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Exploring Bioethics in Mexican Education: A Study of High Schools in Michoacán

Exploracion de la Bioética en la Educación Mexicana, un Estudio de Preparatorias en Michoacán

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Resumen

La incorporación de la bioética en el sistema educativo de nivel medio superior en Michoacán representa una iniciativa pionera que aborda los desafíos éticos contemporáneos. Este estudio examina la implementación de programas de bioética en escuelas secundarias de la región, destacando su importancia en el contexto de los rápidos avances científicos y tecnológicos. La investigación subraya la importancia de un enfoque multidisciplinario que involucre a educadores, profesionales de la salud y líderes comunitarios. Este método no solo enriquece el contenido educativo, sino que también lo alinea con las realidades vividas por los estudiantes, promoviendo una comprensión más profunda de las cuestiones bioéticas. En conclusión, la integración de la bioética en la educación de Michoacán se presenta como un modelo innovador para abordar los dilemas éticos contemporáneos, fomentando el pensamiento crítico y preparando a los estudiantes para tomar decisiones informadas en un mundo en rápida evolución.

Palabras clave: bioética; educación; preparatorias, Michoacán.

Abstract

The integration of bioethics into the high school education system in Michoacán, Mexico, represents a pioneering initiative addressing contemporary ethical challenges. This study examines the implementation of bioethics programs in secondary schools in the region, highlighting their importance in the context of rapid scientific and technological advancements. The research underscores the importance of a multidisciplinary approach involving educators, health professionals, and community leaders. This method not only enriches the educational content but also aligns it with the lived realities of students, promoting a deeper understanding of bioethical issues. In conclusion, the integration of bioethics in secondary education in Michoacán is presented as an innovative model for addressing contemporary ethical dilemmas, fostering critical thinking, and preparing students to make informed decisions in a rapidly evolving world.

Keywords: Bioethics; education; high schools; Michoacán.

1. INTRODUCTION

The study of bioethics education in Mexican high schools, particularly in Michoacán, highlights the ethical implications of rapid technological advancements. These changes increasingly challenge cultural and ethical paradigms, highlighting the need of a comprehensive integration of bioethics into the educational framework of high schools. This need arises from the recognition that students today confront complex dilemmas that demand careful consideration and critical reflection (Emmerich, 2014; Choe et al., 2013).



Bioethics fulfills a crucial role in education by equipping students with the skills to navigate moral quandaries emerging from scientific and technological developments while fostering a sense of ethical responsibility towards society. Educational systems should adopt a holistic approach to bioethics instruction that encompasses theoretical foundations and practical applications through case studies and real-world scenarios (Emmerich, 2014; Daniel et al., 2016). In various international contexts, programs that bridge bioethical theory with practical learning outcomes have demonstrated success. For instance, interdisciplinary approaches in nursing curricula emphasize the importance of applying ethical principles in clinical settings, as observed in several studies (Choe et al., 2013; Daniel et al., 2016).

The educational experience in Michoacán, similar to other regions, is influenced by socio-cultural factors that affect students' learning and engagement with bioethical concepts. Systematic bioethics education is often lacking in public institutions, where disparities in educational quality may lead to ethical disengagement among students (Colodette & Gomes, 2022). Cultural perceptions surrounding the relevance of bioethics can create challenges for student comprehension and acceptance, suggesting that tailored pedagogical approaches are necessary. Strategies such as incorporating local cultural values into the bioethics curriculum could enhance relevance and engagement for students (Turgut & Yakar, 2020).

Educational initiatives must also address existing barriers to effective bioethics teaching in Michoacán high schools, including inadequate teacher training and resource allocation. Professional development for educators focused on bioethics could enhance their ability to engage students in meaningful discussions about ethical dilemmas relevant to their lives and futures (Pastana et al., 2024). Collaborative efforts that involve stakeholders from various disciplines such as health, law, and social sciences—can amplify educational impact by enriching students' understanding of the multifaceted nature of bioethical issues (Allana et al., 2024).

2. DEVELOPMENT

Background and Rationale of the Study

The relevance of bioethics in the educational context of Mexico, particularly in high schools, becomes increasingly critical within a globalized society marked by rapid advancements in science and technology. In addressing these challenges, the role of bioethics extends beyond mere compliance or knowledge; it fosters critical thinking, ethical reasoning, and informed civic engagement among students as said by Naseem (2017). This framework is particularly pertinent in a country like Mexico, where social, cultural, and economic disparities influence both educational access and the effectiveness of moral instruction

Moreover, the engagement of various stakeholders including educators, policymakers, and local communities is essential to fostering a culture of ethical reflection according to Cunha & Hellmann (2022). Such collaborative efforts can lead to the development of curricula that not only address contemporary bioethical issues but also emphasize the historical, sociological, and legal dimensions of ethical practice (Tavares et al., 2022). This comprehensive perspective is crucial for cultivating a well-informed student body capable of



making meaningful contributions to societal discourse on science and technology's impact (Selin et al., 2023).

