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Development and evaluation of the CoBo application: enhance confidence and social skills through physical education for bullying victims

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ABSTRACT

Background: Bullying remains a persistent issue in physical education (PE), often leading to decreased student participation, low self-confidence, and poor social interaction. While several anti-bullying interventions exist, few are tailored specifically to the PE context or leverage technology to promote engagement and resilience. This gap underscores the need for innovative, context-specific tools such as the CoBo application. **Objectives:** This study explores the design, development, implementation, and evaluation of the CoBo application—an interactive educational tool aimed at enhancing confidence, social skills, and participation in physical activities among primary school pupils. **Methods:** A research and development (R&D) approach was adopted, beginning with a needs analysis through interviews with PE teachers, students, and bullying victims. **Finding/Results:** Findings revealed a strong need for an engaging, supportive digital resource to help students cope with bullying and re-engage in PE. In response, CoBo was developed with modules targeting self-confidence, social competence, anti-bullying strategies, physical activities, and motivation. Prototype and pilot testing involving bullied students demonstrated improved self-efficacy, socialization, and PE participation. **Conclusion:** CoBo offers a promising technology-based solution for addressing bullying in PE settings. Future research should expand testing across diverse school populations to assess broader applicability and long-term impact.

Keywords: CoBo application; physical education; bullying victims; confidence; social skills

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INTRODUCTION

Bullying remains a pervasive issue in schools worldwide, particularly in physical education (PE) settings, where students are often exposed to physical and verbal aggression. There are different types of bullying in physical education, such as physical, verbal or cyber. It has been found that students who have better sporting skills tend to ostracize and discriminate against their less skilled counterparts due to existing power structures (Green et al., 2024; Yosep et al., 2023). Boys bully more in PE, and girls reject violence more (Benítez-Sillero et al., 2024). There are studies which show that girls are

more extreme in their dislike of violence than boys, who exhibit more bullying behaviour in physical education. This brings to light numerous studies that indicate that bullying in elementary levels of school results in loss of self-esteem, social withdrawal, and low accomplishments, namely among the bullied. Reports explain that in PE classes where students are encouraged to cooperate and show physical skills, bullying adversely alters youngsters' self-esteem, social competence, and psyche in the long run (Ploeg et al., 2020).

According to the Indonesian Child Protection Commission (KPAI) and the Federation of Indonesian Teachers' Unions (FSGI), elementary school students are the most susceptible to bullying, with a prevalence of 26%. Junior high school students (25%) and high school students (18.75%) follow in that order. Verbal violence was the most prevalent form of abuse, with 87.6% of individuals in Indonesia admitting to having experienced it, according to Jakpat's research (Naurah, 2023). Bullying in Schools: In 2023, there were 30 instances of bullying in educational facilities, which represents a rise from the 21 cases reported in the previous year. Up to 80% of the cases were reported in institutions under the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) (Annur, 2024).

Numerous studies have examined the detrimental effects that bullying has on students, including emotional distress and chronic mental disorders that may occur later in life (Husky et al., 2020). There was a significant negative correlation between self-esteem and bullying victimisation, with bullying accounting for 21% of the variance in self-esteem (Mawlod et al., 2024). Self-esteem moderated bullying victimisation's impact on internalising symptoms (Mullan et al., 2023), and resilience significantly contributed to the self-esteem of bullying victims, accounting for 21.7% of the variance in self-esteem (Virilia et al., 2024). In physical education classes, these impacts are magnified, as students are required to perform tasks publicly, making them vulnerable to criticism and exclusion by their peers (Benítez-Sillero et al., 2021). Poor social skills, which are essential for establishing and preserving peer connections, are frequently displayed by bullying victims. One study found that the positive relationship between social skills and self-esteem was buffered by bullying victimisation, with victims of bullying with social skills experiencing heightened self-esteem when not bullied (Dou et al., 2022). There was a significant association between bullying victimisation and social interaction because victims usually have difficulty with social contact, which is essential in friendship-making (Madya et al., 2022). Victims of bullying experience adverse psychological effects, which are directly inversely related (Stephen & Soni, 2023).

