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ANALYSIS OF THE CONTENT OF THE LUBRICATION SYSTEM UNIT IN ENGINES FROM THE AUTOMOTIVE MECHANICS CURRICULUM FOR 11TH-GRADE INDUSTRIAL STUDENTS IN LIGHT OF KNOWLEDGE PATTERNS AND BLOOM'S COGNITIVE LEVELS

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Abstract
This study aimed to analyze the content of the Lubrication System Unit in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students in light of knowledge patterns and Bloom's cognitive levels. The study population consisted of the vocational curriculum textbook (Automotive Mechanics) for the 11th-grade industrial track. The study sample was limited to the Lubrication System Unit in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students, divided into five lessons. To achieve the study's objectives, two tools were used: a content analysis card for knowledge patterns and a content analysis card for Bloom's cognitive levels. The results revealed that the concept pattern ranked first, accounting for 44% of the total knowledge patterns. Meanwhile, the procedures pattern ranked last, accounting for 15% of the total patterns. As for the inclusion percentages within Bloom's cognitive levels, comprehension and understanding accounted for 31% of the total levels. Meanwhile, the application level appeared at 16%, ranking last. In light of the results, the study recommends and suggests that curriculum developers modify the analysis categories by enriching them with more practical exercises, discussions, and projects. It also recommends conducting further studies to include the remaining units in the targeted content and other components of the curriculum. Additionally, it suggests organizing training courses for teachers and trainers in industrial schools and vocational centers, focusing on higher-order thinking skills and strategies for their meaningful application.

Keywords Content analysis, Lubrication system in engines, Knowledge patterns, Bloom's cognitive hierarchy levels.

INTRODUCTION

The increasing scientific and technological advancements have led to fundamental changes in the educational process. There is an urgent need to keep pace with these realities and adapt to them by developing curricula, ensuring their flexibility, updating them, employing modern technology, enhancing scientific thinking, and fostering individual skills and competencies. Additionally, the educational content must be renewed to connect it with the realities of the environment, local communities, and the global community. This is because it has become a requirement for those involved in the educational process to stay aligned with and adapt to these developments.

Scientific and technological progress in any society today depends on an educational system that provides quality education, which means developing and updating curricula. Curricula occupy a vital center in the process of education and are considered the backbone of the educational process. They reflect the reality of society, its philosophy, culture, needs, and aspirations. The challenges of globalization and rapid technological development in the 21st century have made it essential for the education sector to keep pace with these developments. This is because, in addition to the complexities of globalization, the entire cognitive, technological, and information revolution is transforming educational curricula and preparing students to interact with this revolution in multiple ways. Current curricula are not aligned with the development of new thinking skills that keep pace with this revolution (Al-Khaldi & Kashk, 2020).

Therefore, the vision of the Palestinian Ministry of Education and Higher Education is to establish an educational system that aligns with the best global educational standards, guiding students towards a useful and productive life. It aims to develop the ability for continuous learning and teaching, keeping pace with the realities of the globalization era, and contributing to achieving sustainable development in society. This vision is focused on creating modern educational curricula, accompanied by methods and assessment tools based on global academic standards. It also contributes to creating an educational environment that places the student at the center of the educational process. The Palestinian Ministry of Education and Higher Education's focus on developing education dates back to the

early 1990s, when it recognized the strong connection between primary, secondary, and higher education. This began with the recognition of the impact of education outputs on the efficiency and productivity of the workforce graduating from higher education, university, technical, and vocational institutions (Ministry of Education and Higher Education, 2009).

School curricula are among the most prominent components of the educational system in any society. They are an important means upon which educational institutions rely to achieve their teaching and learning goals. Through them, learners practice the values, principles, customs, and perceptions of the society they live in, utilizing their mental and physical abilities to fulfill their desires, needs, and aspirations (Alimat, 2006).

In light of the above, the curriculum is not limited to textbooks but extends to include several interconnected and integrated elements: goals, educational content, cognitive mental stimuli, educational activities, teaching aids, technological activities, assessment methods, and educational questions. All of this is implemented under effective teaching methods that achieve the teaching-learning objectives set by the Ministry of Education (Drouza, 2006).

Educational content is considered one of the key elements of the curriculum in the modern perspective. It is delivered through the school curriculum to achieve the holistic development of the learner, through the information, concepts, skills, attitudes, and values prepared by the institution for the learner. These are the essential components the learner needs to adapt to society in various areas of life. It is defined as a collection of experiences provided through the school curriculum to achieve the holistic development of the learner, through the information, concepts, skills, attitudes, and values prepared by the educational institution for the learner. These are the elements the learner needs to adapt to society in various areas of life, and they are prepared by the educational institution for the learner (Shaheen, 2006).

It is essential to diversify the questions included in the curriculum to cover the different cognitive levels. One of the most prominent classifications addressing this is Bloom's taxonomy. Bloom's Taxonomy of Learning Objectives (Bloom et al., 1956) is one of the most well-known models describing levels of cognitive performance. Its levels are hierarchical, meaning that learners must achieve the objectives of the lower levels to progress to the higher levels. This taxonomy includes the levels of remembering, comprehension and understanding, applying, analyzing, synthesizing, and evaluating (Drouza, 2021).

The researchers selected the Lubrication Unit in Vehicles from the Palestinian curriculum for 11th grade (Automotive Mechanics) within the (Industrial) track. This unit is delivered to students in two parts (theoretical and practical). Through this, the researchers analyzed the unit's content in light of knowledge patterns and Bloom's cognitive levels to examine the extent to which this unit addresses those patterns and cognitive levels. The goal is to achieve scientific integration and ensure the diversity of levels, particularly related to automotive mechanics. Since this curriculum encompasses both theoretical and practical aspects, the researchers targeted all knowledge patterns and all levels of Bloom's cognitive taxonomy. They aimed to identify the extent to which the unit includes all cognitive levels and knowledge patterns and to analyze them.

As stated in the introduction of the prescribed textbook for the first semester, where the unit is included, its objectives aim to provide students with various levels of knowledge, bring them closer to the work environment, and prepare them

to enter the field of automotive mechanics. This is achieved through educational activities with a practical and applied nature, incorporating an integrated work plan for training on the curriculum's outlined mechanical requirements and the prerequisites for applying this training. Additionally, it emphasizes knowledge boxes and critical thinking issues that stimulate the students' memory (Al-Rajabi et al., 2020).