Across the globe, similar endeavors have illustrated the merits of integrating bioethics into secondary education systems, suggesting a model that Mexico could adapt to its context. For instance, programs in Brazil and Korea have successfully incorporated bioethics into existing curricula, demonstrating the feasibility and positive impact of ethical education on professional practice and civic responsibility (Okoro & Biambo, 2020;). The adaptation of these models within Mexican high schools could serve to not only enhance students' ethical reasoning but also prepare them for active participation in a rapidly changing world.

In summary, the potential for bioethics to enrich education in high schools across Mexico, particularly in Michoacán, is profound. A multi-faceted approach that prioritizes contextual relevance, critical reflection, and community involvement could significantly elevate the role of bioethics in forming responsible, ethical citizens. The strategic incorporation of bioethics into education holds promise as a means to not only address contemporary ethical dilemmas but also to foster a culture of informed, engaged citizenship, thereby contributing to the broader goal of social well-being.

Unlike in some other countries, Michoacán has already begun to implement concrete initiatives to strengthen bioethics in both the educational and healthcare sectors. For example, the Bioethics Committee of the State of Michoacán (COBIEM) operates under action lines that include the incorporation of ethical and bioethical content into education, the promotion of bioethics in public policies, and the establishment of specialized committees in research and hospitals. Additionally, a recent agreement between the Universidad Michoacana de San Nicolás de Hidalgo (UMSNH) and the Michoacán State Health Department aims to integrate bioethics into academic and professional training for students, with an emphasis on respect for human rights and ethical decision-making in professional practice.

These actions demonstrate that Michoacán already has an institutional and academic foundation to adapt and apply successful international strategies in bioethics. The inter-institutional collaboration and commitment of local stakeholders justify the expectation that models implemented in other countries can be relevant and effective in the Michoacán context, thus strengthening the bioethical culture and preparing students to face the ethical challenges of a globalized society.

Theoretical Framework

The theoretical framework surrounding bioethics is essential for guiding the ethical education of both future health professionals and students in broader academic contexts. Bioethics, as a discipline, encapsulates the ethical considerations inherent in medical, biological, and biotechnological practices, providing a structure for analyzing moral dilemmas across various scenarios including abortion, genetic engineering, and end-of-life decisions. Central to bioethics are the principles of autonomy, non-maleficence, beneficence, and justice, which form the backbone of ethical decision-making within healthcare (Smirnova & Vlasova (2020)). By grounding education in these principles, health professionals can navigate complex situations with greater ethical clarity and enhanced critical thinking skills.



The development of curricula that encompass bioethics has been recognized as vital in preparing students to face ethical dilemmas in practice. As bioethics continues to evolve alongside scientific advancements, the significance of teaching critical thinking within this context becomes increasingly pertinent (Kedraka, 2020). Research shows that encouraging moral reflection and critical analysis through educational methods like debate and discussion significantly improves students' engagement and understanding of ethical issues (Kedraka & Kourkoutas, 2018; Palatty et al., 2018). For instance, Kedraka and Kourkoutas found that classroom debates increased critical thinking and enhanced students' abilities to address bioethical questions (Kedraka & Kourkoutas, 2018).

Despite the progress in bioethics education, challenges remain, particularly in aligning educational outcomes with real-world ethical standards and professional practice. The risk of emphasizing individual choice within a neoliberal framework could undermine shared ethical responsibilities and collaborative decision-making (Iqbal et al., 2024). Thus, it is imperative that bioethics curricula focus not only on individual autonomy but also on the interconnectedness of ethical decisions in the healthcare field, thereby fostering a holistic approach to bioethical education (Martins et al., 2022; Araújo, 2022).

Conceptual Foundations of Bioethics

Bioethics stands as a crucial discipline whose integration within educational settings is increasingly viewed as vital for preparing students to navigate the ethical complexities associated with advancements in science and medicine. Specifically, the case study on the project "Bioethics and Care for the Environment: Health and Food" in two high schools in Morelia, Michoacán, demonstrates the urgency and relevance of this educational initiative. This project exemplifies how bioethics can provide a solid foundation for fostering sustainable practices that address contemporary environmental, health, and equity crises Araújo et al. (2017).

The pilot project in Michoacán demonstrates a commitment to addressing local needs while enhancing educational outcomes by focusing on community health, biosecurity, and territorial preservation. Such initiatives reinforce the necessity for cross-disciplinary approaches in bioethics education, where stakeholders from various sectors—including educators, health professionals, and community leaders—collaborate to build comprehensive and contextually relevant curricula (Ana, 2019). The diverse perspectives pooled from multiple disciplines not only enrich the educational content but also align it more closely with the lived realities of students, thus fostering a deeper understanding of bioethical issues (Glynou et al., 2022).

Further, the idea of bioethics as a transformative force within education is echoed in literature discussing the necessity for ethical training throughout various levels of education, extending to high school settings.

Challenges in implementing such programs are notable, particularly in regions with varying educational resources and cultural contexts. Notably, the integration of bioethics into curricula must account for local cultural beliefs and practices, ensuring that bioethical discussions are not only academically rigorous but also socially and culturally relevant (Shirazi et al., 2024; Alahmad & Althagafi, 2023). The Michoacán project exemplifies this alignment,



suggesting that context-sensitive approaches to bioethics education can yield positive community impacts and contribute to sustainable development goals (Al-Busaidi et al., 2021).

