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Evaluation of Grade 9 Technology question papers: A content analysis of their potential to foster problem-solving skills

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Abstract

Education policies today aim to equip learners with 21st century skills considered as a universal necessity and problem-solving skill is one of the skills that have emerged as a requirement of the 21st century. Technology education demands learners to think critically and solve authentic problems, making it a must for teachers to develop learners' problem-solving skills in the classroom. This study aimed to evaluate the extent to which Grade 9 Technology mid-year examination papers promote problem-solving skills. Four Grade 9 mid-year examination papers from the 2022 to 2025 academic years were purposefully sampled from the Limpopo Department of Education. Using Bloom's taxonomy as a guide, content analysis supported by NVivo software was applied to classify each examination question according to its cognitive level, from lower-order to higher-order thinking skills. The analysis revealed that most (approximately 92,9%) of the questions focused on recalling facts and applying routine procedures while a smaller proportion (about 7,1%) required critical and creative thinking to address real life problems. These findings suggest a misalignment between the intended curriculum outcomes and the cognitive demands of the assessments. Conclusion can be made that Grade 9 Technology assessments emphasize lower-order thinking skills with minimal attention to higher-order skills. Yet, this study is of the view that Technology assessments should be redesigned to include a greater proportion of higher-order tasks to better prepare learners for problem-solving in real-life contexts. It also encourages subject advisors to train teachers and moderators on how to design and evaluate assessments with all cognitive levels in line with Bloom's taxonomy and CAPS requirements.

Key words: Problem-solving skills, Technology education, Assessment, Bloom's taxonomy, 21st century skills

Introduction

Recent evidence accumulated from a variety of research papers have indicated that learners should be well-equipped with the 21st century skills to function effectively in every walk of life. The literature on 21st-century skills is quite rich and it includes several skills either listed individually or situated within frameworks (Erdem, 2019). One of the most often cited skill when referring to 21st-century skills is Problem-solving skill. Problem solving skills are the abilities to identify problems, search and select various alternative solutions and make decisions in solving all the problems at hand (Bariyyah, 2021). The promotion of an open-minded perspective toward the world emphasizes the ongoing commitment to prioritizing the cultivation of problem-solving skills, which are considered to be crucial skills of today's society (Avdiu, Bektesh & Gollopeni, 2025). Gunawan, Harjono, Nisyah, Kusdiastuti and Herayanti (2020) support this view by suggesting that the development of problem-solving skills is a key focus of 21st -century educational goals.

The Department of Basic Education affirmed that Technology subject is meant to develop knowledge, skills and values that are beneficial for learners to engage in technical activities meaningfully, responsibly and productively in the 21st century (DBE, 2011). In other words, Technology subject was designed to equip learners with skills that would enable them to operate effectively in the 21st - century technical and engineering environments. According to Department of Basic Education (2011), Technology subject was introduced in the curriculum with the intention to produce technologically literate engineers, artisans and technicians for the modern society and world. The subject aims to stimulate learners to be innovative and develop their problem-solving skills as a preparation for their Further Education Training subjects and for the industry needs (DBE, 2011).

However, it is clear that South Africa has yet to fully unleash the potentialities of subjects such as Technology. The existing literature indicates that South African schools continue to produce learners who are not prepared for the 21st -century technical industries (Sikhakhane et al., 2020; Mtshali & Ramaligela, 2020). In a study by Rosina, Virgantina, Ayyash, Dwiyanti and Boonsong (2021) which focused on the alignment between Vocational Education and Industrial Needs, it is argued that due to limited facilities, infrastructure and teachers not having direct background or experience in the industrial world there are not many graduates who are ready to work, because the school curriculum is different from the industrial world. In the same breath, Ali, Triyono and Koehler (2020) highlighted the mismatch between course content, assessment and competencies required in the world of work. Their findings revealed that practical learning is still carried out based on the routine of old materials where students learn too many theories that are not relevant to working in the industry (Ali, Triyono & Koehler, 2020).

According to Mtshali, Ramaligela and Makgato (2021); Catalán and Kirk (2016); Richardson and Blair (2015) and Eisenkraft (2013), assessment has the potential to influence the learners' careers for the rest of their lives. Similarly, Curriculum Assessment Policy Statement (CAPS) for Technology entails that teacher should embrace higher order thinking skills and the application of scientific principles in their lessons to produce practical skills-competent learners who will be suitable for the industry and economic demands of the country (DBE, 2011). However, studies in Technology education pay little to no attention on how assessments develop learners' problem-solving skills.

