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JUDGING STUDENTS' UNDERSTANDING: THE IDEA OF CONCEPT-BASED CURRICULUM

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Abstract

Purpose of the study: This study aims to identify the method of applying the Concept-Based Curriculum, and to explain the strategies and requirements for its application by educators and teachers.

Methodology: Review and comparison different method that have been mentioned in the previous researches.

Results: The study deduces that focusing on the breadth of learning, as opposed to the depth, is vital in ensuring that knowledge is effectively organized for easier transferability into other contexts.

Applications of this study: The results of this study may help instructors to determine the range of potential benefits of using Concept-Based Curriculum to improve teaching and learning processes.

Novelty of the study: seeking for more information which is needed for educational researchers' experiences of developing and using concept-based curricula to evaluate efficacy and usability.

Keywords*: Learning, Conceptual Understanding, Curriculum, Knowledge, Skills.*

INTRODUCTION

The principal aim of teaching is always understanding, which is absolute and not novel for learning process. As its purpose may be easily overlooked in today's mode of teaching and curriculum coverage. The curriculum today is still knowledge-based and emphasizes the breadth as opposed to the depth, i.e., many topics are covered in a very little time, posting challenges in reinforcing this knowledge, consequently shallow understanding (Stern, J., Ferraro, K., & Mohnkern, J. 2017). Often, the acquisition of knowledge is not enough, while students will not comprehend the principal concept conveyed in imparted knowledge as to decipher their meaning, connect them to their learning and apply them in other contexts of routine learning. By knowing, it does not mean the student understands. Therefore, it is vital that they are able to make use of this imparted knowledge and connect it to their real-world and how they are tied around certain concepts in the studies subjects (Erickson, H. L., Lanning, L. A., & French, R. 2017).

The use of classroom time should shift focus from covering and memorizing information to thinking with and applying knowledge at both the factual and conceptual levels. Thinking deeply with factual knowledge and concepts aims to communicate ideas and solve problems, transferring knowledge across distinct global contexts and situations, and seeing patterns and connections between concepts, ideas and situations are at the heart of concept-based teaching and learning. Less factual coverage could open the door to deeper thinking and understanding (Ahmad & Ahmad, 2019; Erickson, H. 2012).

Problem Statement

The researcher finds that traditional curricula are not designed to effectively prepare today's students for the profession. Many schools are moving to the model of concept-based learning as an answer to provide students with a broader perspective of their role and the development of a deeper understanding of the content.

Concept-based learning is a teaching model that organizes curricular content by concepts, using exemplars to focus on specifics about the concept. This approach uses a concept as lens allowing for higher-level thinking as students look for patterns and connections across concepts. Conceptual-level understanding allows linking of new knowledge to current understanding permitting deep learning to occur (Ahmad & Ahmad, 2018; Hardin, P. K., & Richardson, S. J. 2012).

While concept-based curricula promote concept application, these curricula also require significant changes in planning and implementing education. Thus, the researcher seeks more information is needed for educational researchers' experiences of developing and using concept-based curricula to evaluate efficacy and usability.

Questions of the Study

1. What is the Concept-Based Curriculum?
2. How to design Dimensional and the 3-Dimensional Curriculum?
3. What is the role of the knowledge structure and process structure in preparing the Concept-based Curriculum?
4. What is the reason for Teaching Conceptual Understanding?
5. How to apply conceptual curriculum design?

Significance of the Study

The significance of this study is that it discusses the benefits of Concept-Based Curriculum, as the results of this study may help instructors to determine the range of potential benefits of using Concept-Based Curriculum to improve teaching and learning processes.

Aims of the Study

This study aims to identify the method of applying the Concept-Based Curriculum, and to explain the strategies and requirements for its application by educators and teachers.

