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ORIGINAL

Introducing Health Literacy at the Primary School Level: A Pedagogical Model for Early Scientific and Medical Education

Introducción a la Alfabetización en Salud en la Escuela Primaria: Un Modelo Pedagógico para la Educación Científica y Médica Temprana

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ABSTRACT

Health literacy now stands as a cornerstone for lifelong well-being, yet most educational initiatives focus on adolescents or adults, neglecting the formative primary school years when foundational attitudes and habits form. This study addresses that gap by proposing a pedagogical model for introducing health literacy to children aged 6–12, with the goal of developing basic scientific understanding, health awareness, and responsible decision-making from an early age. The research draws on interdisciplinary perspectives from health science education, child psychology, and communication theory, underscoring the urgency of early intervention to reduce long-term health inequalities. A mixed qualitative-quantitative approach was used, combining content analysis of 45 peer-reviewed publications and policy reports with thematic synthesis of case studies and pilot programs from diverse educational contexts. Data analysis identified key competencies, effective pedagogical strategies, and barriers to implementation. The results highlight three main lines of work: (1) integration of age-appropriate health topics—hygiene, nutrition, body awareness, emotional well-being, and responsible use of healthcare services—into existing curricula; (2) adoption of innovative teaching methods such as storytelling, interactive games, role-play, and visual learning tools to make complex health concepts accessible; and (3) promotion of collaboration between educators, healthcare professionals, and families to reinforce learning in both school and home environments. The findings show that structured, engaging, and contextually adapted health literacy education at the primary level can lay the foundation for informed, health-conscious future citizens. The conclusions of the paper discuss implications for policy, curriculum design, and sustainable cross-sector partnerships.

Keywords: Health Literacy; Primary Education; Medical Education for Children.

RESUMEN

La alfabetización en salud constituye hoy en día una piedra angular para el bienestar a lo largo de toda la vida; sin embargo, la mayoría de las iniciativas educativas se centran en adolescentes o adultos, dejando de lado los años formativos de la educación primaria, cuando se establecen actitudes y hábitos fundamentales. Este estudio aborda esa carencia mediante la propuesta de un modelo pedagógico para introducir la alfabetización en salud en niños de 6 a 12 años, con el objetivo de desarrollar una comprensión científica básica, la conciencia sobre la salud y la toma de decisiones responsables desde una edad temprana. La investigación se apoya en perspectivas interdisciplinarias procedentes de la educación en ciencias de la salud, la psicología infantil y la teoría de la comunicación, y subraya la urgencia de una intervención temprana para reducir las desigualdades en salud a largo plazo. Se utilizó un enfoque mixto, cualitativo y cuantitativo, que combinó el

análisis de contenido de 45 publicaciones revisadas por pares e informes de políticas con una síntesis temática de estudios de caso y programas piloto en diversos contextos educativos. El análisis de los datos permitió identificar competencias clave, estrategias pedagógicas eficaces y barreras para su implementación. Los resultados destacan tres líneas principales de trabajo: (1) la integración de temas de salud apropiados para la edad—higiene, nutrición, conocimiento del propio cuerpo, bienestar emocional y uso responsable de los servicios de salud—en los planes de estudio existentes; (2) la adopción de métodos de enseñanza innovadores, como narración de historias, juegos interactivos, dramatizaciones y herramientas visuales, para facilitar la comprensión de conceptos complejos de salud; y (3) la promoción de la colaboración entre educadores, profesionales de la salud y familias para reforzar el aprendizaje tanto en la escuela como en el hogar. Los hallazgos muestran que una educación en alfabetización en salud estructurada, motivadora y adaptada al contexto en el nivel primario puede sentar las bases para la formación de ciudadanos futuros informados y conscientes de su salud. Las conclusiones del artículo abordan las implicaciones para las políticas, el diseño curricular y las alianzas intersectoriales sostenibles.

Palabras clave: Alfabetización en Salud; Educación Primaria; Educación Médica Temprana.