Study Problem

The Automotive Mechanics curriculum is one of the vocational specializations that requires various levels of knowledge and a precise scientific understanding of the material it includes. This is essential to enable students to apply their knowledge practically and achieve higher levels of thinking. Therefore, the study problem is defined as analyzing the Automotive Mechanics curriculum for 11th grade in the industrial track based on knowledge patterns. It aims to develop a specification table to design an achievement test whose questions align with the cognitive objectives of Bloom's taxonomy. Additionally, it seeks to verify the extent to which these objectives are achieved by examining whether the distribution is normal or not, based on the results of the test tool.

One of the researchers has been a vocational instructor for over nine years at a reputable vocational training center in the country, Kalandia Vocational Training Institute. He is also the head of the mechanical department, supervising numerous trainers in this field. Through reviewing studies that indicated issues in the content of vocational curricula in general, and industrial curricula in particular, such as the study by Al-Namla (2017) and the study by Saadat (2022). The researchers aimed to analyze the content of the Lubrication Unit in Engines as a fundamental unit of the targeted curriculum, particularly focusing on those skills that measure thinking in an open-ended manner, such as critical and analytical thinking. Therefore, the researchers deemed it necessary to conduct this study to analyze the levels, types, patterns, forms, and content of the Lubrication Unit in Engines from the Automotive Mechanics curriculum for 11th grade industrial students, in light of knowledge patterns and Bloom's cognitive levels.

Study Questions:

The study is guided by the following questions:

1. What is the extent of inclusion of the Lubrication System Unit content in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students in light of knowledge patterns?

2. What is the extent of inclusion of the Lubrication Unit content in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students in light of Bloom's cognitive levels?

Study Objectives:

The current study aims to achieve the following objectives:

1. To identify the extent of inclusion of the Lubrication System Unit content in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students in light of knowledge patterns.

2. To identify the extent of inclusion of the Lubrication System Unit content in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students in light of Bloom's cognitive levels.

Study Importance

The importance of the study lies in the following aspects:

Theoretical Importance

The theoretical significance of the current study lies in the importance of the topic it addresses. It focuses on analyzing the content of the Lubrication

System Unit in Engines from the Automotive Mechanics Curriculum (AMC) for 11th-grade industrial students in light of knowledge patterns and Bloom's cognitive levels. This study contributes to the scientific material it provides, making it a valuable database for educators, researchers, and students. It offers a theoretical framework that includes the analysis of educational unit content in light of knowledge patterns and Bloom's cognitive levels. Therefore, this study can be considered a reference that enriches university libraries in Palestine, in particular, and the electronic university library websites in general, with research material related to the topic.

Practical Importance

The practical significance is reflected in the following:

1. Highlighting the Automotive Mechanics Curriculum for the 11th-grade students.

2. Benefiting curriculum developers in the industrial field by focusing on higher cognitive aspects as a high level of thinking and linking them to practical application.

3. Encouraging decision-makers at the Ministry to adopt a system of integration between theory and practical application within industrial vocational institutions.

Study Limits:

The study is confined to the following:

Objective Limits: This study is limited to the Automotive Mechanics curriculum for the 11th-grade industrial track, specifically the experimental and revised edition of 2020.

Temporal Limits: The study is restricted to the first semester of the academic year 2024/2025.

Study Terms:

The current study includes several key terms, defined both conceptually and procedurally as follows:

• Content Analysis: One of the scientific research methods aimed at the objective, systematic, and quantitative description of the explicit content of communication materials. It is a research approach that seeks to derive accurate and reliable inferences from data related to the content (Al-Jubouri & Sufeih, 2022).

• Researchers define content analysis procedurally: A research methodology involving a set of organized and sequential steps aimed at analyzing the content of the "Lubrication System in Engines" unit from the 11th-grade industrial automotive mechanics curriculum, in light of knowledge patterns and Bloom's cognitive levels.

• The researchers procedurally define the automotive mechanics curriculum as: The curriculum encompasses theoretical knowledge, cognitive and logical experiences, and practical activities, including higher-order thinking skills and others. It aims to produce beneficial outcomes for students enrolled in this curriculum, which has been approved by the Palestinian Ministry of Education for teaching in the 11th-grade industrial track within the Palestinian curriculum.

• Bloom's Cognitive Taxonomy: One of the most famous educational classifications developed in the cognitive mental field, created by the American scholar in 1956. It categorizes cognitive processes hierarchically into six levels, ranging from simple to complex: remembering, understanding and comprehension, applying, analyzing, synthesizing, and evaluating (Bloom, et al., 1956).

• The researchers define Bloom's Taxonomy procedurally as a classification of educational objectives within the cognitive domain, used to categorize the objectives outlined in the Lubrication System unit of the Automotive Mechanics curriculum for the eleventh-grade

industrial track.

• Patterns of Knowledge: These refer to the analysis of the content of educational tasks, both procedural and cognitive, with the aim of identifying the type of information contained within that content. Four main patterns of educational content are proposed: general concepts, general principles, procedures, and facts and concepts (Druzeh, 2021).

• The researchers procedurally define patterns of knowledge as the analysis of the scientific content in the lubrication system unit of the AMC for the 11th-grade industrial track breaking it down into facts, concepts, procedures, and principles. And organizing these components in a logical sequence, from simple to complex, and from concrete to abstract.

The Theoretical Framework and Previous Studies:

The researchers review the key literature and references that address the topic of assessment, its tools, methods, and any related subjects directly connected to the research topic.

Content Analysis Concept:

Content analysis, or content analysis technique, is one of the research tools increasingly relied upon in studying documents. Some researchers indicate that this technique allows for the study of data indirectly by analyzing the content within documents such as books, magazines, newspapers, and broadcasts.

As Al-Rifa'i (2005) explained, this technique aims to analyze media content by investigating the available information. The importance of this technique lies in its ability to reveal the attitudes of individuals and groups through analyzing their written productions.

Content Analysis Importance

The importance of content analysis in educational studies and curricula lies in its role as a crucial tool for understanding how information is presented and analyzing the extent to which study materials align with educational objectives and academic standards. Its significance is reflected in several points, as highlighted by (Al-Adawi, 2010; Jalal, 2015; Al-Najjar, 2015; Abdullah, 2015; Hamadi, 2011; Al-Faqih, 2013; Krippendorff, 2018; Neuendorf, 2017).

