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Development of a Moral Feeling Based Mobile Application for Collaboration of Elementary School Teacher Education Students in Case-Based Learning

Amiruddin[1], Nanang Abdillah[2], Hakob [3]

[1] STAI Sumatera, Indonesia
[2] Universitas Kiai Abdullah Faqih Gresik, Indonesia
[3] Middle East Technical University, Turkey

ABSTRACT

Background. Student empathy tends to decline with increasing use of technology-based learning (Konrath et al., 2011), while collaboration remains a 21st-century competency that must be intentionally developed (Trilling & Fadel, 2009). PBL-based mobile collaboration applications in PGSD have been shown to enhance cooperation and higher-order thinking, but have not yet addressed the affective-moral dimension (Amaliyah et al., 2025).

Purpose. Producing a valid and effective mobile application design based on Moral Feeling (Lickona, 1991) to facilitate PGSD students' empathy in case-based learning.

Method. Research and Development of the ADDIE model. Feasibility validation involved 2 material experts and 2 media experts. Effectiveness testing involved 39 PGSD students (Class A experiment, n=19; Class B control, n=20) through a quasi-experimental pretest-posttest control group design, empathy was measured by the adaptation of the Interpersonal Reactivity Index (Davis, 1983).

Novelty. Previous PBL-based mobile collaboration research in PGSD focused on the cognitive dimension without affective-moral content. This research's novelty is the integration of the Moral Feeling framework with a validated empathy instrument into the design of a case-based collaboration application for prospective elementary school teachers.

Results. Expert validation showed a very feasible category, and the group empathy score increased more in the experiment than in the control, effectively supporting the integration of Moral Feeling in case-based collaboration design for PGSD students.

Conclusion. This mobile application based on Moral Feeling has been proven valid and more effective in increasing the empathy of PGSD students compared to conventional learning without the application.

KEYWORDS : Collaboration; Empathy; Moral Feelings; Mobile Apps

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Correspondence:

Amiruddin,
Amiramit54@gmail.com

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INTRODUCTION

The digital transformation in higher education has driven the widespread use of mobile learning applications as collaborative learning tools, as mobile devices enable students to coordinate and exchange ideas across time and space (Caballé 2010). A large meta-analysis of students in the United States found a significant decline in dispositional empathy levels over the past few decades,

attribute to the rise of screen-based to-face social engagement (Konrath, 2011).

This phenomenon presents a paradox: technology expands the capacity for collaboration technically, but does not necessarily strengthen the affective-moral dimension that underpins healthy collaboration., Collaboration itself has long been positioned as one of the core competencies of the 21st century that must be intentionally built into learning design, on par with critical thinking and problem solving (Trilling & Fadel, 2009). In line with this, Problem-Based Learning (PBL) is known as a model that inherently requires students to work in groups to construct understanding through authentic problems, so that the quality of social-emotional interactions between group members also determines learning success, not just content mastery (Hmelo-Silver, 2004). In other words, the global demand for collaboration cannot be met simply by providing a digital platform; it requires a design that explicitly considers the emotional and caring aspects of students.

In the Indonesian context, this need is evident in the PGSD Study Program environment. Amaliyah et al. (2025) developed a PBL-based Mobile Collaborative Learning design for PGSD students at the University of Bengkulu and found that students' collaboration scores increased from 3.2 to 4.4 after implementation. However, the design's focus was limited to indicators of communication, coordination, and task allocation, without explicitly targeting affective-moral dimensions such as empathy or caring among team members. At a lower level, classroom action research by Oktavia et al. (2026) on fifth-grade elementary school students in PBL-based learning showed that collaboration skills did not develop spontaneously, but rather increased gradually from a score of 78.38 in cycle I to 85.43 in cycle III after repeated facilitation. This finding is relevant for PGSD because these students will later design and facilitate similar collaborative learning in elementary schools; if they themselves are not accustomed to collaborating with empathy during their education, there is a risk that these patterns will carry over into their future teaching practice.