INTRODUCTION

Health literacy, broadly defined as the ability to access, understand, and use health information to make informed health decisions, has emerged as a crucial determinant of individual and public health outcomes.[1] Despite this recognition, most health literacy education efforts are aimed at adolescents or adults, neglecting the critical early years of childhood when foundational cognitive, social, and emotional skills develop.[2] Primary education represents a vital window of opportunity to embed basic health and medical knowledge in an age-appropriate manner that fosters active and engaging learning experiences.[3]

Furthermore, it is important to emphasize the preventive dimension of health literacy, since healthcare personnel must perform four essential functions: healthcare (including preventive, promotional, therapeutic, and rehabilitative activities), teaching, research, and administrative responsibilities. Preventive actions, in particular, are organized at different levels depending on the pathologies and health programs specific to each region, which highlights the need to introduce children early on to the principles of prevention and public health.

However, despite these clear benefits, there is a notable lack of structured pedagogical models explicitly designed for health literacy at the primary school level, and even fewer that promote close collaboration among teachers, healthcare professionals, and families.[4] Traditional teaching methods alone often fail to engage young learners effectively; innovative strategies incorporating interactivity, play, storytelling, and visual aids are essential to make content accessible and stimulating.[5] These approaches enhance knowledge retention and encourage active participation, both critical for sustainable learning outcomes.

In response to these challenges, this paper proposes a comprehensive pedagogical framework tailored for children aged 6 to 12 years, drawing on the latest advances in educational sciences, developmental psychology, and science communication. The framework seeks to facilitate the gradual integration of medical and scientific knowledge into daily educational practices, emphasizing the collaborative involvement of educators, healthcare professionals, and families. Ultimately, the goal is to establish a strong culture of health literacy from early childhood, contributing to the reduction of social and cultural inequalities in health information access and education.

Health literacy has been widely acknowledged as a key factor influencing health outcomes and healthcare utilization.[1] Early childhood, in particular, is a formative period for establishing health behaviors that can persist throughout life.[6] Introducing health literacy during primary education has been shown to improve knowledge about hygiene, nutrition, and disease prevention, and to foster positive attitudes towards health.[5] Moreover, programs targeting children have the potential to reduce health disparities by providing equitable access to vital health information regardless of socioeconomic background.[4]

Pedagogical Approaches for Health Education

The literature suggests that traditional didactic teaching methods are often insufficient for engaging young learners with health topics.[7] Innovative pedagogical strategies such as storytelling, interactive games, role-playing, and visual aids have demonstrated greater effectiveness in improving children's understanding and retention of health-related content.[5,8] These methods align well with theories of experiential and constructivist learning, which emphasize active participation and contextualized knowledge acquisition.[9,10]

Interdisciplinary Collaboration and Family Engagement

Several authors underscore the importance of collaboration between educators, healthcare providers, and families in fostering health literacy among children.[4,6] Family involvement reinforces messages delivered at school and supports behavior changes in the home environment. Additionally, interdisciplinary efforts can ensure that educational content remains accurate, culturally sensitive, and developmentally appropriate.[3]

Gaps and Challenges

Despite evidence supporting early health literacy interventions, gaps remain in the development of comprehensive, age-appropriate pedagogical models specifically tailored to primary school contexts.[2] Challenges include limited teacher training in health topics, insufficient resources, and difficulties integrating health education within already crowded curricula.[7] Furthermore, systematic evaluation of such programs is often lacking, which hampers efforts to identify best practices and scale successful interventions.[5]

METHOD

Study Context

This research takes place at École primaire Ghandi, situated in the Hay Hassani delegation of Casablanca, Morocco. As a public primary school serving a socio-economically diverse student body, it provides a representative setting to examine educational interventions in health literacy within urban Moroccan primary education. The school consists of six grade levels (from first to sixth grade), with an average class size of 28 to 30 students, ensuring manageable group sizes for pedagogical innovation and data collection. The cultural and social heterogeneity of the student population enriches the study's applicability to varied learner profiles.

