Analysis of Life Skills Education in the Content of General Science Textbook at Secondary School Level

Dr. Shazia Zamir
Assistant Professor Department of Educational Sciences
National University of Modern Languages, Islamabad
Emial: szamir@numl.edu.pk
Dr. Samra Afzal
Assistant Professor Department of Educational Sciences
National University of Modern Languages, Islamabad
Emial: safzal@numl.edu.pk
Dr. Muhammad Asghar Ali
Assistant Professor Department of Education
Women University of AJ&K Bagh Pakistan
Email: aamasgharali@gmail.com

Abstract

The present study aimed to analyze the general science textbook of the 9th& 10th classes based on four life skills clusters with twelve core life skills based on the UNICEF MENA framework (2017). These four life skills clusters are learning, employability, personal empowerment and active citizenship. A qualitative content analysis method was used. Results showed that textbook encourages learning skills through critical thinking, creativity, and problem-solving by providing concepts, activities, exercises, and conceptual questions. Regarding employability skills, decision-making skills were addressed through various scientific choices and ethical dilemmas whereas negotiation and cooperation skills were less attended. Personal empowerment such as resilience and self-management were emphasized by exhibiting events, examples, and topics of overcoming setbacks and challenges. Communication skills have been encouraged among students through articulating ideas and thoughts about scientific principles. Active citizenship skills such as empathy are stressed by displaying figures and topics that show the impact of discoveries and human activities on society while respect for diversity component has been addressed by accentuating the significant scientific contributions of inventors from diverse cultures and backgrounds whereas participation skills are less emphasized. Practical exercises, group activities and ICT links may be added to the textbook to enhance the various life skills among students. The present research is beneficial to improve general science textbooks by incorporating life skills that will help students in scientific growth.

Introduction

New knowledge, evolving learning theories, and rising technology are all influencing how curriculum and the educational process are conducted. In this regard, 21st Century skills might be considered one of the most recent curriculum improvements. The emphasis has been on life skills and education systems worldwide, particularly in low- and middle-income countries should include 21st-century skills into their curricula to meet the needs of 21st-century society. The idea of learning in the twenty-first century is associated with students' abilities to handle challenges in their everyday lives and future encounters.Previously, it was anticipated that students would exhibit altered behavior upon completion of training program.

These days, it's evident that efforts are being made to group these behavioral modifications under several skill themes. By focusing on empowering people with the abilities they will need both now and, in the future, the subject of scientific education has undergone significant transformations. It is said that efforts to design and implement life skills education in schools have begun in several nations worldwide. The goal of life skills training is to make it easier for people to acquire the abilities required to meet the responsibilities and obstacles of everyday life (World Health Organization, 1999).

The ability to think analytically, creatively, make decisions, be entrepreneurial, collaborate with others, and communicate are highlighted in a new skill category under the "Life Skills" theme. It might be helpful to have a glance at life skills' material. Making decisions, which involves picking a favored choice or action plan from range of possibilities grounded on preset standard, is one of the basic rational procedures of social behavior. Two dimensions of entrepreneurship are examined in the sphere of education. While the second component is on developing attitudes of entrepreneurship and abilities connected to the growth of individual characteristics rather than the formation of new firms, the first dimension focuses on teaching individuals how to build business ideas.

Consequently, secondary education's emphasis on life skills is centered on the second dimension. As they were designed for students todevelop life skills in scientific curriculum, these stated life skills are extremely significant. In this way, whether life skills are included in general science textbooks is a research question that must be answered. Being one of the most significant parts of the curriculum, the textbook is a vital part of the educational process and may help achieve the intended learning objectives. The scientific textbook is a specialized book that the student may have in his hands and use as needed; its information may directly affect.

Textbooks play a crucial role in education at all levels because their content may directly affect students in ways that other educational resources cannot. Thus, the current study aimed to examine how life skills are included in the secondary general science textbook material developed by Punjab Textbook Board, Pakistan.

Objectives

1. Investigate the integration of life skills in General Science textbooksof GradesIX& X.
2. Appraise the distribution of life skills across chapters, topics and sections in General Science textbooksof GradesIX& X.

Conceptual Framework of Research

For analyzing the general science textbook of 9th and 10, the present research study followed the UNICEF MENA framework (2017)consisting of the four life skills clusters with twelve core life skills. Four clusters are learning, employability, personal empowerment and active citizenship skills. The learning Skills cluster consists of life skills of creativity, problem-solving and critical thinking whereas the employability cluster consists of life skills of cooperation, decision-making and negotiation. The personal empowerment cluster consists of life skills of self-management, communication and resilience while the active citizenship cluster consists of life skills of respect for diversity, participation and empathy (Initiative, 2017).

Literature Review

Moving from the era of industries of the twenty centuries to the age of information of the 21stcentury, there is a growing recognition that skills that were necessary for success in the past might not be enough now (Kivunja, 2015). Decision-making, communication, critical thinking, problem-solving, and interpersonal skills, emotional intelligence, and resilience are a few examples of life skills.Life skills are defined as a broad range of competencies that enable people to successfully navigate daily challenges across social, cognitive, and personal domains (UNESCO, 2013; WHO, 1999).

For secondary students, life skills development is vital because it equips them with abilities that go beyond academic achievement. These skills empower students to accomplish their emotions, take up-to-date decisions, communicate efficiently, cooperate with others, and adapt to change—all of which help them become more prepared for postsecondary education, adult responsibilities and the workforce (WHO, 1999; UNESCO, 2013). Life skills inspire confidence, independence and competence in uncertain situations and are considered vital for both community engagementand personal development.

