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Enhancing Higher Order Thinking Skills Among TVET Students: HyperDocs as a Tool for TVET Teachers

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ABSTRACT

HyperDocs are interactive digital documents containing links to various digital resources and activities. These learning tools provide students with an interactive and self-directed learning experience that allows them to investigate, generate, and collaborate in a digital environment. HyperDocs have recently experienced a significant surge in usage across various fields. Despite the widespread use of HyperDocs and their potential to improve classroom learning, additional research is required to ascertain their effectiveness in educational settings. This investigation aimed to identify patterns in advanced cognitive abilities to improve Technical and Vocational Education and Training (TVET) educators' understanding of HyperDocs activities. Using Bloom's Taxonomy as a theoretical framework, the TVET instructor conducted a document analysis of HyperDocs to determine the intellectual level of student activities. During this investigation, a significant quantity of previously unrevealed information has been uncovered. The study results indicate that HyperDocs activities comprise the entire spectrum of cognitive abilities outlined in Bloom's taxonomy. The analysis reveals that most HyperDocs activities involve lower-order thinking skills such as remembering, comprehending, and applying. Higher-order thinking skills such as analyzing, evaluating, and creating are utilized less frequently, accounting for only 45.1% of all activities. Although HyperDocs' activities often incorporate primary forms of reasoning, the difference in performance is only 9.8%. The results of the present investigation indicate that the integration of HyperDocs within the Technical and Vocational Education and Training (TVET) domains has the potential to augment cognitive processing.

Keywords:HyperDocs; Technical and Vocational Education and Training (TVET); Bloom's Taxonomy; Improving classroom teaching; Higher-order thinking skills (HOTS)

INTRODUCTION

Acquiring higher-order thinking skills (HOTS) is deemed essential in education, particularly for Technical and Vocational Education and Training (TVET) instructors, as they are tasked with equipping students with the necessary competencies to become adept problem-solvers and valuable members of the workforce (Takko et al. 2020). The emergence of technology has brought about substantial changes in every aspect of human existence. Industry 4.0 has brought about a worldwide digital revolution, generating a surge in the need for expertise and proficiency among new employees and educators (Diao & Hu 2022). A thorough understanding of the present status of teaching competencies among TVET instructors necessitating training in novel pedagogical approaches is imperative for vocational training leaders and educators aspiring to enhance their professional advancement and development (Yaqoot et al. 2021).

TVET is an educational program that focuses on formal and informal training to develop a skilled workforce that meets the needs of various industries (Nooruddin, 2017). With the advent of the Fourth Industrial Revolution,

industries have been able to incorporate smart manufacturing and digital transformation. The World Economic Forum predicts that in the coming decade, professional employment opportunities will shift towards artificial intelligence, data science, robotics, DevOps, cloud computing, and social media (World Economic Forum, 2020). New data compiled by LinkedIn and Burning Glass Technologies demonstrates that these in-demand skills encompass many competencies (Zhu et al. 2018). These skills are divided into seven categories: business skills, specific industry skills, general and soft skills, basic technology skills, and disruptive technology skills (World Economic Forum, 2020). Creativity and originality are examples of qualities that contribute to the development of business abilities. Soft skills include innovation, leadership, social interaction, initiative mind, self-disruption, and critical thinking, while hard skills include management skills and analytical reasoning, based on study by Handayani et al. (2020).

Studies have shown that technology can enhance higher-level cognitive abilities, as demonstrated by Hopson et al. (2001) and the International Society for Technology in Education (ISTE), in 2022, highlighting technology's importance in education. During the COVID-19 pandemic, teachers have quickly adapted to remote teaching and digitized their methods. However, instructors need to use technology to encourage higher-order thinking during online instruction, as Wijnen et al. (2021) noted. Developing higher-order thinking skills among TVET students is crucial, as highlighted by Hamdan et al. (2019), Heong et al. 2019), and Yassir et al. (2021). Although pre-service teachers have a positive attitude towards integrating digital technology in education, their commitment to it must be revised, according to McGarr and Gavaldon, (2018). This study aims to assess the effectiveness of HyperDocs in promoting higher-order thinking skills among TVET students.

In recent years, the utilization of HyperDocs in educational contexts has significantly increased. According to Carpenter, Trust, et al. (2020), the interest of educators in HyperDoc has inspired the creation and delivery of instructional activities. HyperDocs have risen in prominence and are acknowledged for their potential to improve teaching and learning (Carpenter, Krutka, et al. 2020; Hodges et al. 2020). HyperDocs are widely used in classrooms as a tool to improve learning outcomes. However, their effectiveness in educational settings is being evaluated and investigated, as highlighted in Carpenter, Trust, et al. (2020) study. Goodwin et al. (2020) created a six-phase lesson design and delivery method to foster higher-order cognitive abilities. The guidelines in "Teacher Give Teachers" by Goodwin et al. (2021) align well with the introductory lesson format that HyperDocs provides. HyperDocs have seen an increase in adoption across various academic levels and subject areas. According to Carpenter, Trust, et al. (2020) study, educators who use HyperDocs intend to foster student engagement with the subject matter, facilitate the acquisition of new information, promote collaborative learning, encourage the application and demonstration of knowledge, promote quick reflective thinking, and stimulate the generation of innovative ideas. These technological advances facilitate children's cognitive processes, allowing them to engage in critical thinking, creative expression, collaborative endeavors, and interactive experiences within a swiftly changing environment. Highfill et al. (2016) affirm that the availability of educational resources empowers students to gain knowledge on any subject matter that piques their curiosity. Further research is needed to determine the effectiveness of HyperDocs in education, particularly in developing advanced thinking abilities.