Evaluating the quality of curricula through content analysis helps determine their alignment with educational goals and established standards. Content analysis can contribute to analyzing the extent to which curricula cover essential concepts and required skills. Additionally, it helps identify educational gaps and measure the balance between theory and practice by analyzing the curriculum content, which aids in determining the balance between theoretical and practical information in educational texts. It also ensures diversity and inclusivity by representing different groups in educational texts and assessing whether they consider inclusiveness and present diverse images that reflect societal reality. Additionally, content analysis helps examine the appropriateness of the language and style used in the curricula. It also ensures that the content is suitable for the target age group and that it enhances student understanding without unnecessary complexity. Moreover, it helps measure how much the curricula focus on developing essential student skills such as critical thinking, analysis, and problem-solving. By assessing the extent to which these skills are covered, educational institutions can improve their performance in preparing students for their academic and professional future, as well as enhance their evaluation processes.

The researchers believe that the process of content analysis in studies and curricula significantly contributes to improving the quality of education,

ensuring that the curricula align with educational objectives and inclusivity. It helps in identifying gaps and enhancing academic and pedagogical effectiveness, which positively impacts the students' educational experience.

Steps of Curriculum Content Analysis:

According to Krippendorff (2018), content analysis is an organized process aimed at evaluating educational curricula and study materials accurately. The steps of content analysis can be divided into several main stages. The steps include: defining the purpose of the analysis, selecting a sample that appropriately represents the curriculum, determining the analysis criteria, collecting and analyzing data, interpreting and evaluating the results, and providing relevant recommendations.

Bloom's Taxonomy:

Bloom's Taxonomy (Bloom, 1956) is one of the most famous classifications in the field of educational objectives. It has significantly contributed to the development of a system designed to clarify educational goals and assist educators and teachers in measuring the success of the educational process. Bloom's Taxonomy consists of three main domains: the cognitive domain, the affective domain, and the psychomotor domain. The cognitive domain is considered the most important for developing educational tests and measurements. Bloom divided this domain into six levels: remembering, understanding and comprehension, applying, analyzing, synthesizing, and evaluating. This taxonomy has been widely used in many studies (Al-Sibyah, 2019).

Vocational Education:

According to Nasrallah (2018), vocational education forms the vision and objectives of the National Strategy for Vocational and Technical Education and Training. It serves as a basis for modernizing and improving the vocational and technical education and training system in Palestine, achieving the following general objectives:

Meeting labor market demands and acquiring the necessary qualifications as outlined in the Palestinian Professional Classification and National Qualifications Framework. Adopting a holistic approach to develop all required competencies among trainees. Enabling effective participation in processes and performance to ensure their success in their chosen paths and future careers. Supporting every learner to continue learning, advance in personal and professional development, and transition throughout their lives to become dedicated, responsible, and capable members of society. Thus, contributing to economic and social development under the guidance of educational insights. Vocational institutions (such as vocational training centers, industrial secondary schools, and technical colleges) operate within this framework. Vocational and technical education and training play a fundamental role in implementing the core focus of the vocational and technical education and training strategy. This includes developing, modernizing, and implementing market-driven curricula (Al-Dalou, 2017).

Objectives of Vocational and Technical Education and Training:

Vocational and technical education and training aim to transfer, develop, and enhance knowledge by focusing on several key aspects summarized by Al-Dalou (2017) and Awiwi (2021), including:

Basic and advanced vocational education, directed at students of both genders, aims to enhance their previous education and attention to their special needs. It also seeks to integrate youth into environments and regions facing challenging living conditions, enhancing professional competence. This includes combining technical competence

with personal and social competencies to achieve comprehensive skills among individuals. In addition, it emphasizes vocational flexibility, preparing students to adapt to the evolving demands of the labor market and society, while considering the political context in Palestine. Social responsibility is also a key focus, as education and training aim to inspire individuals to become responsible members of society and contribute to its development.

To achieve these objectives, vocational and technical education institutions must adopt a teaching approach that fosters the development of the professional competencies required for initiative and action, according to Abu Hujeir (2022). They should support the needed professional skills by enhancing abilities related to broader vocational fields. They should offer flexible and diverse programs that address students' needs and varying abilities, and respond to labor market changes. Additionally, they must empower students to become independent individuals capable of tackling personal and professional challenges.

Automotive Mechanics Curriculum:

As part of the development of standardized curricula for vocational and technical education institutions, the AMC was designed to achieve the required professional competencies. This curriculum is based on a systematic approach that identifies the standard complex tasks of the profession. It determines the required competencies through close collaboration with the labor market. Furthermore, learning outcomes are validated by referencing the Arab Professional Classification and the Palestinian Professional Classification (Shakir, 2018).

The typical structure of this curriculum aligns with modern educational principles, where the specified complex tasks are designed to enable the achievement of the desired educational goals. The "description of objectives" for each module provides a general outline of the tasks and competencies that learners must acquire. The modules are divided into smaller instructional units called "learning situations," which detail the competencies that must be achieved. These competencies are organized into four main categories: technical, human, social, and methodological competencies (Omar, 2020).

The curriculum based on modules is considered of high quality and credibility because it meets the standards that ensure systematic assessment of students, taking into account their diversity and individual needs. It is characterized by comprehensiveness, flexibility, and a learner-centerd approach, requiring vocational and technical education and training institutions to consider the individual differences among trainees. This includes supporting all learners according to their abilities, including students with special needs or those who are gifted (Rajabi et al., 2020).

Professional Description of Automotive Mechanics

The process of job description involves an automotive mechanic performing a variety of tasks related to the routine and regular maintenance of cars. These tasks include servicing generation, charging, and starting systems. As well as repairing mechanical issues such as engine malfunctions and applying appropriate repair techniques when necessary. The mechanic also replaces engines and performs maintenance on mechanical systems, including the cooling and lubrication systems. Additionally, the mechanic identifies various ignition systems, disassembling and assembling their components. The mechanic also handles various fuel injection systems, whether they operate on gasoline or diesel, and disassembles and assembles all components of the fuel injection systems. Other tasks performed by the mechanic

include conducting compression ratio tests, analyzing the readings, and identifying types of exhaust gases. The mechanic also inspects and maintains the friction clutch assembly, as well as disassembles, reassembles, and performs regular maintenance on both manual and automatic transmissions. The mechanic also diagnoses and maintains traditional and hydraulic steering systems, familiarizes themselves with the electronic steering system, and handles its disassembly and reassembly. Among the technical tasks are calibrating and adjusting the camber angle and identifying wheel alignment angles. Additionally, the mechanic diagnoses and maintains mechanical suspension systems familiarizes themselves with electronic suspension systems, and manages their disassembly and reassembly. In addition, the mechanic handles the diagnosis and maintenance of the hydraulic braking system, becomes familiar with the Anti-lock Braking System (ABS), and utilizes appropriate tools to implement all general and professional safety procedures (Rajabi et al., 2020).