Secondary textbooks are crucial for helping students acquire life skills because they force them to study complex scientific material in-depth and analyze data, which sharpens their problem-solving and critical-thinking abilities (Khan, 2021). To better prepare students for challenges they will encounter in the real world, they include collaboration, leadership, and time management into project-based learning frameworks (Singh, 2018).

Additionally, by encouraging the development of moral reasoning and civic consciousness, the inclusion of ethical and social themes in textbooks improves students' educational experiences (Mahajan, 2020).The textbook,

one of the most important curricular elements, is an essential component of education and can support the attainment of the desired learning outcomes (Ornstein & Hunkins, 2017). According to Garinger (2001), textbooks are crucial to language learning in classrooms all around the world, including language schools, public schools and colleges. In some circumstances, teachers are allowed to select the textbooks they utilize. Nonetheless, the majority of educators are assigned, prescribed, or suggested textbooks. This point of view is related to the study's justification of the crucial role textbooks play in language teaching. Furthermore, textbooks are essential to the topic of teaching languages. (Riazi, 2003).Moreover, textbooks are essential to the teaching and learning of languages, with Riazi (2003) stating that they rank second in importance in the classroom behind the instructor of second or foreign languages. Sheldon (1988) asserts that a teacher's textbook is an instrument and that they should be aware of both its potential advantages and limitations.

Textbook analysis plays a critical role in general science education in figuring out how students develop their life skills in secondary school. Research indicates that integrating life skills like problem-solving and critical thinking into scientific courses enhances students' cognitive abilities and prepares them for challenges they may encounter in the real world (Chen & Wang 2019).

Moreover, researches prove how well-designed science textbooks enhance collaborative communication abilities and supports holistic development in addition to scientific notions (Ibrahim, 2018; Olorundare&Mji, 2021). By analyzing textbooks through the lens of life skills, educators believe that students are assisted by learning resources in acquiring the abilities which are required for both lifetime learning and professional accomplishment (Abrahams et al., 2022).

One of the fundamental components of scientific and technical progress is science textbooks and is also essential for the expansion of an individual personal skills (Smith, 2020). As it offers experiences and planned activities and its approach to scientific and real-world difficulties, it is considered as the ideal tool for problem-solving skills, critical thinking and fostering research, (Brown & Lee, 2018). These skills are known as essential for supporting students in deciding the scientific and social problems, they face daily and for equipping them to handle the quick changes in our society. Since it is vital to include life skills to promote critical thinking in the science curriculum,students must challenge complicated scientific problems by making plans for solutions and developing connections to earlier academic material. Science education prepares students to understand that scientific learning is predicated on induction, deduction, and interpretation.

Numerous researches identify how significant it is to integrate present-day environmental issues and apprehensions into science textbooks. This addition inspires students to understand, explore and apply scientific

thoughts to real-world situations, ensuing in answers for problems affecting the environment and standard of living in their societies. Researchers emphasize that stress on educational institutions has increased along with advances in science and technology and the demands on people's survivals. These institutions must remain up to date by including the necessary abilities in the curriculum, especially in biology. A solid background in science education is necessary to teach life skills including self-care, sickness prevention, and justifying consumption. Scientific education must stay current with priorities and technological developments to teach pupils the skills they need to succeed in the real world. (Saeed, 2003: Bybee, 2010). Organizations also emphasize how critical it is for workers to acquire these abilities to fulfill the demands of the digital age.

Al-Zahrani (2021) highlights that content analysis provides an organized and scientific method that puts rigorous quantitative and qualitative study ahead of subjective judgments in the context of a transformative knowledge era. It is crucial to the field of education in several ways, such as the development and evaluation of curricula and textbooks, weighing the benefits and drawbacks of educational resources, ensuring that they meet the needs of students, and supporting the field's shift in paradigms. This methodological approach improves educational research and practices while encouraging responsiveness to continuing changes and advancements in the field of education. Thirty-two life skills were divided into four areas by (Boleman et al. 2004: Fox et al., 2003) included a number of particular life skills, including decision-making, interpersonal connections, acceptance of self-discipline, accountability, improvement of self-esteem, communication, leadership, technical, personal/social. Oral communication, goal-setting, problem-solving, and record-keeping among others.

Massi & Bakheet (2010) chose the categories to classify life skills were goal setting, critical thinking, communication skills, conflict resolution, problem solving, collaboration, decision making and community services. Key life skills found in youth programs include leadership, teamwork, decision-making, problem-solving, reasoning, communication, responsibility, self-esteem, and integrity. Massi & Bakht. (2010), Fox et al. (2003), Bender (2002), Boleman et al. (2004) introduced instruments that operationalized life skills through a variety of indicators. According to Anderson (2005), life skills have a big impact on school behavior. She emphasizes their importance in raising responsible citizens combined with lifetime rules. Decision-making, problem-solving, critical and creative thinking, effective communication, interpersonal relationships, self-awareness, empathy, emotional coping, and stress management are just a few of the many skills Bender (2002) outlined.

A nation's ability to compete and its level of prosperity depend on its workforce's qualifications and education (Trilling & Fadel, 2009). In the business world, this issue is often referred to as the "skill mismatch"

(Cedefop, 2018) or the "Twenty-first century skills gap" Trilling & Fadel,2009). Recent studies have shown that employers are having more trouble filling open positions (Cedefop, 2018). Massi and Bakheet (2010) The individual's ability to cope with life's demands is a result of all of his or her consensual behavior, which involves applying the knowledge, trends, values, and beliefs that they have chosen to any job or activity they engage in regularly.