When designing anti-bullying applications, the youth can be empowered to take civic action in the fight against bullying in their communities (Hartikainen et al., 2023). Also, mobile applications targeted at secondary school students were developed against bullying, with methods like A.D.D.I.E. (Analysis, Design, Development, Implementation, and Evaluation) (Perez-Siguas et al., 2023). For instance, two meta-analyses revealed that DHI is as effective as face-to-face therapy in decreasing bullying and cyberbullying (Chen et al., 2023), and the "AfriEndly" app was used to detect and manage bullying in schools (Almeida et al., 2023). However, little research has focused on the use of this technology specifically to address issues related to bullying in elementary schools, especially in physical education settings.

The present study aims at exploring the application and evaluation of CoBo in physical education as a digital inclusive tool designed to improve the social skills and self-actualization of students who are being bullied at school in a view to managing bullying.

Using the tool is expected to minimize and address bullying, an issue that has been given relatively little consideration in the literature particularly in the context of Indonesian context. By providing interactive support, emotional assistance, and self-development activities, CoBo aims to be an effective solution for students who struggle with bullying-induced self-doubt and social difficulties.

METHOD

Design

By using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) paradigm, this study employs a research and development methodology. According to Mudjisusatyo et al. (2024), the ADDIE approach has effectively enhanced competency and improved test scores and participant ratings. The ADDIE model ensures that the material of the professional development programs is relevant to the learning outcomes (Zulkepli et al., 2024). This also helps in developing a structured way of addressing the problems in teacher preparation programs that in turn enhance the professional agency of the students and the teachers (Meihami & Malmir, 2024). Using physical education activities, this study aims at developing and assessing the CoBo application as a digital intervention to improve the social skills and confidence of the bullied primary school children. The ADDIE model was chosen due to the fact that it is a systematic approach that starts with the identification of the needs and ends with the evaluation of the results.

Table 1. Validation Stages Using the ADDIE Model

No	ADDIE stage	Main Activities	Validation Techniques	Validation Results
1	Analysis	Student needs analysis- Identification of learning problems- Initial data collection (observation, interviews, literature studies)	Validation of needs (need assessment)	Formulation of development needs and objectives
2	Design	Product design preparation- Determination of materials, learning strategies, media, and evaluation instruments	Design validation by learning design experts	Initial product design ready for development
3	Development	Product development (applications/interventions/ learning tools)- Creation of digital learning materials	Product validation by subject matter experts, media experts, and practitioners	Input revisions to material content, media appearance, and suitability for use.
4	Implementation	Limited and large scale product trials - Implementation of learning using products	Limited trials and field tests	Product effectiveness, efficiency and acceptability data
5	Evaluation	Formative evaluation at each stage- Summative evaluation after implementation is complete	Evaluation of student learning outcomes, teacher and student interviews	Overall product effectiveness assessment and suggestions for improvement

Three knowledgeable validators were involved to make the most of the study process. The trio consists of:

1. A.R. is a physician specialising in educational technology development and has vast expertise in creating and assessing digital learning materials, particularly in physical education settings. The expert examined the digital application’s general layout, functionality, and suitability for the intervention.

2. A.M. is a senior lecturer in physical education who has taught and conducted research on student well-being, motor learning, and social development in physical education for over ten years. The expert offered input on the program's learning objectives, material correctness, and the appropriateness of the physical exercises.
3. Y.H. is a professor of educational psychology who focuses on social-emotional learning, bullying intervention, and child development. The expert examined the intervention's content to ensure it was pertinent and may affect kids' psychological and emotional growth, particularly for those who are bullied.

Participants

The focus of the research was on the students in grades 4-6 in the primary schools and those students who have been identified as victims of physical, verbal or social bullying constituted the research group. Students between the ages of 10 and 12 who teachers or counsellors had recognised as victims of bullying were prepared to participate in an eight-week intervention. They had a parental agreement, which was criteria for choosing the sample using a purposive selection approach. 40 students participated in the study and were split into two groups: 20 students in the experimental group used the CoBo program, while 20 students in the control group did not.