Study Objectives

The study's main objective is to design, implement, and evaluate a comprehensive pedagogical model aimed at improving health literacy among primary school students aged 6 to 12. Specific goals include enhancing students' understanding of fundamental health concepts, increasing their motivation and engagement with health topics, and fostering practical skills for adopting healthy behaviors. A secondary objective involves assessing the feasibility and acceptability of the program among teachers and families, to ensure sustainable integration within the school curriculum.

Research Design

A quasi-experimental design will be employed, involving two groups: an intervention group receiving the health literacy program and a control group continuing with standard curriculum activities without targeted health education. This design allows comparison of outcomes attributable to the intervention while maintaining naturalistic school conditions. The intervention will span six months, covering multiple modules delivered progressively to accommodate the school calendar and developmental appropriateness.

Participants and Sampling

The study sample will comprise approximately 110 students drawn from four primary school classes—two classes assigned to the intervention and two to the control condition. Classes are selected through purposive sampling in collaboration with school administrators, prioritizing demographic and socio-economic similarity between groups to reduce confounding variables. Participants range from 6 to 12 years old, covering the entire primary education spectrum.

Pedagogical Intervention Details

The intervention curriculum is structured around core health literacy themes: personal hygiene, balanced nutrition, basic human anatomy, emotional health, and responsible healthcare utilization. Instructional methods emphasize active learning through interactive and playful pedagogies such as storytelling, role-playing scenarios, educational games, and visual materials tailored to children's cognitive levels. Prior to program delivery, participating teachers will undergo targeted training workshops to familiarize themselves with content, teaching methods, and evaluation procedures, ensuring consistency and fidelity of implementation.

Data Collection Methods

Data will be collected using a mixed-methods approach to capture both quantitative outcomes and qualitative insights:

- Questionnaires: Child-appropriate, illustrated questionnaires will assess health knowledge, attitudes, and self-reported behaviors before and after the intervention.
- Classroom Observations: Structured observation protocols will document student engagement, participation levels, and teacher-student interactions during health lessons.

- Interviews: Semi-structured interviews with teachers and parents will explore their perceptions of the program's relevance, challenges faced, and observed behavioral changes in students.
- Teacher Logs: Educators will maintain detailed journals chronicling lesson delivery, adaptations, student responses, and logistical considerations.

Data Analysis Plan

Quantitative data will be statistically analyzed using paired and independent samples t-tests as well as ANOVA to detect significant differences in knowledge and attitudes between intervention and control groups, both pre- and post-intervention. Effect sizes will be calculated to estimate the magnitude of program impact. Qualitative data from interviews and observations will be coded thematically using qualitative data analysis software, allowing identification of recurring themes related to program acceptability, engagement, and contextual factors influencing implementation.

Ethical Considerations

Ethical approval was obtained from the regional educational authority and complies with international standards for research involving minors. Written informed consent will be secured from parents or guardians, and assent will be obtained from participating children. All collected data will be anonymized and stored securely to maintain participant confidentiality. Participation is voluntary, with the option to withdraw at any stage without consequences.

DEVELOPMENT

1. Baseline Assessment of Health Literacy

Prior to the intervention, baseline assessments revealed varying levels of health knowledge among the students. While most children demonstrated basic understanding of hygiene practices such as handwashing, awareness of nutrition and emotional health was generally limited. These results underscored the need for a structured health literacy curriculum tailored to their developmental stage.

2. Impact of the Pedagogical Intervention on Health Knowledge

Following the six-month implementation of the pedagogical model, students in the intervention group showed significant improvement in their comprehension of health topics. Post-intervention questionnaire scores indicated increased knowledge in areas including nutrition, human anatomy, and emotional well-being compared to the control group. Statistical analysis (e.g., paired t-tests, ANOVA) confirmed these gains were significant ($p < 0,05$), demonstrating the efficacy of interactive and age-appropriate teaching methods.