For instance; Magolego et al (2023) focused on the development of creativity through Mini- Practical Assessment Tasks, Mtshali et al (2021) looked into the actualisation of practical lessons through assessment, Ramaligela (2022) explored student's perceptions of assessment practices and Khoza et al (2025) studied the influence of under-resourced classrooms on continuous assessment. Mtshali et al. (2021) claim that it is because Technology education have been evolving around policies that undermine Technology education thereby tendering little focus on how assessment develop 21st century skills such as problem solving.

Against this background, it seems fair to evaluate Grade 9 question papers to assess the extent to which they foster problem-solving skills. This study comes at a point where vocational skills are in high demand and teachers are expected to contribute to producing skilled individuals. Hence there is a need to verge into how assessment contribute to the development of problem-solving skills as on the important 21st century skill.

Research question

To what extent do Grade 9 Technology assessment practices enhance the development of learners' problem-solving skills?

Literature review

Assessment

Assessment is an integral part of education and there is a substantial body of trials exploring and confirming its effect on learning (Morris, Perry & Wardle, 2021). it affects students' understanding of learning tasks, impacts the quality of students' involvement in these tasks and it influences the transfer of these insights to future learning (Schellekens, Bok, De Jong, Van der Schaaf, Kremer & Van der Vleuten, 2021). Assessment is defined as a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessments (DBE, 2011). It involves four steps: generation and collection of evidence of achievement; evaluation of this evidence; recording of the findings and use of this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching.

In a subject with a significant practical nature, like Technology, it is important to develop and assess the skills and values together with the associated subject knowledge. Therefore, the purpose of assessment in Technology education is to enhance higher-order thinking skills (Ashford-Rowe et al., 2014) and foster students' transferable skills in contextualized settings so that these skills can be utilized in non-academic settings (Villarroel et al., 2018). Furthermore, it should strive to foster students' determination and motivate them to engage in the process of their own learning because their learning is more connected to their real-life environment (Ashford-Rowe et al., 2014). This is to ensure that the objective of the subject curriculum is attained, which is to equip students with problem solving competencies for the world of work.

The major concern for stakeholders in education is to produce Technology students with employability skills as employers often believe that schools are responsible for equipping their students with the knowledge and skills that are required in their careers (Kinash et al., 2018). Assessment as the most important part of learning (Moss, 2013), has been seen as a relevant solution to mitigate this major setback. However, the observed issue is assessment practices are often impertinent to students' professional careers and separated from what employees will tackle in their workplace (Ali, Triyono and Koehler 2020; Mtshali et al., 2020; Maxwell, 2012). This highlights the need for schools to rethink assessment practices so they can better reflect real-world activities and help students develop skills they will need in their future careers.

Problem solving skills in Technology education

The rapid pace of change, the complexity of human problems and the ease of global access to technologies and human resources have created the demand for individuals well prepared to utilize their knowledge of science, technology, engineering and mathematics (STEM) in collaboration with professionals from diverse disciplines to solve complex novel problems. Problem-solving is a crucial component of the curriculum and needs attention in learning because with these skills, learning is more useful, more quality and brings students closer to real life. (Nayazik, 2017; Widiawati et al., 2018). Bariyyah (2021) defines problem solving skills as the abilities to identify problems, search and select various alternative solutions and make decisions in solving all the problems at hand. Additionally, Lu and Xie (2024) and McCormick (1997) emphasize that problem-solving constitutes a particular form of elevated procedural knowledge, encompassing the procedural skills integral to the problem-solving process.

Technology education intends to help pupils to develop their interest in technology and their ability to deal with technical challenges in a conscious and innovative way (Skolverket, 2018a). As a result, to develop these problem-solving skills, students must be provided with opportunities to practice approaching problems in a non-threatening environment (Kapp, 2007). In Technology, this is normally practiced through Mini-Practical Assessments Tasks (mini-PAT) where students solve real life problems following the design process. Mini-PAT is a set of short practical assessment tasks which make up the main formal assessment of a learner's skills and application of knowledge during each term which intends to formalise the practical component of Technology contextualised within a knowledge focus (DBE, 2011). Basically, the core of these activities is to develop learners' real-life problem-solving skills (De Jager, 2011).