Our research focuses on how TVET educators utilize HyperDocs to enhance their students' critical thinking skills. Specifically, we evaluate the extent to which students participate in HyperDocs activities that involve implementing, evaluating, and creating content based on Bloom's taxonomy.

HYPERDOCS

Highfill et al. (2016) reported hat HyperDocs, which are found on Google Docs, has become the favored way of teaching, surpassing traditional worksheets. Teachers can use HyperDocs to incorporate pertinent content and resources for students in place of the lecture and worksheet lesson in GoogleDocs or Slides (Carpenter, Trust, et al. 2020). HyperDocs can be used in the classroom for one-on-one instruction, small-group projects, and large-class assignments. Children can express themselves through cooperation, production, sharing, and critical thought throughout this session. Students can utilize HyperDocs to investigate, understand the background information, find solutions to their questions, and apply what they have learned in novel ways (Clark, 2020).

Popular among educators, the idea of HyperDoc could change how pupils are taught and learned (Carpenter, Trust, et al. 2020). Open-source educational materials called HyperDocs can be freely remixed, repurposed, and disseminated. Teachers can discover current HyperDoc resources with open licenses so they can be customized in a repository called "Teachers Give Teachers." Teachers can include some of the 5Es in their HyperDocs using the HyperDocs Model (Engage, Explore, Explain, Extend, Evaluate). According to Highfill et al. (2016), depending on the lesson design and the material you include,

HyperDocs can easily turn into a digital worksheet (para. 1).

Prior research on HyperDocs is limited, with only one recent study by Carpenter et al. (2020). However, the HyperDocs activity used in this study did not provide crucial information about students' cognitive abilities. Despite the significant promotion of the HyperDocs theory, educators still require further assistance in understanding and implementing it. Carpenter et al. (2020) noted that academic researchers have expressed concerns about potential disparities.

ENGAGING HIGHER ORDER THINKING SKILL WITH TECHNOLOGY

As a result of their daily use of digital tools, it is now more important than ever to provide students with various learning opportunities (Smirnova, 2016). They are more likely to seek out knowledge actively, amuse themselves, and engage in social interaction (Maghsudi et al. 2021). Generation Z or the post-millennial generation also labelled as centennials, for having been born into the world at the turn of the century arrived with a tablet and a smartphone under their arms have no problem learning new technologies (Iberdrola, 2023) because they have already used them in the past. For this to happen, teachers must actively integrate digital technology into their classes and provide students with access to cutting-edge digital learning opportunities.

Students' higher-order thinking skills are increased when teaching and learning are facilitated by technology (Ahmad et al. 2021; Kosasih et al. 2022; Liu & Zhang, 2022). Self-directed learning can be developed by using technology for active learning. Students can participate in the learning process and build higher-order thinking abilities by analyzing and synthesizing concepts, making decisions, and putting theories into practice (Ahmad et al. 2020; Aziz & Kharis, 2021). Teaching online does not always imply that teachers constantly use technology to promote higher-order thinking (Wijnen et al. 2021). When teaching high-order thinking skills to pupils, Bulfin, S. et al. (2015) recommend using technology in the classroom in conjunction with proper learning methodologies.

A project's success depends on appropriate technology use, but teachers play a critical role. Although technology alone does not boost critical thinking, students are more likely to adopt new technology when teachers model real-world experiences (Tang, 2021). Therefore, elementary teachers help students develop higher-order thinking skills to understand problems and identify options and solutions while strengthening their problem-solving skills (Pinyo et al. 2023).

There are a variety of instructional strategies that teachers can use to assist their students in developing critical thinking skills (Wijnen et al. 2021). In the classroom environment of the twenty-first century, students from all backgrounds, including religion, race, and ethnicity, will need to develop outstanding critical thinking skills. According to studies by Kim et al. (2020); Naqiyah and Wilujeng (2019); and Putri and Aznam (2019), the use of technology in active learning settings increases student engagement and encourages the development of advanced cognitive skills. Technology integration into the educational environment has resulted in numerous benefits for students, including increased motivation, an emphasis on student-centered learning, and active participation in the learning process. According to Han et al. (2020) and Siregar (2020), these advantages allow for higher-order thinking and improved memory retention. Rahmatika et al. (2021) are doing a study to see whether YouTube can be used effectively for online education. According to the conclusions of this study, YouTube has a significant positive effect on online education. This research demonstrates that using YouTube as a teaching tool increases student accomplishment levels. If YouTube content is adjusted to a student's age, stage of development, and preferred learning style, the student's comprehension of YouTube content is boosted.