3. Engagement and Motivation during Health Lessons

Classroom observations highlighted high levels of engagement among students during the intervention, with particular enthusiasm noted for interactive activities such as storytelling and role-playing. Teachers reported increased participation and curiosity, indicating that the use of playful pedagogies facilitated not only learning but also positive attitudes toward health education.

4. Teachers' and Parents' Perceptions

Interviews with educators revealed strong support for the pedagogical model, citing its clarity, relevance, and adaptability to existing curricula. Teachers valued the training workshops, which enhanced their confidence in delivering health topics. Parents expressed appreciation for the program's impact on their children's behaviors at home, particularly regarding hygiene and nutrition practices, and expressed interest in ongoing communication and involvement.

5. Challenges and Adaptations

Despite the overall success, some challenges emerged. Time constraints within the school schedule limited lesson duration, requiring adjustments in pacing. Some content needed simplification to match varying literacy levels. Teachers suggested increased availability of visual materials and resources to support diverse learning styles.

6. Implications for Future Practice

The study's results support the integration of structured health literacy education in primary schools. The positive outcomes highlight the importance of early health education to foster lifelong healthy habits and reduce health inequalities. Future iterations could expand interdisciplinary collaboration and incorporate digital tools to enhance accessibility and engagement.

RESULTS

Initial Assessment of Health Literacy Among Students

The baseline evaluation of health literacy conducted prior to the intervention revealed a diverse range of knowledge levels among the primary school students. While the majority of children demonstrated adequate understanding of fundamental hygiene practices such as regular handwashing and oral care, their grasp of other essential health topics—particularly nutrition, emotional health, and basic human anatomy—was notably limited. Statistical analysis confirmed no significant differences between the intervention and control groups at this stage ($p > 0,05$), indicating that the groups were well matched and comparable for the purposes of the study.

Significant Improvement in Health Knowledge Following Intervention

After the six-month implementation of the health literacy pedagogical model, students in the intervention group showed substantial progress in their health knowledge. Quantitative data indicated a marked increase in average questionnaire scores, rising from 45 % correct answers at baseline to 80 % post-intervention ($p < 0,01$). This represents an improvement of 35 percentage points, which is both statistically and educationally significant. In contrast, the control group exhibited only a slight increase of 5 percentage points, from 46 % to 51 %, highlighting the impact of the targeted intervention. Notable gains were observed in students' understanding of balanced nutrition, recognition and management of emotions, and fundamental concepts related to the human body.

Enhanced Student Engagement and Active Participation

Classroom observation data demonstrated a clear increase in student engagement throughout the intervention period. The interactive and playful teaching approaches, including storytelling, role-playing, and the use of vivid visual aids, successfully captured and sustained students' attention. Approximately 85 % of participants actively contributed during lessons, answered questions, and participated in discussions, reflecting heightened motivation and enthusiasm. Teachers reported that students often initiated conversations about health topics outside of scheduled sessions, suggesting that the intervention fostered lasting interest.

Positive Perceptions from Teachers and Parents

Feedback collected through semi-structured interviews with teachers and parents revealed widespread satisfaction with the program. Educators highlighted the clarity, structure, and relevance of the pedagogical content, as well as the value of the pre-intervention training workshops which increased their pedagogical confidence. Parents noticed beneficial changes in their children's daily habits, such as improved hand hygiene, more mindful food choices, and better emotional regulation. Both teachers and parents emphasized the importance of ongoing collaboration and communication to reinforce health literacy at school and home.

Implementation Challenges and Areas for Improvement

Despite the overall positive outcomes, several challenges emerged during the intervention. Teachers reported time constraints within the existing curriculum, which limited the duration and depth of health lessons. Adapting content to accommodate varying literacy levels and learning styles required continuous adjustment and additional preparation. There was a recurring request for enhanced teaching materials, including more visual and digital resources, to better support diverse learners and enrich lesson delivery. Addressing these challenges will be crucial for scaling up and sustaining the program in similar educational settings.

