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Life Skills in Biology Textbook Grade IX: A Qualitative Content Analysis

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Abstract
The current qualitative study focused on integrating 12 core life skills in secondary school Biology textbooks identified in the UNICEF MENA report (2017). The textbook was selected through purposive sampling, which was employed when choosing the textbook. The data analysis was done using qualitative content analysis facilitated through *NVivo* 14. The analysis revealed specific aspects of critical thinking, problem-solving, decision-making, and participation skills in different activities, questions, and practical work from the textbook analysis. Some concerns were that creativity and communication skills were neglected, although only a few activities were suggested to address these areas. Furthermore, no specific content and activities taught students about cooperation, negotiation, self-management, resilience, respect for human diversity, and empathy. The current study indicates that though the Biology textbook has some specific necessary life skills, there may be a gap in the coverage of the necessary life skills identified by UNICEF. As a result of the present research, it is suggested that textbook content should be matched to fundamental life skills to ensure positive outcomes in students' everyday lives. The information can be helpful in future textbook writing and updating to enhance the delivery of life skills education in secondary schools.
Keywords: Life Skills, Biology, Textbook, Critical Thinking, Qualitative Content Analysis

1. Introduction

Education plays a significant role in preparing students for success in both their personal and professional development. In addition to academic knowledge, it is increasingly recognized that students need to develop a range of life skills to navigate the complexities of the modern world effectively. The UNICEF has identified 12 core life skills for young people to thrive in the 21st century: creativity, critical thinking, problem-solving, cooperation, negotiation, decision-making, self-management, resilience, communication, respect for diversity, empathy, and Participation (UNICEF MENA, 2017). These skills are valuable for personal development and contribute to better learning outcomes and future employability (Cottrell, 2021).

Textbooks are essential instructional sources used to distribute curriculum content. They are necessary to develop students' knowledge, skills, and perceptions. Evaluating textbooks to match the intended learning achievement and foster the acquisition of crucial life skills remains paramount. Examining the existing textbooks from the perspective of life skills education helps identify the level of integration and inspiration of these skills in the textbooks (Jamil et al., 2024).

In the Pakistani context, like in other countries, the importance of life skills in education has been recognized as being integrated into the national curriculum (Iqbal & Khalil, 2021). Education policy and curriculum documents of Biology at the secondary school level aim to provide students with a strong foundation in the subject while fostering critical thinking, problem-solving, and other essential skills (Jamil et al., 2024, 2024a). However, limited research has been done to evaluate Biology textbooks regarding incorporating the 12 core life skills identified by UNICEF (Jamil et al., 2024).

As per UNICEF MENA (2017), there are 12 essential life skills ranging from creativity to critical thinking, problem-solving and conflict-solving, negotiating, decision-making and self-management, resilience, communication, human rights, respect for diversity, understanding other people's perspectives, and participation. All these skills are necessary and helpful for an individual's growth and overall development.

This study aims to evaluate the incorporation of UNICEF's 12 core life skills in Biology textbook. The findings of this study will affect previous learning on life skills in the Pakistani context and offer significant awareness to textbook writers, curriculum developers, administrators, and teachers. Recognizing the strengths and gaps in the existing textbook can apprise upcoming efforts to improve the incorporation of life skills in the secondary school content to prepare the students for the 21st century. Furthermore, the study can serve as a foundation for further research on life skills education in Pakistan and beyond, contributing to the current discourse on the role of education in fostering the holistic development of young people.

1.1. Objective of the study

- To analyze the incorporation of the UNICEF MENA (2017) framework's 12 core life skills in Biology textbook Grade IX.

2. Review of the Literature

Life Skills Education (LSE) has only recently received serious attention as a fundamental part of holistic education. Life skills were defined by the World Health Organization (WHO) as abilities for adaptive and positive

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behavior, that enable individuals to deal effectively with the demands and challenges of everyday life. Broader personal competencies, cognitive skills, and social abilities all determine an individual's success in their life course (Kirchhoff & Keller, 2021).

Life skills education is important for students to learn because it helps prepare them for life and equips them with the tools required to face the modern world. Indeed, research has demonstrated that including soft and life skills in schools ultimately results in improved academic achievement, prosocial behavior patterns (Guidance was also given on social behaviours), and mental health outcomes for students (Feraco et al., 2023). In addition, life skills education has been associated with increased employability opportunities through various soft skills such as teamwork, communication, and problem-solving (binti Ab Aziz & Balraj, 2022).