REVIEW OF LITERATURE

Teaching Conceptually

The concept-based teaching approach, employed in concept-based curricula, has existed for more than 50 years and focused on the development of complex thinking. Initially, this method was developed by Hilda Taba and it was popular during the 1960s and early 1970s in the United States. This corresponded to the implementation of the open classroom in kindergarten (K) to 8th grades, which reflected team teaching, creativity, and less structured curricula. However, an educational movement in the mid-1970s changed the dynamics of the open classroom. The purpose of this was to promote students' evaluation more accurately using objective tests. These tests focused on segments of information and skills but were incapable of measuring complex thinking skills. The focus of teaching and learning changed, yet again, to meet the criteria of objective tests, and the concept-based method with the emphasis on teaching thinking waned, but the method has resurfaced in nursing programs and in other disciplines today.

Erickson's work (2012), instrumentally demonstrated the benefits of a concept-based curriculum and instruction for the 21st century. Her work based on the findings of Hilda Taba. Erickson described the task of developing curricula and teaching students to think. She stated, "Designing curricula to develop thinking is hard work; teaching students to think is even harder work".

The viewpoint supporting the method of flipping the classroom means students come to class prepared and ready to practice thinking. The preparation may include PowerPoints with voice, video lectures, readings, and quizzes. When students are prepared for class, they are ready to apply concepts and exemplars into real life situations reflective of current practice in education. The classroom environment becomes interactive with the educator facilitating learning.

The Concept-Based Curriculum, what is It?

The concept-based teaching refers to a student-centered inquiry-based method for learning. It enables the learner to deepen their understanding of the taught concept using a synergistic way of thinking, i.e., factual, mental and conceptual interaction process (Cash, R. M. 2017). These would result in an enhanced mastery skill for higher-order thinking criteria. The current literature on concept-based learning twigs from the constructive learning theory. The theory mentioned is one of the derivatives of Piaget and Vygotsky's cognitive science (Ahmad & Sahar, 2019; Rogers, B. 2018). Similar to the current day scholars, Piaget stated that active assimilation stimulates learning, i.e., integrating existing knowledge with new knowledge. Therefore, learners will accommodate information; in the event, they adjust their prior knowledge to fit in their acquired knowledge. The procedure involved in the assimilation and the accommodation of the knowledge is what inhibits it from being abandoned in the isolated islets and instead integrated with the new information to realize some meaning in varying contexts of use (Erickson, H. Lynn. 2016).

The argument for the case is to understand how knowledge is integrated to realize a concept-driven curriculum. Hence, the content as being taught to a learner does not prompt their need to materialize and interlink the information, then such a learner would be said to gain a disjointed knowledge. This knowledge often does not serve any useful goal for learning or the transferability of knowledge (Cash, R. M. 2017). Such is the result of the knowledge-based and content-rich curriculum. In understanding what the concept-based curriculum entails, the following must be well understood.

Concept

The term concept is a mental construct that shares in the element of transferability and abstract, as well as timelessness and universalism (Erickson, H. L., Lanning, L. A., & French, R. 2017). The significance is that a mental construct transcends time with examples that are applicable across varying cultures. Concepts are equally transferable into varying disciplines and in different contexts and are in themselves abstract.

Similarly, (Isecke, H. 2017), achieves another explanation using the 'threshold concept' that involves the binding of various disciplines and subjects during the internalization for learners to integrate new concepts easily within their thinking. This would help in shaping the practices and manner of thinking when interacting with different disciplines (Jensen, R. A., and Kiley, T. 2015).

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Concepts v. Topics and Themes

An in-depth understanding of concept helps overcome mixing up in differentiating between it on the one hand and themes and topics on the other hand. Themes are common in the interdisciplinary curriculum to interweave between knowledge across varied disciplines. Primarily, the educator identifies a topical subject within a designated curriculum that is linkable to the theme to increase knowledge integration ability. Whereas knowledge enhances the coordination and the efficiency of the curriculum, the inability to realize it under a conceptual focus qualifies it as a mere multidisciplinary curriculum (Erickson, H. Lynn. 2016). The educators must identify with the concept to impart the vital knowledge in a curriculum. The concept is the underlying idea in a discipline that attaches meaning and importance of the content to be studied. The need to distinguish between topics and concept help separate the 3-Dimensional from the 2-Dimensional models of curriculum design. The variations, as achieved in figure 1 below, help with visual contrasting of the two configurations of curriculum models to be adopted in explaining the intellectual challenges that learners are exposed to (Rogers, B. 2018).