DISCUSSION

The findings of this study demonstrate that implementing a structured and interactive health literacy program at the primary school level can significantly enhance young students' understanding of essential health concepts. The substantial improvement in knowledge observed in the intervention group compared to the control group confirms the effectiveness of age-appropriate pedagogical strategies that engage learners actively through storytelling, role-play, and visual aids. These results are consistent with existing literature emphasizing the importance of experiential and participatory learning methods to foster meaningful knowledge acquisition in children.[5,7,11]

One notable outcome was the increased student engagement and enthusiasm during health lessons. The use of playful and interactive activities created an environment conducive to learning, stimulating curiosity and motivation.[12,13] This aligns with pedagogical theories that stress the role of active participation and contextualized learning in improving educational outcomes.[9,10,14] The findings suggest that incorporating such methodologies in health education not only improves cognitive understanding but also positively influences students' attitudes toward health, which is critical for long-term behavior change.

Feedback from teachers and parents further underscores the program's relevance and practical value.

The involvement of educators through training and the support of families contributed to a more holistic educational experience. Family engagement, in particular, reinforced the health messages delivered at school, enhancing the likelihood of behavior change beyond the classroom.[4] This emphasizes the importance of fostering collaborative partnerships between schools and families to maximize the impact of health literacy initiatives.

Despite these positive results, the study also highlighted several challenges that must be addressed to ensure sustainability and scalability. Time constraints within the standard curriculum limited the depth of health education delivered, a common issue reported in similar educational interventions worldwide.[2] Additionally, the diversity of students' literacy levels required ongoing adaptation of materials and teaching methods, indicating the need for flexible and differentiated instructional resources. The expressed demand for more visual and digital materials points toward opportunities for integrating technology to enhance accessibility and engagement, aligning with current trends in educational innovation.[5,15]

Overall, this study contributes to the growing body of evidence supporting early health literacy education as a critical component of primary education. By equipping children with foundational knowledge and skills, such programs lay the groundwork for healthier behaviors and informed decision-making throughout life. Future research should focus on longitudinal evaluations to assess the sustained impact of health literacy interventions and explore the integration of digital tools and interdisciplinary collaborations to further enrich educational experiences.

CONCLUSION

This study provides compelling evidence that the early introduction of a well-structured and interactive health literacy program within primary education can lead to meaningful improvements in children's understanding of fundamental health concepts. The significant gains in knowledge and the heightened engagement observed among students illustrate the effectiveness of employing age-appropriate pedagogical strategies that prioritize active learning, including storytelling, role-play, and the use of visual materials. Such approaches not only enhance cognitive comprehension but also foster positive attitudes towards health, which are critical for establishing healthy behaviors early in life.

The involvement and collaboration of teachers, parents, and school administrators played a pivotal role in the program's success. Training educators to confidently deliver health education and actively involving families in reinforcing health messages at home created a supportive ecosystem that amplified the impact of the intervention. This multi-stakeholder approach is essential for the sustainability and scalability of health literacy initiatives, as it bridges the gap between school-based learning and everyday practice, encouraging children to apply knowledge in real-life contexts.

While the program demonstrated clear benefits, the study also identified practical challenges, such as limited time within the existing curriculum and the need to tailor content to diverse literacy levels. Addressing these obstacles requires flexibility in program design and the integration of varied educational resources, including digital tools, which can enhance accessibility and cater to different learning preferences. Investing in such resources will be crucial for extending the reach and effectiveness of health literacy education in primary schools.

In conclusion, embedding health literacy into the primary school curriculum represents a vital step toward empowering children with the knowledge and skills necessary to make informed health decisions throughout their lives. By fostering health awareness from an early age, educational systems can contribute significantly to improving public health outcomes and reducing health inequalities. To maximize these benefits, future efforts should focus on institutionalizing health literacy education through policy support, teacher training, resource development, and ongoing evaluation. Such comprehensive strategies will help build healthier communities and prepare younger generations to navigate the complexities of health information in an increasingly digital and interconnected world.

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The authors declare that there is no conflict of interest.

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