By enhancing cognitive skills such as creativity, critical thinking, and problem-solving, individuals can make sense of information, generate new ideas, and develop optimal solutions to challenges. For example, previous Pakistani research studies have recently emphasized critical thinking/higher-order thinking skills (Muhammad Jamil, Tahira Batool Bokhari, & Dawood Ahmad, 2024). However, limited research has been done to evaluate Biology textbooks regarding incorporating the 12 core life skills identified by UNICEF (Jamil et al., 2024). Personal competencies can also be developed, including self-management and resilience, enabling individuals to control their emotions, self-direct, and adapt to change. Lastly, interpersonal competencies such as cooperation, negotiation, and appreciation for diversity can be developed, which facilitate positive communication and relationships with others.

These life skills have been promoted by UNICEF (20217) due to their importance in the 21st century for the learners of this era, which promotes its relevance for preparing children to cope with the challenges and issues facing them in this century; therefore, many countries have introduced life skill program at both primary mythology school levels.

Many studies have been conducted in schools about methodologies and techniques for enhancing life skills using textbooks in different primary, elementary, and secondary subjects. Khosravani et al. (2014) conducted a study to analyze the effect of EFL textbooks on students' life skills in the Iranian context. In another study by Cronin et al. (2020), life skills development was explored in Physical education. Yaki (2022) studies Biology secondary-level students and the integrated STEM approach to developing critical thinking among students. In the same way, critical thinking has been focused by education policy documents (Jamil et al., 2020), textbooks (Bhatti et al., 2015; Jamil et al., 2024; Tufail et al., 2016), teachers' perceptions and practices (Jamil, 2021; Jamil et. al., 2024; Jamil & Muhammad, 2019; Jamil, Muhammad & Qureshi, 2021). These studies show the importance of using textbook analysis to investigate life skills education integration and suggest further improvements. But rare are the studies focusing on mainstreaming UNICEF's 12 core life skills in Biology book and there is no significant study that has been conducted related to this perspective, especially in Pakistan.

3. Research Methodology

It was a qualitative study. The Biology grade IX textbook was selected through a purposive sampling technique appropriate for qualitative studies where specific insights and in-depth analysis are sought (Patton, 2002). The textbook was downloaded from https://pctb.punjab.gov.pk/E-Books and analyzed through qualitative content analysis (Krippendorff, 2018) involving systematic categorizations and classifications onto texts to establish whether UNICEF's conceptual framework for 12 core life skills in this study was integrated throughout its entirety. NVivo 14, a computer-assisted qualitative data analysis software, was used to efficiently organize the textbook content before coding and categorization. Coded data was further analyzed to identify patterns of the amount and type of references each life skill made within the study textbook.

3.1. Findings of the study

3.1.1. Creativity

The textbook encourages creativity in a few sections, mainly through the design and execution of experiments and models. For example,

- In Chapter 4, students design molecular models of ATP using low-cost materials (p. 51). This hands-on activity promotes creative thinking and problem-solving.
- Chapter 7 includes an activity to design a model of light and dark reactions using low-cost materials (p. 51), encouraging students to think creatively about representing complex biological processes.

3.1.2. Critical Thinking:

The textbook often challenges students to think critically and analyze characteristics with questions about the reasoning behind traits. For example,

- Beginning the dialog, Chapter 1 prompts students to Identify and analyze how scientific ideas have impacted society (p.13). For instance, students are asked to consider how human population growth, infectious diseases (in general), addictive drugs, and pollution represent major biological challenges today.
- Chapter 2 asks students to generate and test hypotheses, interpret data, and revise or confirm the theory after experimental results (pg.14). This approach - the process behind scientific inquiry - is designed to develop attributes of critical thinking.

- Chapter 3 promotes students' evaluation of human influences on biodiversity (page. Have students find and assess the impact of scientific ideas and technological developments in society (p.13).
- Chapters 7-9 contain exercises in interpreting data, and questions combine test items of different styles. In Chapter 7, for example, students use data on daily food intake and compare that to a balanced diet. Students evaluate the effect of different activities on pulse rate and then analyze this data (p. 25).

3.1.3. Problem-solving:

The textbook incorporates problem-solving, especially in the practical work sections at the end of chapters, where students develop procedures to investigate various biological phenomena.