Despite the potential of these mini-Practical Assessments Tasks to develop learners' higher order thinking skills including problem solving, most researchers have observed that Technology teachers are inadequately equipped and still facing challenges in facilitating these tasks to successfully develop students with the high order thinking skills when they carry out these tasks (Magolego et al.,2023, Ramaboe et la., 2022, Gumbo, 2019; Kubheka, 2018; Sephoto and Kola (2018). This raises the question of whether teachers are adequately integrating problem-solving skills into written assessments such as tests and examinations.

Research indicates that in Grade 9 traditional written assessments often limit learners' autonomy and engagement in scientific thinking and problem-solving as they typically lack scaffolds that promote independent planning and critical analysis (Kibirige, 2014). Similarly, van Staden and Motsamai (2017) have also found significant issues in the reliability, validity and alignment of School-Based Assessments (SBAs) with policy due to weak moderation and variation in teacher practices, suggesting that pen-and-paper assessments often fail to consistently encourage conceptual understanding and problem-solving abilities. Additionally, Ukobizaba, Nizeyimana and Mukuka (2021) highlighted that some teachers spend much of their time on past paper examination explorations since their focus is on increasing the number of students who may pass the national examinations. These findings align with the perspectives of Sievertsen (2022), Shepard et al. (2018), and Stiggins (2004), who assert that current assessment systems often hinder learners by failing to adequately prepare them for real-life problem-solving.

Bloom's Taxonomy

The critique of current assessment systems as highlighted in the previous paragraph, clearly shows that there is a need to orient both pre-service and in-service teachers on appropriate assessment approaches that support the development of students' problem-solving skills. Bloom's Taxonomy offers a structured framework to achieve this by categorizing cognitive skills into hierarchical levels. Bloom's Taxonomy was primarily developed by Benjamin Bloom in 1956 along with a team of educational psychologists including Max Engelhart, Edward Furst, Walter Hill and David Krathwohl. However, in 2001, it was revised by Anderson and Krathwohl to reflect updated perspectives on learning. Bloom's Taxonomy is very well supervised learning model used by elementary and secondary school teachers, university and college learners and scholars for many years. This taxonomy was created with the intention to guide teachers when creating educational materials to guarantee that the appropriate cognitive skills are met (Momen, Ebrahimi & Hassan, 2022).

Bloom's Taxonomy is organized into hierarchical levels and categorized in two cognitive orders: higher order thinking skills (HOTS) and lower order thinking skills (LOTS). The Lower order skills consist of; Remembering, Understanding and Applying while Higher order skills include; Analysing, Evaluating and Creating. This framework ensures that all stages of thinking skills are covered by existing instructional content such as learning objectives, curriculum plans, lessons and assessments (Momen, Ebrahimi & Hassan, 2022; Marzano,2001). Education aims at nurturing individuals with reasoning faculty, critical skills, and problem-solving approaches (Chandio, Zafar& Solangi, 2021). Therefore, understanding this progression can help teachers to design assessments that move learners beyond recalling facts to analysing and solving problems. This balanced distribution of cognitive levels in assessments can promote higher order thinking skills among students, better preparing students for both academic success and professional challenges (Nurmatova & Altun, 2023).

Theoretical framework

This study was guided by the works of Anderson and Krathwohl on the Revised Bloom's Taxonomy. Bloom's taxonomy is a hierarchical six-level classification system that uses observed behavior to infer the level of cognitive achievement. This framework was created with the intention to guide teachers when creating educational materials to guarantee that the appropriate cognitive skills are met (Momen, Ebrahimi & Hassan, 2022). It consists of three domains including cognitive, affective and psychomotor. The cognitive domain deals with the intellectual development of learners, the affective domain focuses on emotional stability whereas the psychomotor relates to physical skills.

The cognitive domain is further divided into six stages which got changed from the noun to verb vocabulary. The levels of the original taxonomy included the following categories: knowledge, comprehension, application, analysis, synthesis and evaluation, each with its own subcategories, except for application (Bloom, 1956; Krathwohl, 2002). However, in the revised taxonomy of Anderson and Krathwohl (Anderson & Krathwohl, 2001), synthesis changed places with evaluation and was named 'create'. The levels of the revised taxonomy consist of; remembering, understanding, applying, Analyzing, evaluating, and creating (Bloom, 1956; Anderson et al. 2001). Remembering, understanding, and applying belong to the lower domains, whereas Analyzing, evaluating, and creating belong to the higher domains. The revision was done to allow for more teacher usage and more overlap and to relax the hierarchical process (Krathwohl, 2002). For the purpose of this study, this taxonomy was used to classify each examination question according to its cognitive level, from lower-order to higher-order thinking skills. It is also worth noting that problem solving is a higher order thinking skill which aligns with the analyze, evaluate and create categories of the Bloom's taxonomy.