As a result of their research, Noah and Gbemisola (2020) found that adopting Google Classroom as an online learning platform impacted students' academic performance, attitudes, and views in Nigerian secondary schools during the Nigerian secondary pandemic. According to this study, students should be adequately prepared to use this platform for educational purposes during a pandemic. Teachers and students can use this site to interact, collaborate, set assignments, grade students, and share learning materials. Students can also ask questions about unfamiliar areas. According to past research, the ability of students to learn content utilizing technology is a significant factor in their success. Future HyperDocs-related activities may encounter advantages and disadvantages due to the research presented here. The environment of the actual world is being recreated by technology. The use of virtual reality or games that inspire exploration, planning, and construction of new things can boost students' critical thinking, Creativity, teamwork, academic accomplishment, and problem-solving ability. This can be accomplished through virtual reality or games (Chang & Yeh, 2021; Shih et al. 2010; Van Voorhis & Paris, 2019). Players of goal-oriented video games need to assess and synthesize information to achieve their goals (Shih et al. 2010). The cognitive abilities of students who employed game-based learning were not investigated in these studies, despite the studies looking at a wide range of different characteristics. The majority of research has focused on lower-level skills and knowledge. Between 2007 and 2014, Zydney and Warner conducted a comprehensive literature evaluation on using mobile

applications for science education. Using Bloom's Taxonomy, the researchers determined the cognitive student learning outcomes associated with mobile applications (Zydney & Warner, 2016). However, our preliminary literature searches did not reveal any studies that evaluated the pedagogical options offered to TVET students through technology, specifically through the usage of HyperDosc, in terms of cognitive levels defined by Bloom's Taxonomy. This purpose has only been studied in a recent study (Crompton et al. 2021) that applies Bloom Taxonomy to an analysis of learning activities conducted using HyperDocs to detect new trends and broad findings regarding how HyperDocs are being used to engage students cognitively.

BLOOM'S TAXONOMY

Educational research acknowledges Bloom's Taxonomy as a method of categorizing different stages of thought (Bloom et al. 1956). It helps teachers analyze course material and assess students' progress effectively. Bloom's innovative idea involved creating systematic categories of cognitive operators and developing three learning domains: cognitive, affective, and psychomotor (Bloom et al. 1956). The system has two types of classification: complex and simple. Utilizing Bloom's Taxonomy is an easy way for researchers to identify students' preferred learning behaviors after completing a course. Recently, impressive results were seen when HyperDocs exercises incorporated Bloom's Taxonomy as a conceptual framework to evaluate students' cognitive ordering.

Studies have shown that using instructional materials can greatly benefit students in their cognitive, emotional, and physical development (Campbell, 2019; Rasmitadila et al. 2020; Schudde, 2019). Bloom et al. (1956) proposed six stages of cognitive development, from basic understanding to comprehensive evaluation. The affective domain deals with emotions in learning, while the psychomotor domain focuses on physical abilities. Recently, Anderson et al. (2021) expanded on the framework by introducing six new categories of cognitive processes, focusing solely on cognitive abilities. Figure 1 provides a clear and easy-to-understand classification that has been refined for better comprehension.

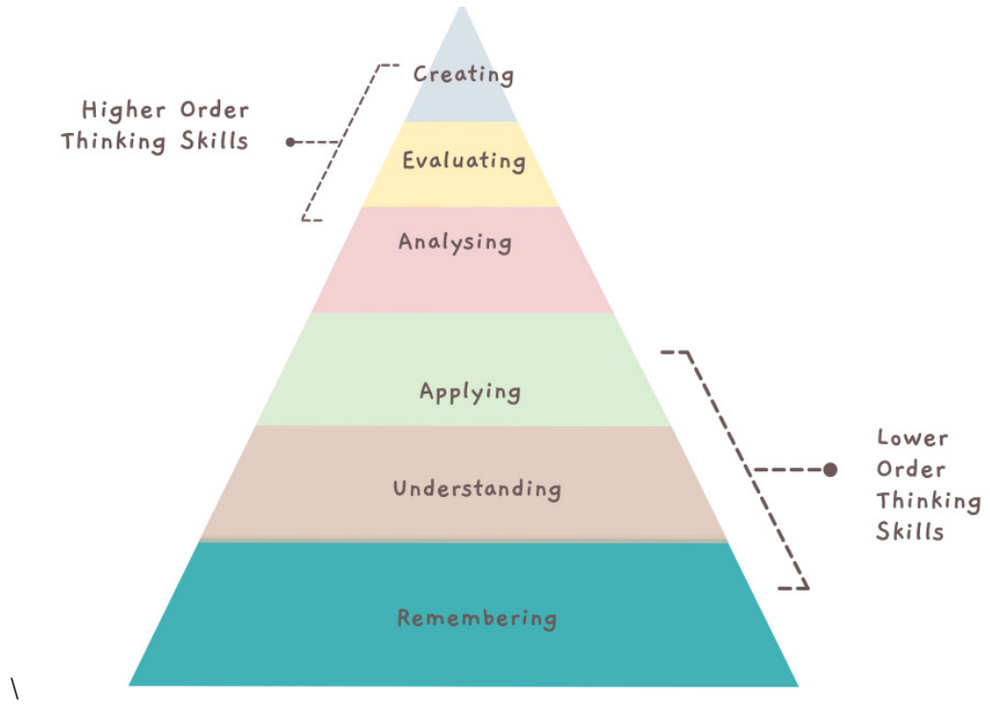

FİGURE 1. Revised Bloom's Taxonomy levels as outlined by Anderson et al. in 2021.