Previous Studies:

The following presents a selection of recent Arabic and international studies, arranged chronologically from the most recent to the oldest. These studies support the importance of content analysis based on objectives and analytical tools within knowledge patterns and Bloom's levels. The discussion highlights the agreements and differences concerning the research problem, followed by the researchers' perspectives and their critique of these studies.

The first study addressing this topic was conducted by Atta (2024). The study aimed to identify the extent to which the questions in the ninth-grade science textbook for basic education in Libya take into account the modified Bloom's cognitive levels. The study utilized the descriptive method through content analysis. The study encompassed all the questions from the ninth-grade student textbook for basic education in Libya, including both parts (part one and part two), which comprised "Review Questions" and "Thinking Corner Questions". The study results revealed the following: The first level (remembering) and the second level (understanding) were collectively addressed in the textbook questions at a rate of 69.11%. Meanwhile, the remaining four levels, which require higher-order cognitive skills from students, accounted for the rest of the percentage, not exceeding 30.90%. However, the analysis level alone constituted 18.70% of this percentage, whereas the proportions of the application, evaluation, and creativity levels were minimal, amounting to 5.69%, 1.63%, and 4.88%, respectively. Accordingly, the study reached a set of recommendations, the most important of which is the necessity for science curriculum developers and authors of school science textbooks to reconsider the questions in the ninth-grade science textbook, particularly the "review questions." This reconsideration should ensure alignment with the modified Bloom's cognitive levels, especially the last four levels.

Meanwhile, the study by Juba (2023) aimed to evaluate and analyze the science and life textbook for the sixth grade in Palestine, using a descriptive-analytical approach. The study population and sample consisted of students of sixth grade in Palestine, applied in the academic year 2022-2023, including both parts one and two. The researcher used three tools in the study: a content analysis card for the textbook in terms of (educational objectives and their domains). A content analysis tool according to the components of knowledge and its levels, and a content analysis tool based on the standards of individual differences. The study reached several findings, the most important of which was: a significant variation between the

domains of educational objectives (cognitive, affective, and psychomotor). The percentage of cognitive objectives was 88.5%, while the percentage of affective objectives was 3.9%, and psychomotor objectives were 7.5%. When classifying the behavioral objectives in the cognitive domain into levels of remembering, understanding, applying, analysis, evaluating, and creating. The results showed that the content of the science and life textbook for sixth grade focused on lower-level cognitive skills while neglecting higher-order cognitive processes. The percentage of objectives at the remembering level was 45.7%. The percentage of cognitive objectives at the understanding level was 22.6%, and the applying level was 6.0%. The analysis level was 7.0%, the evaluating level was 13.8%, and the creating level was (4.2%). The study showed that the total number of knowledge components in the science textbook for sixth grade, in both parts one and two, was (618) frequencies. These were distributed between (facts, concepts, generalizations and principles, laws, and theories). The average percentage for the knowledge component of facts was 53.7%. The average percentage for concepts was 22.3%. The average percentage for generalizations and principles was 22.9%. The average percentage for laws was 0.6%, and the percentage for the knowledge component of theories was 3%.

The study by Saadat (2022) aimed to evaluate the higher-order thinking skills in the content of the vocational curriculum for automotive mechanics for the 11th grade (industrial) in Palestine, by assessing the extent to which critical thinking, creative thinking, and metacognitive skills were included. To achieve the study's objectives, the researcher used the descriptive analytical method. The study sample included the educational scenarios, questions, activities, discussions, projects, and practical exercises found in the content. The researcher developed a content analysis card for higher-order thinking skills, which consisted of seven sub-skills, including: (inference, interpretation, flexibility, sensitivity to problems, planning, monitoring and control, and evaluation). To measure the sub-skills, the researcher developed 27 indicators. The researcher also prepared a personal interview consisting of nine questions related to the targeted higher-order thinking skills. These questions were developed for interviews with six teachers, trainers, and experts in the automotive mechanics curriculum for the 11th-grade industrial track. To assess the experts' evaluation of the inclusion and application of the targeted skills. The researcher used frequencies, percentages, the arithmetic mean, and Holsti's formula to calculate reliability across individuals in the statistical treatments. The study concluded that the inclusion level of higher-order thinking skills was low, with a percentage of (33.3%). Metacognitive thinking skills were moderately included at (39.8%). Followed by creative thinking skills at (30.4%), and finally, critical thinking skills at (29.8%), both categorized as low. The interview results collectively indicated the inclusion of higher-order thinking skills in the content with varying degrees. The study recommended revising the content of the automotive mechanics curriculum to incorporate critical and creative thinking skills more extensively. It emphasized the importance of integrating theoretical and practical aspects within the content. Additionally, the study highlighted the necessity of developing training programs for teachers on higher-order thinking skills and encouraged conducting similar studies in the future.

A study by Zhao et al. (2022) aimed to explore and establish an effective teaching process for the university-level English course at Yuxi Normal University (YXNU) in China. The objectives of the college-level English course were refined based on Bloom's cognitive learning domain and

categorized into three high-level goals: analysis, evaluation, and creativity. A qualitative approach was adopted for the pilot study, utilizing a systematic literature review method in writing a theoretical framework for understanding the application of Bloom's taxonomy. Subsequently, the case analysis approach was employed to examine the English teaching objectives at YXNU, which were then refined. The study concluded that the revised objectives for teaching the English course at YXNU were more integrated with the actual target teaching scenarios and were of a high academic standard. Furthermore, Bloom's cognitive objectives framework was effectively reflected in the university-level English teaching objectives at YXNU. Teachers should ensure they focus on achieving teaching objectives at all levels, particularly high-level objectives, to effectively meet teaching goals. Additionally, Bloom's taxonomy of educational objectives can be reflected in other subjects as well.