These domains are better explained in the following table;

SKILL	VERBS	PURPOSE	LEVEL
CREATING	Design, construct, plan, develop, formulate	Combine elements into a new pattern	Higher order
EVALUATING	Check, review, conclude, explain	Decide according to a set of criteria	Higher order
ANALYZING	Compare, organize, deconstruct, judge, experiment	Examine information and draw connections among ideas	Higher order
APPLING	Implement, carry out, use, apply, show, solve	Apply knowledge in new situations	Lower order
UNDERSTANDING	Describe, estimate, predict, classify, explain, discuss	Explain ideas or concepts	Lower order
REMEMBERING	Define, organize, list, identify, state	Recall facts and basic concepts	Lower order

Note: Adopted from The Impact of Assessment on Students Learning by Jimaa, 2011, p.719

Methodology

This study employed a qualitative research design to analyze secondary data in the form of Grade 9 Technology question papers to determine the extent to which they foster problem-solving skills. Qualitative content analysis is a systematic approach in which latent meanings and values within a text are identified, described, and interpreted (Sheydayi & Dadashpoor, 2023). A total of four Grade 9 Technology mid-year examination papers from the years 2022 to 2025 were purposively sampled to identify information-rich cases relevant to the phenomenon of interest (Palinkas et al., 2015). Each question was analyzed and categorized according to Bloom's Revised Taxonomy, with a focus on both lower-order (Remember, Understand, Apply) and higher-order (Analyze, Evaluate, Create) cognitive domains.

To systematically code and organize the questions, NVivo 15 software was used. This software was selected for its ability to efficiently manage and analyze textual data within the examination papers (Bazeley & Jackson, 2019). The analysis followed four stages: importing data, coding data, creating framework matrices and reporting findings (Bazeley & Jackson, 2019). The question papers were imported individually as PDF documents and each question was coded according to its corresponding Bloom's cognitive level. Lastly, frequency counts and visualizations were produced to examine the distribution of lower-order and higher-order questions, with particular attention to the study's primary aim of assessing problem-solving opportunities. To enhance trustworthiness, each question was coded independently and reviewed to ensure consistency in classification.

Findings

The entire Grade 9 Technology mid-year exam question papers, which included multiple-choice, matching, short-answer and design questions, were analysed using Bloom's revised taxonomy to determine the extent to which they enhance problem solving skills. The findings of are presented in both table and graph forms. The first table show detailed coding of each question number, verbs used and corresponding cognitive level. The second table summarizes frequency of each cognitive level in percentages across the question paper. Lastly, the graphs provide visual summary of the frequency and distribution of cognitive levels across the entire question paper.

Question Paper 1 (2022)

Table 1: Distribution of question verbs and associated Cognitive Levels in question paper 1

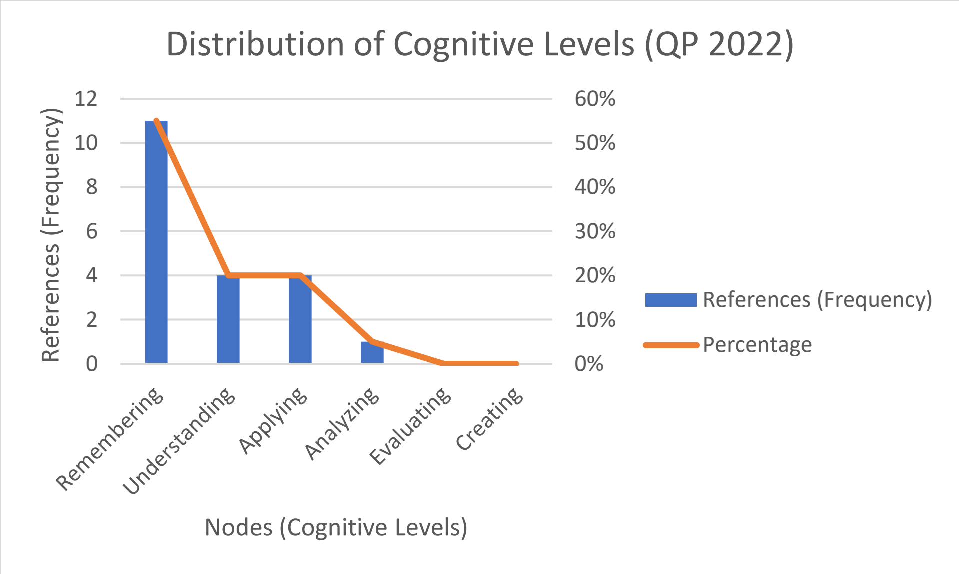
Questions	Node (Verb)	Node (Cognitive level)
1	Choose, Match	Remembering (x2)
2	Write	Remembering
3	Write, Tabulate, Draw, Calculate	Applying (x3), Analyzing
4	Explain (x3)	Understanding (x3)
5	Draw	Applying
6	Name (x3), Write, State, Mention (x2), Predict, List	Remembering(x8), Understanding (x1)