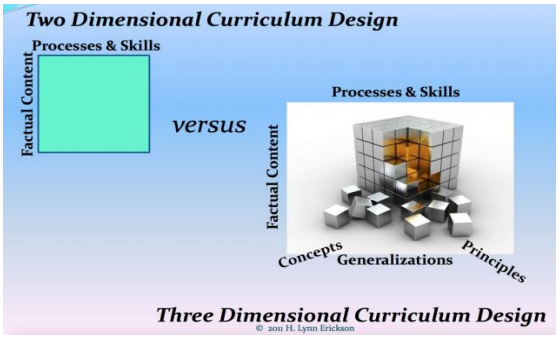

Figure 1: The 1-2-D.v. 3-D Curriculums.

Source: Copyright 2011 by H. Lynn Erickson

The 2-Dimensional and the 3-Dimensional Curriculum Design

The 2-Dimensional curriculum design.

The 2-Dimensional curriculum design focuses on facts, content knowledge and procedural skills. Interlink ages within the regions tend to get shallower and encourage for somewhat lower level memorization. Learning at this level is seldom transferable, and learners should gain an understanding of the underlying principles to apply the knowledge in various contexts (McTighe, Jay. 2017). The curriculum is associated with deductive teaching, i.e., the educator introduces the rule and theory for learning then make an illustration for areas of studies and rehearsals to secure the facts and skills gained from knowledge. The design seeks to evaluate learners' ability to apply knowledge and or skills on the exam. The study barely stimulates higher thinking skills (Cash, R. M. 2017).

The 3-Dimensional curriculum design.

This design advocates for a rather advanced level of learning and thinking and seek to ensure a conspicuous conceptual understanding is attained (Wiggins, G., and McTighe, J. 2016). Teaching using the design should be predominantly achieved using an inductive inquiry-based approach that contrasts the empirical method of teaching, i.e., learn of where, when and why, in using the learned knowledge. Hence, in the planning of the lessons and units under the curriculum deploying the 'structure of process' and the 'structure of knowledge' guide is useful (Jensen, R. A., and Kiley, T. 2015).

The Structure of Knowledge and the Structure of Process

The Structure of Knowledge

The structure of knowledge refers to a graphical representation that helps in illustrating the relationship between concepts, facts, topics and their generalization. Under a curriculum, the process is handy in the organizing and classifying information in every discipline to guide the teacher in reviewing relevant content that will trigger conceptual understanding. The structure emphasizes in the descending order of, theory, principle generalization, and then concept. Topic forms for the construction and consists of a set of facts critical in concept formulation (Stern, J., Ferraro, K., & Mohnkern, J. 2017). The structure is ideal for discipline and subjects that are factual and can be conceptualized, e.g., science and mathematics, and is particularly suitable for lesson/ unit planning.

The Structure of Process

It was devised by Erickson, H. L., & Lanning, L. A. (2013) to seal the void in the curriculum that was concept-based for those subjects primarily perceived as being process-based, e.g., English, arts and languages. The structure of the process provides for a crucial conceptual understanding that inspires various methods to make sense of skills and strategies that are executed in need of sustaining the conceptual understanding. The structure is most useful for process-driven units

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and or subjects such as Arts and Languages (Stern, J., Ferraro, K., & Mohnkern, J. 2017). The two structures are complementary and tend to have a symbiotic relationship.

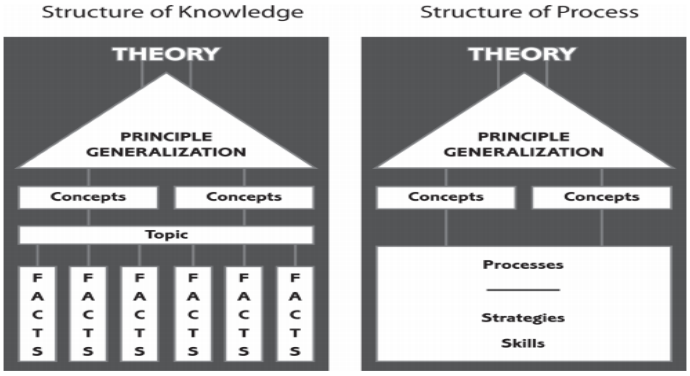

Figure 2: The structure of knowledge and the structure of process

Source: Copyright Erickson, H. Lynn. (2016) and Lanning, Lois A. (2015) Respectively

Reason for Teaching Conceptual Understanding.