The study by Damayanti et al. (2020) aimed to describe the achievement of cognitive levels from Bloom's taxonomy used by physics teachers. It emphasized the importance of reviewing curricula in the field of science learning. Along with science and engineering practices (SEPs) indirectly by teachers and incorporating higher-order thinking skills into both the learning process and the assessment process. The six cognitive levels in Bloom's taxonomy were divided into two types of thinking skills: lower-order thinking skills and higher-order thinking skills. Therefore, this study followed a qualitative research design. There are three types of analysis in this study: level analysis, evaluation level, and creation level. The reasons preventing teachers from using Bloom's cognitive level for higher-order thinking skills were studied. The results showed that the cognitive levels used were as follows: remembering 0%, understanding 3.3%, applying 33.3%, analysis 50%, evaluation 3.3%, and creation 3.3%. The cognitive levels used in the sixth-grade mathematics exam were as follows: 0% remembering, 0% understanding, 25.7% application, 51.4% analysis, 5.7% evaluation, and 17.1% creation. Based on these results, they could actually serve as a starting point for meeting the requirements of the revised curriculum set by the Ministry of Education in Thailand.

The study by Al-Sibyah (2019) aimed to analyze the questions in the Arabic language textbook for the twelfth grade in Jordan in light of the cognitive objectives. The researcher used the descriptive approach. The tool used was a specially designed card for analyzing the questions in the Arabic language textbook for the twelfth grade. The analysis form was divided into four sections. The first section represents the units, the second contains the lessons, the third includes the question numbers as they appear in the textbook, and the fourth covers Bloom's cognitive levels. The researcher analyzed the questions in the Arabic language textbook of the study in light of a special form that included the six levels of Bloom's taxonomy: remembering, understanding, applying, analysis, evaluation, and creating. The study found that out of the (558) questions in the Arabic language textbook, (25%) of the questions measured remembering information and (36%) measured the student's understanding of the content. (17%) measured the application of knowledge, (9%) measured analysis, (5%) required the student to evaluate new ideas, and (8%) measured creating and issuing judgment.

The study by Ighbariya (2013) aimed to evaluate the importance of textbooks in developing students' thinking. The researcher chose the questions in the Afaaq English language textbook as the unit of analysis. Based on the idea that questions are crucial for assessing students' understanding of the studied material. It followed the principle of analyzing the six units of the Afaaq

English textbook for the ninth grade, using the questions to enhance students' thinking skills. The results showed that out of 381 questions in the six units, the percentages ranged between 29.66% and 2.36%. These percentages correspond to the cognitive levels of understanding and evaluation, respectively. The notable result was that the analysis level appeared at a rate of 23.36%, which is a percentage that roughly matches the cognitive level.

Commentary on Previous Studies:

In light of the aforementioned studies, all of which emphasized the importance of educational content and its analysis based on set objectives, it is evident that Juba (2023) and Saadat (2022) adopted the descriptive-analytical method. They utilized content analysis cards, percentages, and frequencies to identify the components of knowledge. This supports the methodology adopted by the researchers to analyze the levels, types, patterns, forms, and content. This method was used in the lubrication unit in the automotive mechanics curriculum for the 11th-grade industrial track, in light of knowledge patterns and Bloom's cognitive levels.

The researchers aimed to develop a classification of educational objectives in the cognitive domain to categorize the objectives included in the lubrication unit of the AMC for the 11th-grade industrial track. This aligns with the studies of Ighbariyah (2013) and Damayanti et al. (2020), who concluded that the required skill levels in the studied curricula were organized according to the students' age stages based on Bloom's taxonomy levels of knowledge. The study by Zhao et al. (2022) reinforced this, emphasizing the need for teachers to ensure the achievement of teaching objectives across all levels, particularly higher-level objectives to fulfill the goals of teaching. Bloom's taxonomy of educational objectives can also be reflected in other subjects, including vocational ones, as addressed in this research. This is supported by the studies of Al-Sibyah (2019) and Atta (2024).

Hence, this research aimed to analyze the content of the lubrication system unit in the automotive mechanics curriculum for the 11th-grade industrial track, in light of knowledge patterns and Bloom's cognitive levels. This unit is vocational, which distinguishes the researchers' work from the previous studies discussed. Despite its vocational aspect, the researchers focused on application within the cognitive domain rather than the psychomotor performance domain. It possesses originality that researchers can rely on, as well as the flexibility to be further developed and expanded upon in the future.

METHODOLOGY

The researchers adopted the descriptive-analytical approach as the study's methodology due to its suitability for the study's objectives. This was implemented through the content analysis method.

Study Population and Sample:

The study population consisted of the content of the vocational curriculum book (Automotive Mechanics) for the 11th-grade industrial track, designated for teaching in schools and vocational units in Palestine since the academic year 2018/2019. The edition selected for content analysis was the revised version printed in 2020 (1441 AH). The study sample was limited to the Lubrication System in Engines unit from the automotive mechanics curriculum for the 11th-grade industrial track, divided into five lessons.

Table (1): Lubrication System in Engines unit from the automotive mechanics curriculum

Unit	Learning situations (lessons)	Learning situations (items)	Questions	Activities	Projects	Discussions	Practical exercises
Engine Lubrication System	Lesson 1: Identifying the types of oils used in engines.	1	3	0	0	1	0
	Lesson 2: Maintaining the lubrication system and identifying its components	1	3	1	0	1	0
	Lesson 3: Changing engine oil and the oil filter	1	3	0	0	1	0
	Lesson 4: Presence of oil in	1	3	0	0	1	1

	the radiator water.						
	Lesson 5: Oil leakage under the engine	1	12	0	1	1	2

Table (1) illustrates that the study sample consisted of five learning situations, including 24 questions, one activity, one project, five discussions, and three practical exercises, in addition to all the texts included in the unit.

Study Tool:

To achieve the objectives of the study and answer its questions, the researchers reviewed educational literature and relevant previous studies, such as the study by Atta (2024), the study by Al-Dhurwi (2021), the study by Dahlan (2021), and the study by Juba (2023). These studies were utilized to develop tools suitable for the study's methodology. The tools include:

1. Content Analysis Card for Knowledge Patterns:

This is a form designed to collect data and monitor the frequency of occurrences within the materials being analyzed. Its purpose is to assist researchers in fulfilling the elements of analysis, following a unified system for analysis, achieving high objectivity, and ensuring a high-reliability coefficient for the analysis process. The elements of analysis included facts, concepts, principles, and procedures.

2. Content Analysis Card for Bloom's Cognitive Levels:

This form is designed to collect data and monitor the frequency of occurrences within the materials being analyzed. Its benefit lies in aiding researchers to meet the elements of analysis, follow a unified system for evaluation, achieve significant objectivity, and ensure a high-reliability coefficient for the analysis process. The elements of analysis included recall, comprehension, application, and higher-order thinking levels (analysis, synthesis, and evaluation).