The Middle and North Africa region is referred as MENA. In this sense, "life skills" would often refer to the fundamental abilities and information required for day-to-day functioning and personal growth. UNICEF MENA (2017)

Given the current status of education in the Middle East and North Africa (MENA), a comprehensive lifelong and rights-based perspective is required. This vision should maximize the potential of all children and youth in the region, better preparing them to make sense of what they learn, navigate the changes from childhood to maturity, education to employment, and move from unreflective development to responsible and active citizenship. This is the rationale for the MENA Life Skills and Citizenship Education (LSCE) Initiative, which was launched in 2015 to provide conceptual, programmatic, and technical support to the region's nations to improve education and better allocate it to the development of individuals, society, and the economy.

A list of twelve fundamental life skills for the Middle East and North Africa (MENA) has been determined using the four-dimensional learning model: Learning to Be (Individual Dimension), Learning to Do (Instrumental Dimension), Learning to Know(Cognitive Dimension), and Learning to Live Together (Social Dimension). Based on research highlighting the importance of skill development at a young age, the twelve key life skills have been built and are relevant for one's whole life. In addition, the twelve fundamental life skills are learned and maintained via all educational modalities in a systems approach that acknowledges many formal, non-formal, and informal learning paths.They improve people's general well-being and progress in society by giving people the skills they need to succeed in both their personal and professional lives.

According to the Partnerships for Skills for the 21stCentury(2015), life skills are those that are part of the 21st century skills that aid in our efficient problem-solving in day-to-day situations (World Health Organization, 1997). Thus, a few queries come up, starting with, " In the twenty-first century, what are the fundamental life skills?"

Numerous researches that categorize life skills in different ways can be found in the literature (Hanbury, 2008; United Nations, 2003). A total of thirty-two life skills were categorized by Fox, Schroeder, and Lodl (2003) into four categories (e.g., leadership abilities, technical communication and personal/social). The 4 H-life skills model, arranged by Hendricks (1998), is among the most complete categories. The four primary categories of these

talents are Hand (providing and working), Heart (relating and caring), Head (governing and thinking), and Health (being and living). Flexibility and adaptability, initiative and self-direction, social and cross-cultural abilities, productivity and accountability, and leadership and responsibility are the categories into which life and career skills fall.

WHO (1997) notes that the nature of these skills may vary among cultures and identifies decision-making, problem-solving, creativity, critical thinking, effective communication, interpersonal skills, self-awareness, empathy, emotion management, and stress management as the primary skill set for life skills. The WHO's list of essential abilities also includes typical skills that are present in several study literature classifications. "What are the level definitions for the 21st-century skills and how can they be adopted in the curricula?" is the second question. The official ratification of "The European Qualifications Framework for life-long learning" (EQF) by the European Parliament and European Council in April 2008 was a significant step towards answering this question (European Communities, 2008).

The eight levels that make up the EQF's foundation establish the minimal common qualifications. These levels are known as "level indicators" since they are created via learning acquisitions of knowledge, competence, and abilities. Over the past ten years, numerous nations—the majority of which are in Europe—have successfully implemented national curriculum reforms that are in line with the essential skills outlined in the EQF (European Commission/EACEA/Eurydice, 2012). Developing pupils' life skills was one of the goals of these changes, as it would help them get ready for adulthood.

Life skills are essential for comprehensive development because they help people deal with problems that arise daily. It is essential that life skills education be incorporated into school curricula, particularly in topics like general science. (Garcia & Lopez 2020). The research findings on inclusion are also examined in this review.

Numerous researches have investigated the connection between general scientific subjects and secondary school students' growth in life skills.

Osborne and Dillon (2008) presented the argument for creating curriculum that emphasize holistic competencies—more so than scientific knowledge—for lifetime learning in their thorough review paper on science education in Europe. These are perfectly aligned with the three essential life skills: critical thinking, communication and problem solving. Therefore, Rannikmae and Holbrook (2008) vision for scientific education goes beyond content to include a set of competences necessary for responsible citizenship. Additionally, they argued that scientific education needs to foster the development of fundamentally significant communication skills as well as other abilities like cooperation and moral judgment. When Ayvacı and Bebek (2017) looked at scientific curriculum purchases in terms of creating and applying models, they discovered that

about fourteen percent of the acquisitions were focused on these areas. According to the findings of this study, all three science textbooks for grades 6th through 8th provided four topics, however, the subject "To Investigative Nature of Science" received the most attention. The subject "Interaction of science, technology, and society" was completely overlooked in all three scientific textbooks at elementary level taught in Khyber Pakhtunkhwa, Pakistan. (Ali & Shah 2017)

Kodan and Bozdemir (2014) looked at the scientific curriculum acquisitions for grades four and five and discovered that forty-two of them have anything to do with environmental education. You may find several other studies that looked at the life science curriculum in addition to these. Hussain & Raza (2021) emphasize the Integration of indigenous knowledge in textbooks of general science textbooks at secondary level in Pakistan. Moreover,Jones (2016) defends Integration of life skills into secondary science education to inculcate problem-solving, critical thinking and communication skills. When Yasaroglu (2013) examined the values of education material in the science curriculum, she found that the ideas of morality, peaceful living, and peace were addressed the least, with the idea of responsibility receiving the most attention.

