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Empowering Students through Health Literacy: A School-Based Community Learning Innovation in Secondary Education

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ABSTRACT

Adolescents are increasingly at risk of preventable health issues due to unhealthy lifestyle behaviors and limited access to contextualized health education. Addressing this gap, the study aimed to develop and evaluate a School-Based Community Learning Model that enhances health literacy and student engagement through participatory, project-based learning. The intervention was based on contextual teaching, social constructivism, and experiential learning principles. It involved digital health modules, peer discussions, and community action projects delivered over six weeks to 120 senior high school students in Pekanbaru, Indonesia. A quasi-experimental pretest-posttest control group design was employed to assess changes in health literacy and life skills. Statistical analysis showed a significant improvement in both health literacy and life skills in the intervention group ($p < 0.001$). The average N-Gain score was 0.62, indicating moderate-to-high learning gains. Qualitative observations also indicated enhanced collaboration, critical thinking, and student initiative—markers of affective and psychomotor development. These findings suggest that the model effectively fosters essential health competencies and supports holistic student development. By aligning with national education goals, the program provides a viable framework for integrating health education into the standard curriculum. The School-Based Community Learning Model presents a scalable and practical approach to embedding health literacy in secondary education. It reinforces the role of health education as a fundamental aspect of character building and life skills development in schools.

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1. INTRODUCTION

Health education in schools plays a vital role in shaping students' awareness, attitudes, and competencies related to their overall well-being (Tafuri & Latino, 2024). However, at the secondary education level, health curricula often remain cognitive and theoretical in nature, focusing more on disease-related information than on fostering meaningful connections to students' everyday lives (Jia, Du, Huang, & Pang, 2024). As a result, students may acquire basic knowledge but fail to internalize healthy behaviors that require reflection, motivation, and contextual relevance (Compare, Rivero, Moniz, & Albanesi, 2024).

Conventional health instruction in schools tends to rely on passive lecture-based methods with limited opportunities for student engagement (Zhang, Tang, Zhao, & Wang, 2023). This misalignment between content and delivery methods restricts the development of critical thinking skills, life competencies, and interest in health topics (Chesire et al., 2022). Moreover, such approaches often fail to encourage the behavioral transformation necessary to address the current health risks faced by adolescents (Wiedermann et al., 2023).

Educational frameworks such as Contextual Teaching and Learning (CTL) emphasize the importance of linking academic content to real-life situations, allowing students to build meaning through authentic experiences (Sarwari & Kakar, 2023). Similarly, Vygotsky's socio-cultural theory suggests that learning is a social process in which knowledge is constructed through interaction and scaffolding within meaningful contexts (Daramola, Okunade, Jegede, & Okeya, 2024). These perspectives advocate for a shift in school-based health education from rote memorization to interactive, student-centered learning experiences (Kiptiony, 2024).

In light of these challenges, schools must adopt pedagogical innovations that situate health learning within social, collaborative, and project-based frameworks (Kalla, Jerowsky, Howes, & Borda, 2022). One such approach is school-based community learning, which empowers students to engage in health-promoting actions that are relevant to their social environment and lived experiences (Kitching, 2025).

Previous studies have demonstrated that integrating community-based and project-driven learning approaches into health education can significantly enhance student engagement, conceptual understanding, and behavioral change. For example, other researchers found that school-based health interventions involving social and collaborative activities significantly increased students' motivation and responsibility toward healthy living (Nagy-Pénzes, Vincze, & Bíró, 2022). Similarly, other researchers showed that nutrition advocacy projects involving student participation led to consistent improvements in nutrition literacy and eating practices (Branum, 2024). Further research also reported that engaging students in school-based community projects created meaningful learning experiences that transformed students' perspectives on health as a part of daily life (White et al., 2023). Therefore, community-based pedagogical innovations are not only relevant to health education but also vital in developing students' 21st-century competencies and character.