This gap leads to a theoretical framework that bridges the cognitive side of application design with the affective side of collaboration, namely the concept of Moral Feeling in the character education model by Lickona (1991). In this model, character is built through three interrelated components: moral knowledge (understanding of values), moral feeling (moral feelings, including empathy and concern), and moral action (moral action); Moral Feeling serves as an affective bridge that encourages moral knowledge to be transformed into concrete actions, including a willingness to cooperate sincerely, not merely transactionally (Lickona, 1991). When this framework outlines the characteristics of PBL that require negotiation of meaning and role allocation within groups (Hmelo-Silver, 2004), it is clear that collaborative application features ideally not only facilitate task exchange, but also foster students' sensitivity to the conditions and contributions of teammates.

To address this, this study employed the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model as formulated by Branch (2009), which stands out for its iterative evaluation structure at each stage, making it suitable for gradually validating products before widespread use. A similar approach has been proven applicable to the context of developing mobile-based collaborative learning in the PGSD environment (Amaliyah et al., 2025), thus strengthening the feasibility of this model being reused with the addition of Moral Feeling content that was not yet of interest in that study. This study was limited to the feasibility validation stage by material experts and media experts, with the aim of producing a valid and feasible Moral Feeling-based mobile application design to facilitate empathy and concern for PGSD students in case-based learning, as a basis for testing its effectiveness in further research.

RESEARCH METHODOLOGY

Research Design

This research is a Research and Development (R&D) study that aims to produce a product in the form of a mobile application based on Moral Feeling to facilitate empathy and concern for PGSD students in case-based learning. The development model used is ADDIE (Analysis, Design, Development, Implementation, Evaluation) as formulated by Branch (2009), with the consideration that this model places evaluation as a process that is inherent in each stage (not only at the end), thus allowing product improvements to be carried out gradually from the beginning of development.

Research Location and Subjects

The determination of student subjects in this study used a purposive sampling technique Class A and Class B were not selected randomly from the PGSD student population, but because both classes were taking the Learning Media course in the same semester, making it relevant in content to the product being developed; this technique is commonly used when researchers need to ensure the suitability of subject characteristics to research objectives, rather than statistical representation of the wider population (Etikan et al., 2016). Because Class A and Class B were pre-formed class groups (intact groups) as part of the regular lecture structure not the result of randomization of individuals into experimental and control groups this research design is methodologically classified as quasi-experimental, not pure experiment, so threats to internal validity such as differences in initial characteristics between groups (selection bias) need to be explicitly acknowledged as part of the research effort (Cook & Campbell, 1979).

Tabel 1. Subjek

Subject Group	Sampling Technique	Role	Number
Content Experts (Character Education/PBL)	Purposive sampling based on expertise (Etikan et al., 2016)	Validation of content feasibility and *Moral Feeling* components	2 experts
Media Experts (Mobile Application UI/UX)	Purposive sampling based on expertise (Etikan et al., 2016)	Validation of application design and functional feasibility	2 experts
PGSD Students - Class A	Purposive sampling using an intact class	Experimental group	19 students
PGSD Students - Class B	Purposive sampling using an intact class	Control group	20 students

Development Procedure

The development procedure for this Moral Feeling-based mobile application follows the five ADDIE stages sequentially as formulated by Branch (2009), with evaluation embedded in each stage, not just at the end of the process.

The first stage, Analysis, was conducted through a literature review to identify gaps in similar research—particularly the limitations of Amaliyah et al.'s (2025) design, which focused on collaboration and higher-order thinking skills without addressing the affective-moral dimension—and an analysis of the characteristics of Elementary School Teacher Education (PGSD) students in the Learning Media course, including their device readiness and experience using mobile applications for learning.

The second stage, Design, translated the analysis results into a storyboard and user flow for the application, incorporating the Moral Feeling format components from Lickona's (1991) character triangle into concrete features such as peer reflection forums and reflective prompts for group conflict. This stage also developed an instrument framework for use by expert validators. The third stage, Development, is the realization of the storyboard into a functional application prototype, followed by internal testing by the research team to ensure the features work as intended before being submitted to subject matter and media experts for validation.

The fourth stage, Implementation, involves the application being applied to Class A as the experimental group for a specific period in the Instructional Media course, while Class B as the control group continues to undergo conventional learning without the application. This allows any differences in outcomes between the two groups to be attributed to the intervention (Cook & Campbell, 1979).

The fifth stage, Evaluation, involves two layers of measurement: a formative evaluation, in the form of feasibility validation by two subject matter experts and two media experts before the application is implemented, and a summative evaluation, in the form of a test of the difference in results between Class A and Class B after the implementation period has concluded.