Anderson and his colleagues proposed a comprehensive interpretation of Bloom's taxonomy in 2021. Table 1 was devised to summarize the definition, which can assist researchers in comprehending their research findings. This table simplifies the various categories within Bloom's Taxonomy, thereby reducing confusion. The study offers a detailed explanation of the distinct cognitive stages using Bloom's Taxonomy. Researchers must utilize this resource to enhance the precision and dependability of their research.

TABLE 1. An Overview of the Cognitive Process Dimension by Anderson et al. (2021)

Cognitive Process	Definition
Remember	To clarify, "recognizing" means "identifying." Recollection (retrieval)The act of interpreting involves various techniques such as clarifying, paraphrasing, representing, and translating.
Understand	Exemplifying refers to the act of providing an example or instance to illustrate a concept or idea.
Apply	Utilizing distinct methods for differentiation in order to discriminate, focus, select, and distinguish.
Analyze	The process of organizing involves various techniques such as finding, coherence, integrating, outlining, parsing, and structuring.
Evaluate	The act of verifying or ensuring the accuracy and consistency of a process or system through the coordination, detection, monitoring, and testing of its various components.
Create	Formulating hypotheses, Design planning, The act of creating or manufacturing.

RESEARCH QUESTION

1. At what level of the cognitive domain does it manifest in HyperDocs learning activities, according to Bloom's Taxonomy?

2. Does a clear relationship exist between Bloom's Taxonomy levels and grade levels?

3. Does each subject area exhibit a noticeable pattern in Bloom's Taxonomy?

METHOD

RESEARCH CONTEXT AND PARTICIPANTS

This study was conducted in the Klang Valley region of Malaysia as part of an online professional development program to improve educators' understanding of digital content. The study involved 51 participants, with 70.59% female teachers, comprising 36 individuals, and 29.41% male teachers, comprising 15 individuals. Of these, 17.65% (9 teachers) were familiar with HyperDocs, and 35.29%

