training session to learn how to use the tool and apply the multisensory routine.

During the initial needs assessment, the classroom teacher reported that many students struggled to blend sounds and showed low engagement during phonics instruction that relied mainly on worksheets and board-based activities. The teacher also expressed a preference for a hands-on, non-digital learning tool that could better support active participation. In response to this identified need, the university team proposed the use of a tactile flipbook as an instructional medium.

The design of Flipbook Magic was then refined collaboratively with the teacher, who provided input on practical considerations, including limiting sessions to 30 minutes, sequencing instruction from CVC to CVCC/CCVC patterns, and using simple, low-cost materials that could be reproduced without additional funding. The school emphasized alignment with the existing Grade 2 literacy curriculum and the regular instructional schedule, as students could not be removed from class. Decisions related to lesson structure, pacing, and classroom implementation were made collaboratively, with the teacher retaining primary responsibility for instruction and the university team supporting through modeling and mentoring.

From Weeks 3 to 6, the intervention was taught during the regular literacy block. Students used the flipbook in eight phonics sessions over four weeks (two sessions per week), with each session lasting 30 minutes. The teacher led the lessons using a consistent multisensory sequence—manual flipping, sound pronunciation, and blending—while a university team member attended each session to co-teach, model strategies, and provide on-the-spot mentoring.

Data collection was built into this schedule. Pre-intervention ratings were completed in the final session of Week 2, after training but before students used the tool. Post-intervention ratings were collected during the final two sessions of Week 6. The teacher and the primary researcher completed the Structured Observational Checklist at the same time for each student, and follow-up reflective discussions were held after Week 4 and Week 6 to capture what worked well and what remained challenging.

2.4. Data analysis

Data were analyzed using a mixed-methods approach that combined descriptive statistics and thematic interpretation. For the quantitative strand, scores from the Structured Observational Checklists were summarized descriptively. For each skill area (CVC blending and CVCC/CCVC blending), the frequency and percentage of students in each performance category (Independent, With Support, Not Yet) were calculated at pre- and post-intervention. Changes in these distributions, along with the overall proportion of students who improved, were then used to describe patterns of progress.

For the qualitative strand, field notes and teacher reflections were examined through thematic analysis following [Braun & Clarke's \(2006\)](#) steps: familiarization, initial coding, searching for themes, reviewing themes, and defining themes. To support consistency, two researchers double-coded a subset of the data and resolved any differences through discussion.

3. Results and Discussion

This section presents the results achieved from the community service program and discusses them in relation to the implementation process. The discussion is structured according to the four stages described in the methods: (1) needs assessment, (2) co-creation and training, (3) classroom implementation, and (4) evaluation and reflection.

3.1. Needs assessment: Identifying contextual challenges

The initial stage involved classroom observation and collaborative discussion with the partner teacher to identify instructional challenges. The results achieved indicate that students experienced significant difficulty in phoneme blending, particularly when transitioning from simple (CVC) to more complex (CVCC/CCVC) word patterns. In addition, students showed low engagement and participation, often becoming passive during lessons dominated by worksheets and board-based instruction.

These challenges are consistent with previous research indicating that traditional phonics instruction lacking interactive elements often fails to support deep conceptual understanding ([Crompton et al., 2024](#); [Mesmer & Griffith, 2005](#)). Furthermore, the observed low engagement aligns with studies showing that passive learning environments reduce students' motivation and limit literacy development ([Guay et al., 2020](#); [Guthrie et al., 2000](#)).

The teacher also reported limited access to hands-on instructional media, which constrained the ability to make abstract phoneme-grapheme relationships more concrete. This reflects a broader gap between theory and practice, as research has long emphasized the importance of active, meaningful engagement in early reading instruction ([Quiroz et al., 2010](#); [Snow et al., 1999](#)). These findings highlight the need for

an intervention that integrates interactive, multisensory approaches tailored to young learners.

3.2. Co-creation and training: Developing contextualized solutions

In the second stage, the university team collaborated with the teacher to design and develop Flipbook Magic, a tactile phonics learning medium. This process involved identifying target phonics patterns, designing structured letter sequences, and ensuring alignment with the Grade 2 curriculum. The use of low-cost and easily reproducible materials ensured that the tool could be sustainably adopted by the school.

The teacher actively participated in the design process, contributing insights on classroom constraints, lesson timing, and student needs. This collaborative approach resulted in a learning tool that was both theoretically grounded and contextually appropriate.

A hands-on training session was then conducted to support the teacher in implementing multisensory instruction. The training emphasized the integration of visual, auditory, and tactile modalities, which are known to enhance phonological processing and memory retention (Birsh, 2017; Nation, 2022; Shams & Seitz, 2008; Vrieling-Teunter et al., 2022). This approach is further supported by research demonstrating that systematic and multisensory phonics instruction significantly improves early reading outcomes (Ehri, Nunes, Stahl, et al., 2001).

The results achieved in this stage indicate that active teacher involvement increased ownership, confidence, and readiness to implement the innovation. This aligns with studies showing that collaborative and practice-based professional development leads to more effective instructional change (Desimone, 2009, Guskey, 2002).

3.3. Classroom implementation: Multisensory learning in practice

The third stage involved implementing Flipbook Magic during eight classroom sessions. Instruction followed a structured multisensory sequence: students flipped letter cards, pronounced phonemes, and blended them into words. As shown in Figure 1, students actively engaged with the flipbook during learning activities. The results achieved demonstrate increased student participation, improved focus, and reduced learning anxiety compared to previous instruction.