Instrument

Several methods were used to gather data to produce thorough findings. A questionnaire administered before and after the session evaluated students' social skills and self-confidence. The tools used were the Self-Confidence Scale and the Social Skills Scale, both created based on relevant indicators and validated by experts. In addition to direct observation to record student behavior during physical education activities—focusing on social interactions and teamwork—structured interviews were held with instructors and students to explore their experiences during the intervention process. Additional information about student behaviour from teacher reports was also gathered through documentation studies.

Procedures

Both quantitative and qualitative methods were used to analyse the collected data. In quantitative analysis, the pretest and posttest findings were compared within the experimental group and between the experimental and control groups using descriptive statistical tests, normality tests, homogeneity tests, and T-tests (Paired Sample T-Test). To determine if student behavior changed throughout the intervention, theme analysis was used to examine qualitative data from observations and interviews. The study used various instruments, such as observation sheets, interview guides, and questionnaires. Specialists in child psychology, educational technology, and physical education assessed the questionnaire's content validity. The instrument validation process in this study involved content validity evaluation by experts in child psychology, educational technology, and physical education to confirm the appropriateness of the indicators relative to the research objectives. Additionally, reliability was assessed using Cronbach's Alpha method to gauge the instrument's internal consistency, with a value of ≥ 0.7 signifying good reliability. This validation encompasses many phases, including expert evaluation by specialists, restricted trials within small cohorts, reliability assessment utilising Cronbach's Alpha, and potential instrument modification contingent upon the analytic outcomes and expert feedback. A Cronbach's Alpha score of ≥ 0.8 indicates high

reliability of the instrument, while a value between 0.7 and 0.8 denotes acceptable reliability. A value below 0.7 necessitates further adjustment before its application in the primary research.

Data Analysis

Teachers and counsellors were interviewed as part of the requirements analysis phase of the study process. This was followed by creating a CoBo application prototype with essential elements, including interactive activities, motivating films, and physical education manuals. Following the development of the application, an eight-week trial was run on the experimental group. The program was utilised as a component of organised physical education exercises throughout the installation. In this study, an evaluation was conducted to see the impact of using the CoBo application in improving students' social skills and self-confidence in learning physical education. The results of this study are expected to help promote inclusive physical education, develop students' skills comprehensively, and offer a new, more creative method of learning physical education.

RESULTS AND DISCUSSION

Results

This study uses physical education activities to determine how effectively the CoBo application improves bullied children's social skills and self-esteem. Pretest and posttests were utilized to collect data for the study, and the experimental and control groups were subjected to quantitative and qualitative evaluations, respectively.

Results of the Self-Confidence Pretest and Posttest

Data analysis revealed that, compared to the control group, which did not get the intervention, the experimental group's level of self-confidence significantly increased after utilising the CoBo application.

Table 2. Results of Pretest and Posttest of Self-Confidence

Group	N	Mean Pretest	Mean Posttest	Difference	t-count	p-value
Experiment	20	65.50	85.75	20.25	5.78	0.000**
Control	20	66.10	70.25	4.15	1.98	0.065

The mean self-confidence score in the experimental group rose by 20.25 points, from 65.50 to 85.75. The CoBo application intervention led to a notable increase in students' self-confidence, demonstrated by a T-test p-value of 0.000. In contrast, the control group only experienced a rise of 4.15, which was not statistically significant ($p > 0.05$).

Social Skills Pretest and Posttest Results

Students in the experimental group who utilized the CoBo program developed better social skills and self-confidence.

Table 3. Social Skills Pretest and Posttest Results

Group	N	Mean Pretest	Mean Posttest	Difference	t-count	p-value
Experiment	20	65.80	82.60	21.80	6.25	0.000**
Control	20	61.20	65.10	3.90	1.55	0.132

With a difference of 21.80 ($p = 0.000$), the social skills score in the experimental group rose dramatically from 60.80 to 82.60. There was a slight 3.90 rise in the control group, which was insignificant ($p > 0.05$).