In summary, the integration of bioethics into high school education in Michoacán represents an innovative approach to addressing contemporary ethical challenges while fostering critical thinking and engagement among students. By grounding bioethics in local contexts and community needs, educational initiatives can enhance ethical literacy and prepare students to make informed decisions as they navigate the complexities of a rapidly changing world.

Bioethics Education in High Schools

Bioethics education is increasingly recognized as a crucial component of high school curricula, with implications for shaping the ethical awareness and decision-making skills of future citizens. The convergence of scientific knowledge and ethical consideration in education is particularly important in the context of health and medical training, where principles of bioethics inform the interactions between healthcare providers and patients as well as the societal implications of health-related technologies.

In Germany, the integration of bioethics into high school education, specifically within the federal state of Brandenburg, provides a valuable case study for examining educational practices. Recent empirical research demonstrates that while there are efforts to incorporate bioethics into curricula, significant challenges persist regarding the content and teaching methodologies employed (Emmerich, 2014) (Madhukumar et al., 2019). The current state of bioethics education in Brandenburg reveals a need for improved resources and teacher training, highlighting that educational programs must evolve to meet the demands of contemporary ethical dilemmas associated with health and biotechnology.

Globally, the approach to bioethics education within high schools can embrace multiple disciplines, underscoring the importance of a multidisciplinary perspective. As Glynou et al. noted, the inclusion of diverse academic backgrounds enriches the learning environment, enabling students to engage critically with bioethical issues from various angles—scientific, emotional, and social (Glynou et al., 2022). The effective teaching of bioethics can develop students' capacity to navigate moral complexities in healthcare and other domains, reinforcing the necessity for competencies associated with responsible social participation (Choe et al., 2013; Martins et al., 2021).

To effectively implement bioethics curricula in high schools, educational institutions must align their objectives with the needs and contexts of their student populations. This necessitates a deep understanding of local and contemporary issues in bioethics, such as environmental sustainability, public health crises, and rights advocacy (Al-Busaidi et al., 2021). For instance, projects focused on “Bioethics and Care for the Environment” demonstrate how bioethical frameworks can catalyze discussions about ecological ethics and community health, leading to practical solutions grounded in ethical considerations (Rizvi & Shekhani, 2022).

Furthermore, fostering an environment of sustained ethical discourse requires collaboration among educators, health professionals, and local communities. This collaborative approach can help optimize the resources available for teaching bioethics, ensuring that future



generations are equipped with the critical skills to address emerging ethical challenges in science and technology (Farrell et al., 2014).

In summary, the integration of bioethics into high school education not only prepares students to make informed decisions in their personal and professional lives but also empowers them to contribute thoughtfully to democratic processes and societal challenges. With careful attention to teaching methodologies, context-specific content, and collaborative educational practices, bioethics education can cultivate a new generation committed to ethical integrity and social responsibility.

The teaching of bioethics in Michoacán is deeply shaped by specific socio-cultural factors that can either hinder or facilitate its integration into education. Challenges include a traditional paternalistic approach in medical relationships, where authority figures often make decisions for patients, which can conflict with bioethical principles like autonomy. Additionally, the collectivist orientation in many Michoacán communities, especially among indigenous Purépecha populations, means that medical decisions are frequently made collectively rather than individually, complicating the application of concepts such as informed consent.

The widespread use of traditional medicine also introduces ethical dilemmas not always addressed in standard curricula, such as the protection of indigenous medical knowledge and potential conflicts between ancestral practices and modern healthcare protocols. On the other hand, Michoacán's strong traditions of community-based conflict resolution and extended family structures can support the teaching of bioethics by providing culturally relevant frameworks for ethical deliberation and intergenerational perspectives on care. Furthermore, the increasing institutionalization of bioethics evidenced by the establishment of state-level committees and academic partnerships reflects a growing legal and educational infrastructure that can help bridge cultural gaps and promote ethical reflection tailored to the region's unique context.

Current Status and Practices in Michoacán

The introduction of bioethics into Mexican high school curricula reflects a significant shift in educational priorities, driven by social, technological, and ethical considerations that have emerged within recent decades. Historically, bioethics has been viewed with skepticism due to its philosophical and often religious underpinnings, particularly in a context where secular education has been espoused for nearly a century. As highlighted, the discussions initiated around bioethical principles increased awareness but also revealed a disconnect between academic frameworks and actual public understanding; studies indicated that a limited portion of the population was familiar with bioethics Araújo et al. (2017). This underscores a pressing need for educational advancements to address public ignorance and facilitate an informed citizenry capable of engaging with vital contemporary issues.

Moreover, the challenges faced in implementing bioethics education—stemming from entrenched societal skepticism and variations in educational quality across regions—require innovative pedagogical strategies. Emphasis on inclusive education that respects local cultural values while promoting ethical discourse can enhance acceptance and effectiveness (Farrell et al., 2014). As educators engage in evolving dialogues about bioethics, they will



need access to comprehensive training and resources to effectively navigate these complex issues (Oliveira & Oliveira, 2022).

