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Study of the Contents of Secondary High School Chemistry Textbooks in Iran and Malaysia Regarding Attention to Occupational Readiness Components

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ABSTRACT

This article investigated the contents of secondary high school chemistry textbooks in Iran and Malaysia regarding occupational readiness components. The method was comparative qualitative using George Bereday's approach. The data was collected by the documentary method. The research sources included primary sources (Iranian secondary chemistry textbooks in grades 10, 11, and 12 and Malaysian supplementary secondary chemistry textbooks in Forms 4 and 5) and secondary sources. Data analysis was performed using content analysis and included the review of text, images, questions, and activities in primary sources. The findings showed that the textbooks of the two countries have similarities. In both countries, the attention to recognizing and discovering occupational opportunities was more than other components. Both countries were almost the same regarding performing manual and physical skills. The concepts discussed in the chemistry textbooks of Malaysia and Iran was similar. Also, the results showed some differences between the chemistry textbooks of the two countries. Pictures and texts related to career preparation in Malaysian textbooks provided better guidance to students about choosing a career. The attention to acquiring occupational skills presentable in the labor market in Iranian chemistry textbooks was less than other components while manual and physical skills had the least attention in Malaysian chemistry textbooks. An interesting point in the Malaysian books was the inclusion of a section namely "the Career Kiosk", which provides information on chemistry-related careers. According to the findings, it is suggested that more content related to occupational readiness is included in chemistry textbooks of Iran secondary high schools, especially in the field of acquiring occupational skills presentable in the labor market and manual and physical skills. Appropriate pictures and activities could be used to guide students' future careers.

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1. Introduction

In centralized educational systems, textbooks hold particular significance as other educational media revolve around them. Textbooks play a pivotal role in the teaching-learning process, and any decision regarding central elements of planning should be reflected in the textbook. Each country has developed a unique educational system according to its historical, cultural, and economic backgrounds (Marlow-Ferguson, 2002). These educational systems rely on textbooks to provide optimal learning opportunities for students (Chou, Tang and Tsai, 2021). Textbooks are necessary elements in the learning process as they serve as sources for teachers and students to perform educational and learning activities in line with a given curriculum that helps develop social, cultural, and occupational values (Shen, 2021; Koivisto, Vinokur and Vuori, 2011).

The degree to which textbooks focus on teaching skills can determine the learning opportunities that society provides for its students (Kar, Güler, Sen, and Özdemir, 2017). In Iran's education system, textbooks are the main content available to teachers; and the teaching-learning process is directed only by relying on the lessons' contents, concepts, priorities, and values presented in the textbooks. In today's intricate and challenging world, assessing, analyzing, revising, and reforming textbooks' content based on society's requirements is essential. Numerous studies have reported on the content analysis of textbooks. For instance, Ryu, Jeon, and Paik (2021) analyzed the perception of pre-service chemistry teachers toward chemistry textbooks and concluded that the textbooks' contents need to be improved to reduce teachers' unawareness of scientific concepts.

Discovering occupational interests and making decisions that influence students' occupational futures is an essential topic in high school curricula. For adolescents, one of the most significant decisions is entering university to acquire more advanced knowledge and skills required for many occupations today (Xiao, Newman, and Chu, 2018). Researchers have long been interested in how adolescents choose future jobs and achieving occupational readiness is viewed as a central developmental stage in adolescence (Savickas, 2002) since insufficient readiness may lead to professional problems in the future (Skorikov, 2007). Occupational readiness, as defined by Lent (2013), is the consciousness of health status regarding occupational health threats and resources and opportunities that can be used.

Today, with economic globalization and the technological advancement that has culminated in the emergence of new occupations, the youth encounter new competencies for occupational readiness. Students who lack a clear understanding of the working environment of each discipline or the occupations related to each field may fail to choose the appropriate university field. This

situation can lead to a lack of academic motivation and negatively affect their career development in the future (Xiao, Newman, and Chu, 2018). Therefore, it is essential to put occupational planning and incorporate employment-related concepts into textbooks to increase their motivation to learn and make more meaningful occupational decisions (Keele, Swann, and Davie-Smythe, 2020).

In their research, Xie, Kong, Skaggs, and Yang (2019) assessed an occupational training program as part of the curriculum of a secondary high school in Zhejiang Province, China. This program included occupational training classes, occupational counseling, and professional activities aiming to teach occupational exploration skills to students and help them build an accurate perception of occupations. Implementing this program improved students' total occupational adaptation, including increased awareness of the importance of future planning, increased curiosity regarding occupational world information, and increased self-confidence to engage in occupation-related responsibilities.

Occupational planning training is a focal point in the school curricula in most countries worldwide. According to Fletcher, Warren, and Hernandez-Gantes (2018), a crucial goal in the American education system is to ready students for an effective transition to adulthood, college, and occupation, leading students to become productive citizens by nurturing an educated and skillful labor force. In public high schools in Saskatoon, Saskatchewan State, Canada, occupational readiness courses are implemented in the 10th to 12th grades, providing students with actual workplace experiences supported by basic skills taught in the classroom. In the 10th and 11th grades, these classes focus on reviewing and identifying occupations, while in the 12th grade, they are administered practically and experientially. The practical activities implemented in the 12th grade consist of developing a resume and cover letter, mock interview practice, job shadowing, and working in a company selected and suggested by the teachers for a limited time (Gaylor & Nicol, 2016).