Instrument Validity:

The first instrument, in its initial form, was presented to a panel of experts specializing in the vocational field (content experts) to suggest necessary modifications based on their opinions and recommendations. Their feedback was considered and incorporated.

The initial version of the second instrument was presented to a panel of experts specializing in the academic field to make the necessary adjustments based on their feedback and suggestions.

Reliability

First, The reliability coefficient of agreement (Content Analysis Card for Knowledge Patterns): To ensure the reliability of the first instrument, Holsti's formula was used to measure the agreement ratio. Two teachers of the automotive

mechanics curriculum for the 11th-grade industrial track were consulted. Holsti's formula (Holsti, 2006, p. 39) was applied, as outlined by Raffle (Raffle, 2006, 39):

$$C.R = (2M) \div (N1+N2)$$

Where C. R. represents the coefficient of agreement. 2M denotes twice the number of agreement points or cases between the two analyses (first and second). N1+N2 represents the total of the two analyses (first and second).

The following table is a presentation of the analysis agreement results among individuals, based on Holsti's formula, as illustrated in the table below:

Table (2): Analysis of Agreement Between Analysts

Analysis element	First Analysis	Second Analysis	Third Analysis	Points of agreement No.	Percentage%
Facts	19	17	16	16	89
Concepts	40	36	34	34	89
Principles	18	14	15	15	94
Procedures	14	14	14	14	100

By calculating the arithmetic mean, the agreement coefficient between the analysts reached 93%, which is a high percentage and indicates an acceptable level of reliability for the analysis using the instrument.

Second: The reliability coefficient of agreement (Content Analysis Card for Bloom's Cognitive Levels).

Table (3): Analysis of Agreement with Colleagues

Analysis element	First Analysis	Second Analysis	Third Analysis	Points of agreement No.	Percentage%
Remembering	18	15	16	15	88

Understanding	19	15	16	15	88
Application	10	8	8	8	89
Higher-order thinking levels	14	11	12	11	88

By calculating the arithmetic mean, the agreement coefficient between myself and my colleagues reached 88%, which is a good percentage. This reassured the researchers about the work accomplished so far, ensuring credible and reliable results at the conclusion of the analysis process.

Study Procedures

To conduct the study, the researchers followed a series of sequential and interrelated steps to complete the study, which are:

1. The researchers reviewed educational literature and relevant Arabic and international studies to gain a comprehensive understanding of the study's topic and to draw a clear vision for conducting the study.

2. The researchers examined the content of the Automotive Mechanics textbook for the 11th-grade industrial track, issued by the Curriculum Center in Palestine in its 2018 experimental edition and updated for the 2020/1441 academic year, including both its first and second parts. The activities and sections of the educational situation items, questions, discussions, projects, practical exercises, or observations have been confined. The researchers selected the Engine Lubrication unit from the first part of the textbook and analyzed it in light of knowledge patterns and Bloom's cognitive levels within one week.

3. The researchers prepared the two study instruments (content analysis cards).

4. The study instruments were distributed to reviewers, and adjustments were made based on their feedback to finalize them.

5. The researchers analyzed the unit's content according to knowledge patterns and Bloom's cognitive levels.

6. The analysis was conducted collaboratively with qualified individuals.

7. Results and recommendations were issued.

Analysis Controls:

The analysis was conducted according to specific controls based on the elements and indicators of analysis. This was done to ensure that the analysis process was successful, accurate, and clear to readers, avoiding any ambiguity. The controls are as follows:

1. Excluding the page containing the professional competencies at the beginning of the unit.

2. Excluding images derived from the description of the educational learning situation.

3. The content analysis card included items, questions, activities, discussions, projects, exercises, or observations, along with their corresponding indicators, within the elements of the targeted analysis in the curriculum content of the selected study unit.

4. Unit of Analysis: The item was selected as the comprehensive unit of analysis for the content. Each main item was considered an item, each sub-item within the main item was treated as an item, each question was considered an item, each

activity as an item, and each project as an item.

5. The analysis included the questions at the end of the unit, referred to as the unit questions, and indicated the analysis elements contained within them.

Statistical Treatments

After reviewing the educational literature and studies related to the current research, and in light of the nature of the current study, the researcher used the following statistical methods:

- Holsti's formula for calculating the reliability of the analysis.
- Frequencies (Freq.).
- Percentages (%).

These methods were considered the most suitable to verify the extent to which the content of the Engine Lubrication unit in the Palestinian automotive mechanic's curriculum for 11th grade (industrial track) includes knowledge patterns and Bloom's cognitive levels.

RESULTS AND DISCUSSION

The following presents the results of the study questions outlined in chapter one, including percentages, analysis tables, and the specification table for the study instrument. Each section is preceded by a comment and followed by an interpretation of each result related to the study questions. Through this, the researchers aim to provide a systematic scientific explanation.

Presentation of results for the first question: What are the results of the content analysis of the Lubrication System Unit in the automotive mechanics curriculum for the 11th-grade industrial track in light of knowledge patterns?

The table below shows the results of the content analysis of the Lubrication System Unit in the AMC for the 11th-grade industrial track in light of knowledge patterns. It includes facts, concepts, principles, and procedures, along with the percentage of each cognitive pattern relative to the total of those patterns.

Table (4) Presents the Content Analysis of the Lubrication System Unit in Light of Knowledge Patterns

Educational content patterns	Description	Freq.	%
Concepts	Engine oils / Viscosity of car oils / Friction oxidation / Forced-feed lubrication system / Full filter / Partial filter / Splash lubrication system / Oil pressure / Oil strainer / Oil pan / Oil pump / Oil pressure regulator / Oil filter / Engine oil cooler / Oil baffles (oil retainers in the engine) / Oil dipstick / Oil sludge / Oil indicator lamp	40	44