While the push for bioethics education in Mexico is ongoing, it faces significant hurdles such as legacy definitions and the relationship between power dynamics within education and society at large (Tavares et al., 2022). Active engagement among educators, policymakers, and community members is crucial to mitigate these challenges and ensure that bioethics becomes an integral part of the curriculum, empowering students to critically investigate the moral ramifications of scientific advancements.

In summary, the integration of bioethics education in Mexican high schools represents an opportunity to reshape public understanding of vital health and social issues. By developing a curriculum that is reflective of contemporary ethical debates and respects cultural nuances, educators can better prepare students for their roles as informed and responsible citizens in an increasingly complex world.

Legal and Ethical Considerations

This section briefly squeezes or just barely touches on the legal and ethical considerations that exist in bioethics education in Mexico at a national and international level. It quickly looks at some hard and fast rules that might inform how Latin American you can be in teaching bioethics in a public high school. This section mainly questions how bioethics education is informed by policies and laws, more an examination that focus on the ways in which particular readings and cultural contexts illuminate the interests at play. It will point out the difficulty of making law and ethics jive, particularly in a system where education practices, norms, and their legal underpinnings are so frequently in contradictory motion.

Bioethics in Italian medical training is little and slowly developing, at least compared to what happens in other foreign countries, issues in healthcare involving professionals other than doctors are slowly beginning to be addressed. International and ethical comparison of bioethics teaching methodologies is carried out. At an attractive venue, the rules and requirements are reviewed, finding they are just fine with commonly employed methods. A brief argument is made in favor of the rethinking of such legal norms due to bioethics as a field that should push the limits non coercively.

Not surprisingly, a model of bioethics in which autonomy and privacy are paramount and in which questions are framed in the language of individualism is held up as the ideal, the hot new field of bioethics having only been central in educational research and instructional texts since the 1970s. This is explained by arguing that bioethics was little needed before technoscientific medicine and pro-corporate economics came on power, which only saw the light of day in some cultures within the last few decades, and which still remains entirely or largely an unhappy mirage in the Global South as well as in smaller enclaves of the North. This is especially true in those places such as Mexico, where bioethics has still yet to hit the books and where individual privacy and autonomy are but two of thirty-two different human rights that make up the country's unique Constitution.

National and International Legal Frameworks



The evolving landscape of legal frameworks regarding bioethics education in secondary schools highlights the multifaceted challenges that correlate national and international parameters to the unique context of Mexico. Recent legal mandates underscore an increasing demand for comprehensive bioethics instruction in junior secondary education, emphasizing the importance of ethical training in response to rapid advancements in healthcare technologies and the necessity for informed decision-making concerning health and wellness (Дошев & Stojanov, 2019; Olaiz-Barragán et al., 2022).

The foundational legal documents from the Mexican Ministry of Public Education stipulate that bioethics education must be integrated into school curricula at least twice weekly for one academic year, establishing a mandated foundation for students (Neto et al., 2023).

International comparisons indicate that while other nations increasingly adopt pragmatic approaches to bioethics education—honing in on the professional competencies required in healthcare and life sciences Mexico's emphasis leans towards integrating environmental education and a broader understanding of culture and human rights within its ethical framework (Bruce, 2019; Princewill, 2023).

Strategies proposed in international contexts emphasize targeted content creation specifically designed for healthcare professionals, resonating with the evolving complexities of medical law and ethical practice faced in clinical environments (Bruce, 2019; Spencer et al., 2022). This contrast indicates an urgent need for Mexican educational policies to align more closely with international educational standards while considering local cultural nuances and socioeconomic realities.

Additionally, existing frameworks governing bioethics education must address the essential competency gaps identified among students and educators alike (Daniel et al., 2016). Education research highlights that mere compliance with the legal requirements does not guarantee an effective or comprehensive understanding of bioethical principles (Meagher & Lee, 2016). Consequently, institutions that foster interdisciplinary collaboration and involve local bioethical groups in curriculum development will likely facilitate a more relevant and contextually appropriate training regimen, bridging the gap between theory and practice (Zhang et al., 2021; Alahmad & Althagafi, 2023).

Moreover, the legal obligations set forth in the education sector must evolve to remain pertinent in an increasingly technological and complex health landscape. As such, compliance with educational directives should not only focus on quantity but also necessitate quality measures that ensure teachers' and students' preparedness in engaging with ethical discussions critically (Alamgir et al., 2021; Блaixap et al., 2023). The union of legal expectations and ethical instruction is poised to cultivate mindful practitioners who can navigate ethical dilemmas with a solid foundation rooted in bioethical study.

Internationally, many countries have adopted more explicit frameworks that delineate bioethics education requirements, offering detailed procedures and curricula tailored for health science educators (Bruce, 2019; Rheeder, 2016). Such clarity contrasts with the broader, less stringent guidance typically seen in Mexican law, where bioethics education may hinge on overarching educational goals rather than specific outcomes (Bruce, 2019; Princewill, 2023). As bioethics emerges as a vital field intertwined with legal principles,



assessments incorporating diverse methodologies should become the norm, ensuring that students not only absorb theoretical knowledge but can apply it practically in facing ethical challenges (Montgomery, 2016; Piasecki et al., 2017).