According to Siddiky and Aktar (2021), students usually choose their occupations without proper awareness of job information and labor market conditions; while success in a job depends on accurate occupational planning, including choosing the profession and adopting appropriate strategies for occupational readiness. Occupational planning plays a fundamental role in creating successful occupational futures for students by helping them choose the right job and apply the proper actions to achieve career goals. Shen (2021) studied the occupational training assigned in high schools in Western countries and China. He concluded that some Western countries had more advanced and mature methods of providing occupational training, while Chinese high schools had not comprehensively developed similar curricula yet. Thus, similarly, occupational guidance should

be provided to Chinese high school students to help them think more about their future goals and facilities and plan for college and occupation; hence, to make the provision of occupational planning training efficient and effective in schools, policymakers, professional instructors, school principals, and teachers should collaborate with each other so that they can promote the development of such curricula in high schools. Serbes and Albay (2017) referred to the relationship of occupational planning training with development, particularly in the present era in which, with increasing technology development, demands in markets and expectations in societies and organizations have changed. They concluded that all these changes had enhanced the importance of learning and teaching so that the role of administrators of the education system had become more important than ever.

Despite the cultural, social, historical, and economic differences that form different educational systems, these systems have similar difficulties. Doing comparative studies and being aware of the experiences and methods of developing educational systems and reforms of other developed countries will be increased our ability to eliminate the difficulties available in science and technology education. The analysis and comparison of the textbooks of different countries help better understand the different educational systems across the world; and the training methods followed by each country (Sun, 2011; Backhaus, Mell, Sabel, 2007). Comparative study of textbooks helps better understand the society in which the educational system is implemented and results in understanding the probable reasons for the students' different performances in different countries (Sakir & Kim, 2021). Comparative studies can help us specify the advantages and disadvantages and similarities and differences of textbooks (Gedik & Kolsal, 2022; Takeuchi & Shinno, 2020) and potentially build a perspective for their improvement and modification in the future.

Chemistry is a fundamental discipline that is relevant to a variety of careers in industry and academia (Solano, Wood & Kurth, 2011), such as the development of new materials, medical chemistry, green and environmental chemistry, forensic chemistry, engineering and materials chemistry, and nanotechnology (Phoenix, 2007; Solano, Wood & Kurth, 2011; Dangur, Avargil, Peskin & Dori, 2014). Therefore, it is necessary to develop technological and scientific innovations that will shape the future achievements of each country.

Chemistry encompasses many abstract concepts, theories, and principles. However, according to various studies, it is not a popular career choice, and there is a shortage of skilled professionals in the field at all educational, academic, and industrial levels (Solano, Wood & Kurth, 2011; Ogunde et al., 2017). Researchers have noted that high school students tend to avoid chemistry as a subject

of study, and fewer students pursue chemistry in higher education (Salta, Gekos, Petsimeri & Koulougliotis, 2012; Ardura & Pe´rez-Bitria´n, 2018).

In recent years, there has been a decline in the selection of several fields as university disciplines, and chemistry is one of the most affected disciplines, according to many researchers (Salta, Gekos, Petsimeri & Koulougliotis, 2012; Ardura & Pe´rez-Bitria´n, 2018). Chemistry students often have poor perceptions of the subject in academia and industry, are unaware of the various career opportunities available, and sometimes lack the necessary additional skills to act as professional chemists (Tucci, O'Connor & Bradley, 2014). Therefore, high school students need help with career planning and familiarization with the career options available to chemists (Solano, Wood & Kurth, 2011).

All students have concerns about finding a job, making a good living, and balancing their personal and professional goals. Exposing students to graduate school options and professionals increases their awareness of available career options (Bowers, 2021). Given the critical role of chemistry lessons in creating employment in society and the importance of chemistry textbooks in creating occupational readiness in students, this study compares the chemistry textbooks of secondary high schools in Iran and Malaysia with attention to Broline's occupational readiness components.

Education plays a crucial role in realizing Malaysia's aspirations for development (Wan, Sirat, & Razak, 2018). Malaysia invests in education and training to improve workforce quality, economic productivity, and global competitiveness. Hence, to fully realize these goals, the country is eager to develop its human capital that can respond to changes in the 21st-century workplace. Education in Malaysia is a continuous effort to further develop the potential of individuals in a comprehensive and integrated manner (Nurul-Awanis, Hazlina, Yoke-May & Zariyawati, 2011). The Malaysian education system is conducted by the National Education Philosophy, which aims to create competent and knowledgeable Malaysian citizens with high moral standards who are responsible for achieving personal well-being and contributing to the harmony and improvement of life, family, society, and the nation in general (MoE, 2001; Nurul-Awanis, Hazlina, Yoke-May & Zariyawati, 2011).

In Malaysia, the education system for chemistry is highly reliant on chemistry textbooks as they serve as the primary source of information for students. Given their importance and widespread use, analyzing textbooks is necessary to gain valuable insights as they play a crucial role in the national curriculum. Therefore, the results that highlight important content elements can be used as headings in the production of future textbooks. Additionally, the information obtained from the

analysis can be integrated to produce better textbooks, improving the education of the country and providing teachers with competitive teaching materials to enhance student learning. Therefore, a careful analysis of textbooks is essential to ensure continuous growth and improvement (Xing & Mohd Fadzil, 2021).

In Iran, high school courses last for six years and involve two three-year periods. The lower high school comprises the 7th, 8th, and 9th grades, while the secondary high school includes the 10th, 11th, and 12th grades. Chemistry is taught as a compulsory lesson for pure science in secondary high school courses (Ministry of Education of Iran). Secondary education in Malaysia lasts for five years, referred to as Form (Tingkatan) 1 to 5. Form 1 to Form 3 is known as Lower Secondary (Menengah Rendah), while Form 4 and 5 are known as Upper Secondary (Menengah Atas). In Malaysian secondary high schools, chemistry is one of the compulsory subjects for pure science students. Students who choose pure science classes have to take up two years of chemistry in Form 4 and Form 5 before they sit for the public examination (Ministry of Education of Malaysia).