Table 2: Frequency and Percentage distribution of Cognitive Levels in question paper 1

Node (Cognitive Level)	References (Frequency)	Percentage
Remembering	11	55%
Understanding	4	20%
Applying	4	20%
Analyzing	1	5%
Evaluating	0	0%
Creating	0	0%

Figure 1

Percentage distribution of Cognitive Levels in question Paper 1



The 2022 mid-year examination paper, the lowest cognitive skill of Remembering is highly focused on with 55% portion of the question paper. Moreover, Understanding and Applying account for 40% of the paper while the higher order skills remain underexplored with Analyzing accounting 5%. Furthermore, the graph confirms that the lower order thinking skills such as Remembering and Understanding are frequently assessed as compared to higher order thinking skills.

Question paper 2 (2023)

Table 3: Distribution of question verbs and associated Cognitive Levels in question paper 2

Questions	**Node (Verb)**	**Node (Cognitive level)**
1	Choose, State, Match	Remembering (x3)
2	Name, Sketch	Remembering (x2)
3	Differentiate, Explain, Calculate, Predict, Draw, Define	Remembering, Understanding (x2), Applying (x3)
4	Identify (x2), Write (x2), List	Remembering, Understanding(x2), Applying (x2)
5	Mention (3), Suggest	Remembering(x2), Applying, Creating

Table 4: Frequency and Percentage distribution of Cognitive Levels in question paper 2

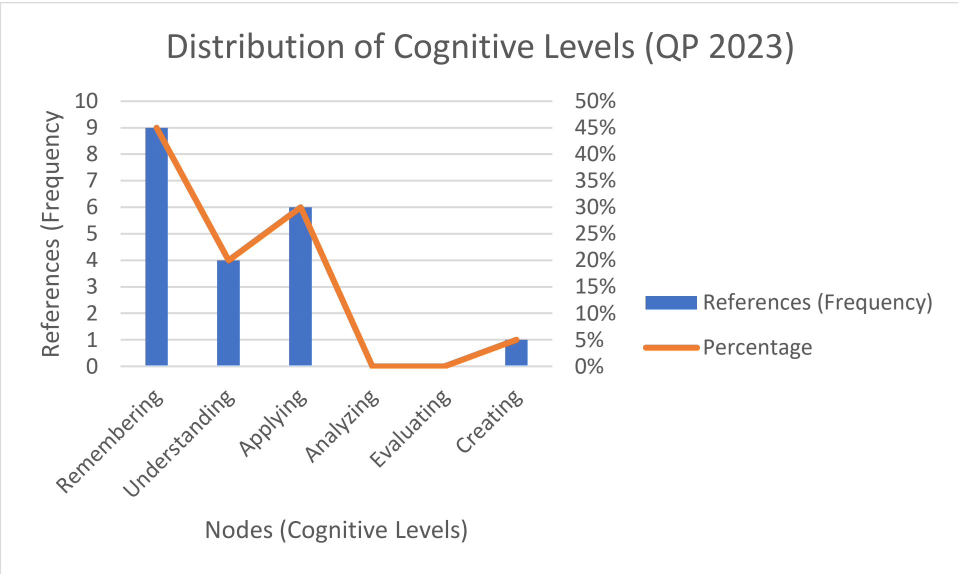
Node (Cognitive Level)	**References (Frequency)**	**Percentage**
Remembering	9	45%

Understanding	4	20%
Applying	6	30%
Analyzing	0	0%
Evaluating	0	0%
Creating	1	5%

Like the 2022 question paper, the 2023 mid-year paper also focused on Remembering domain with a higher portion of 45%. Even though they tried to assess learners' application skills, 95% of the question paper is composed of lower order thinking skills and the higher order skills remain overlooked altogether. Creating cognitive skill represented 5% of the exam paper which is really alarming that learners are given less opportunities to exercise their problem-solving skills.