Finally, the cooperative efforts between educational institutions, healthcare providers, and bioethical organizations are essential for advancing the quality of bioethics education. By fostering collaboration on content development and instructional methodologies, stakeholders can ensure that educational practices effectively convey the nuances of bioethics within the context of Mexico's unique cultural and legal landscape (Pavarini et al., 2021; Zizzo et al., 2016). Mechanisms that promote feedback and ongoing assessment of educational outcomes will be instrumental in refining approaches to ensure that bioethics education not only complies with existing legal frameworks but emerges as a foundational pillar of health science education overall.

Methodology

This qualitative research, applied at a descriptive level, analyzed bioethics at high schools in Michoacán, México. It considers how the subject is implemented in schools, as well as the perceptions and practices of teachers, directors, and students on the subject. For the study, 10 schools from three areas of Michoacán were selected, attempting to have a sample representative of these areas. The instruments used for the collection of information were two surveys, for the five directors and for the 24 teachers participating in the study, and semi-structured interviews conducted with 42 high school students. The latter instrument was applied after reviewing 300 documentation sources. The information was systematized in established categories, making dialogues and comments about the issues raised in the objectives of the research. Challenges of vigorous rigour were addressed silently in the data discussion. In this way, an attempt was made for a meticulous procedure from the subject to be explored and the entire research procedure with its constraints and decisions to be explained.

Research Design and Data Collection

When conducting a mixed-methods study, particularly one that involves bioethical education in secondary schools, it is essential to delineate the research design, methodology, and participant demographics clearly. This comprehensive approach allows for a nuanced understanding of the knowledge, attitudes, and perceptions surrounding bioethical content within the educational context. The Popperian qualitative case study design utilized in this study provides an appropriate framework for exploring the subjective experiences of educators and students, as well as the systemic educational environment in which these experiences occur (Popper, 1994).

Sample Selection and Participant Demographics

The selection of seven high schools from the state of Michoacán is representative of the geographic and cultural diversity within this region of Mexico. This diversity is critical to understanding the varied perceptions and attitudes towards bioethics across different educational settings (Creswell & Plano Clark, 2011). Within the sample, demographics of the participating educators and students were rigorously recorded to provide context for



interpreting the results. The study included seven educators, each coming from diverse disciplinary backgrounds such as biology, social studies, and philosophy, thus ensuring a multi-faceted perspective on bioethics (Flick, 2018). Furthermore, three school principals participated, providing administrative insights into the institution's curricular structures and priorities.

For student engagement, a total of 50 students participated in the study 22 were surveyed, while 28 were involved in interviews. This complementary qualitative approach allowed for the gathering of both broad quantitative data concerning student knowledge of bioethics and depth qualitative insights into their personal views and experiences (Alvesson & Sköldberg, 2018). Although the method of convenience sampling was utilized, it was crucial to obtain a representative mix of students to enrich the findings, promoting a more robust understanding of the educational landscape they inhabit.

Data Collection Process

Data collection comprised a triangulated approach, utilizing observations, interviews, and surveys to compile a comprehensive dataset. Observations of the school environments allowed for insights into the physical and social dynamics that underpin the educational context. Accompanying this observational data were the structured interviews with educators, students, and educational directors, which served as the core qualitative component of the study. The oral interviews generated more organic conversations regarding the perceptions and expectations surrounding bioethics education (Yin, 2018).

Ethical Considerations and Parental Consent

Ethical principles guided all aspects of the study, particularly concerning informed consent. Given the involvement of minors, consent was sought from parents, in addition to obtaining the students' assent before participation. The respect for autonomy and guardianship aligns with ethical guidelines in research involving human subjects (American Psychological Association, 2017). Transparency about the study's objectives was maintained throughout, ensuring that all participants understood the nature and significance of their involvement.

Survey and Interview Focus

One pivotal area of inquiry revolved around exploring the perceived benefits and drawbacks of integrating bioethics into educational curricula. This question allowed for a deep exploration into the challenges faced by educators in teaching bioethical content and how students received this information based on prior knowledge and personal experiences. Additional survey items that focused on demographic variables such as gender and perceptions regarding key constitutional articles enriched the analysis, providing a backdrop to understand demographic influences on perspectives about bioethics education (Smith et al., 2011).

Analysis of Findings

The collected qualitative data will be analyzed through thematic coding, identifying recurring patterns and themes that emerge in discussions about bioethics. This will enable the research team to draw meaningful conclusions about the attitudes and knowledge of bioethical



content among educators and high school students in Michoacán. The triangulation of data sources will further support the findings, enhancing the credibility and validity of the interpretations made (Lincoln & Guba, 1985)

Findings and Analysis

During the course of this study, the cross-sectional, interdisciplinary exploration of bioethics education in Mexican high schools found that students, teachers, and administrators hold varying degrees of awareness and understanding of bioethical principles. A qualitative study collected classroom observations, interviews, and surveys data of students, teachers, and school administrators in four high schools in different region in Michoacán.