Based on Broline's occupational readiness model, the first step towards occupational readiness is to train the required skills in daily life. These skills should be learned by students at an early age to be adequately prepared for the job they will take in the future. These skills include recognizing and discovering occupational opportunities, making appropriate decisions about occupations, developing appropriate behaviors at work, carrying out manual and physical skills, and acquiring occupational skills that are marketable (Sharifi Jandani, Ghobari Bonab, 2015; Sawareh, Abdi, Sawareh, 2020). The purpose of this research was to perform a content analysis of chemistry textbooks of secondary high schools in Iran and supplementary secondary high schools in Malaysia based on occupational readiness components. This analysis was guided by four questions:

- What is the level of attention to occupational readiness components in high school chemistry textbooks in Iran?
- What is the level of attention to occupational readiness components in high school chemistry textbooks in Malaysia?
- Are there any differences in the chemistry textbooks of Malaysia and Iran regarding the attention to the components of occupational readiness?
- What topics are raised in the chemistry textbooks of Iran and Malaysia?

2. Research Method

The current research is of the descriptive-comparative and applied type. The statistical population under investigation includes chemistry course textbooks from secondary high schools in both countries, which were downloaded from their respective Ministry of Education websites. The study utilized George Bereday's comparative study model, which involves four stages: description, interpretation, juxtaposition, and comparison. In the description stage, the study phenomena were prepared by collecting evidence and information, taking notes, and collecting findings for review and criticism in the next stage. In the interpretation stage, the collected information was investigated and analyzed. In the adjacency stage, the information prepared in the previous two stages was categorized and put together to establish a framework for comparing similarities and differences. Finally, in the comparison stage, the research problem was investigated and compared in detail regarding similarities and differences, and the research questions were answered (Adick, 2018).

3. Findings

The Table 1 presents the results of the content analysis of chemistry textbooks in Iran and Malaysia regarding their attention to Broline's occupational components. These data are obtained from the analysis of all texts, tables, figures, and problems of textbooks.

Table 1: Examples of the occupational readiness component in chemistry textbooks in Iran and Malaysia

Component	Country	Example
Recognition and discovery of occupational opportunities	Iran	Detergents and cleaning products production industry as one of the extensive and profitable industries
	Malaysia	Production of self-heating smart cans
Making proper decisions about occupations	Iran	Using lithium to produce lighter and smaller batteries with the ability to store more energy
	Malaysia	Using plastic coatings and galvanization as protector against rust
Having appropriate behavior at work	Iran	Since the can of photographic film is thrown, do the experiment at an appropriate distance from you and your classmates.
	Malaysia	The laboratory is both a crucial place to learn chemistry and a dangerous place. All safety regulations and measures must be followed in the laboratory.
Carrying out manual and physical skills	Iran	Exploring the cleansing of soap in various waters
	Malaysia	Role-playing activity (acting) regarding occupations

		in the field of chemistry
Acquiring occupational skills presentable in the labor market	Iran	Plating a steel spoon with silver metal
	Malaysia	The way of using the device correctly in the laboratories, the way of moving them correctly, and the way of using, transporting, and moving chemicals with correctly methods.

3.1. What is the level of attention to occupational readiness components in high school chemistry textbooks of Iran?

Table 2 provides the results of content analysis of Iran's secondary high school chemistry textbooks by text, table, figure, and problems.

Table 2. The frequency and frequency percentage of occupational readiness components in secondary high school chemistry textbooks in Iran

Occupational Readiness Components	Grade	Text	Table	Figure	Problem	frequency	frequency percentage
Recognition and discovery of occupational opportunities	10th	6	2	4	0	12	34.28
	11th	14	1	8	3	26	48.16
	12th	16	0	7	2	25	53.20
Making proper decisions about occupations	10th	3	0	3	4	10	28.57
	11th	9	0	1	2	12	22.22
	12th	9	0	0	4	13	27.64
Having appropriate behavior at work	10th	3	0	0	0	3	8.60
	11th	3	0	3	4	10	18.52
	12th	1	0	0	0	1	2.12
Carrying out manual and physical skills	10th	4	0	1	3	8	22.85
	11th	3	0	0	0	3	5.55
	12th	3	0	0	0	3	6.40
Acquiring occupational skills presentable in the labor market	10th	1	0	0	1	2	5.70
	11th	2	0	0	1	3	5.55
	12th	4	0	0	1	5	10.64
Total	10th	17	2	8	8	35	100
	11th	31	1	12	10	54	100
	12th	33	0	7	7	47	100

The total distribution of the frequency percentages of occupational readiness components in Iranian chemistry textbooks is displayed in Figure 1.