- In Chapter 5, students conduct experiments to observe the stages of mitosis and meiosis (pp. 11-22). They follow a systematic procedure, make observations, and interpret the results to understand cell division.
- Chapter 6 includes an experiment to demonstrate the in-vitro working of enzymes on substrates (pp. 16-21). Students design and execute the experiment, troubleshoot issues, and evaluate the results.
- In Chapter 7, students investigate the processes of photosynthesis and respiration through a series of experiments (pp. 10-14). They problem-solve to set up the experiments, control variables, and interpret the results.
- Chapter 8 includes experiments to test for starch, reducing sugars, proteins, and lipids in food samples (pp. 14-18). Students develop problem-solving skills as they design and execute these tests.
- In Chapter 9, students investigate the effect of physical activity on pulse rate and observe capillary flow in a fishtail (pp. 10-16). These experiments require students to problem-solve and troubleshoot to obtain accurate results.

3.1.4. Cooperation:

While the textbook does not explicitly mention group activities, the practical work sections provide opportunities for cooperative learning if teachers have students work in teams.

- The experiments in Chapters 5-9 (pp. 11-22, 16-21, 10-14, 14-18, 10-16) could be conducted in small groups, allowing students to cooperate, delegate tasks, and work together to achieve a common goal.
- Cooperative learning could also be incorporated into the "Discussion/Debate" sections in some chapters (e.g., Chapter 1, p. 3), where students could research and present arguments.

3.1.5. Negotiation:

The textbook does not directly address negotiation skills or include activities that require students to negotiate with each other.

3.1.6. Decision-making:

Some questions in the textbook require students to make judgments and decisions based on data and evidence.

- In Chapter 1, students are asked to evaluate the impact of science on society and decide whether the effects are positive or negative (p. 13).
- Chapter 2 requires students to accept or reject hypotheses based on experimental results (p. 14).
- In Chapter 7, students must make decisions about the validity of their hypotheses and experimental designs when investigating photosynthesis and respiration (pp. 16-22).
- Chapter 8 encourages students to make health-related decisions based on their understanding of nutrition. For example, students analyze their daily food intake and compare it to balanced diet requirements to make informed choices (p. 18).

3.1.7. Self-management:

While self-management skills are not a major focus, a few aspects are covered in the textbook. For example,

- Chapter 8 discusses the importance of a balanced diet and the consequences of malnutrition (pp. 18-21). This information can help students make better decisions about their eating habits and manage their health.
- In Chapter 9, students learn about cardiovascular disorders and risk factors (p. 49). This knowledge can help them manage their health risks by making lifestyle changes.

3.1.8. Resilience:

The textbook does not directly address the skill of resilience or include content on facing and overcoming life challenges and failures.

3.1.9. Communication:

A few activities in the textbook require students to discuss and communicate scientific information. For example,

- Chapter 3 asks students to relate advancements in scientific understanding to the development of classification systems (p. 23). This activity promotes scientific communication and the ability to explain complex ideas.
- Also, in Chapter 3, students are asked to explain the importance of binomial nomenclature in developing a more comprehensible sharing of scientific research (p. 23).
- In Chapter 8, students are encouraged to describe their nutrition and compare it with recommended norms (p. 18). This activity promotes communication and self-reflection.

3.1.10. Respect for diversity:

Chapter 3 extensively covers biodiversity and the need to protect diverse species. For example,

- The chapter defines biodiversity and discusses its importance in ecosystems (pp. 2-3).
- It also covers the classification of organisms into different kingdoms, highlighting the diversity of life (pp. 8-11).
- The chapter emphasizes the impact of human activities on biodiversity and the need for conservation efforts (pp. 14-19). While this chapter can help build an appreciation for natural diversity, the textbook does not address respect for human diversity.

3.1.11. Empathy:

The textbook supports active participation through each chapter's many hands-on practical work activities.

- Chapters 5-9 include numerous experiments and investigations that require students to actively participate in the learning process (pp. 11-22, 16-21, 10-14, 14-18, 10-16).
- These activities range from observing cell division (Ch. 5) to investigating enzyme activity (Ch. 6), demonstrating photosynthesis and respiration (Ch. 7), testing for nutrients in food (Ch. 8), and exploring the circulatory system (Ch. 9). participation is also encouraged through the many questions posed to students throughout the chapters, prompting them to think critically, analyze data, and engage with the content.