Proponents studying conceptual understanding argue that it achieves an impression that for the transfer and the integration of knowledge, thinking should be moved away from the factual to a conceptual level and that the design of the curriculum should be reviewed using a conceptual outline (Jensen, R. A., and Kiley, T. 2015). It is through such fulfillment that a learner can relate their previous learning and factual knowledge to their newly acquired knowledge as they continue with their education and ability to connect between various discipline and contexts. Without the appropriate curriculum, confusions are bound in the retrieval of facts/knowledge with profound conceptual understanding (Killen, Roy. 2016). Leaners with well-prepared facts/skills in problem-solving such as in mathematics struggle with the application of understanding of skills and using them in a diverse context. This is because the learners have merely acquired the procedural knowledge and not the conceptual understanding to allow them generalizes such acquired learning in varied settings (McTighe, Jay. 2017).

Achieving a conceptual structure for curriculum designing is a critical activator to conceptual understanding, and mere designing of curriculum around some fundamental knowledge does not necessarily prompt for profound understanding (Lewis, L. S. 2016). Often content knowledge, skills, and facts tend to complement conceptual understanding. The concept-based learning process tends to necessitate the relationship between the conceptual and the factual levels of thinking, allowing the learners to develop an enduring understanding and the discovery of the associations in learning. The interchange process helps convert the factual info into usable knowledge, i.e., synergistic thinking (Erickson, H. Lynn. 2016). the figure (3) exhibits the interrelatedness in facts, knowledge and skills within the continuum of knowledge and understanding.

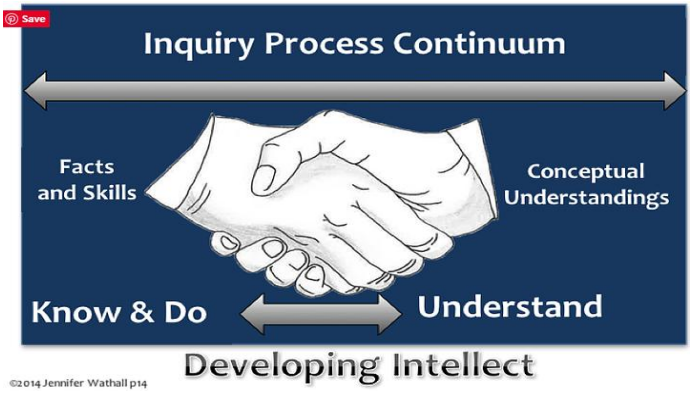

Figure 3: The Inquiry process Continuum.

Source: copyright Wathall, J. (2016).

The students will learn several facts during their classroom learning/instruction and in their textbook. However, their development for profound conceptual understanding will mainly be pegged on the approach used by the educators' approach in joining between concepts and facts (National Research Council. 2017). As for educators prepared with a conceptually driven curriculum, they will impart the learners with the stimulating learning experience for an increased order of thinking and a specific inquiry-based style of learning. These educators will engage their learners in developmental opportunities for learning and applying of these problem resolution skills, collaborative skills and the critical skills imperative for 21st Century competencies for learners (McTighe, Jay. 2017).