Hilton and Pellegrino (2012) assert that many transferable abilities, such as problem-solving, may be effectively comprehended and developed via education by incorporating them into an instructional framework. This is relevant to the context of 21st-century skills. After analyzing the scientific curriculum in terms of subject matter and units, course duration, methods of instruction, and science literacy, Karatay, Timur, and Timur (2013) concluded that there has been a decline in these types of acquisitions in the science curriculum.

A few of life skills are crucial in environments that revolve around information, like business analytics. They argue that all disciplines, including science, should combine cognitive, interpersonal, and intrapersonal abilities. Several scholars have tackled the more general concept of including life skills into scientific instruction.

Yumuşak (2017) found that scientific curriculum acquisitions had been described rather broadly after comparing the acquisitions related to the theme "Matter and Change" in the curriculum. In terms of entrepreneurial abilities, Deveci and Çepni (2017) looked at the scientific curriculum acquisitions and discovered that the acquired featured mostly Skills in creativity and communication, but not in taking risks efficient time management and collaboration skills.

Methodology

The general science textbook of 9^{th} and & 10^{th} classes wasanalyzed in the context of life skills usingthe qualitative content analysis method. Qualitative content analysisfollows the procedure ofgenerating codes, classes and themes followed by certain rules (Büyüköztürk et al., 2013). In

the content analysis process, themes are generated from collected data and presented meaningfully to readers (Yildirim & Şimşek, 2011). This method is useful as it interprets large amounts of textual data systematically to find themes, meanings and patterns (Kyngäs, 2020). Content analysis is the appropriate method for textbook analysis as the content andlearning outcomes of textbooks helps in generating themes (Mayring, 2014). The purposive sampling technique was used for selecting the general science textbook of 9^{th}& 10^{th} classes that can bedownloaded from link https://pctb.punjab.gov.pk/E-Books.

Data Analysis

Brief Description of the General Science Book

General science textbook for 9^{th}& 10^{th} class of Punjab Curriculum and Textbook BoardLahore consists of 11 chapters covering topics from various fields of science such as the role of science, our life and chemistry, biochemistry & biotechnology, human health, diseases, cause & prevention, environment & natural resources, energy, current electricity, basic electrons, science & technology and space & nuclear program of Pakistan. Every chapter contains a list of topics that students will learn, comprehensive content, figures, important chapter points, chapter glossary, and questions. The questions section at the end is a combination of true/false questions, incomplete statements, MCQs, short answers and long questions. Most of the chapters also contain blocks of interesting information.

Learning Skills

Learning skills include critical thinking, creativity, and problem solving.The science textbook encourages critical thinking among students through evaluating evidence, making links between concepts, and concluding. The General Science textbook of the 9^{th} and 10^{th} class promotes critical thinking by asking questions such as *What is the role of enzymes in our daily life is. How can genetic engineering help us in improving livestock and agriculture? How waste and scarce materials can be made reusable.*(p. 39) However, textbook writers may makethe content of science textbooks more challenging for students by adding practical activities where students can analyze scientific information, ask questions, draw conclusions, and engage in discussions on scientific themes to develop critical thinking among students.Creativitymay be fostered through activities that help studentsto think creatively and propose solutions and ideas for problems.The text of general science textbook for 9^{th}&10^{th} classes is helpful for students to develop creativity to some extent, although, it lacks activities that help students think creatively and propose solutions and ideas for problems. One of the examples of promoting creativity is figure 3.6 (p.35) which explains the successful experiment in pest resistance.

(a) The non-engineered tomato plant that has been completely eaten by caterpillar.
(b) The engineered tomato plant that is not affected by caterpillar.

Fig. 3.6: A successful experiment in pest resistance (p. 35)

Heading 3.8 Recycling of Waste and Scare Material explained various recycling procedures that are useful in developing creativity.

Many of the materials discarded as rubbish, such as paper, card board, plastic, rubber, metal glass etc. can be retrieved and recycled through respective industries.

(p. 36)

Moreover, science textbooks may also addskills examples related to creativity that encourage students to design experiments and innovative solutions to practical problems through presentations or projects.

In science textbooks, problem-solving abilities can be fostered by displaying real-world scenarios to promote logical argumentationand reasoning among students. General science textbook for 9th& 10 classes enhancing problem-solving abilities through conceptual questions in assessment activities like questions *Describe any three non-conventional methods of producing electricity.Give suggestions for the conservation of energy.*(p. 109)

The question posed and displayed in Fig. 8.3 is another example of problem-solving skills.

Let us consider the following example to understand this.

Suppose that the body A carries +10C charge and the body B carries –10C charge. Let both of them are connected with each other through a wire for a small duration and then put them apart. If –4C charge is transferred from body B to A during this interval, then what should be the charge on bodies A and B after they are separated again.

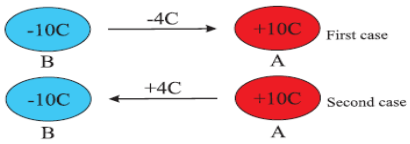


Fig. 8.3

(p. 112)

However, content of the science book could include practical exercises and present case studies to help students identify scientific challenges, solve complex problems, and think critically to solve scientific enigmas.

Employability Skills

Employability skills include life skills of negotiation, cooperation, and decision-making. In general science textbooks, negotiation skills can be addressed by displaying scenarios of students working collectively to conclude. The present textbook of general science for 9th& 10th grade lacks activities or scenarios that help students cooperate and teamwork. The focus of the textbook is on the development of skills for learning.

The general science book content lacks cooperation as group projects have not given proper weightage that requiresteamwork and collaboration. However, few figures show cooperation such as Fig. 5.9, p. 61 displayed that people are working together to fill holes near houses.