Findings from Social Behaviour Observations

During physical education exercises, observations were made to track changes in the experimental group's social behaviour. The observations' findings demonstrated a rise in constructive behaviour, including the capacity to cooperate, communicate, and support peers. Data on the experimental group's observations were gathered both before and after the intervention. The accompanying graphic compares scores in each area of social behaviour before and after the intervention. Following intervention treatment using the CoBo program, Figure 1 demonstrates a noteworthy improvement in scores across the board, suggesting that students' social skills have strengthened.

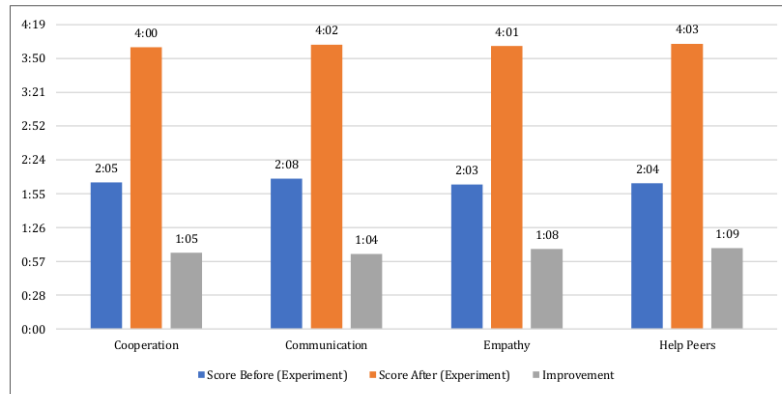


Figure 1. Results of social behavior observations

Discussion

Observations showed that students in the experimental group experienced increased positive behaviours, such as the ability to cooperate, communicate, empathize, and help peers. This demonstrates the usefulness of the CoBo application in aiding the development of social skills through physical education.

According to the study, primary school pupils who face bullying see significant benefits from using the CoBo app as a digital intervention tool in physical education, as it enhances their social skills and self-esteem. These findings support previous research indicating that organized physical education can improve children's social skills and mental health. Structured physical activities, especially team sports, greatly enhance students' communication and teamwork abilities (Chatzipanteli & Adamakis, 2022; Muzandi & Susanto, 2024). Regular participation in organized physical education has been associated with reduced levels of stress, anxiety, and depression (Bajwa et al., 2024; Nashwan, 2024; Singh, 2024), and it also contributes to the development of emotional regulation skills, which are essential for managing emotions and stress effectively (Bagum et al., 2024). Physical activity boosts students' self-esteem and general life happiness (Sirojova, 2024). Structured physical activities help students develop their motor abilities, social skills, and emotional well-being, all of which contribute to their success (Neto et al., 2024; Putri et al., 2024). The CoBo application offers a unique technology solution that piques kids' attention and provides interactive materials to help them develop psychologically.

The gain in self-confidence shown in the experimental group, as seen by the pre-and post-test findings, demonstrates that a technology-based strategy paired with exercise might help bullying victims overcome feelings of inadequacy. The CoBo app offers encouragement, simple physical exercise recommendations, and advice on how to form great social interactions. As a result, students might develop a more positive self-image and feel more prepared to face problems in their social relationships. This increase in self-confidence is consistent with Bandura's self-efficacy hypothesis, which states that successful experiences, positive feedback, and direction increase an individual's belief in their skills. According to research, positive reinforcement can help students overcome feelings of inadequacy and can increase their capacity to be more fully able to participate in social and educational activities (Basnet, 2022), and can also improve and create an inclusive atmosphere that encourages more collaborative learning (Khoirunnisak et al., 2023), which can boost their self-esteem.