3.1.12. Participation:

The textbook supports active participation through many hands-on practical work activities in each chapter. Students actively participate in experiments to learn biological concepts. Participation is also encouraged through the many questions posed to students throughout the chapters. For example, Chapters 5-9, pp. 11-22, 16-21, 10-14, 14-18, 10-16 (Implied in the numerous hands-on Practical Work activities) are provided.

4. Conclusions

The analysis results indicated that many activities, questions, and assignments in this textbook promote some life skills, including critical thinking, problem-solving, decision-making, and participation skills. Cooperation, negotiation, self-management, and behavioral flexibility were not as well addressed in addition to the life values like coping skills with ambiguity/uncertainty & different social-cultural realities (diversity), which includes an attitude of empathy. The findings underscore the importance of a comprehensive and deliberate incorporation of life skills education in the secondary school textbook of Biology. Furthermore, the integration of life skills education needs to be culturally sensitive, as learners in Pakistan are diverse and come from different realities. Textbooks, the primary sources of knowledge for students, could potentially help place life skills education in a context that is relevant and relatable to individuals' lives - increasing engagement and motivation and leading to better learning advantage. In addition, making life skills education part of the curriculum should be combined with a whole-school approach that weaves these competencies throughout the holistic school experience in both curricular and extracurricular settings. A holistic approach that requires all stakeholders, schools' administrations, and teachers to parents and the wider community to enable a supportive environment where life skills can be developed. This study adds to the information about life skills education in a secondary school Biology textbook available for Pakistan and indicates more work. Further research should look at how life skills education is being integrated more broadly into the educational system of Pakistan by using a larger set of textbooks covering different subjects.

5. Discussion

Analysis of qualitative content from Biology textbook for secondary schools in Pakistan suggested a mixed picture about the integration of UNICEF 12 core life skills. The textbook showed strengths in transmitting other life skills, including critical thinking, problem-solving activity, and decision-making with participative skills. Other skills, such as cooperativity and negotiation ability to cope with stressful and pressured situations, were fewer common topics that needed addressing. The book encourages the student, through different types of activities, questions, and practical works sections, to think critically (critical thinking), solve problems related to Biology, and make proper decisions in connection with specific biological phenomena by analyzing information as well as formulating hypotheses then plan experiments finally draw evidence-based conclusions. Critical thinking has been focused in several studies in the Pakistani context (Jamil, 2021; Jamil et al., 2024; 2024a; 2024b; 2024c; Jamil et al., 2023). Such skills encourage scientific literacy and equip students to face complicated real-world problems (Vieira et al., 2011). Promoting participation skills was also evident in the variety of practical and often manual work activities that engaged students directly with their learning.

Because of other life skills, the textbook did include aspects such as cooperation, negotiation, and self-confidence, but in slightly less depth. Although some of these skills might be slightly promoted through group work and class discussion, the textbook lacked explicit content to build them. This result aligns with earlier studies, which demonstrated that textbooks do not integrate certain life skills (Rakhmawati & Priyana, 2019; Tufail et al., 2016). The analysis of the study underscores the importance of the life skills in education that are needed for Biology textbook. Textbook writers and curriculum designers should aim for broader life skill topics and activities for this.

It might be facilitated by the implementation of case-based learning in real-life situations for the learners so that may be good decision-makers in their daily lives (Prajapati et al., 2017).
The findings also illuminate the implications of teacher capacity and desired support to effectively deliver life skills education. There is a vital role for teachers to play in promoting life skills through teaching, curriculum, and classroom practice (Ananiadou & Claro, 2009). There is simply no question that teachers must be trained and equipped in life skills education and create a supportive learning environment for students undertaking well-developed programs across many professional disciplines including the direct assessment of student progress in acquiring life skill competencies.

6. Recommendations

- Secondary school curriculum should be reconstructed as a life skills curriculum with clearly defined themes and extended learning content which will help cultivate various necessary life-skills in the teenagers.
- Textbooks should be youth-friendly and culturally appropriate, to help increase the engagement of youths in their learning process as well as motivation.
- Make life skills in textbooks a school-wide program, integrated into all aspects of the curriculum and co-curricular activities.
- More research should cover a wider variety of textbooks and subjects to get a full picture of life skills education integration in the schools' curricula, which would also assist future educational policies and implementations.

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