	(oil gauge) / Oil additives / Oil bearings / Coolant / Engine oil mixing / Radiator / Rocker arms / Camshaft / Valve springs / Timing gears / Piston shaft / Connecting rods / Cooling system/ Silicone gasket / Gearbox pad / Front pad of the crankshaft / Rear pad of the crankshaft / Internal leakage / External leakage / Engine oil level sensor / Cushion .		
Principles / Generalizations	The higher the temperature, the lower the viscosity of the oil./ The lower the temperature, the higher the viscosity of the oil./ Larger engines require high-viscosity oils./ The oil used in a car changes as the engine's lifespan increases./ Oil should be changed after a certain number of kilometers, as per the manufacturer's instructions./ Drivers maintain their engines for as long as possible through regular engine oil maintenance./ The emission of blue smoke from the exhaust of a gasoline-powered vehicle is related to issues in the lubrication system./ Oil pump malfunctions of any type cause significant problems for engines./ The shortage of lubricating oil in engines depends on internal or external leakage within the engine/ Oil pumps of various types push oils into narrow spaces using mechanical or electrical methods/ Oil additives work to protect the engine and increase its efficiency/ The oil indicator light signals a malfunction in the engine's lubrication system/ The appropriate oil for a vehicle is selected based on data about the car and the engine's age./ The lubrication system is connected to the cooling system in its	18	20

	mechanism of operation./ Lack of regular maintenance leads to clogged oil pipes in the engine./ A greyish color indicates oil mixing in the engine./ The presence of an engine oil cooler in the vehicle reduces lubrication system issues./ Oil shortage in the engine is linked to internal or external leakage.		
Procedures / Theories:	Checking oil pressure in the lubrication system using a testing device./ Activating the oil pump in the engine./ Repairing a malfunction in the oil pump./ Replacing the engine oil./ Replacing the oil filter./ Inspecting the oil indicator light./ Proper disposal of old oil./ Replacing the engine oil cooler./ Disassembling the cooling system./ Cleaning oil passages and pipes./ Replacing the engine oil seal./ Replacing the transmission oil seal./ Replacing the cylinder head gasket./ Replacing piston rings or valve seals.	14	15
Facts	The viscosity of SAE 10W-40 engine oil at (-18°C) is (10), and at (100°C), it is (40)./ The viscosity of SAE 5W-30 engine oil at (-18°C) is (5), and at (100°C), it is (30)./ The viscosity of SAE 10W-30 engine oil at (-18°C) is (10), and at (100°C), it is (30)./ The symbol (S) is used for oils in gasoline engines, while the symbol (C) is for oils in diesel engines./ The (API) system employs a global numbering method to measure engine oil viscosity./ The global classification of oils began in (1964)./ (MIN) represents the minimum allowable oil level, and (MAX) represents the maximum allowable oil level./ Antioxidant additives reduce engine overheating, prevent the formation of foreign	19	21

	substances, and minimize the wear on oil bearings./ Anti-corrosion additives prevent the formation of harmful acids that damage bearings./ Shell is one of the leading companies in car oil manufacturing./ Oil exits the filter through the oil distribution tube towards the camshaft in the first direction./ Oil exits the filter through the oil distribution tube to the timing gears in the second direction./ Oil exits the filter through the oil distribution tube to the crankshaft in the third direction./ The oil level is checked using the manual dipstick or the electronic oil indicator./ The engine oil level sensor is installed inside the oil pan./ The function of the oil pressure switch and indicator light is to monitor oil pressure between the pump and the oil lines connected to the plain bearings / A ventilation passage is created to reduce vaporized gases produced in the combustion chamber.		

As shown in Table (4) above, the concept pattern accounted for (40) concepts out of a total of 91 patterns, making its percentage (44%) of the total patterns. Thus, it ranks first in terms of its presence in the content of the lubrication system unit in engines. Meanwhile, the fact pattern accounted for (19) facts out of a total of 91 patterns, making its percentage (21%) of the total patterns. Thus, it ranks second in terms of its presence in the content of the lubrication system unit in engines. Meanwhile, the principles pattern accounted for (18) principles out of a total of 91 patterns, making its percentage (20%) of the total patterns. Thus, it ranks third in terms of its presence in the content of the lubrication system unit in engines. The procedures pattern accounted for (14) procedures out of a total of 91 patterns, making its percentage (15%) of the total patterns. Thus, it ranks fourth and last in terms of its presence in the content of the lubrication system unit in engines.

The results revealed a high inclusion of concepts, with a percentage of (44.4%) and a total of (40) frequencies, ranking first among the other knowledge patterns analyzed. This, as the researchers see it, reflects the abundance of concepts and terms presented in the unit, including new terms for students that are connected to other concepts in subsequent units. This reflects the curriculum developers' focus on reinforcing these concepts. In contrast, facts were included at a rate of (21%), with (19) frequencies,

ranking second in terms of inclusion compared to other knowledge patterns. According to the analysis conducted by the researchers on the unit's content, this indicates the abundance of symbols and numbers related to the types of oils and their uses in the global oil classification system. It also reflects the clear components of the system in both Arabic and English, as well as the indisputable facts within the professional content and its various terminologies. The principles, on the other hand, accounted for (20%), with (18) frequencies, ranking third and second to last in their inclusion as a cognitive pattern compared to other patterns. This, according to the researchers, may be attributed to the recurring causal relationships in the unit's content, which link the various lubrication systems and their interrelations, as well as the disruption of connections due to the absence of certain causal elements. These relationships result in an integrated operational system. Additionally, the specificity of the unit contributes to the weakening of generalizations for the vehicle as a whole. While procedures ranked last in terms of inclusion in the content, with a percentage of (15%) and (14) frequencies. This is attributed, according to the researchers, to the fact that the procedures mentioned in the educational learning situations pertain to technical competencies rather than cognitive competencies. This contrasts with the essence of Bloom's cognitive hierarchy, which focuses on the cognitive abilities of students, ranging from lower to higher levels. It does not reflect physical abilities or their coordination with the nervous system. This is primarily what the educational learning situations in the lessons of the unit address. In addition, the researchers noted the low number of analysis categories that primarily simulate procedures, as there was only one exercise, one project, and one activity included in the unit's content. In contrast, 24 questions mainly targeted facts, concepts, and texts, which rarely addressed any cognitive or mental procedures. The results of this study were similar to those of the study by (Juba, 2023), in which facts ranked first with a percentage of (53.7%), followed by concepts in second place with (22.3%), while procedures ranked third with (0.3%), reflecting the same order as the findings of this study. The researcher targeted a similar curriculum in natural sciences within the scope of the study in the State of Palestine, using a version identical to the targeted content edition. This reflects a unified approach to curriculum design in Palestine, which relies on centralization by the Ministry, without consulting a sufficient number of content and educational experts in the relevant field. The study also showed similarities with the study (Dafar, 2024), where concepts ranked first with (140) frequencies, accounting for (34.48%). However, it differed from that study in terms of principles, as they accounted for (5.91%) in the researcher's study. This discrepancy reflects the differences in age stages and the varying curriculum policies from one country to another. In contrast, the results of this study differed from those of (Botros, 2016), where the percentage of concepts was (13.35%), the lowest among the components of knowledge. This reflects the difference and variation in the targeted content, which focused on the mathematics book, as it addresses the transition of mathematical concepts from the concrete to the abstract. This does not imply that the weakness of a component here or there reflects a flaw in the curriculum design. According to the researchers' view, it primarily depends on the nature of the content, the age group, and the system of centralization or decentralization in the country.