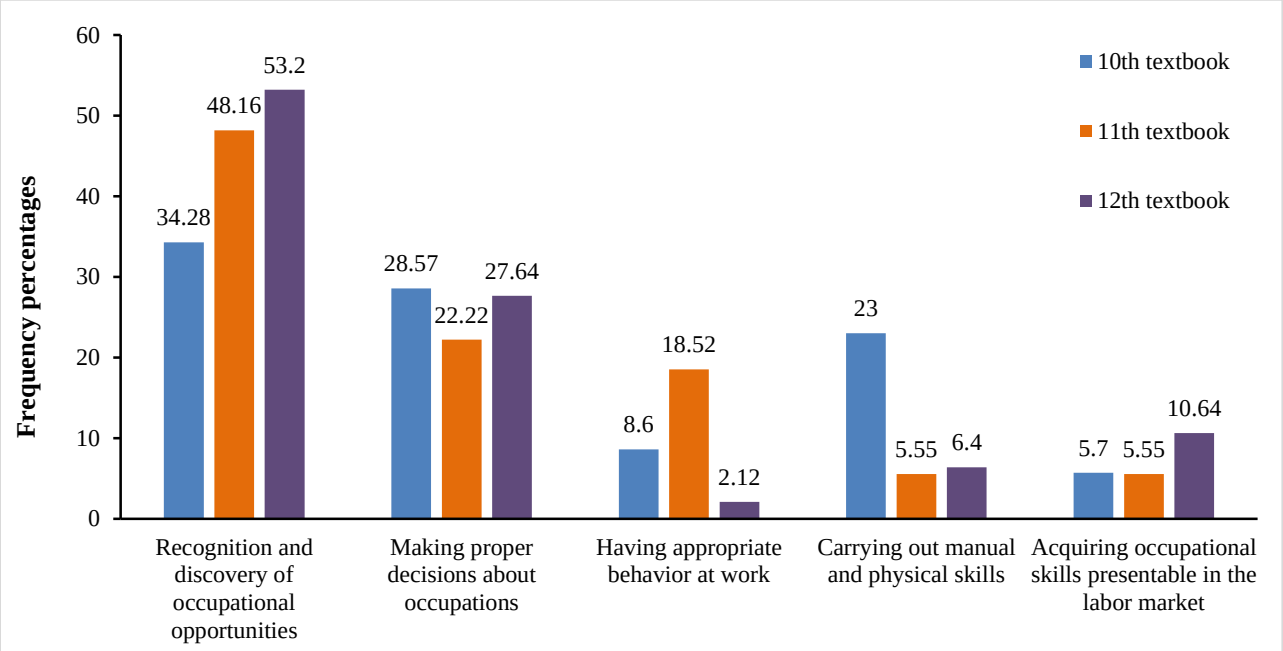


Figure 1. The total distribution of the frequency percentages of occupational readiness components in Iranian chemistry textbooks

As shown in Table 2, the 11th grade chemistry textbook had the highest frequency of coded components (54 items), while the 10th grade chemistry textbook had the lowest (35 items). Notably, the recognizing and discovering occupational opportunities component had the highest frequency percentage across all Iranian chemistry textbooks. Among the three books, the 12th grade textbook received the most attention (53.20%) in this component. Making proper decisions about occupations was ranked second in attention level, with almost equal attention in the chemistry books of the 10th and 12th grades. The 11th grade chemistry textbook received the most attention (52.52%) in this component, while the 12th grade chemistry book received the lowest attention (2.12%) in the appropriate behavior at work. The 10th grade chemistry textbook had the highest attention level (22.85%) in carrying out manual and physical skills. But the attention levels in the 11th and 12th grade chemistry textbooks were significantly lower and roughly equal to each other. The attention levels to acquiring occupational skills in the labor market were almost the same in the 10th and 11th grades, while the percentage in the 12th grade was nearly twice as much.

3.2. What is the level of attention to occupational readiness components in high school chemistry textbooks of Malaysia?

Moving on to the level of attention given to occupational readiness components in high school chemistry textbooks in Malaysia, a content analysis was done on all texts, tables, figures, and problems. Table 3 presents these findings.

Table 3. The frequency and frequency percentage of occupational readiness components in secondary high school chemistry textbooks in Malaysia

Occupational Readiness Components	Form	Text	Table	Figure	Problem	frequency	frequency percentage
Recognition and discovery of occupational opportunities	4	1	0	2	5	8	21.62
	5	18	6	10	3	37	47.45
Making proper decisions about occupations	4	0	0	0	2	2	5.40
	5	13	4	2	0	19	24.35
Having appropriate behavior at work	4	10	0	4	1	15	40.54
	5	3	0	2	0	5	6.40
Carrying out manual and physical skills	4	4	0	0	4	8	21.62
	5	2	0	0	1	3	3.85
Acquiring occupational skills presentable in the labor market	4	1	0	1	2	4	10.82
	5	0	0	0	14	14	17.95
Total	4	16	0	7	13	37	100
	5	36	10	14	18	78	100

The total distribution of the frequency percentage of occupational readiness components in Malaysian chemistry textbooks is presented in Figure 2.