Figure 2

Percentage distribution of Cognitive Levels in question Paper 2



Question Paper 3 (2024)

Table 5: Distribution of question verbs and associated Cognitive Levels in question paper 3

Questions	**Node (Verb)**	**Node (Cognitive level)**
1	Choose, State, Match	Remembering (x3)

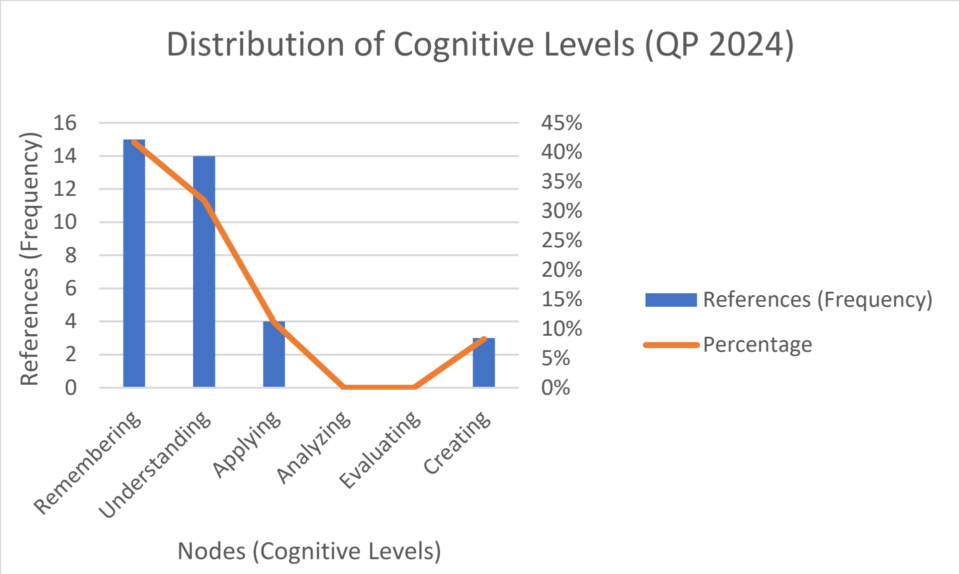
2	Identify, Explain (x4), Suggest, Draw, Define, Mention, Calculate	Remembering (x3), Understanding (x4), Applying (x2), Create
3	Explain(x2), Suggest, Name(x2), Draw, Give (x2)	Remembering (x4), Understanding (x2), Creating (x2)
4	Identify, Write (x2), Explain (x4), Calculate, Give, Name	Remembering (x3), Understanding(x5), Applying (x2)
5	Identify, Explain (2), Give (x2)	Remembering(x2), Understanding (x3),

Table 6: Frequency and Percentage distribution of Cognitive Levels in question paper 3

Node (Cognitive Level)	**References (Frequency)**	**Percentage**
Remembering	15	41,7 %
Understanding	14	38,9%
Applying	4	11,1%
Analyzing	0	0%
Evaluating	0	0%
Creating	3	8,3%

Figure 3

Percentage distribution of Cognitive Levels in Question Paper 3



In 2024, the Remembering cognitive domain has slightly reduced as compared to 2022 and 2023 papers with 13,3% as it has moved from 55% in 2022, 45% in 2023, to 41,7%. The creating cognitive skill has been sightly paid attention to with a portion of 8,3% of the paper. Nevertheless, the paper still consists of 91,7% of lower order thinking skills and higher order skills such as Analyzing and Evaluating remain ignored.

Question paper 4 (2025)

Table 7: Distribution of question verbs and associated Cognitive Levels in question paper 4

Questions	Node (Verb)	Node (Cognitive level)
1	Choose	Remembering
2	Choose	Remembering
3	Write, Mention, Indicate	Remembering (x2), Applying
4	Draw	Applying
5	Name, Predict, Give, Describe, Calculate	Remembering(x3), Understanding, Applying
6	Calculate(x2), Draw, Label, Mention, Explain	Applying (3), Remembering (x2), Understanding
7	Label, Differentiate, Complete, Design, Explain (x2), Draw	Remembering (x2), Analyzing, Creating, Understanding (x2), Applying

Table 8: Frequency and Percentage distribution of Cognitive Levels in question paper 4