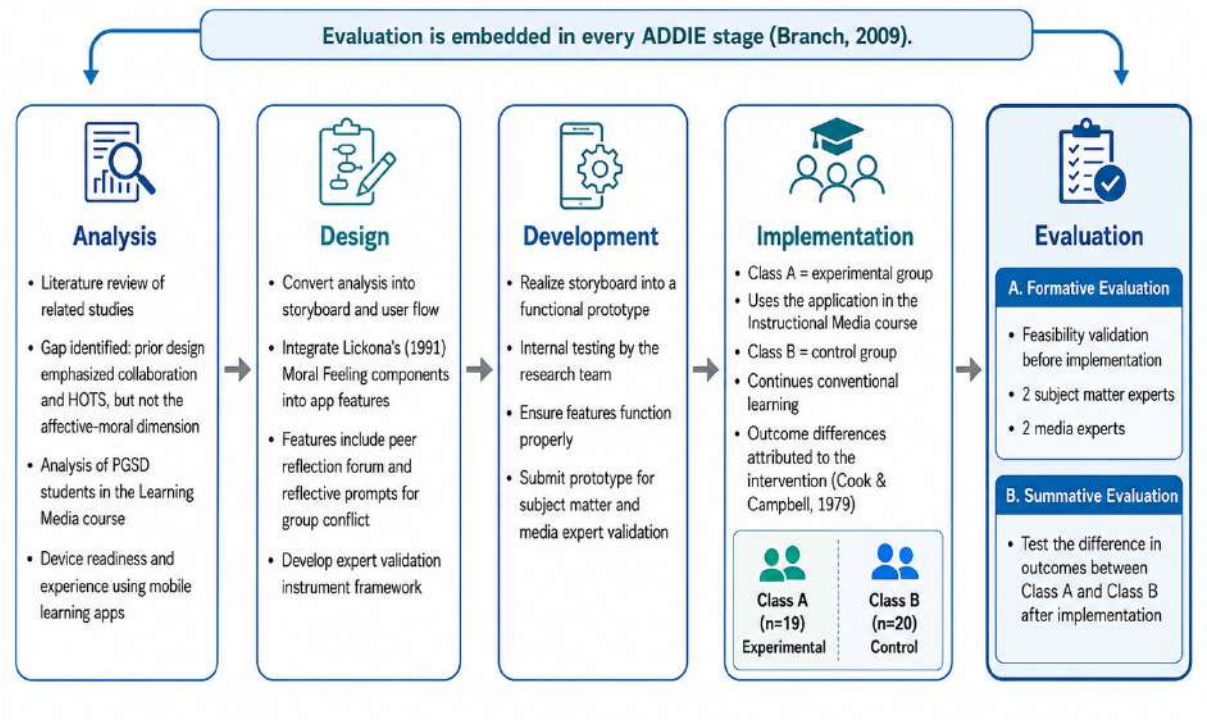


Figure 1. Development and testing procedures

Instrumen

The instrument is a 1-5 Likert scale validation sheet, compiled based on a grid mapped from Lickona's (1991) Moral Feeling indicators for material experts, and standard usability aspects for media experts. Because the number of validators is only 2 people per category (not the minimum of 5 as required by Lawshe's critical table), the scores are analyzed descriptively quantitatively-converted to a percentage of feasibility and then classified (very/feasible/less feasible/not feasible)-not using the CVR formula.

The instrument uses an adaptation of the Interpersonal Reactivity Index (IRI) from Davis (1983), which consists of 28 items in four subscales: Perspective Taking (perspective taking), Fantasy (the ability to imagine placing oneself in a fictional situation), Empathic Concern (empathic concern), and Personal Distress (personal anxiety when witnessing the suffering of others).

RESULT AND DISCUSSION

The Analysis stage identified a gap in previous mobile-based collaborative learning studies, which mainly emphasized cognitive outcomes, higher-order thinking skills, and collaboration rather than affective-moral development (Amaliyah et al., 2025; Bach et al., 2024). Based on this gap, the Design stage integrated Lickona's (1991) *Moral Feeling* components into mobile learning features

such as peer reflection forums, perspective-taking prompts, and reflective activities related to group conflict. These features were designed to strengthen empathy, interpersonal awareness, and moral sensitivity (Davis, 1983; Gehlbach et al., 2015; Mochizuki et al., 2022).