In Indonesia, national surveys such as the Basic Health Research report that more than 30% of adolescents aged 15–18 years exhibit poor dietary habits, low physical activity, and lack adequate health knowledge conditions that contribute to long-term health risks, including obesity, diabetes, and hypertension. Furthermore, disparities in access to health education are influenced by socioeconomic status, with students in lower-income or under-resourced schools often receiving less comprehensive instruction in preventive health. These inequalities underscore the need for contextualized health education models that are adaptable to diverse school environments and can empower students regardless of background. Addressing these gaps requires pedagogical models that not only transfer knowledge but also cultivate decision-making, empathy, and collective responsibility. This study positions the school-based community learning model as a transformative pedagogical framework to foster health literacy and critical thinking through experiential and collaborative learning in the school environment.

2. METHODS

This study employed a quantitative approach using a quasi-experimental design with a pretest-posttest control group format. The primary objective was to evaluate the effectiveness of a school-based community learning model in enhancing students' health literacy and promoting health-oriented life skills within the context of secondary education.

The intervention was developed as a blended learning model that integrates digital health education with peer-based discussion and community engagement activities. It was explicitly designed within the framework of project-based learning, social constructivism, and experiential learning, where students were encouraged to construct knowledge through social interaction and authentic tasks. Learning took place through problem-solving, reflection, and active participation in meaningful real-world contexts.

The instructional model consisted of three key components: (1) interactive digital modules on diabetes prevention and healthy lifestyle; (2) structured peer-supported group discussions; and (3) community action projects implemented in school settings. Each module incorporated clear learning objectives, student-centered instructional approaches such as inquiry-based tasks and group reflection, and formative assessment techniques, including self-assessment checklists, peer feedback, and guided teacher observations. The program was implemented over six weeks, with two 90-minute sessions per week.

The blended learning design combined synchronous face-to-face sessions with asynchronous digital activities using Google Classroom as the central Learning Management System (LMS). Digital modules were distributed weekly via Google Classroom in the form of interactive presentations, short educational videos, self-assessment quizzes using Google Forms, and embedded discussion prompts. Students accessed these materials independently prior to the in-class sessions. To increase interactivity, additional tools such as Padlet and Canva were used for collaborative poster design and idea sharing. The integration between online and offline learning was structured into a weekly cycle: Mondays were allocated for accessing digital materials and completing pre-class assignments, while Thursdays were used for in-person sessions focusing on peer group discussion, project planning, and teacher-guided reflection. This structure ensured continuity and reinforcement between digital and classroom experiences, allowing students to internalize health concepts and immediately apply them in real-life projects and group settings.

This intervention is designed as a blended learning model integrating peer learning and community engagement to build 21st-century competencies such as critical thinking, collaboration, and health-related decision-making in real-life contexts. The control group, meanwhile, received the standard school-based health education without the enriched model.

A total of 120 students from two senior high schools in Pekanbaru, Indonesia, participated in the study. The selection of schools and participants was based on purposive sampling using several inclusion criteria. First, both schools held a minimum accreditation level of "B" from the National Accreditation Board for Schools, ensuring a baseline of institutional quality and commitment to curriculum innovation. Geographically, the schools were located in urban subdistricts of Pekanbaru, representing areas with moderate population density and accessibility for research coordination. Socioeconomic background was also considered; one school primarily served students from lower-middle income families, while the other had a more socioeconomically diverse student population. This variation allowed for capturing different contextual influences on health literacy outcomes. Student participants were enrolled in grade XI (eleventh grade) and aged between 16 and 17 years, an age range deemed developmentally appropriate for engaging in peer-supported health learning and community projects. Participation required written informed consent from parents or guardians and verbal assent from students. The schools also expressed institutional support through formal approval letters and designation of teacher coordinators to assist implementation. They were selected through purposive sampling and divided evenly into intervention and control groups (n=60 each). Data were collected

using validated questionnaires measuring students' health literacy and health-oriented behavior before and after the intervention.