Node (Cognitive Level)	References (Frequency)	Percentage
Remembering	11	47,8%
Understanding	3	13%
Applying	7	30,4%
Analyzing	1	4,3%
Evaluating	0	0%
Creating	1	4,3%

Figure 4

Percentage distribution of Cognitive Levels in question paper 4

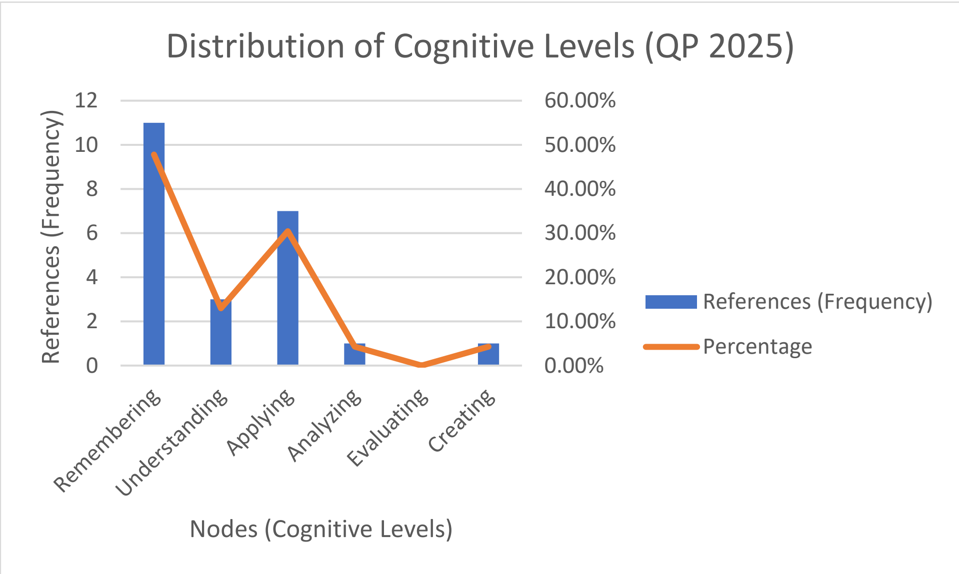


Table 7 shows that the question paper consisted of a total of 23 coded references across the six cognitive levels of Bloom's taxonomy. The majority of the questions fell under Remembering with an increase of 6,1% as compared to the previous year. 91,2% of the paper assessed lower order skills with Remembering accounting for 47,8%, Understanding 13% and Applying 30,4%. Higher order skills were minimally represented with Analyzing at 4,3% and Creating at 4,3% as well. Evaluating skills were not tested at all.

Table 9: Overall distribution of Lower- and Higher-Order Thinking Skills across the four question papers

Final output	References	Percentage
Lower order thinking skills	92	92,9%
Higher order thinking skills	7	7,1%
Total	99	100%

Table 9 presents the overall distribution of Lower-order and Higher-order thinking skills across the four Grade 9 Technology mid-year examination question papers. The findings show that Lower-order thinking skills dominate the assessments, accounting for 92.9% of the questions while Higher-order thinking skills make up only 7.1%. This imbalance indicates that the examinations are heavily skewed towards remembering, understanding and routine application, with very limited opportunities for learners to engage in critical, analytical or creative thinking.

Discussion

The Technology curriculum document outlines its primary objective as the cultivation of independent thinkers, problem solvers and decision-makers capable of applying their understanding to real-life challenges in personal, social, and professional context (Department of Basic Education, 2011). According to Kaya et al. (2014), problem-solving skills are a complex process to identify the problem and its salient features, imagine based on experience, deal with problem-solving, analyze for a solution, draw a conclusion and make a decision. Ideally, these processes should be reflected in the Grade 9 pen-and-paper assessments. Based on the analysis, the strong emphasis of the assessments is put on lower thinking skills which does not really prepare learners for real life challenges. Clearly there is a little confidence in the abilities of Technology teachers to design assessments that can increase learners' employability and industry competitiveness (Mtshali, 2020).