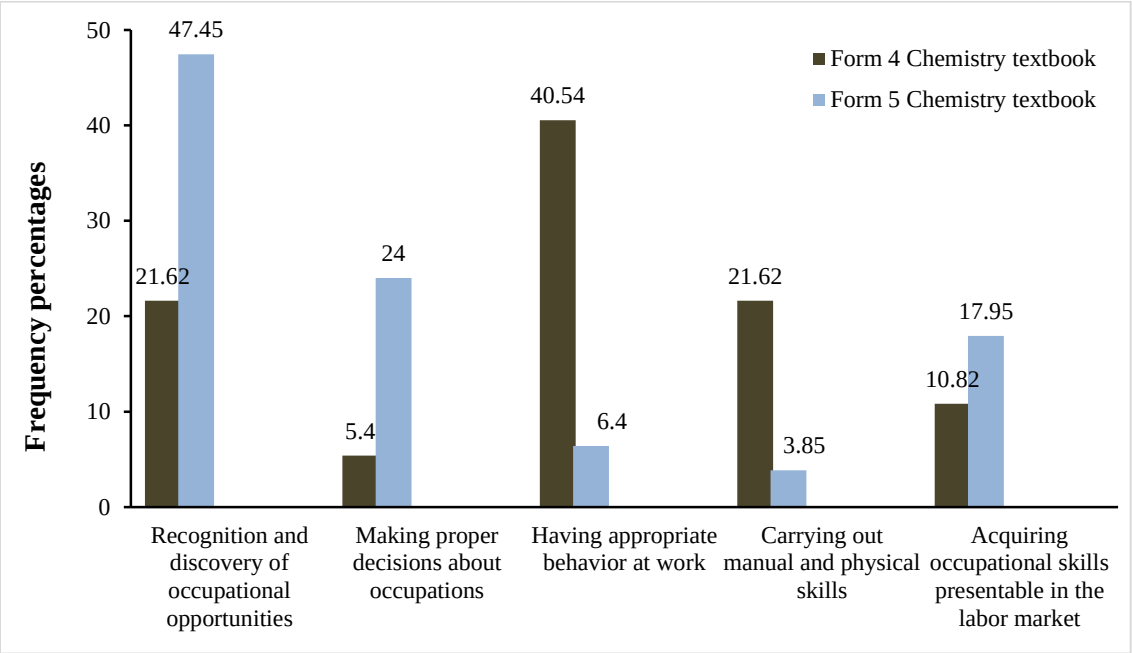


Figure 2. The total distribution of the frequency percentages of occupational readiness components in Malaysian chemistry textbooks

According to Table 3, the Malaysian Form 5 chemistry textbook had 78 coded components, whereas the Form 4 chemistry textbook only had 37. However, the Form 5 chemistry textbook had a higher frequency percentage for three components: recognition and discovery of occupational opportunities, making proper decisions about occupations and acquiring occupational skills that are presentable in the labor market. In contrast, the Form 4 chemistry textbook had a higher percentage for the other two components, the appropriate behavior at work and carrying out manual and physical skills. The recognition and discovery of occupational opportunities and having appropriate behavior at work had the highest frequency percentages in the chemistry textbooks of Form 5 and 4, respectively. The lowest levels of attention were related to the skills of making proper decisions about occupations in the chemistry textbook of Form 4 (5.40%) and carrying out manual and physical skills in the chemistry textbook of Form 5 with 3.85%.

3.3. Are there any differences in the chemistry textbooks of Malaysia and Iran regarding the attention to the components of occupational readiness?

Table 4 lists the frequency and frequency percentage of occupational readiness components in secondary high school chemistry textbooks in Iran and Malaysia. Figure 3 shows the total distribution of the frequency of occupational readiness components in Iranian and Malaysian chemistry textbooks. Based on the mean data scores of the two countries presented in Table 4, the

highest frequency in the two countries of Iran and Malaysia is related to the recognition and discovery of the occupational opportunities component, which is higher in Iranian secondary high school chemistry textbooks (46.32%) than in Malaysian secondary high school chemistry textbooks (39.13%). Making proper decisions about occupations is located in the second rank, and again, Iranian chemistry textbooks have a higher percentage of it. For the two skills of having appropriate behavior at work and acquiring occupational skills presentable in the labor market, Malaysian chemistry textbooks have a higher percentage. Both countries are almost the same in carrying out manual and physical skills.

Table 4. The frequency and frequency percentage of occupational readiness components in secondary high school chemistry textbooks in Iran and Malaysia

Occupational Readiness Components	Iran	Malaysia
Recognition and discovery of occupational opportunities	46.32	39.13
Making proper decisions about occupations	25.73	18.26
Having appropriate behavior at work	10.30	17.40
Carrying out manual and physical skills	10.30	9.56
Acquiring occupational skills presentable in the labor market	7.35	15.65
Total	100	100

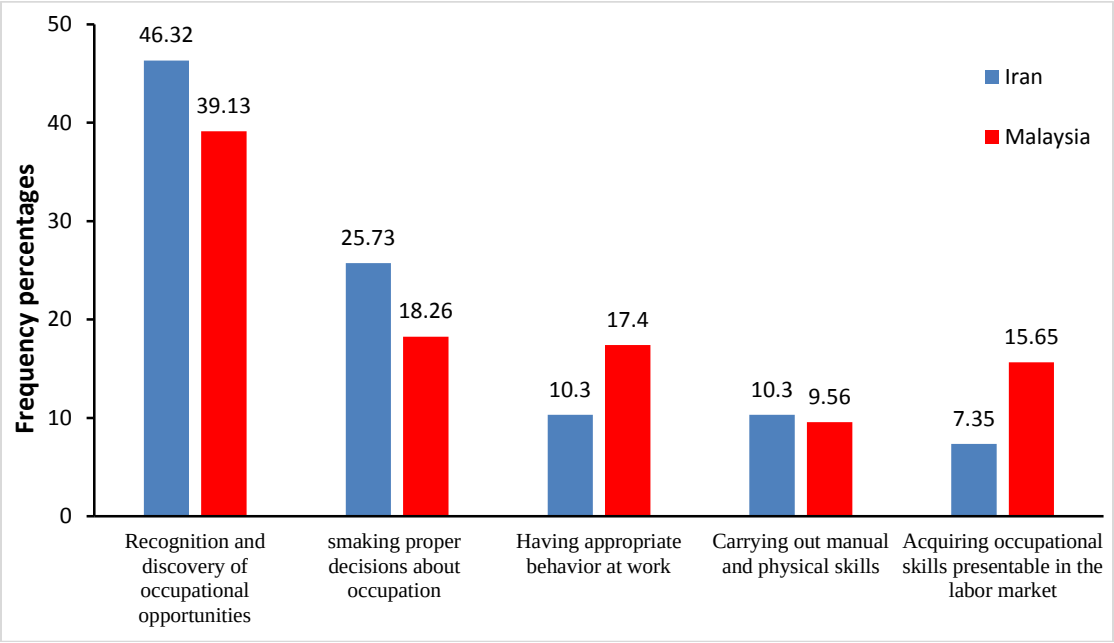


Figure 3. The total distribution of the frequency percentages of occupational readiness components in Iranian and Malaysian chemistry textbooks

3.4. What are the topics raised in the chemistry textbooks of Iran and Malaysia?

The topics covered in the chemistry textbooks of Iran and Malaysia was studied. As earlier noted that in Iran chemistry is a separate subject in the Grade 10, 11, and 12. Tables 5 and 6 presented the topics of Iranian and Malaysian chemistry textbooks, respectively.