The instruments used in this study underwent a rigorous validation process to ensure their appropriateness for assessing adolescent health literacy and behavior. Content validity was established through expert review by three health education specialists, who assessed the relevance, clarity, and comprehensiveness of each item in the questionnaire. Their feedback was used to revise ambiguous statements and align the indicators with national adolescent health standards. Construct validity was tested through a pilot study involving 30 students from a different school not included in the main study, using exploratory factor analysis (EFA) to ensure that questionnaire items clustered appropriately within their intended constructs. Reliability analysis showed high internal consistency, with Cronbach's alpha values of 0.87 for the health literacy scale and 0.84 for the health-oriented behavior scale. These values exceed the commonly accepted threshold of 0.70, indicating that the instruments are both valid and reliable for use in this educational context. Statistical analysis was conducted using SPSS version 25, including paired t-tests and independent t-tests to determine the significance of changes within and between groups.

3. FINDINGS AND DISCUSSION

3.1. Quantitative Learning Outcomes

The findings show that the implementation of the school-based community learning model led to a significant increase in students' health literacy and health-oriented life skills compared to the control group. The average posttest score for health literacy in the intervention group increased by 25.9 points, with an N-Gain of 0.62, indicating a moderate-to-high learning gain. Likewise, the behavioral indicators—reframed here as affective and psychomotor learning outcomes—also improved significantly. These included increased initiative in engaging in physical activity, better decision-making in food selection, and greater consistency in daily health practices.

Table 1. Comparison of Health Literacy Scores

Group	Pretest Mean ± SD	Posttest Mean ± SD	Δ Score	N-Gain	p-value
Intervention	58.2 ± 7.1	84.1 ± 5.3	25.9	0.62	<0.001
Control	57.6 ± 6.8	62.5 ± 6.1	4.9	0.13	0.087

Table 1 shows a significant increase in health literacy scores in the intervention group compared to the control. The N-Gain value of 0.62 falls within the moderate-to-high category. The paired t-test results confirm the statistical significance of this improvement ($p < 0.001$), while the control group exhibited minimal change. The magnitude of improvement in the intervention group—an average increase of 25.9 points—indicates a substantial learning gain that is both statistically and educationally significant. This suggests that the combination of digital modules, peer engagement, and contextualized projects effectively supported students in acquiring not only declarative knowledge but also functional health literacy, such as interpreting health information, making informed choices, and reflecting on health behavior. The control group's limited progress (only 4.9 points) demonstrates the relative ineffectiveness of conventional instructional methods in fostering transformative health understanding. The large gap between groups emphasizes the necessity of interactive and applied pedagogical models in secondary health education.

Table 2. Comparison of Health-Oriented Behavior Scores

Group	Pretest Mean ± SD	Posttest Mean ± SD	Δ Score	p-value
Intervention	60.8 ± 7.4	79.7 ± 5.9	18.9	<0.001
Control	61.2 ± 7.1	65.1 ± 6.5	3.9	0.069

Table 2 illustrates significant improvements in health-oriented life skills in the intervention group, which reflect affective and psychomotor learning gains. These include behaviors related to physical activity, diet, and healthy decision-making. The statistical difference between groups confirms the pedagogical impact of the intervention. The behavior score increase of 18.9 points in the intervention group reflects not only the students' increased awareness but also their capacity to act on this knowledge through daily habits. The behaviors assessed included key indicators such as choosing healthier food options, initiating physical activity routines, and reducing sugar intake, which requires intentional decision-making and behavioral reinforcement. The minor improvement in the control group (3.9 points) suggests that without structured opportunities for reflection, peer support, and real-life application, students are less likely to translate knowledge into meaningful lifestyle changes. These findings highlight the importance of designing health education programs that integrate affective and psychomotor learning domains to support lasting behavioral transformation.