(Fig. 5.9, p. 61)

General science textbooks demonstrate scientific choices and ethical dilemmas that students may consider while making decisions that will help in development of decision-making skills. Such as in the topic of Smoking various situations and the harmful effects of smoking have been explained which will help learners in decision-making.

5.4 Effects of Smoke and Smoking

Some people chew the tobacco while other use it in cigarettes. Tobacco smoke consists of many chemical substances. Nicotine, tar and carbon monoxide are the most important chemical substances. Nicotine is a very poisonous chemical compound which causes addiction and which makes difficult to quit smoking in the smokers. Another most important effect of nicotine on the human body is that it causes the narrowing of the blood vessels which hinders the blood supply to all the organs of the body.

(p. 65)

Personal Empowerment Skills

Personal Empowerment Skills include resilience, self-management, and communication.Resilience has been addressed by exhibiting examples and topics of overcoming setbacks and challenges. Examples are measures to reduce pollution (p. 79), question 8 about measures to control aquatic pollution (p. 90), first aid given at accidents (p. 48) and protection from germs (p. 64). Self-management as personalempowerment has been addressed in the General Science textbook. Activity regarding Ohm's Law requires the self-management skills of students. However, the activities presented in the textbook were very limited.

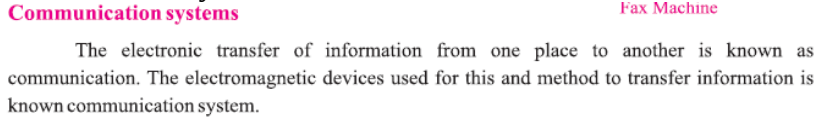
Activity

Connect one metre long nichrome wire to a variable power supply as shown in Fig.(8.6). Also connect an ammeter in series with the circuit. Connect a voltmeter parallel to the nichrome wire. Increase the voltage step by step from the power supply. Keep on noting the

(p. 113)

Precautionary measures about the dangers of electricity (p.121) and first aid administration (p.122) are also examples of self-management skills addressed in the textbook.

Communication skills have been encouraged among students through articulating their ideas and thoughts about scientific principles.The electronic communication system on p. 144 also provides information on various electronic communication channels and components of the communication system.


Communication systems

Fax Machine

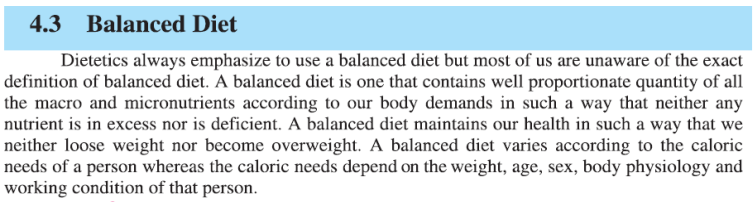
The electronic transfer of information from one place to another is known as communication. The electromagnetic devices used for this and method to transfer information is known communication system.

(p.144)

Active Citizenship Skills

Active Citizenship Skills include empathy, respect for diversity and participation. **Empathy** is discussed in the textbook by displaying figures and topics that show the impact of discoveries and human activities on the environment and society. Examples are figure 4.6 showing helping the breathless patient by lifting chest cavity (p. 49), topic first aid help (p. 48) and figure 5.9 of preventive measures of malaria where people are helping others, (p. 61). While explaining diseases it is instructed in various places such as a suffocated child with diarrhea disease should be admitted to hospital immediately and figure 5.6 shows child can be saved from tetanus disease through tetanus vaccination(p. 59).

The **respect for diversity** componenthas been addressed ingeneral science textbook content by accentuating the significant scientific contributions of inventors from diversecultures and backgrounds. One example is a picture of Marconi who invented radio system (p. 131). While discussing the balanced diet caloric needs of a person are addressed diversity in context of age, weight, sex, working conditions and body physiology (p. 44).


4.3 Balanced Diet

Dietetics always emphasize to use a balanced diet but most of us are unaware of the exact definition of balanced diet. A balanced diet is one that contains well proportionate quantity of all the macro and micronutrients according to our body demands in such a way that neither any nutrient is in excess nor is deficient. A balanced diet maintains our health in such a way that we neither loose weight nor become overweight. A balanced diet varies according to the caloric needs of a person whereas the caloric needs depend on the weight, age, sex, body physiology and working condition of that person.

(p. 44)

Participation of students is less discoursed in general science textbooks. Students' involvement in scientific experimentations, projects and community engagement may be added to increase the participation of students.

Discussion

Research studies showed that most schools use textbooks to teach science subjects, and textbooks are enacted as a curriculum. Therefore, high-quality

textbooks are important for achieving learning outcomes for science subjects (McDonald, 2016).Thus, the present research study analyzed the general science textbook ofthe 9th& 10thclasses of Punjab Curriculum and Textbook BoardLahore in the context of life skills through qualitative content analysis.Present research based on four clusters of life skills learning, employability, personal empowerment and active citizenshipwith three life skills under each cluster. The general science textbook contains 11 chapters covering various science subject themes and lists topics, contentdescriptions, figures, important chapter points, a glossary, interesting information blocks and exercise questions. Open-ended questions in the general science textbook help students to think scientifically. Örnek andAlaam(2024) also supported the idea that questions increase students' interest in science and help them think deeply. Questioning allows students to explore different perspectives to understand the concept better. There is a need for open-ended questions which help students to think scientifically. Aldahmash, et al. (2016) and Dunne et al. (2013) in their research studies said thattextbooks play a key role in teaching science subjects as theyshape the curriculum and teachers' practices.