Table 5. Topics of high school chemistry textbooks of Iran

Grade	Chapter	Subject
10 th (126 pages)	The universe is the birthplace of the alphabet	• How did the elements appear? • Classification of elements • The atomic mass of elements • Light emission and emission spectrum • structure of atom • Electronic arrangement of atoms • Converting atoms into ions and molecules
	Traces of gases in life	• Air is a precious potion • Oxygen, a reactive gas in the atmosphere • Chemical reactions, the law of conservation of mass • What did we do with the atmosphere? • Greenhouse Effect • Green chemistry, a way to protect the air • Ozone, another form of oxygen in the atmosphere • Behavior of gases
	Water is the song of life	• Invisible companions of water • Solution and amount of solutes, types of concentration • Do salts dissolve equally in water? • The behavior of water and other molecules in an electric field • Intermolecular forces of water, beyond expectations • Which substances make solutions with each other? • The process of dissolving salts in water • Do gases also dissolve in water? • Water footprint in life
11 th (126 pages)	Appreciate earthly gifts	• Patterns and trends in the behavior of materials and elements • The radius of the atom • A colorful world with elements of group d • How are elements found in the world? • Real-world reactions • The metal flow between the environment and society • petroleum, a wonderful gift • Carbon, the basis of the skeleton of hydrocarbons • Alkanes, alkenes and alkynes • Cyclic hydrocarbons • petroleum, the substance that changed the world economy

	In search of healthy food	• Food, matter, and energy • What does the temperature of a material tell? • Preparing boiled food, experiencing the difference in temperature and heat • The flow of thermal energy • heat in chemical reactions (thermochemistry) • Enthalpy and its types • Colorful natural foods, useful and effective inhibitors • Reaction speed • Food, waste and its footprint
	Clothing is an inexhaustible need	• Fibers and macromolecules • polymerization • Polyesters • Alcohols and acids • Esterification reaction • Polyamides • Polymers, permanent or degradable • Green polymer
12 th (121 pages)	Molecules in the service of health	• Environmental cleanliness with molecules • Looking for new detergents • Corrosive detergents • Acids and bases • Electrical conductivity of solutions and acid strength • equilibrium constant and acidic strength • How do corrosive detergents work?
	Comfort and well-being in the shadow of chemistry	• Conducting reactions with electron travel • Energy flow by electron travel • Chemical reactions and the guided travel of electrons • Fuel cells, a source of green energy production • Electrolysis • Corrosion is an unwanted redox reaction
	Chemistry is a manifestation of art, beauty, and durability	• Silica is beautiful, hard, and durable • Graphene, a species as thick as an atom • Ice formations, beautiful with a hard but brittle appearance • The behavior of molecules and the distribution of electrons • Demonstration of molecular and ionic fluids for electricity generation • The beautiful, and three-dimensional arrangement of ions in an ionic solid • Metals, malleable elements with beautiful polish • Titanium, a metal beyond expectation

	Chemistry, a way to a brighter future	• Looking for fresh air • The activation energy in chemical reactions • Ammonia and productivity in agriculture • System volume changes in gas equilibrium • Temperature, a factor for shifting the equilibrium and changing k • The value of chemical technologies • Functional group, the key to the synthesis of organic molecules • Recycling PET

Table 6. Topics of high school chemistry textbooks of Malaysia

Grade	Chapter	Subjects
4 Form (280 pages)	Introduction to Chemistry	• Development in Chemistry Field and Its Importance in Daily Life • Scientific Investigation in Chemistry • Usage, Management and Handling of Apparatus and Materials
	Matter and the Atomic Structure	• Basic Concepts of Matter • The Development of the Atomic Model • Atomic Structure • Isotopes and Its Uses
	The Mole Concept, Chemical Formula and Equation	• Relative Atomic Mass and Relative Molecular Mass • Mole Concept • Chemical Formula • Chemical Equation
	The Periodic Table of Elements	• The Development of the Periodic Table of Elements • The Arrangement in the Periodic Table of Elements • Elements in Group 18 • Elements in Group 1 • Elements in Group 17 • Elements in Period 3 • Transition Elements
	Chemical Bond	• Basics of Compound Formation • Ionic Bond • Covalent Bond • Hydrogen Bond • Dative Bond • Metallic Bond • Properties of lonic Compounds and • Covalent Compounds