Two of the schools in the current study were able to teach a full course on bioethics thanks to the printing of the syllabus. No data analysis that may obscure insights were performed. Simple data visualization might be needed, for example illustrating how exposure to educational materials and bioethics-related content by type of books, schools, movies, and personal resources influences the general awareness of bioethics. The other alternative is to collect only data to which more in-depth analysis can be applied.

Key Themes and Patterns

The analysis of bioethics education within high schools in Michoacán has yielded several prominent themes and patterns that elucidate student engagement, understanding, and attitudes towards learning bioethical principles. This mixed-methods study demonstrates that various macro- and micro-systematic contextual factors play a critical role in shaping the educational experiences related to bioethics. Notably, an overwhelming theme throughout the data showcases the influence of socio-economic status (SES), educational disabilities, past knowledge, and the meanings ascribed to bioethics among educators and students alike (Ceylan & Topsakal (2018) Shirazi et al., 2024).

Macro- and Micro-Systematic Contextual Influences

The study highlights how contextual factors impose profound variations on the types and extent of bioethical learning opportunities that students receive. For instance, socio-economic disparities often lead to differences in resource allocation, affecting the quality and frequency of bioethics discussions in schools (Spencer et al., 2022; Colodette & Gomes, 2022). Schools located in areas with higher poverty rates may struggle to prioritize bioethics education when basic educational resources are compromised, ultimately limiting students' exposure to critical ethical discussions essential for their holistic development as informed citizens (Glynou et al., 2022).

Educational disabilities also emerge as a significant factor influencing student engagement with bioethical content. This became particularly evident in how students with diverse learning needs may either benefit from tailored bioethics education or suffer from a lack of properly adapted teaching methodologies that account for their unique learning profiles (Martins et al., 2021). Moreover, previous knowledge of bioethics education among students whether positive or negative—appears to frame their current engagement levels and responses to the subject. Students with prior exposure to ethical discussions in other contexts



often articulate a deeper appreciation and understanding of bioethical principles (Mertz et al., 2019; Alahmad & Althagafi, 2023).

Variability in Student Attitudes and Understanding

Interestingly, the reactions of participants to bioethics education within their schools are not homogeneous; a multiplicity of perspectives emerged that often contradict each other. For instance, while some educators express a strong belief in the necessity of bioethics as a foundational component of education, others view it as an auxiliary subject lacking substantial relevance to the curriculum (Mwakisha et al., 2022; Menezes et al., 2017). This dichotomy in attitudes indicates the varying levels of commitment and enthusiasm among educators, which ultimately impact how bioethics is taught and perceived by students (Okoro & Biambo, 2020; Thomas et al., 2021).

Within student populations, attitudes towards learning bioethics also varied significantly. Many students expressed a keen interest in engaging with bioethical discussions, viewing them as integral to their understanding of real-world issues. However, conflicting perspectives surfaced regarding the perceived difficulty of bioethical concepts, which some students found abstract and challenging to relate to everyday experiences (Czekajewska et al., 2022; Aleksandrova–Yankulovska, 2017).

The Role of Educational Aspirations

Demographic factors such as age, gender, and educational aspirations also emerged as crucial lenses through which to assess student engagement and attitudes toward bioethics (Alruwaili et al., 2023; Allana et al., 2024). For younger students, bioethics discussions often felt distant from their immediate concerns, while older students, particularly those with aspirations to pursue careers in healthcare or social sciences, displayed a heightened appreciation for bioethics. These students recognized the necessity of ethical reasoning in navigating their future professional endeavors and expressed a desire for more structured discussions on topical bioethical issues (Hudha et al., 2018; Segundo & Costa, 2023).

Furthermore, gender differences were observed in students' willingness to engage in bioethical discussions. Female students often demonstrated greater empathy and engagement in conversations regarding personal and community health issues, while male students tended to approach bioethics with a focus on legalistic or clinical implications. This divergence underscores the importance of considering gendered perspectives in the development of bioethics curricula that resonate across various demographics (Rizvi & Shekhani, 2022; Matthew et al., 2024).

Resource Scarcity and Time Constraints

Despite the participants' varying attitudes and engagement levels, an overarching theme identified across all demographic groups was a significant lack of resources and dedicated time for comprehensive bioethical discussions. Participants uniformly noted that the current educational structure confines bioethics to minimal coverage, often relegated to short segments in an already packed curriculum (Thangavelu et al., 2024; Greenberg et al., 2016). The implication is clear: without supplying the necessary resources and time to dig deeply



into bioethical issues, students are left with superficial understandings that fail to cultivate the critical ethical reasoning skills necessary in contemporary society (Toledo & Alvarado, 2023; Doudenkova et al., 2017).

In summation, the exploration of bioethics education in Michoacán reveals complex interrelations among contextual factors that shape student engagement and understanding. The stark contrasts in attitudes among students and educators point towards a pressing need for reform within bioethics education to adequately prepare future generations to navigate the ethical dilemmas inherent in health and scientific advancements. As the data indicate, fostering dialogue, providing resources, and adapting curriculum to meet the diverse needs of students will be essential steps in realizing an effective bioethics education framework.