Results of the second question: What is the extent of inclusion of the Lubrication System Unit content in Engines from the Automotive Mechanics curriculum for 11th-grade industrial students in light of Bloom's cognitive levels?

The table below presents the results of the content analysis of the lubrication system unit in the AMC for the eleventh-grade industrial track in light of Bloom's cognitive levels. These levels include remembering, understanding, comprehension, applying, and higher-order thinking skills (analysis, synthesis, and evaluation). The table also indicates the percentage of each cognitive level relative to the total levels.

Table (5) Represents the analysis of the lubrication system content in light of Bloom's Cognitive levels

Cognitive Level	Sub - indicators	Freq.	%
Remembering	The content helps students recall the symbols and diagrams mentioned in the unit.	**18**	**30**
	The content enables students to retrieve steps and processes sequentially.		
	The content encourages students to recall previously mentioned scientific knowledge, including definitions, points, and more.		
Understanding & Comprehension	The content helps students interpret the information in the unit in their own way without compromising the scientific content.	19	**31**
	The content describes the functioning of parts and components through explanations or diagrams.		
	The content compares two components in terms of similarities and differences.		
	The content develops the ability to interpret relationships and connections between related concepts and facts.		
	The content enhances the ability to discuss causes and solutions for apparent malfunctions and issues.		

Application	The content contributes to the student applying learned facts, concepts, and principles through drawing or tabulating.	**10**	**16**
	The content provides opportunities for students to describe work procedures using models and diagrams.		
	The content includes activities where students present scenarios related to safety, risk management, and handling hazards during work.		
Higher-order thinking skills (analysis, synthesis, and evaluation)	The content provides opportunities for students to collect, organize, and arrange related data to verify the accuracy of results.	**14**	**23**
	Questions and activities in the content help students propose the most suitable solutions and justify them.		
	The content connects relationships within the unit's content to other related topics.		
	The content offers a summary of the topics in the unit in either a structural or conceptual form.		
	The content provides immediate feedback to students to measure their progress in the unit.		

As shown in Table (5) above, the recall level accounted for (18) frequencies out of a total of (60) appearances of Bloom's cognitive levels. Consequently, its percentage is (30%) of the total levels, ranking second in terms of its presence within the content of the lubrication system unit in engines. Meanwhile, it was found that the comprehension level accounted for (19) frequencies out of a total of (60) appearances of Bloom's cognitive levels. Consequently, its percentage is (31%) of the total levels, ranking first in terms of its presence within the content of the lubrication system unit in engines. Meanwhile, it was found that the application level accounted for (10) frequencies out of a total of (60) appearances of Bloom's cognitive levels. Consequently, its percentage is (16%) of the total levels, placing it at the bottom of the overall ranking in terms of its

presence within the targeted unit content. Meanwhile, the higher-order thinking levels (analysis, synthesis, and evaluation) accounted for (14) frequencies out of a total of (60) cognitive levels. Consequently, their percentage is (23%) of the total levels. Thus, they rank third in terms of their presence within the content of the lubrication system unit in engines.

The results showed the inclusion of the understanding & comprehension category with (19) frequencies, representing (31%). While the remembering category included (18) frequencies, with a percentage of (30%). Both percentages are nearly equal in their extent of inclusion within the targeted unit content. Researchers attribute the high and nearly equal percentages of their inclusion to the fundamental nature of the unit in terms of concepts. It necessitates the inclusion of a significant amount of information, symbols, numbers, and terms that students need to remember for later use in related units and lessons. Additionally, it emphasizes the importance of understanding and comprehending the processes to a near-complete degree, as required by the essential and dynamic nature of the unit. The researchers attribute this level of inclusion to the repeated occurrence of these elements in texts, questions, and discussions. This finding aligns with the results of the study (Shuqairat, 2020), in which remembering accounted for (52%), while understanding represented (41.4%), making them the most frequently targeted aspects in that researcher's study. The researchers attribute this to the nature of the content, which sometimes requires higher levels of knowledge than others. This contrasts with the study by Damayanti et al. (2020), where remembering was 0%, and comprehension was 3.3%. The researchers attribute the low percentages of remembering and comprehension to the fact that the researcher targeted science and engineering. They require higher levels of thinking, along with purely mathematical and engineering problems that demand extensive application, analysis, and synthesis. Meanwhile, the results for application totaled (10) frequencies, representing (16) %, and the higher-order thinking levels totaled (14) frequencies, representing (23) %. The researchers attribute the low inclusion of the application level in the targeted unit, despite it being a vocational unit, to the researchers' focus on application in the cognitive domain rather than in the psychomotor performance domain. Meanwhile, the researchers believe that the inclusion of higher-order thinking levels, which ranked second to last in the targeted unit, reflects the curriculum developers' focus on foundational knowledge and basic concepts. Rather than delving into skills aligned with higher levels of Bloom's cognitive taxonomy. These higher levels require analysis, inference, synthesis, problem-solving, self-evaluation, and similar advanced skills. The results of the study were similar to those of the study (Al-Sibyah, 2019), in which application accounted for (17%), while higher-order thinking levels did not exceed (9%) of their overall inclusion in the Arabic language textbook questions. The results of the study differed from those of Damayanti et al. (2020), where analysis accounted for (50%). This difference is attributed to the nature of mathematical questions, which require high-level analytical skills, as well as differences in the educational environment and education policies in the East Asia region.

Recommendations

In light of the study's findings, the following recommendations are proposed:

1. Encourage curriculum developers of the Automotive Mechanics course for 11th-grade vocational students to revise the analysis categories, enriching them by incorporating more practical exercises, discussions, and projects.

2. Allocate more space for higher-order thinking

skills in alignment with the cognitive, intellectual, and educational characteristics of learners.

3. Ensure that questions, activities, and projects are connected to real-life situations and the learner's environment, aligning with their abilities and interests.

Suggestions

1. Conduct further studies to cover other instructional units within the targeted content and other components of the curriculum.

1. Organize training courses for teachers and trainers in industrial schools and vocational centers focusing on higher-order thinking skills and strategies for their meaningful application.

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