	Acid, Base and Salt	• The Role of Water in Showing Acidic and Alkaline Properties • pH Value • Strength of Acids and Alkalis • Chemical Properties of Acids and Alkalis • Concentration of Aqueous Solution • Standard Solution • Neutralisation • Salts, Crystals and Their Uses in Daily Life • Preparation of Salts • Effect of Heat on Salts • Qualitative Analysis
	Rate of Reaction	• Determining Rate of Reaction • Factors Affecting Rate of Reactions • Application of Factors that Affect the Rate of Reaction in Daily Life • Collision Theory
	Manufactured Substances	• Alloy and Its Importance • Composition of Glass and Its Uses Composition of Ceramics and Its Uses • Composite Materials and Its Importance
5 Form (210 pages)	Redox Equilibrium	• Oxidation and reduction • Standard electrode potential • Voltaic cell • Electrolytic cell • Extraction of metal from its ore • Rusting
	Carbon Compound	• Types of carbon compounds • Homologous series • Chemical properties and interconversion of compounds between homologous series • Isomers and naming based on IUPAC nomenclature
	Thermochemistry	• Heat change in reactions • Heat of reaction • Application of exothermic and endothermic reactions in daily life
	Polymer	• Polymer • Natural rubber • Synthetic rubber
	Consumer and Industrial Chemistry	• Oils and fats • Cleaning agents • Food additives • Medicines and cosmetics • Application of nanotechnology in industry • Application of Green Technology in industrial waste management

Malaysian chemistry textbooks incorporate more pictures, which aid students in selecting their future careers. For instance, in the Malaysian Form 4 textbook, the image of an MRI instrument was featured twice: once as the chapter title image and the other in a section discussing the applications of superconductors in manufacturing devices and equipment. This information would fall under the component of recognizing and discovering occupational opportunities. On the other hand, the Iranian textbook stated that helium is used to cool electronic components in imaging devices like MRI (Figure 4). Figures 5 and 6 depict two examples of labeled occupational readiness components in Iranian and Malaysian chemistry textbooks. An interesting part in the Malaysian chemistry textbooks was Career Kiosk. This section provides information on chemistry-related careers.

Figure 4. An example of the figures of chemistry textbooks in Malaysia (top) and Iran (bottom), which were classified in the component of recognition and discovery of occupational opportunities

سالانه میلیون‌ها تن از انواع شوینده‌ها در جهان مصرف می‌شود. صنعت تولید شوینده‌ها و فراورده‌های پاک‌کننده، یکی از صنایع بزرگ و سودآور است که سالانه سود فراوانی را نصیب صاحبان آن می‌کند.

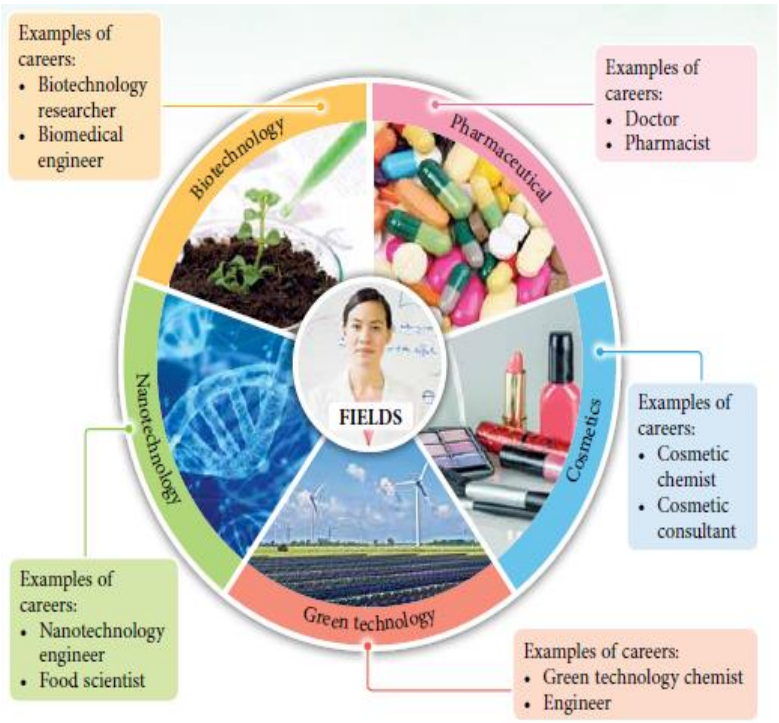
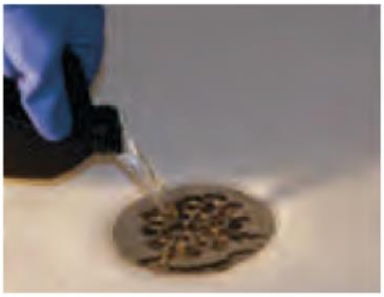


Figure 5. An example of the figures of chemistry textbooks in Malaysia (right) and Iran (left), which were classified in the component of Making proper decisions about occupations



● هنگام استفاده از محلول غلیظ سدیم‌هیدروکسید به‌عنوان لوله‌باز کن، رعایت نکات ایمنی ضروری است، زیرا تماس این محلول با بدن و تنفس بخارات آن آسیب جدی به دنبال دارد.

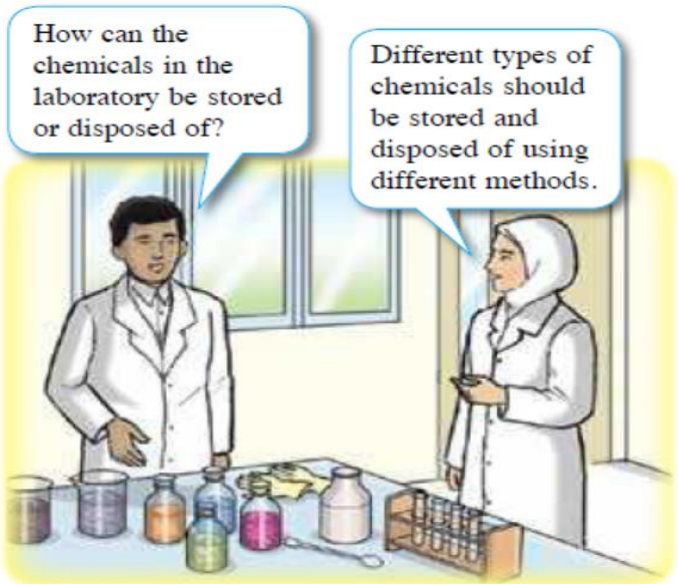


Figure 6. An example from chemistry textbooks in Malaysia (right) and Iran (left), which were classified in the having appropriate behavior at work