The general science textbook encourages learning skills that include critical thinking, creativity, and problem-solving. It promotes critical thinking byassessingevidence, linking concepts and drawingconclusions.Creativity is addressed to some extent,though,activities and exercises based on hypothetical situations may be included in the textbook to enhance creativity. Conceptual questions are included in general science textbooks for developing problem-solving abilities. Örnek & Alaam (2024) also favoured that textbooks should promote inquiry-grounded activities hands-on practices and student engagement. These activities include experimentation, and problem-solving assignments, which demand pupils to apply scientific knowledge to solve real-worldproblems.PISA also examines scientific competency of students by examining science knowledge which includes scientific methods, its explanations, students' scientific attitudes and their engagement in science activities (Eivers et al., 2008). Jamil, Bibi and Shahzadi (2024) were of the view that critical thinking can be enhanced by including clear stepwise directions in the textbook where clear strategies are provided to apply problem-solving skills to cope with novel situations.

Regarding employability skills, results of present research revealed that in general science textbooks, negotiation and cooperationskills are addressed less in terms of activities or scenarios that help students cooperate and teamwork. There were various scientific choices and ethical dilemmas that were useful for students in the development of decision-making skills.

According to Chiappetta and Fillman (20027) textbooks are useful in providing guidelines for teachers so they can design their teaching strategies for promoting learning among students. Textbooks haveseveral purposes such as framing teaching, disseminating content,settingprojects, supplyinga framework for activities, providinghome tasks, and facilitating teachers (Hansen, 2018).

Personal empowerment such as resilience and self-management are addressed in the General Science textbookby exhibiting events, examples, and topics of overcoming setbacks and challenges. Communication skills have been encouraged among students through articulating their ideas and thoughts about scientific principles. Danczak et al. (2017) and Yoon et al. (2014) also supported problem-solving techniques and practical activities in science.Zajkov et al. (2017) also claimed that textbooks are an essential source of knowledge that teachers and students mostly use but there are certain concerns about the quality of textbooks.

Active Citizenship Skills include empathy, respect for diversity and participation.Active citizenship skills such asempathy are discussed in the textbook by displaying figures and topics that show the impact of discoveries and human activities on the environment and society.The respect for diversity component has been addressed in general science textbook content by accentuating the significant scientific contributions of inventors from diverse cultures and backgrounds while the participation of students is less addressed in general science textbooks.Okan and Kaya (2023) were also supported that there is a need to integrate the social institutional side of science with the epistemic and cognitive aspects to get a holistic understanding of science that is important for scientific development.

Conclusion

The general science textbook ofthe 9^{th}& 10^{th} class of Punjab Curriculum and Textbook BoardLahore was analyzed based on four skills clusters associated with life skills which arelearning, employability, personal empowerment and active citizenship.The general science textbook contains 11 chapters covering various science subject themes. The general science textbook encourages learning skills throughcritical thinking, creativity, and problem-solvingbyproviding concepts, activities, exercises, and conceptual questions.Regarding employability skills, in general science textbooks, negotiation and cooperation skills are addressed less in terms of activities or scenarios that help students cooperate and teamwork. There were various scientific choices and ethical dilemmas that were useful for students in the development of decision-making skills.However, the activities presented in the textbook were very limited. Personal empowerment such as resilience and self-management are addressed in the General Science textbook by exhibiting events, examples, and topics of overcoming setbacks and challenges.Communication skills have been encouraged among students through articulating ideas and thoughtsaboutscientific principles. Active Citizenship Skills such as empathy areaddressed in textbook by displaying figures and topics that show the impact of discoveries and human activities on the environment and society while respect for diversity component has been addressed by accentuating the significant scientific contributions of inventors from diverse cultures and backgrounds while participation of students is less addressed in general science textbooks.

Recommendations

1. More practical and group activities may be added to enhance the various life skills among students such as participation, decision-making, communication, resilience and self-management.
2. Chapter openers may be added by short writeups about chapters with interesting pictures to trigger inquiry among students.
3. Investigations may be added in the form of simple experimentations and demonstrations.
4. ICT links may be added which may help the learners to search the information from the internet.

References

- Abrahams, I., et al. (2022). Life skills integration in science education: A systematic review. *Educational Research Review*, 35, 100462. doi:10.1016/j.edurev.2021.100462
- Aldahmash, A. H., Mansour, N. S., Alshamrani, S. M., &Almohi, S. (2016). An analysis of activities in Saudi Arabian middle school science textbooks and workbooks for the inclusion of essential features of inquiry. Research in Science Education, 46(6), 879–900.
- Ali, F., & Shah, S. H. (2017). Critical analysis of the portrayal of scientific concepts in secondary level general science textbooks in Pakistan. *Journal of Educational Sciences and Research*, 7(2), 45-58
- Al-Zahrani, Y. (2021). Analyzing the content of the third intermediate grade mathematics book in the light of the twenty-first century skills for students of public education schools in Saudi Arabia. Journal of Arts, Literature, Humanities and Social Sciences, No. 68, 209-242, ISSN Online: 2414 – 3383 , ISSN Print: 2616 – 3810.
- American Psychological Association. (2024). *Middle East and North Africa (MENA) region: Life skills*. Retrieved July 12, 2024.
- Ayvacı, H. Ş., &Bebek, G. (2017). 2013 yılındarevizeedilen fen bilimleridersiöğretimprogramı'ndayeralankazanımlarınincelenmesi: Model oluşturmavekullanmakonusu. Hasan Ali Yücel EgitimFakültesiDergisi, 14(1), 89-104.
- **Bender, D. (2002).** Assessing Life Skills Development: A Series of Skill Sets.*Journal of Adult and Continuing Education*, 8(3), 41-50.
- **Boleman, C., Merten, K., & Hall, G. (2004).** Youth Life Skills Development through Extension Programs. *Journal of Youth Development*, 4(1), 15-22
- Bybee, R. W. (2010). "Advancing STEM Education: A 2020 Vision." Technology and Engineering Teacher, 70(1), 30-35
- Büyüköztürk, Ş., Kiliç Çakmak, E., Akgün, Ö. A., Karadeniz, S., & Demirel, F. (2013). Scientific research methods. Pegem Academi.