Figure 1. Grade 2 students using the flipbook magic during a phonics session

These improvements can be explained through multisensory learning theory, which posits that learning is enhanced when multiple sensory pathways are activated

simultaneously (Shams & Seitz, 2008). The tactile manipulation of letters also supports haptic learning processes, which have been shown to facilitate phonological awareness and letter recognition (Bara et al., 2007). Additionally, embodied cognition theory suggests that physical interaction with learning materials strengthens cognitive processing and understanding (Wilson, 2002).

The increased engagement observed in this program is consistent with student engagement theory, which highlights that active participation is a key determinant of academic success (Guay et al., 2020; Reeve, 2013). Students were more willing to participate, demonstrated longer attention spans, and showed greater persistence when encountering challenging phonics patterns. To accommodate diverse learning needs, the teacher also implemented adaptive strategies, including peer collaboration and small-group support. This reflects recommended practices in early literacy instruction, where differentiated and scaffolded teaching is essential for supporting varied student abilities (Quiroz et al., 2010; Torgesen, 2002).

3.4. Evaluation and outcomes: Student achievement and teacher empowerment

First, student learning outcomes. The results achieved show a substantial improvement in students' decoding skills. As presented in Table 2, the proportion of students who could independently blend CVC words increased from 20% to 80%. For more complex CVCC/CCVC patterns, no students demonstrated independence at baseline; however, after the intervention, 40% achieved independence and another 40% succeeded with teacher support. These improvements indicate that Flipbook Magic functioned as an effective instructional scaffold, supporting students' gradual progression from basic to more complex decoding skills. This is consistent with research demonstrating that systematic phonics instruction and scaffolded learning significantly enhance reading development (Castles et al., 2018; Ehri, 2005). However, some students continued to experience difficulty with consonant clusters, particularly CCVC patterns. This suggests that more complex phonological structures require extended instruction and targeted intervention, as supported by prior studies in early literacy (Snow et al., 1999; Ziegler & Goswami, 2005).

Table 2. Student decoding performance before and after intervention (n=22)

Skills	Pre-intervention (Independent)	Post-intervention (Independent)	Post-Intervention (With Support)
CVC Blending	20% (4 students)	80% (16 students)	15% (3 students)
CVCC/CCVC Blending	0% (0 students)	40% (8 students)	40% (8 students)

Second, teacher development and instructional change. In addition to student outcomes, the program achieved important results in teacher professional development. The teacher demonstrated the ability to independently use Flipbook Magic and integrate multisensory strategies into lesson planning. As illustrated in Figure 2, the teacher actively modeled the use of the flipbook during classroom instruction. The co-teaching and mentoring approach provided real-time guidance, feedback, and reflection opportunities, which contributed to increased instructional confidence and competence. These results align with research showing that job-embedded professional development—such as coaching, mentoring, and collaborative teaching—is more effective than traditional workshop-based training (Darling-Hammond et al., 2017; Desimone, 2009). Furthermore, the collaborative nature of the program reflects

principles of community empowerment and sustainable capacity building, where teachers become active agents of change (Boyd & Szplit, 2014; Jacoby, 2015).



Figure 2. Classroom teacher modeling flipbook magic during a co-teaching session

3.5. Overall results achieved and implications

Overall, the results achieved demonstrate that combining a multisensory tactile learning tool with a collaborative teacher empowerment model can significantly improve early phonics instruction. The program successfully addressed both student learning challenges and teacher capacity gaps, resulting in improved decoding skills, increased engagement, and enhanced instructional practices.

These results reinforce the importance of integrating evidence-based literacy strategies with context-sensitive implementation, as emphasized in contemporary reading research (Ehri, Nunes, Willows, et al., 2001; Schmeichel, 2007). Moreover, the findings highlight that sustainable educational innovation requires not only appropriate instructional tools but also continuous teacher support and active collaboration (Darling-Hammond et al., 2017).

4. Conclusion

This community service program demonstrates that the integration of a multisensory tactile learning tool, namely Flipbook Magic, combined with a collaborative teacher empowerment approach, can effectively address challenges in early phonics instruction. The results achieved indicate a substantial improvement in students' decoding abilities, particularly in blending CVC, CVCC, and CCVC word patterns. In addition, the program contributed to increased student engagement, as learning activities became more interactive, concrete, and accessible through hands-on manipulation.

Beyond student outcomes, this program also achieved meaningful impact in terms of teacher professional development. Through co-creation, training, co-teaching, and mentoring, the teacher developed greater confidence and competence in implementing multisensory phonics instruction. The ability of the teacher to independently apply and adapt the Flipbook Magic in classroom practice indicates that the program successfully supported sustainable instructional change, rather than short-term intervention.

Importantly, the success of this program lies in its partnership-based approach, where the university team and the school collaboratively identified needs, designed solutions, and implemented instructional improvements. This model ensures that the intervention

is contextually relevant and has the potential for continued use beyond the duration of the program.

However, several limitations should be acknowledged. Some students continued to experience difficulty with more complex phonics patterns, indicating the need for longer intervention duration and more differentiated instructional strategies. In addition, the program was conducted in a single classroom setting, which may limit generalizability.

Based on the results achieved, it is recommended that future community service programs: (1) expand the use of tactile and multisensory tools to cover broader literacy skills; (2) incorporate longer-term implementation and follow-up evaluation to assess retention of learning outcomes; and (3) replicate the collaborative empowerment model in different school contexts to strengthen its scalability. Overall, this program highlights that effective improvement in early literacy instruction requires not only innovative learning media but also ongoing teacher support and active collaboration, ensuring that educational change is both meaningful and sustainable.

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Authors Contribution

Activity implementation: AZ, SW, AAR, NS. Concept planning: AZ. Coordination: AZ. Material designs: SW. Logistics and procurements: AAR, NS

Conflict of Interest

The authors state that there is no conflict of interest in the publication of this article.

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