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The application of the conceptual curriculum design: a case of US National Curriculum

A curriculum can be designed in several ways to enhance conceptual understanding while still meeting the statutory requirement. In this particular case, the mathematics curriculum requirement for a 1st year will be used in Fractions, where the 'structure of knowledge' will be applied in breaking down of the principle generalization, i.e., the enduring standards the learner must meet to confirm knowledge, facts, and concept acquisition. Under the US National Curriculum statutory requisites, the pupil should be taught to; (i) identify, name and distinguish a half as one of the two equal parts of a shape/ object/ quantity, (ii) identify, name and distinguish a quarter as one of the four equal parts in a shape/ object/ quantity. In such a case, the learners are taught that (non-statutory guide) the half and quarter as 'fraction of discrete and continuous quantities' are solved by using objects, quantities, and shapes. Therefore, they will connect between the halves and quarters to their equal groupings and sharing of objects to gauge, acknowledge, and combine the quarters and halves as a part of the whole (Nottingham, James, and Bosse, Larsson. 2018).

There exist some tips the educator can employ in engaging the learners' in a math lesson and enhance their learning and conceptual understanding. These tips include; (Strategy I); establish a social learning environment that promotes collaboration and team process (Strategy II) provide for an open and secure earning environment where mistakes are permissible as part of the learning. This will help nurture and foster the learners' mindset to attain a high growth both with teachers and fellow learners (Lanning, Lois A. 2015). Relatively (strategy III), adhering to established levels of inquiry helps realize an inductive teaching style. As a Fourth Strategy (Strategy 4), the educator/teacher may consider reducing their talk time as research revealed that about 15 to 20 minutes is the optimal concentration-time for many students at the secondary school level. Also (Strategy 5), it is vital to cater to the need of all learners depending on their interests and background. In the subsequent strategy (Strategy 6), the use of diagnostic, summative and formative assessment is a prerequisite, as well as (plan 7) ensuring the educator remains purposeful with the questions learners are asked. Finally, (Strategy 8), the teachers should structure their classroom in a somewhat flexible fashion, e.g., (the sage and stage approach for didactic learning, etc.).

Figure (4) below depicts the 'structure of knowledge' as used in a curriculum in benchmarking the appropriateness of a learning objective, about the US National curriculum, US Common Core State Standards, IB Scope and Sequence in Mathematics and Singapore Mathematics Syllabus.