- Cedefop (2018). *Insights into skill shortages and skill mismatch: Learning from Cedefop's European skills and jobs survey*. Publications Office of the European Union, Luxembourg. http://data.europa.eu/doi/10.2801/645011
- Chen, X., & Wang, Y. (2019). The impact of teaching life skills through general science curriculum: A longitudinal study in middle schools. *Educational Research Review, 27*, 125-137. doi:10.1016/j.edurev.2019.03.002
- Chiappetta, E. L., & Fillman, D. A. (2007). Analysis of five high school biology textbooks used in the United States for inclusion of the nature of science. *International Journal of Science Education*, 29(15), 1847–1868.
- Deveci, İ., &Çepni, S. (2017). Examination of science education curriculum (5-8 grades) in terms of entrepreneurial characteristics. Alan EğitimiAraştırmalarıDergisi, 3(2), 52-74.
- Danczak, S., Thompson, C., & Overton, T. (2017). 'What does the term Critical Thinking mean to you?'A qualitative analysis of chemistry undergraduate, teaching staff and employers' views of critical thinking. Chemistry Education Research and Practice, 18(3), 420-434.
- Dunne, J., Mahdi, A. E., & O'Reilly, J. (2013). Investigating the potential of Irish primary school textbooks in supporting Inquiry-based Science Education (IBSE). International Journal of Science Education, 35, 1513–1532.
- Eivers, E., Shiel, G., & Pybus, E. (2008). A teacher's guide to PISA science (pp. 1-68). Educational Research Centre.
- European Commission/EACEA/Eurydice. (2012). *Developing Key Competences at School in Europe: Challenges and Opportunities for Policy*. Eurydice Report. Luxembourg: Publications Office of the European Union. Retrieved from https://op.europa.eu/en/publication-detail/-/publication/5d1b1dd7-f94b-4b93-90fd-82a1b9153a6e
- European Communities. (2008). *The European Qualifications Framework for Lifelong Learning (EQF)*. Luxembourg: Office for Official Publications of the European Communities. Retrieved from https://europa.eu/europass/en/european-qualifications-framework-eqf
- **Fox, J., Schroeder, D., & Lodl, K. (2003).** "Life Skills Development Through 4-H Clubs: The Perspective of 4-H Alumni." *Journal of Extension*, 41(6). Retrieved from https://www.joe.org/joe/2003december/rb2.php
- Garcia, M., & Lopez, A. (2020). Linking general science education with life skills in diverse cultural contexts: A comparative analysis. *International Journal of Science Education, 42*(7), 980-995. doi:10.1080/09500693.2020.1712198

- **Garinger, D. (2001).**Textbooks and their Role in Language Classrooms: Perspectives from Teachers and Learners. *English Teaching Forum*, 39(1), 34-43. (Note: The specific page number for the quote provided is page 34)
- Hanbury, A. (2008). *The Life Skills Handbook: An Active Learning Handbook for Working with Street Children*. Published by Active Learning Centre, United Kingdom. Retrieved from https://resourcecentre.savethechildren.net/node/3171/pdf/the_life_skills_handbook.pdf
- Hansen, T. I. (2018). Textbook use. In E. Fuchs & A. Bock (Eds.), The Palgrave handbook of textbook studies (pp. 369–381). Palgrave Macmillan.
- Hendricks, P. (1998). *Developing Youth Curriculum Using the Targeting Life Skills Model: Incorporating Developmentally Appropriate Learning Opportunities to Assess Impact of Life Skill Development*. Iowa State University. Retrieved from https://www.extension.iastate.edu/4hfiles/VI950902FA_TargetingLifeSkillsModel.pdf
- Hilton, M. L., & Pellegrino, J. W. (2012). Education for life and work: Developing transferable knowledge and skills in the 21st century. National Academies Press.
- Hussain, A., & Raza, S. (2021). Integration of indigenous knowledge in general science textbooks at the secondary level in Pakistan: A qualitative analysis. *International Journal of Science Education*, 43(9), 1295-1310. doi:10.1080/09500693.2020.1862084
- Ibrahim, M. (2018). Lifeskills development through science education: A case study in secondary schools. *Journal of Education and Practice*, 9(3), 106-113.
- Initiative, C. E. (2017). Analytical Mapping of Life Skills And Citizenship Education In The Middle East And North Africa.
- Jamil, M., Bibi, T., & Shahzadi, U. (2024). Critical thinking skills development among secondary school students: An analysis of Chemistry textbook grade X (2020). *Research Journal for Societal Issues*, 6(2), 1-11.
- Jones, A. B. (2016). Integrating life skills into secondary science education: Enhancing critical thinking, problem-solving, and communication. Journal of Science Education, 24(3), 345-360.
- Karatay, R., Timur, S., & Timur, B. (2013). 2005 ve 2013 yılı fen dersiöğretimprogramlarınınkarşılaştırılması. Adıyaman ÜniversitesiSosyalBilimlerEnstitüsüDergisi, 6(15), 234-264
- Khan, A. (2021). Advanced problem-solving in high school science textbooks. *Educational Sciences: Theory & Practice, 21*(4), 789-803.