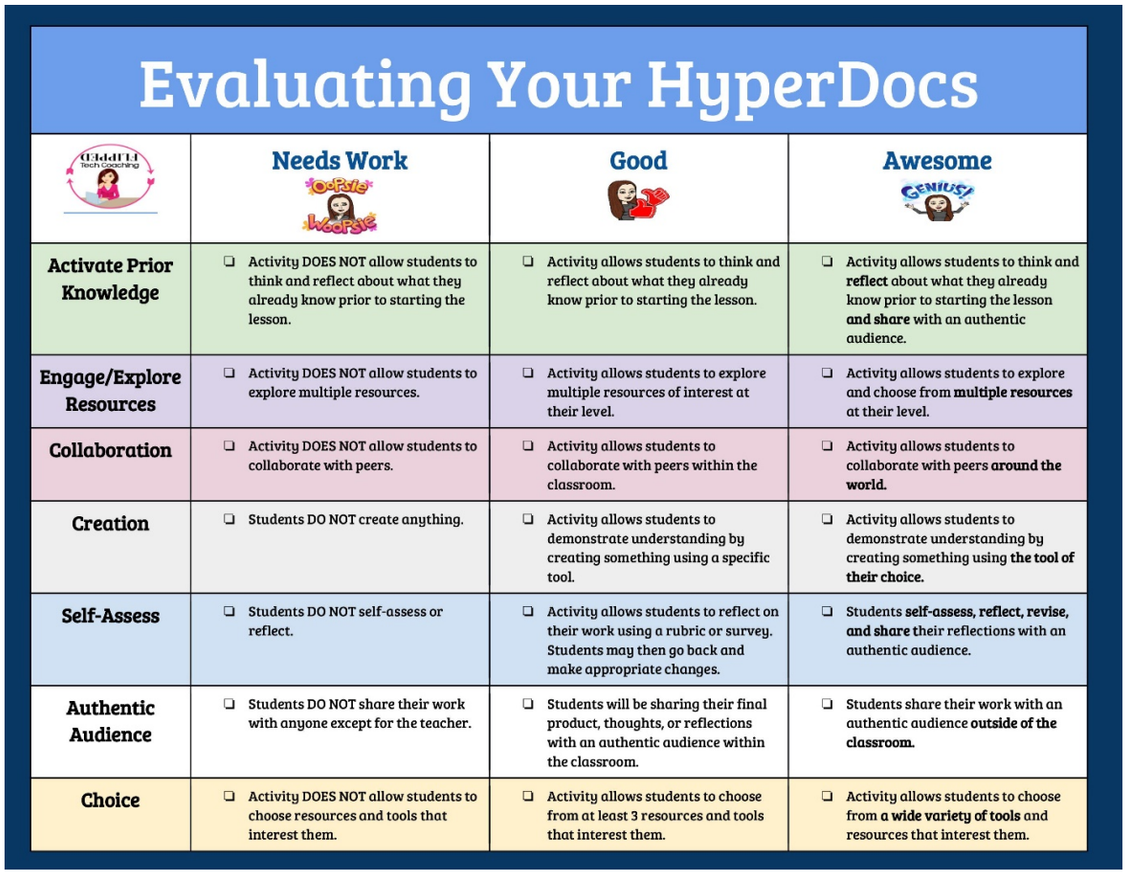

FİGURE 2. Seven key factors Hyperdocs evaluation based on Boucher's 2017 (Boucher, 2017)

(18 teachers) had been involved in online education for over three years.

The participants were given a presentation on HyperDocs to improve their understanding and then assigned the task of creating their HyperDocs according to the criteria of Flipped Tech Coaching (Figure 2). The study employed double-loop learning, which involved peer assessment of four HyperDocs. Peer feedback is a valuable tool for improving work, and the researchers followed the methodology of Kalantzis and Cope (2012) to ensure constructive feedback. Participants then incorporated suggested changes and engaged in introspective inquiries. The Bloom Taxonomy was used to rank the teachers according to their level of understanding.

DOCUMENT ANALYSIS

Through our thorough analysis of HyperDocs created by educators, we clearly understood how teachers effectively utilize Bloom's Taxonomy in their teaching. We meticulously categorized the cognitive processes employed by teachers in creating HyperDocs based on Bloom's Taxonomy, following the framework outlined by Anderson et al. (2021). Our study aimed to determine whether the use of HyperDocs by teachers could effectively facilitate higher-order cognitive engagement among students. During the coding phase, we conducted two inquiries to examine the sequence of Bloom's Taxonomy in HyperDocs. We ensured our data's accuracy through interrater reliability, which quantifies the level of agreement between multiple raters, observers, coders, or examiners, as defined by Lange (2011). Applying Bloom's Taxonomy, a pair of researchers conducted a joint categorization of the investigational coding, identifying concurrences in the domains of remembering, understanding, applying, analyzing, evaluating, and creating. Inconsistencies were resolved through coder discussion. At the outset, a considerable proportion of 88% of participants concurred with the classifications. The researchers engaged in a discourse on Taxonomy variations, ultimately reaching a consensus regarding the placement of the studies on the graph. The classifications of subject areas and grade placements were determined based on their respective categorizations. The scholars employed a secondary analysis methodology, which involved retaining the original meaning and context of the unprocessed data while utilizing the coding technique.

FINDINGS

The results section is organized according to the three research questions.

Question 1: At what level of the cognitive domain does it manifest in HyperDocs learning activities, according to Bloom's Taxonomy?

5.88 % of the 51 HyperDocs' activities consisted of level-one memory tasks, according to the statistics. Quizizz was cited as an example of Bloom's Taxonomy-based memory activities for TVET students.

HyperDocs activities engaged 15.69% of users during concurrent learning on two levels. As an example of a learning activity, students were required to record a video of themselves listing graphic design software. 33.33 % of the time, HyperDocs activities exhibited level three applications. During a Form 5 TVET (Visual and Animation) class, students studied animated characters and were required to design the size of the selected characters. They then presented their findings to their peers, using their knowledge of the chosen animated characters. 5.88% of the time, level four analysis was used in HyperDocs activities. Students must analyze the sounds and sound effects required to create an interactive design by specifying an appropriate sound file format.

According to the results, 7.84% of the time, level five HyperDocs activities engaged in evaluation activities. In a literacy activity for fifth-graders, students must clarify the problem. They were able to evaluate their current knowledge level. Students in fifth grade generated new information 31.37 % of the time. Students in the fifth grade were required to create animated sequences in 3D

Figure 3 illustrates the diverse learning activities of HyperDocs across different levels of Bloom's Taxonomy. The research on Bloom's Taxonomy highlights that over 45% of the learning activities included in HyperDocs focus on higher-order cognitive skills like analysis, evaluation, and creation. Additionally, students receive an equitable distribution of tasks, with application and creation assignments allotted proportionately (around 30% for each category). This represents a shift from previous studies that primarily used technology to assess students' ability to recollect information. Recent research suggests that HyperDocs can enhance higher-order thinking abilities, giving students greater autonomy, flexibility, and authority in their learning journey (Carpenter, Trust et al. 2020). However, despite these benefits, over half (54%) of the study still involves lower-level Bloom's Taxonomy tasks.