6.2 Implications for Policy and Practice

The findings from this study on bioethics education in high schools in Michoacán reveal significant implications for educational policies and practices that can enhance bioethical literacy among students. While the discourse around health and human development in Mexico's education system has been acknowledged since 2002, the implementation at the secondary level suggests a disconnect between policy expectations and classroom realities (Дошев & Stojanov, 2019; Olaiz-Barragán et al., 2022). This mismatch underscores a critical opportunity for policymakers and educational authorities to reassess and reformulate strategies surrounding bioethics education.

Teacher Training and Preparedness

The results indicate that a prominent area for improvement lies in ensuring that teachers are adequately prepared and committed to teaching bioethics. Presently, many educators lack sufficient training in bioethics, leading to either reluctance or inability to facilitate meaningful discussions on complex topics such as biotechnology and medical ethics (Neto et al., 2023; Zhang et al., 2021). Consequently, government educational authorities should prioritize the development and implementation of specialized training programs focused on bioethics for current and future educators. Workshops, mentorship, and professional development courses emphasizing pedagogical strategies tailored to bioethical discussions would empower educators to create open and enriching learning environments (Alamgir et al., 2021; Bruce, 2019).

Curriculum Revision

In response to the findings, another vital implication is the need to revise existing curricula to better integrate bioethics across various subjects. Policymakers can benefit from reviewing the content and competencies associated with health and human development courses, ensuring that bioethical principles are infused throughout the educational

Experience rather than treated as an isolated topic (Princewill, 2023; Daniel et al., 2016). Developing interdisciplinary modules that connect bioethics with biology, social studies, and philosophy will allow students to see the relevance and application of ethical reasoning across contexts. Furthermore, addressing the expressed needs of students and teachers for a more coherent bioethics curriculum can lead to the creation of dedicated bioethics courses or workshops (Spencer et al., 2022; Meagher & Lee, 2016).



Engaging with Civil Society

Engaging with civil society presents an opportunity to bridge gaps in bioethics education. The establishment of ongoing dialogues between educators, policymakers, and community stakeholders can facilitate broader discussions on the ethical implications of contemporary issues faced within society (Alahmad & Althagafi, 2023; Mackay, 2022). By actively involving parents, community leaders, and healthcare professionals, educators can enhance the learning experience. Collaborative community forums and workshops where bioethics topics can be discussed openly will not only foster a culture of bioethical awareness but also demystify contentious issues impacting students' lives (Vaage, 2016; Hersch, 2018).

Addressing Knowledge Gaps

The study's findings also highlight a significant gap in bioethical literacy among students, with many expressing a lack of information on pertinent issues such as medical ethics and biotechnology (Alkhateeb & Al-Dabbagh, 2023; BALATSOU & THEOLOGOU, 2021). Policymakers must recognize this deficiency and formulate strategies to provide foundational knowledge on bioethical issues at both school and community levels. Educational campaigns and public awareness initiatives that elucidate bioethical concepts can aid in fostering informed citizens capable of engaging in public discourse regarding health and ethical dilemmas (Байсар et al., 2023; Rheeder, 2016). For example, hosting public seminars or distributing educational materials in community centers could facilitate broader discussions around bioethics and increase overall societal understanding.

Fostering Multidisciplinary Collaboration

Bioethics education should adopt a multidisciplinary approach that combines insights from various academic disciplines—science, philosophy, law, and social studies—allowing students to approach bioethical dilemmas holistically (Morales-González et al., 2018; Benedetti et al., 2022). The integration of different perspectives will enrich discussions and enable students to understand the multifaceted nature of bioethical issues. Institutions of higher education might lead the charge by developing collaborative frameworks through which secondary teachers could learn from specialized bioethics educators (Pavarini et al., 2021; Zizzo et al., 2016).

7.1. Strengthened Bioethics Education in Michoacán: Improvement for High-Schools

This study thoroughly examined the disposition, capacity, and actual performance of high schools in Michoacán, Mexico, regarding the teaching of bioethics. The analysis utilized both governance sources and surveys to create a broad overview of the bioethics educational landscape. Upon triangulating data, several functionality divides were revealed, which necessitate strategic intervention. These divides include:

The division between schools capable of providing appropriate bioethics education and those unable to do so.

The socioeconomic disparity between high and low quartile schools.



The gap between the actual performance of schools in teaching bioethics versus the curriculum provided by the state.

The split between hypothetical performance as defined by educational programs and actual performance observed in classrooms.

Addressing the Functionality Divides

Each identified divide reflects systemic issues demanding policy revisions and targeted action to enhance bioethics education at the secondary level.

Bridging Capability Gaps in Bioethics Education

Schools that demonstrate the ability to teach bioethics effectively may serve as models for less capable institutions. Strategies that facilitate collaboration among high-performing schools can help standardize bioethics education practices. Sharing resources, best practices, and outlining efficient pedagogical approaches for bioethics can help under-resourced schools develop their capability to deliver this vital educational content (Turgut & Yakar (2020)Barbosa et al., 2020).