The results of the qualitative data indicate even though developing problem-solving skills is the primary goal of the curriculum at the schools, lower order thinking skills including Remembering, Understanding and Applying are still the dominating cognitive domains in the Assessments. This is seen in the results across all the years where Remembering was the most dominating skill with above 40% portion consecutively from 2022 to 2025. In the same breadth, Understanding and Applying cognitive skills, have been consistently accounted for more than 40% of the assessments across the years. This trend does not align with the CAPS documents which stipulates that, assessments must cater for a range of cognitive levels and abilities of learners, with Remembering comprising of 30%, Understanding and Application accounting for 40% and Analyzing, Evaluating and Creating constituting of 30% (Department of Basic Education, 2011). One can actually conclude that in the world of education, precisely Technology, the students' skills to solve problems are far from the educational expectations and goals.

Assessment practices has been critiqued in several studies for its ineffectiveness, shortcomings, and grey areas (Khalid, 2024). It lacks items probing critical thinking, problem solving and analytical skills;

contents asked and enquired are either superficial or devoid of depth and breadth (Khalid, 2024; Ali, Triyono and Koehler 2020; Mtshali et al., 2020; Chandio et al., 2016). This is seen in the analyzed assessments where Higher order thinking skills including Analyzing, Evaluating and Creating were consistently ignored. Looking at the results, Analyzing represented only 5% in 2022 and 4,3% in 2025 while it was not tested at all in 2023 and 2024. Evaluating skills were assessed in all the assessments. Lastly, Creating only formed 5% portion of the assessment in 2023, 8,3% in 2024 and 4,3% in 2025 while it was completely overlooked in 2022. This represents 7.1% of the overall distribution of higher-order thinking skills across the four assessments, which is far below the 30% prescribed in the CAPS document.

Van Zanten and Van den Heuvel-Panhuizen (2021) believe that not only do textbooks pay little attention to problem solving at school levels, but teachers also find it challenging to design good problem-solving assessments (Doorman et al., 2007). This is supported by a qualitative study delved into how Grade 9 Technology teachers understand and conduct performance-based assessments (MngunikazI, 2014). It concluded that teachers continue to struggle with implementing such assessments effectively, indicating that current practices may not adequately assess process skills or problem-solving (MngunikazI, 2014). Moreover, Orgill and Nolin (2020) assert that educational curricula and assessments often focus on knowledge acquisition aiming at the lower levels of Bloom's taxonomy. This is because teaching and designing a valid, reliable, transparent, error-free, comprehensive assessment needs proper training but most of the training programs have remained non-productive and ineffective (Reeves & Crippen, 2021; Aslam, et al. 2010; Behlol & Anwer, 2011; Shamim, 2008). Yet, this study believes that without improvement in this regard, the DBE will continue to utilize teachers who design superficial assessments, thereby making the aims of the CAPS document somewhat redundant (Mnisi 2015).

Conclusion

This study was designed to analyze Technology mid-year exam question papers to evaluate the extent to which they enhance problem solving skills among grade 9 secondary school students. The results indicated that Technology teachers do not use pen-and-pencil assessments as mechanisms to enhance problem-solving skills. The Department of Basic Education through CAPS document has provided guideline on the distribution of cognitive levels when designing assessments however teachers are still focusing on Lower order thinking skills.

One could actually conclude that teachers do not know how to construct Higher order thinking questions, therefore they need proper training to effectively distribute cognitive levels when designing assessments. This is proved by the overall distribution of Lower-order and Higher-order thinking skills across the four Grade 9 Technology mid-year examination question papers with Lower-order thinking skills dominating the assessments, accounting for 92.9% of the questions while Higher-order thinking skills make up only 7.1%. Interestingly, these assessments were moderated and approved, reflecting that moderator themselves may lack sufficient understanding of Bloom's taxonomy and CAPS cognitive requirements. This suggests that moderation processes are more of a formality rather than a quality assurance check for cognitive levels. Therefore, with both teachers and moderators overlooking higher-order thinking skills the system will continue to recycle superficial assessments that do not prepare learners for real-world problem-solving.

Recommendations and Limitations

- This study encourages subject advisors to come with better ways of training teachers on how to design assessments with all the cognitive levels as per the CAPS document.
- Moderation processes should be strengthened by training moderators to evaluate cognitive levels in line with Bloom's taxonomy and CAPS requirements.
- Collaboration should be encouraged among Technology teachers and schools to share knowledge and skills on how to develop effective assessments
- This study was limited to June examination question papers from the Sekhukhune East District in Limpopo Province. Further research could focus on question papers from other terms to determine whether superficial assessments are a consistent, year-round practice. Since assessment plays a critical role in developing learners' higher-order thinking skills for industry competitiveness, additional studies should also explore the challenges teachers face in designing assessments that address all cognitive levels.

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