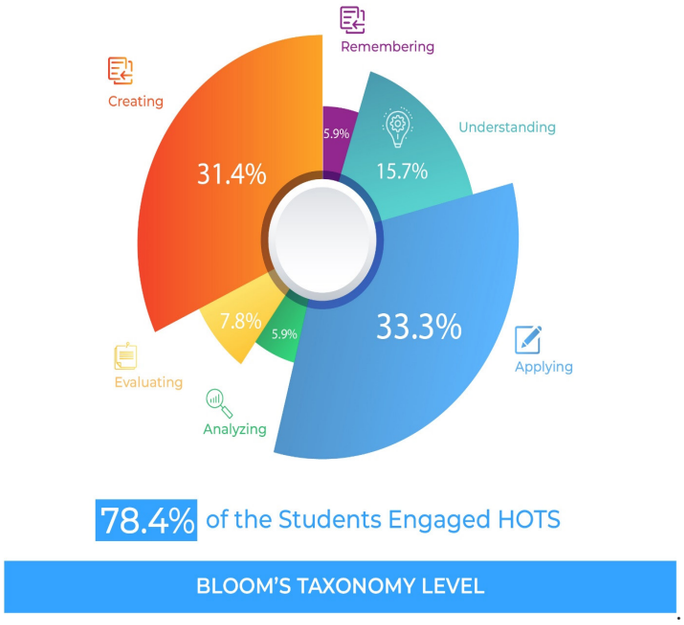

FİGURE 3. Level of Bloom's Taxonomy

Question 2: Does a clear relationship exist between Bloom's Taxonomy levels and grade levels?

The data in Figure 4 shows the percentage of students engaged in each level of Bloom's Taxonomy across different grade levels. For example, 8.7% of fourth-grade activities required level one learning, 17.39% required level two, and 8.7% required level three. Level four learning activities accounted for 4.35% of total time spent, while level five assessments scored 13.04%. Finally, 30.43% of the total time was allocated to level six activities that involve producing and engaging in new knowledge. Similarly, in fifth grade, 9.09% of activities focused on level two comprehension, 18.18% on level three application, and 9.09% on level five assessment. Most students (63.64%) were actively engaged in creating new knowledge or ideas at level six, while no assignments were given at levels one and four.

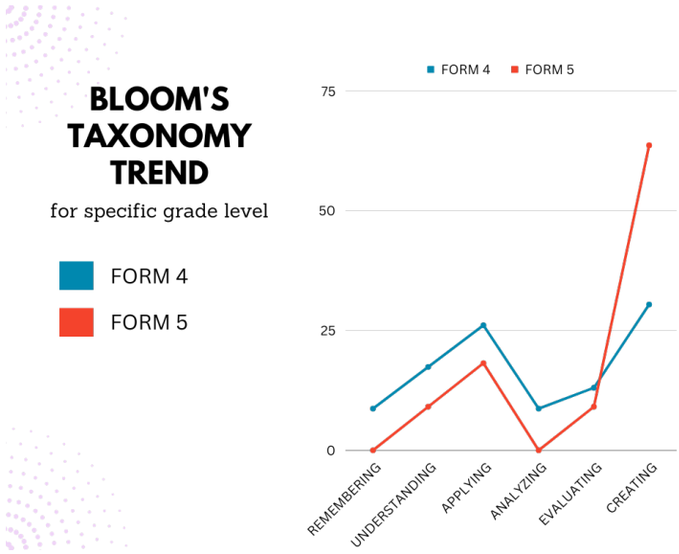

FİGURE 4. The trend of Bloom's Taxonomy for a particular grade level.

The findings of the investigation are depicted in Figure 4. Research has indicated that as students advance to higher grades, there is an increase in the prevalence of higher-order thinking. Most academic coursework across different educational levels is designed to foster advanced cognitive skills. Even with the possibility of acquiring knowledge at the genesis stage through implementing HyperDocs' activities, a significant % of educators, namely 40%, prioritize rote learning or comprehension of subject matter in their instructional practices.

Question 3: Does each subject area exhibit a noticeable pattern in Bloom's Taxonomy?

TVET SUBJECT (KNOWLEDGE ASSESSMENT)

This third study focuses primarily on evaluating Technical and Vocational Education and Training (TVET) subjects, emphasizing comparative analysis. The evaluation of TVET subjects can be divided into two distinct categories based on competency-based evaluation principles: knowledge-based assessment and performance-based assessment (Jabatan Pembangunan Kemahiran, 2023). 52.94% of the total dataset was comprised of HyperDocs on Technical and Vocational Education and Training (TVET), according to the findings. Table 2 displays the classification of HyperDocs learning activities according to the various levels of Bloom's taxonomy for a subset of Technical and Vocational Education and Training (TVET) students, consisting of 27 subjects, based on their knowledge assessment. 59.26 % of the data indicate that TVET has tremendous potential for imparting advanced cognitive skills. Furthermore, educational opportunities for retention are lacking. The probability of acquiring comprehension-related knowledge is only 14.81%, while the probability of applying that knowledge is 25.93%.