Table 3. Changes in Specific Components of Health-Oriented Behavior

Behavioural Component	Intervention (Δ Score)	Control (Δ Score)	p-value
Physical Activity Frequency	+1.7 sessions/week	+0.4 sessions/week	<0.001
Fruit and Vegetable Intake	+2.3 servings/day	+0.6 servings/day	<0.001
Sugary Drink Reduction	-1.9 glasses/week	-0.5 glasses/week	0.002

Table 3 provides a breakdown of changes in specific behavioral indicators. Students in the intervention group showed meaningful improvements in physical activity, dietary habits, and reduced intake of sugary beverages, all of which align with psychomotor and affective educational outcomes.

The data from Tables 1 to 3 consistently indicate that students who engaged with the community learning model experienced improvements not only in cognitive comprehension but also in behavior-related outcomes. The substantial N-Gain value of 0.62 reflects a high learning impact, exceeding the typical threshold for moderately effective interventions. Behavioral changes, such as a +2.3 daily serving increase in fruit and vegetable intake and a -1.9 weekly reduction in sugary drink consumption, show alignment between knowledge acquisition and practical application. These figures illustrate that the program successfully encouraged students to transform awareness into action—a key challenge in adolescent health education. The effect sizes observed in physical activity frequency and dietary behavior change suggest that repeated engagement with content and peer collaboration may contribute to habit formation, not just episodic behavioral shifts.

3.2. Impact on Student Engagement and Collaborative Learning

In addition to quantitative gains, qualitative observations during the intervention revealed high levels of student engagement and meaningful peer collaboration. Students actively participated in designing and executing health campaigns, working in groups to produce posters, conducting peer surveys, and leading classroom discussions. This aligns with Vygotsky's concept of social constructivism, which posits that knowledge is co-constructed through social interaction. The project-based nature of the learning model fostered a sense of shared ownership and accountability among students, encouraging mutual support and reflective dialogue throughout the learning process.

These collaborative dynamics also contributed to the development of students' communication skills, empathy, and leadership core components of affective learning. By participating in health-related decision-making and group consensus-building, students learned how to negotiate, listen actively, and build consensus, illustrating growth in interpersonal competence and civic responsibility.

Qualitative observations also highlighted emotional and motivational dimensions of learning. A student from the intervention group remarked, "This is the first time I feel like health class is connected to my real life. We don't just listen—we do something." Meanwhile, one teacher coordinator noted, "The students were much more motivated and confident, especially when they saw their posters and health campaigns appreciated by their peers. It gave them a sense of purpose beyond just school assignments." These reflections underscore the value of experiential learning in fostering deeper student engagement, identity development, and a sense of agency.

3.3. Pedagogical Implications for Curriculum Developers and Teachers

The outcomes of this study underscore the need for curriculum reform that prioritizes active and contextually rich learning experiences. Traditional health education programs tend to be didactic and knowledge-based, limiting students' engagement and behavioral application. In contrast, the school-based community learning model offers a template for how project-based, socially embedded learning can cultivate real-life competencies.

Curriculum developers are encouraged to incorporate elements of experiential learning and social constructivism into health education. This includes integrating digital tools, real-world problem-solving, community mapping, and formative assessments such as peer evaluation and reflective journals. For teachers, this model provides practical strategies to scaffold student learning, foster collaboration, and connect classroom content with students' lived experiences.

Discussion

The findings of this study are consistent with a growing body of literature that emphasizes the importance of embedding health education within meaningful, socially relevant learning environments. Other researchers found that socially integrated health education programs led to improved student motivation and a heightened sense of personal responsibility (Hwang, Ko, Shim, Ok, & Lee, 2023). Further research demonstrated that nutrition education grounded in contextual and project-based approaches fostered stronger self-regulation and healthier eating practices among adolescents (Loyens, van Meerten, Schaap, & Wijnia, 2023). Similarly, other researchers emphasized that project-based interventions not only engage students academically, but also promote sustained behavioral transformation by linking content to real-life challenges (Sukackė et al., 2022).