- Kivunja, C. (2015). "Exploring the Pedagogical Meaning and Implications of the 4Cs 'Super Skills' for the 21st Century through Bruner's 5E Lenses of Knowledge Construction to Improve Pedagogies of the New Learning Paradigm." *Creative Education*, 6(2), 224-239.
- Kodan, H., & Bozdemir, H. (2014). İlköğretim 4. ve 5. sınıf fen veteknolojivesosyalbilgilerdersikazanımveetkinliklerininçevreeğitimin eyönelikanalizi. International Journal of New Trends in Arts, Sports & Science Education (IJTASE), 3(3), 28-35.
- Kyngäs, H. (2020). Qualitative research and content analysis. The application of content analysis in nursing science research, 3-11.
- Mahajan, R. (2020). Ethical and social considerations in middle school science textbooks. *Science Education Review, 32*(1), 44-58.
- Mayring, P. (2014). Qualitative content analysis: theoretical foundation, basic procedures and software solution.
- Massi, M. & Bakheet, (2010). Learning and Teaching Life Skills, Dar AlZahra, Riyadh, Saudi Arabia.
- McDonald, C. V. (2016). Evaluating junior secondary science textbook usage in Australian schools. *Research in Science Education*, 46(4), 481–509
- Okan, B., & Kaya, E. (2023). Exploring the inclusion of nature of science in Turkish middle school science textbooks. Science & Education, 32(5), 1515-1535.
- Olorundare, A. S., & Mji, A. (2021). The role of textbooks in promoting lifeskills in science education: A comparative analysis. *Journal of Research in Science Teaching*, 58(5), 624-645. doi:10.1002/tea.21787
- Örnek, F., & Alaam, S. (2024). Five Essential Features of Scientific Inquiry in Bahraini Primary School Science Textbooks and Workbooks. Science & Education, 1-49.
- Ornstein, A. C., & Hunkins, F. P. (2017). Curriculum: Foundations, Principles, and Issues. Pearson.
- Osborne, J., & Dillon, J. (2008). Science education in Europe: Critical reflections (Vol. 13). London: The Nuffield Foundation.
- Rannikmäe, A., Rannikmäe, M., & Holbrook, J. (2008). A paradigm shift in teachers: Recognizing the nature of science as its' place in teaching. The need for a paradigm shift in science education for post-Soviet societies, 143-163.
- **Riazi, A. M. (2003).** "What Textbook Evaluation Schemes Tell Us? A Study of the Textbook Evaluation Schemes of Three Decades." *Society and Education*, 21(1), 21-36. (Note: The specific page number for the quote provided is page 21)
- Saeed, M. (2003). "Enhancing Life Skills through Science Education: A Comprehensive Approach." International Journal of Science and Technology Education, 12(2), 147-159.

- **Sheldon, L. E. (1988).** "Evaluating ELT Textbooks and Materials." *ELT Journal*, 42(4), 237-246. (Note: The specific page number for the quote provided is not mentioned; if you have access to the text, you can add it accordingly)
- Singh, V. (2018). Preparing high school students for real-world challenges through science education. *Journal of Secondary Education, 47*(2), 105-121.
- Smith, J. (2020). *The Role of Science Textbooks in Developing Critical Thinking and Problem-Solving Skills*. Academic Press.
- Trilling, B., & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times*. Jossey-Bass, San Francisco.
- UNESCO. (2013). Education for sustainable development goals: Learning objectives. UNESCO.
- UNESCO. (2021). *Life Skills Education: A Global Perspective*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000375444
- United Nations. (2003). *The United Nations Literacy Decade: Education for All*. International Plan of Action. New York: United Nations. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000139910
- World Health Organization [WHO]. (1997). *Life Skills Education for Children and Adolescents in Schools*. Programme on Mental Health, Geneva. Retrieved from https://apps.who.int/iris/handle/10665/63552
- World Health Organization. (1999). Partners in life skills education: Conclusions from a United Nations inter-agency meeting. World Health Organization.
- YAŞAROĞLU, C. (2013). HAYAT BİLGİSİ DERSİ KAZANIMLARININ DEĞERLER EĞİTİMİ AÇISINDAN İNCELENMESİ. *Electronic Turkish Studies*, *8*(7).849-858
- Yildirim, A., & Şimşek, H. (2011). Qualitative research methods in social sciences (8th. ed.). Seçkin Publishing House.
- Yoon, H., Woo, A. J., Treagust, D., & Chandrasegaran, A. (2014). The efficacy of problem-based learning in an analytical laboratory course for pre-service chemistry teachers. International Journal of Science Education, 36(1), 79-102.
- Yumuşak, G. K. (2017). 2005 fen veteknolojive 2013 fen bilimleriöğretimprogramımaddevedeğişimöğrenmealanıkazanımlarının karşılaştırmalıanalizi. BartınÜniversitesiEgitimFakültesiDergisi, 6(2), 596-613.
- Zajkov, O., Gegovska-Zajkova, S., & Mitrevski, B. (2017). Textbook-caused misconceptions, inconsistencies, and experimental safety risks of a grade 8 physics textbook. International Journal of Science and Mathematics Education, 15(5), 837–852.