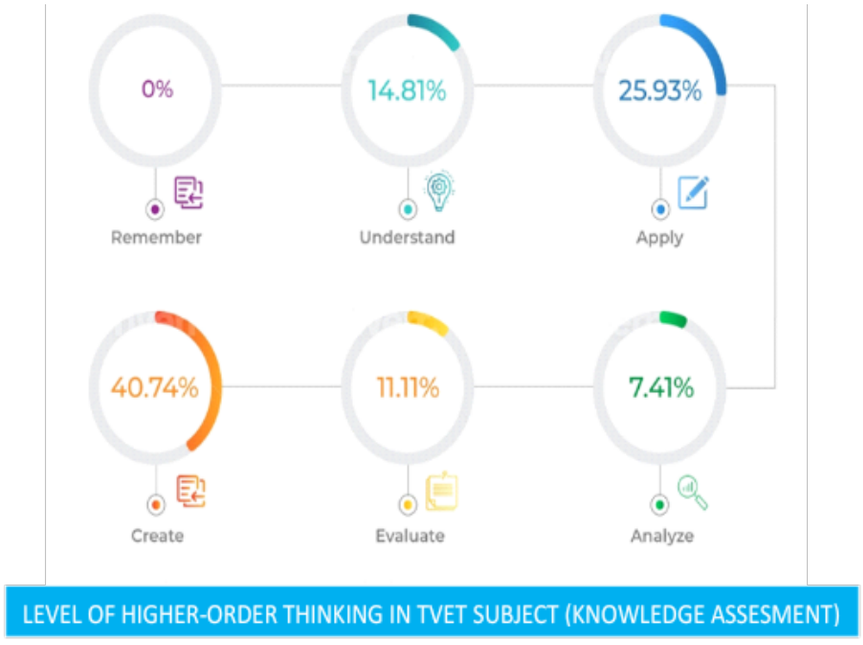

FİGURE 5. Assessment of Higher-Order Thinking Skills in TVET Subjects (Knowledge Evaluation)

TVET SUBJECT (PERFORMANCE ASSESSMENT)

With an impressive 47.06% utilization rate, nearly half of the TVET subject dataset prefers to use HyperDocs. As depicted in Figure 6, using Bloom's taxonomy, these have proven to be highly effective in enhancing learning activities. The TVET subject of performance assessment provides a significant opportunity for teaching low-level cognitive processes, as an astounding 70.83% of classes include this aspect. In addition, approximately 20% of TVET classes use online educational activities such as Kahoot, Quizizz, and Wordwall to support student learning, which research has demonstrated significantly improves knowledge retention and comprehension. Notably, 20.83 % of TVET instructors use HyperDocs for document creation, which can enhance advanced cognitive abilities; however, additional evaluation may be necessary for optimal results. Students can also use functional instruments to complete tasks requiring higher-order cognitive abilities.

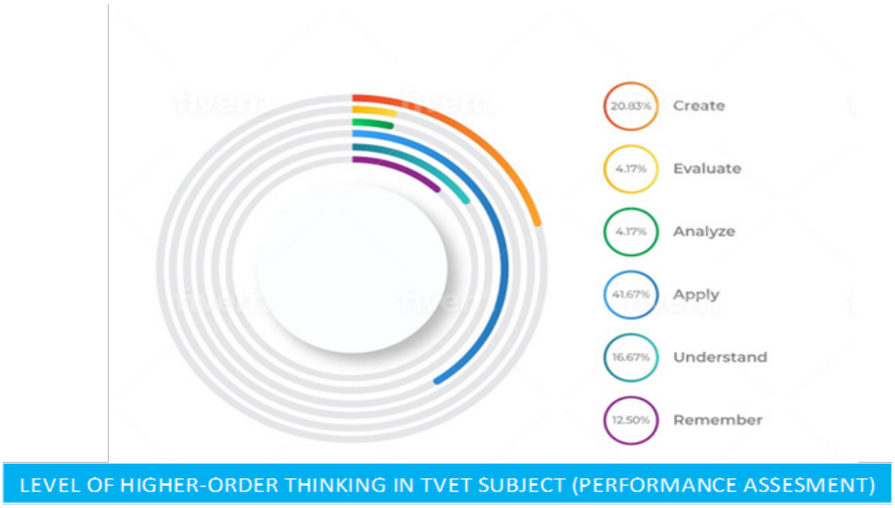

FİGURE 6. Evaluating advanced cognitive abilities in a Technical and Vocational Education and Training (TVET) environment.

Figure 7 displays the investigation results on Bloom's Taxonomy patterns in a specific field. The study revealed that Technical and Vocational Education and Training (TVET) disciplines cover all levels of Bloom's Taxonomy, making them appropriate for engaging in more advanced cognitive processes through the use of HyperDocs. However, despite a significant increase of 59.26% in utilizing Bloom's Taxonomy in TVET, educators tend to rely on lower-level cognitive processes. It is worth noting that TVET courses that involve performance evaluation show a 29.17% reduction in higher-order cognitive skills. This highlights the importance of educators adopting a learner-centered, 4C-oriented pedagogical approach when implementing HyperDocs, as suggested by Highfill et al. Furthermore, even after completing a three-day professionalism course, many educators continue to stick to their traditional teaching methods, emphasizing the need for ongoing updates in educational techniques

These findings are consistent with and relevant to previous research on the skills required in the future, namely information brokerage skills, basic ICT skills, and management skills as part of complex skill sets, and social interaction, critical thinking, and knowledge application as soft skill sets (Colombo et al. 2019). Teachers in the field of TVET have utilized the capabilities provided by HyperDocs to interact with real-world scenarios, which is very encouraging, given the need for high-level reasoning skills in producing human capital to meet future employment expectations. Using the Bloom Taxonomy as a guide, TVET courses offer the most opportunities for advanced thought.