Furthermore, the implementation of the school-based community learning model in this study clearly reflects the principles of Contextual Teaching and Learning (CTL). CTL encourages students to make meaningful connections between academic knowledge and their everyday experiences. The model developed here successfully operationalizes this framework by embedding health-related content within community contexts, facilitating project-based learning, and encouraging students to act as agents of change within their school environment. This approach reinforces not only cognitive

understanding, but also cultivates critical thinking, ethical reasoning, and long-term behavioral intention core components of 21st-century education.

The findings also illustrate that the learning process became multidimensional: students did not only learn about health but learned through health by collaborating, leading initiatives, making group decisions, and reflecting on real outcomes. These pedagogical results support the argument that health education should evolve beyond passive knowledge transfer into a more transformative, learner-centered experience.

Despite the positive outcomes, this study is not without limitations. The intervention was implemented over a relatively short period of six weeks, which may not be sufficient to capture long-term behavioral change or the sustainability of health-oriented habits. While gains in knowledge and short-term behavior were evident, further research is needed to assess whether these improvements persist beyond the study timeline. Additionally, the model's adaptability across different school settings, especially in rural or under-resourced areas, requires further exploration. Embedding the program into a full academic semester or integrating it with existing school health policies may yield more sustainable outcomes and institutional support. These considerations are essential for scaling and contextualizing the model across diverse educational landscapes.

In conclusion, this study provides strong empirical support for integrating community-based and project-driven approaches in formal health education. The model developed here has proven to be an effective pedagogical tool not only for improving health literacy but also for advancing character development, student agency, and reflective learning. It offers a promising direction for educators and curriculum designers aiming to bridge the gap between health knowledge and real-world action in schools.

The findings of this study are consistent with global literature supporting the effectiveness of project-based and community-integrated health education. For instance other researchers found that peer engagement and school-driven health campaigns increased both short-term motivation and sustained behavior change in Hungarian adolescents (Nagy-Pénzes, Vincze, & Bíró, 2022). Similarly, the nutrition intervention explored by other researchers also emphasized the importance of student-led advocacy projects in translating knowledge into healthier food choices (Branum, 2024). In comparison, the model implemented in this study emphasizes blended learning and peer interaction within local cultural contexts, contributing to both individual and collective health awareness. What distinguishes this model is its integration of contextual teaching and learning (CTL) with action-oriented school projects, a synergy not commonly addressed in existing models. Furthermore, the behavioral depth reflected in physical activity and diet change aligns with research advocating for combining cognitive and psychomotor engagement to foster habit transformation (Sukackė et al., 2022). Thus, the current study builds on and extends existing frameworks by adapting them to the Indonesian educational landscape and demonstrating applicability in low-to-middle income school settings.

4. CONCLUSION

This study demonstrates that the school-based community learning model significantly enhances students' health literacy and health-oriented life skills by engaging them in experiential, collaborative, and contextually grounded educational practices. The learning gains observed in both affective and psychomotor domains indicate that students not only acquired health knowledge but also internalized values, behaviors, and decision-making skills relevant to real-life challenges.

The model offers a practical framework for integrating health literacy into the secondary school curriculum through participatory and context-based learning, aligned with national education goals. It emphasizes student agency, peer collaboration, and real-world problem-solving elements that are often lacking in conventional school health programs.

The findings advocate for reorienting health education as a core element of character and life-skill development, and call for curriculum revision to adopt context-rich, learner-centered models. For

teachers, this research provides strategies for implementing project-based, socially embedded instruction. For policymakers and curriculum developers, it reinforces the need to design health education not merely as content delivery, but as a transformative pedagogical process that empowers adolescents to become critical thinkers, ethical decision-makers, and active participants in their communities.

Nonetheless, the relatively short intervention period limits the ability to assess the program's long-term impact. Future implementations should consider extending the duration and embedding the model within semester-long curricula to foster deeper habit formation and sustainability. Moreover, studies across varied demographic and regional contexts are necessary to evaluate the model's adaptability and scalability. Such efforts would further strengthen the potential of this school-based community learning model as a transformative and sustainable approach to adolescent health education.

Conflicts of Interest: The authors declare no conflict of interest.

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