Enhancing social skills such as teamwork, empathy, communication, and peer support demonstrate the intervention's effectiveness. This is consistent with cooperative learning concepts, which highlight the importance of social contact in developing interpersonal skills. Observations of social behavior throughout the intervention demonstrated that physical exercise increased students' positive attitudes and flexibility in group settings. Pan et al. (2024), argue that improvements in positive psychology are crucial for fostering good attitudes in social circumstances. They also assist in decreasing anxiety and introversion, fostering a positive outlook (Bonab et al., 2022). Physical education and sports participation promote social adaptability by teaching students how to manage interpersonal interactions and integrate into society (Hu & Prompanyo, 2021). Furthermore, physical education helps international students adjust to new educational and cultural environments (Slukhenska et al., 2023). To adapt to group dynamics, individuals must regulate their emotions and prioritize the group's demands over their own (Vega-Ramírez et al., 2024). The CoBo program organizes physical education activities that foster positive student interactions. Students learn the importance of teamwork, empathy, and mutual support via organized group activities.

In addition to the quantitative statistical results of the study, teacher and student interviews also showed quite good results from using this application. This shows that the tool is acceptable and can be applied in the physical education learning process. Teachers noted that students participated more in group activities and exhibited less withdrawal behavior toward their group or learning environment. Furthermore, students said the tool used in this intervention can increase their motivation and make them feel more at ease while interacting with their peers. This shows that the CoBo application is a support system that helps overcome and heal the psychology of students who experience less or more unpleasant treatment.

However, this study has weaknesses, so it needs to be updated to get more optimal results. Some of these weaknesses include the sample size and short intervention period. Larger sample sizes and longer-term interventions are needed to examine this application's impact on student development thoroughly. Additionally, additional aspects such as family support and the school environment must be considered to handle bullying holistically. The findings of this study suggest that integrating technology into the physical education learning process can help bullied physical education students become more confident and socially adept. This strategy can be replicated, modified, and continued by other schools as part of a school-based intervention program to foster friendlier classrooms and their students' psychological growth. Children between the ages of 10 and 12 are in the industry vs inferiority stage, during which positive social experiences can boost their social skills and self-esteem. The CoBo application has been demonstrated to positively influence the establishment of an environment that promotes

strengthening areas of social development, as evidenced by enhanced scores of cooperation (1.5 points), communication (1.4 points), empathy (1.8 points), and concern for friends (1.9 points).

Based on the research, various recommendations may be made to strengthen digital interventions in physical education, notably for bullying. Technology like the CoBo app should be integrated into the physical education curriculum to help students' social and psychological development, with teacher training to optimise its usage and promote an inclusive learning environment. Teachers, parents, and classmates should collaborate on bullying prevention initiatives. Longitudinal studies are needed to assess this application's long-term effects on student development and broaden the sample to reflect different socioeconomic and cultural backgrounds. Further study is needed to determine how family and school contextual variables affect digital intervention efficacy and to compare various intervention approaches to find the best ones. Self-efficacy, resilience, and emotional intelligence research can enhance programs to boost kids' self-confidence and social skills.

CONCLUSION

Based on the results of the study obtained, elementary school students who received unpleasant treatment and were bullied by their environment showed an increase in their social skills and self-confidence. Post-intervention assessments showed that the application of the tool can help increase students' self-confidence in physical education learning. This program allows students to create a positive image of their talents in social and physical environments while providing guidance and motivational assistance.

Second, this application contributes to developing students' social skills, including their capacity for collaboration, communication, empathy, and peer support. Students are encouraged to engage more effectively and cultivate positive attitudes in a group setting through structured physical exercises facilitated by interactive instructions in the application. Quantitative evidence is supported by observational and interview findings, indicating that both instructors and students observed positive behavioral changes, such as increased engagement, a willingness to participate, and a sense of mutual support within groups. This highlights how integrating digital technology in physical education can be an innovative approach to mitigate the psychological impacts of bullying. To create a more inclusive learning environment and support optimal student development, this study recommends that primary schools adopt similar programs as part of their bullying prevention and rehabilitation efforts.

Nevertheless, this study has drawbacks, such as a small sample size and a brief intervention period. To obtain a more thorough understanding of the efficacy of technology-based interventions in addressing bullying and fostering students' social-emotional development, future research is advised to include larger and more diverse samples, prolong the intervention period, and investigate additional variables like family involvement, teacher support, and school climate.

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CONFLICT OF INTEREST

All authors declare that there is no conflict of interest in this study.

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