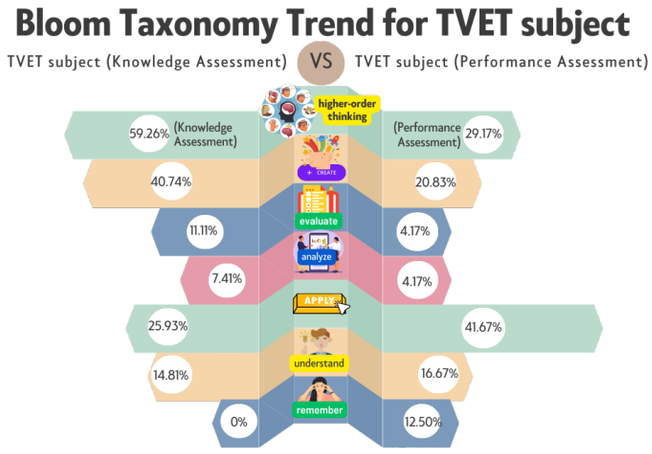

FİGURE 7. Bloom Taxonomy Trend For Specific Subject Area

DISCUSSIONS AND CONCLUSION

The present research examined the efficacy of HyperDocs in the realm of education and ascertained that these pedagogical tools cater to all tiers of Bloom's taxonomy. Although frequently employed for cognitive processes at the lower end of the spectrum, such as recall, comprehension, and application, using said processes for higher-order thinking, such as assessment, appraisal, and generation, experiences a notable uptick of 54.90%. It is well-known that students tend to operate at low cognitive levels, despite frequently using low-level reasoning. Several studies have shown that pupils operate at low cognitive levels, including those conducted by Frohberg et al. (2009); Lindsay, (2016);and Zydney and Warner, (2016). Nevertheless, the results of this study suggest that HyperDocs can play a crucial role in promoting higher-order thinking.

Furthermore, HyperDocs can be effectively employed with teacher-centered learning objectives, focusing on the four Cs of communication, cooperation, creative thinking, and creativity. This study provides convincing evidence that HyperDocs facilitate the transformation of students from information consumers to creators, with the highest proportion of creators at 31.37%. While this is only a preliminary inquiry, it is clear that further research is required to comprehend the potential applications of HyperDocs fully.

The study's findings indicate that the integration of HyperDocs was utilized in the assessment of technical and vocational education and training (TVET) subject matters, using a competency-based evaluation framework encompassing knowledge-based and performance-based evaluations. TVET (knowledge assessment)-based subjects accounted for 52.94% of all studies, with TVET (performance assessment) in second place (47.06%). This study discovered a 59.26% rise in higher-order thinking in TVET subjects based on knowledge assessment classes. Only 29.17 % of subjects in TVET (performance assessment) use higher-order thinking skills and cognitive abilities. The findings of this study indicate that teachers still need to thoroughly comprehend the student-centered and 4C-oriented HyperDocs concept developed by Highfill and colleagues. All participating instructors received a three-day course in professionalism, which only sometimes implies that they are willing to alter their teaching methods. Similar results were discovered by Carpenter, Trust, et al. (2020), who discovered that many educators still need to acquire a deeper understanding of HyperDocs. Instructors require additional in-house training to remain current with the Highfill version of HyperDocs.

LIMITATIONS AND FUTURE RESEARCH

Future studies should consider potential areas for further exploration in this research. The study focused on teachers who had completed the HyperDocs TVETs professional development course and were selected using convenience sampling. However, Highfill et al. (2016) suggest that more than the three-day course may be necessary for participants to comprehend HyperDocs fully. Highfill's conceptualization of lesson design and delivery in HyperDocs promotes higher-order thinking skills and the potential of HyperDocs to enhance learning across various cognitive levels. Previous research has established the efficacy of implementing HyperDocs by Technical and Vocational Education and Training (TVET) instructors to promote student autonomy and enhance learning outcomes.

One concern is the need for more student learning data while assessing the Bloom's taxonomy levels that students applied while undertaking learning tasks on HyperDocs. Further research is necessary to explore the efficacy of HyperDocs as an instructional aid in promoting advanced cognitive skills. The observation was made that there was a lack of evidence indicating that instructors were utilizing HyperDocs as a pedagogical tool with their pupils. Instead, the focus was solely on the HyperDocs that were generated for the curriculum.

It is crucial to conduct interviews with educators regarding the implementation of HyperDocs to facilitate additional research, as this approach has the potential to foster advanced cognitive abilities. Further investigation is required to explore the utilization of HyperDocs, as they possess the capacity to stimulate advanced cognitive processes in various fields. The efficacy of this approach could be evaluated in alternative academic domains, and scholars can investigate the potential advantages this technology may offer students by correlating specific academic tasks with the utilization of HyperDocs.

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