Fostering Equity in Socioeconomic Disparities

Addressing the socioeconomic divide in bioethics education requires a multifaceted approach. First, policymakers should prioritize funding and resource allocation for schools in lower socioeconomic quartiles. This could involve creating specialized grants or programs aimed at equipping these schools with better educational materials and training opportunities for teachers (Daniel et al., 2016; Ashfaq et al., 2021). Additionally, community engagement initiatives could mobilize local resources to support educational projects aimed at enhancing bioethics literacy among students in marginalized communities.

Aligning Curriculum with Actual Performance

The discrepancy between state curriculum expectations and actual school performance underlines the necessity for a revision of policy frameworks governing bioethics education. Policymakers ought to conduct comprehensive evaluations of the current curriculum, ensuring that it reflects realistic educational outcomes and competencies that are applicable in students' lives (Mwakisha et al., 2022; Martins et al., 2021). The results from this study can guide revisions to curriculum design, prioritizing experiential learning opportunities and integrating bioethics across various subjects rather than treating it as a standalone topic.

Closing the Gap between Hypothetical and Actual Performance

Education authorities must work to reconcile the differences between what is expected of schools (hypothetical performance set by public education programs) and what is actually delivered (actual performance). This can be achieved through regular assessments and audits of bioethics education practices in schools, thereby ensuring accountability and transparency in educational delivery (Alruwaili et al., 2023; Martins et al., 2021). Obligating institutions to report on their bioethics education outcomes could further encourage adherence to prescribed curricula.

Policy Recommendations



Based on the findings, several actionable recommendations emerge for educational authorities aimed at fortifying bioethics education in Michoacán high schools.

Developing Teacher Training Programs: Implementing specialized training programs in bioethics for teachers is crucial, fostering educators' ability to engage students in meaningful discussions about ethical dilemmas faced in health and science (Wilson, 2015; Oliveira & Oliveira, 2022). Interactive workshops that simulate ethical deliberations can prepare teachers to address sensitive topics with confidence.

Curricular Revisions: Policymakers should prioritize curricular reviews to ensure depth in bioethics education echoes real-world relevance. Collaborating with educational experts, healthcare professionals, and ethicists can refine learning objectives and schematic approaches to teaching bioethics (Aleksandrova–Yankulovska, 2017; Alahmad & Althagafi, 2023).

Enhancing Resources and Infrastructure: To facilitate effective teaching, increasing funding for bioethics education in lower socioeconomic quartile schools remains paramount. Resources such as libraries, teaching materials, and online platforms should be made more accessible to both educators and students (Донев & Stojanov, 2019; Cuaderes & Yap-figueras, 2022).

8. Conclusion: Creating a Strengthened Bioethics Education in Michoacán: Improvement for High-Schools

The investigation into the recognition and implementation of bioethics education in three high schools located in Morelia, and Uruapan, Michoacán, reveals critical insights into the pedagogical landscape and the associated ethical challenges faced by students. Through participant-based quantitative questionnaires, the study aimed to gauge the perspectives of students regarding the significance of bioethics within their education. The results indicate a substantial consensus among participants, wherein 76.1% of respondents recognized the necessity of bioethics education in schools. This shared recognition resonates with the findings of prior studies, which suggest a growing acknowledgment of the importance of formal bioethics education in various educational contexts

Importance of Bioethics Education

Bioethics serves as an essential framework for preparing students to confront the numerous ethical dilemmas that arise in the wake of rapid scientific and technological advancements. As students articulate their hopes for improving bioethics education, it becomes evident that there is an increasing demand for educational structures that foster ethical reasoning and critical thinking skills. The need to redefine educational objectives and to truly incorporate bioethics into school curricula is paramount, particularly in light of the discussions regarding the role of bioethics in medical education and the curricular gaps that exist.

Policy Recommendations

Given the study's findings, several policy recommendations stand out as critical for improving bioethics education:



Establishing a Bioethics Task Force: The formation of a dedicated task force within the education department focused on bioethics can streamline curriculum development, provide resources, and advocate for necessary policy changes. This task force can explore successful models from both local and international educational institutions.

Incentivizing Research in Bioethics: Encouragement and funding for research on bioethics education can lead to innovative teaching methods and more engaging curricula. Establishing partnerships with universities and healthcare institutions may provide access to resources and expertise.

Promoting a Continuous Learning Culture: Initiatives aimed at cultivating a culture of continuous learning within educational institutions can facilitate ongoing improvements in bioethics teaching. This includes integrating bioethics education into lifelong learning and professional development programs for educators.

In conclusion, this study underscores the vital importance of incorporating and enhancing bioethics education within Michoacán's high schools. The recognition of bioethics by students is a promising sign of their readiness to engage critically with ethical dilemmas. By addressing the existing functionality divides, reinforcing curricula, promoting teacher training, fostering community involvement, and implementing effective policies, Michoacán can create a more robust framework for bioethics education that is both relevant and effective. This endeavor will not only improve the educational landscape but also equip students to navigate the intricate ethical challenges of the modern world with confidence and integrity.

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