4. Conclusion

The increasing complexity of life in all areas has made it a challenge to make an informed decision about choosing a career. The complexity of the modern world, the development of global technology, the development of technical and professional education, and attention to individual differences require people to really identify their talents, abilities, possibilities, and limitations. Making decisions based on correct information becomes crucial. All curricula aim to establish occupational readiness in students through practical goals and solutions. In Iran, the general purposes of education regulations for secondary high school courses aim to lead students toward employment and create the required readiness for it. Specific goals include building and strengthening one or more skills presentable in the labor market, creating adequate and favorable readiness for university education, and helping students recognize and discover their individual talents and capabilities (Safi, 2006). Malaysia's secondary school curriculum aims to develop students' potential by considering their abilities, interests, and talents to prepare them for further education and employment (Ministry of Education of Malaysia, 2008). Also, in the secondary school curriculum of Malaysia, the goal is to develop the potential of people by considering the abilities and capabilities, interests, and talents of the students. The curriculum should prepare students to continue their education and select the employment field.

In Malaysia, the grand strategy is based on technical and vocational education throughout the country, which aims to strengthen the country's working community, develop social justice and solve many social problems. Educational systems' five central elements include educational content, teachers, learners, equipment and tools, and educational planning and management. All these elements have reciprocal interactions, making the educational system dynamic and revolutionary (Serkan Arik & Kezer, 2010). Textbooks are at the center of attention for education experts in centralized educational systems like Iran, where almost all educational factors are determined and implemented based on their content. Therefore, evaluating and analyzing textbooks can solve many current problems in education.

Preparing students for post-school life is the most important mission of education, which requires teachers to provide knowledge and skills for academic and occupational management. Occupational planning training can lead to various positive consequences, such as promoting motivation to learn, increasing self-confidence and positive attitude toward occupation-related decisions, and promoting occupational planning awareness and exploration behaviors (Shen, 2021). Therefore, it is essential to consider the complicated, dynamic, and reciprocal relationships among attitudes, knowledge, competencies, and behaviors (Marciniak, Johnston, Steiner, Hirschi,

2020). Several studies have assessed the relationships among dimensions of occupational readiness, such as occupational readiness attitudes, occupational maturity attitudes, and occupational decision-making (e.g., Creed & Patton, 2003; Gaffner & Hazler, 2002; Hirschi, Herrmann & Keller, 2015; Punch, Creed & Hyde, 2005). For example, occupational readiness attitudes occupational maturity attitudes and occupational decision-making predicted occupational maturity knowledge (Creed & Patton, 2003).

Recognition and discovery of occupational opportunities and making appropriate decisions about occupations play a significant role in choosing a job in the future. The results of this research indicate that, in the secondary chemistry textbooks of Iran and Malaysia, the most attention is given to recognizing and discovering job opportunities. Shen (2021) and Xie, Kong, Skaggs & Yang (2019) suggest that training in the discovery of occupational opportunities helps students develop a clear perception of occupations, increase their curiosity about information related to the labor market, and improve their self-confidence to engage in tasks related to careers. However, in Iranian secondary high school chemistry textbooks, except in the 10th grade, manual and physical skills have received little attention. But the results of other studies have indicated that work experience and the acquisition of manual and physical skills are essential for making occupational decisions and forming occupational attitudes (Trolian, Jach & Snyder, 2018). Talbert & Balschweid (2006) also asserted that "from an occupational viewpoint, student participation in activities related to occupational readiness leads to more informed and appropriate occupational choices" (Connors & Mundt, 2001).

The level of attention given to acquiring occupational skills presentable in the labor market in Iranian chemistry textbooks is lower than all other components. In Malaysian chemistry textbooks, this component has more attention. Walker, Bair, and Macdonald (2022) emphasize that skill-building and occupational discovery strongly affect students, so adopting occupational development activities in classrooms should be considered in organizational programs and levels. An interesting point is that in Malaysian textbooks more attention has been paid to appropriate behavior in work than in Iranian.

As seen in Tables 5 and 6, the number of chapters and pages in Malaysian chemistry textbooks is more than that of Iranian chemistry textbooks. One of the reasons for this is that chemistry experiments are included in Malaysian chemistry textbooks, while in Iran, there is a separate book for science laboratories in the 10th and 11th grades that consist of experiments in biology, chemistry, physics, and geology. Incorporating science experiments into course material may lead to better learning outcomes. From the comparison of Tables 5 and 6, which show the topics

discussed in Iranian and Malaysian chemistry textbooks, it is clear that the titles of topics in Malaysian textbooks are more explicit and clear; while in Iranian textbooks, some subjects are unclear. Also, the pictures in Malaysian books are more effective in promoting occupational readiness components in students (see Figures 4-6). According to the findings, the following suggestions are presented to the planners of chemistry education in Iran:

- More attention should be given to occupational components when compiling chemistry textbooks.
- The objectives and contents of chemistry textbooks from other countries should be studied.
- To improve the position and infrastructure of employment, institutions, organizations, industries, universities, and the Ministry of Education should establish better communication than before and establish a headquarters to facilitate better access to the views and attitudes of the Ministry of Education.
- Similar studies should be conducted for other subjects, particularly science courses.

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