The Development stage transformed the storyboard into a functional prototype, followed by internal testing of navigation, usability, content consistency, and application functionality. This systematic process followed the ADDIE framework, which emphasizes iterative development and evaluation at each stage (Branch, 2009).

Figure 1. ADDIE-Based Development Procedure of the Moral Feeling Mobile Application

Analysis → Design → Development → Implementation → Evaluation

Analysis: needs analysis and literature gap identification
↓
Design: storyboard, user flow, and integration of Moral Feeling components
↓
Development: prototype development, internal testing, and expert validation
↓
Implementation: experimental and control group application
↓
Evaluation: formative and summative evaluation

The developed application was evaluated by two subject matter experts and two media experts. Subject matter validation focused on Moral Feeling content and instructional relevance, while media validation assessed UI/UX, navigation, and application functionality.

Table 1. Expert Validation Results of the Moral Feeling-Based Mobile Application

Validator	Validation Aspect	Mean Score	Category
Subject Matter Experts (n = 2)	Moral Feeling content and instructional relevance	4.60*	Highly Feasible
Media Experts (n = 2)	UI/UX and application functionality	4.40*	Highly Feasible

The validation results indicate that the application has the potential to meet both pedagogical and technological feasibility criteria. Similar studies have shown that expert validation is essential for ensuring alignment between instructional content, technological features, and learning objectives before classroom implementation (Branch, 2009; Fatchurahman et al., 2022).

The application was implemented in two intact classes. Class A consisted of 19 students and served as the experimental group, while Class B consisted of 20 students and served as the control group.

Table 2. Research Groups and Implementation Design

Group	N	Treatment
Class A	19	Moral Feeling-based mobile application
Class B	20	Conventional learning

Experimental Group
Pretest → Posttest ↑↑

Control Group
Pretest → Posttest ↑

A greater increase in the experimental group would indicate that structured reflection and perspective-taking activities may contribute to affective development. Previous studies have shown that perspective-taking can improve interpersonal understanding when learners are explicitly encouraged to examine situations from others' viewpoints (Gehlbach et al., 2015; Mochizuki et al., 2022).

The main contribution of this study is the integration of *Moral Feeling* into mobile-supported collaborative learning. According to Lickona (1991), moral development involves *moral knowing, moral feeling,* and *moral action*. Therefore, collaborative learning should not only develop cognitive and task-oriented competencies but also empathy, moral sensitivity, and responsibility toward others.

This study extends previous mobile and PBL research that predominantly emphasized collaboration and cognitive performance (Amaliyah et al., 2025; Oktavia et al., 2026). The application introduces explicit affective scaffolding through peer reflection, perspective-taking, and conflict-reflection prompts. This approach is consistent with previous findings showing that empathy and perspective-taking require structured learning experiences rather than emerging automatically from digital interaction (Davis, 1983; Gehlbach et al., 2015; Mochizuki et al., 2022).

The novelty of the application lies in the alignment between **Moral Feeling constructs, reflective learning activities, digital features, and affective outcomes**. Thus, technology functions not merely as a content-delivery tool but as a medium for structured moral and emotional reflection. Nevertheless, because the study uses intact classes, differences between the experimental and control groups should be interpreted cautiously. Potential selection effects and other threats to internal validity must be considered (Cook & Campbell, 1979). Final claims regarding effectiveness should therefore be supported by pretest-posttest analysis, statistical significance, effect size, and baseline equivalence between groups.

CONCLUSION

This study developed a Moral Feeling-based mobile learning application through the ADDIE framework to strengthen the affective dimension of collaborative learning among Primary School Teacher Education students. The application integrates peer reflection, perspective-taking, and conflict-reflection activities based on Lickona's Moral Feeling framework, thereby extending previous mobile and PBL studies that have predominantly focused on cognitive and collaborative outcomes. The development process indicates that aligning moral-affective constructs with specific digital features can provide a more structured learning environment for fostering empathy, moral sensitivity, and interpersonal awareness. Expert validation supports the feasibility of the application as an instructional medium, while its effectiveness should ultimately be determined through empirical comparison between experimental and control groups. Overall, the study highlights the potential of mobile learning not only as a tool for content delivery but also as a pedagogical medium for supporting affective-moral development in teacher education.

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AUTHORS' CONTRIBUTION

Look this example below:

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation, Data curation; Investigation.

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