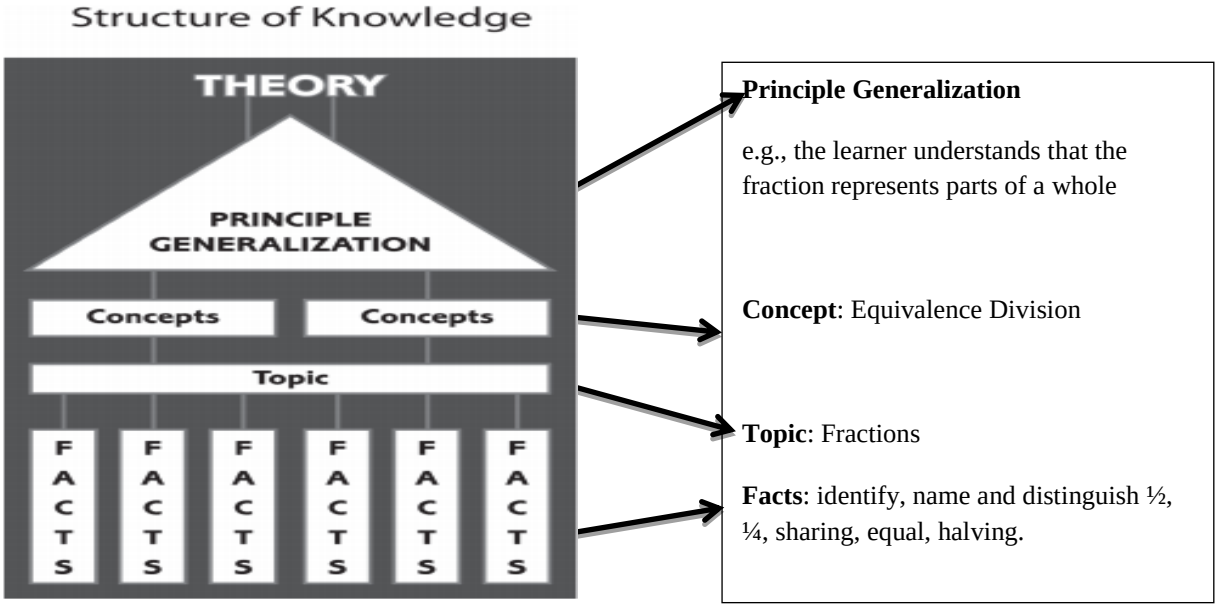

Figure 4: Using the structure of knowledge in planning a curriculum

The structure of knowledge above provides for a visual understanding of things the learner should conceptually (fraction rep parts of a whole and tied to equivalence and division), factually (relevant terms) and skillfully (identify, name, and distinguish) grasp (Wathall, J. 2016). Based on the national curriculum in the US, adhering to the statutory obligation is not an adequate requirement for enhancing conceptual understanding but instead induces a factual and skill-based approach for the teaching of Fractions. The terms such as "identify, name and distinguish" are verbs pointing to the skills that are perceived as meeting the expectation and not necessarily the understanding of what Fraction truly represent (Rose-Duckworth, R., and Ramer, K. 2019).

RESULT AND DISCUSSION

Whereas the non-statutory guide demonstrates how conceptual knowledge is encouraged, their classifications in the order tend to hinder its importance. For example, an unfamiliar educator with concept identification is likely to teach only the statutory requirements of 'identifying, naming and distinguishing quarters and halves while failing to achieve a

profound understanding of the relationship between the concept and the application of the knowledge in varied contexts (Tileston, D. 2015). Hence, it is recommended that the curriculum designers and the management in school should invest their effort and time in devising a holistic and comprehensive curriculum. This will simplify the educators' task to ensure that all students gain a profound conceptual understanding of their curriculum, course and even unit. Furthermore, it will be better where the national curriculum was issued to schools in a manner to facilitate planning and teaching of the conceptual understanding (Tomlinson, C., and McTighe, J. 2016). Meaning, the educators will comprehend the concepts that learners need to obtain. Where a national curriculum is not concept-driven, then the individual effort will be necessary despite that it will be time-consuming, and a lot of research and planning for conceptual understanding will be expended. Educators find in such fronts may find these needs quite daunting; however, through a collaborative effort, they can overcome the challenges to further and expedite on their practice (Erickson, H. L., Lanning, L. A., & French, R. 2017).

Using such an example will help highlight the significance of embracing for a National Curriculum that will be handy even for the most experienced educators. In a survey accomplished on teachers, the study established that there had been no principle of generalizing or understanding that was gained by students in memorizing poetry (National Research Council. 2017). However, experienced teachers certainly possess the know-how to identify with those pivotal concepts, informing of the generalization that could potentially meet/ address the statutory standards.

Nevertheless, the teachers are unable to identify with these conceptual focuses of the objectives, then they will be menial in motivating the intellectual thinking beyond the typical memorization (Lewis, L. S. 2016). In the teaching of poetry, an educator is mainly responding to standards of conceptual focus by teaching poetry. These standards would be re-written to depict the generalization and the enduring understanding achievable through the teaching of poetry, i.e., using of few words in conveying profound life lessons on human experiences (Nottingham, James, and Bosse, Larsson. 2018). Employing the principle generalization in such fashion achieves a meaning to the entire purpose of teaching poetry and further addresses the fundamental concept enabling the learners to derive better meaning using the text learned. They can derive several inferences after that while safeguarding the factual knowledge retained (Wiggins, G., and McTighe, J. 2016). Hence, it is claimed that such adherence will enhance learners' ability to begin appreciating the profoundness and influences that the '*English literature heritage*' has and that which cannot be realized by mere reading of poetry (Wathall, J. 2016).

CONCLUSIONS

The need for learning with the aim of understanding is a prerequisite goal for any curriculum-based teaching. Where the goal is to transfer and integrate the application of the acquired knowledge, then it is imperative that thinking should be guided from factual through to the conceptual level (Isecke, H. 2017). The findings from this research coincide with those of other research confirming that understanding through learning is attainable provided that knowledge is pillared on some well-organized concepts of particular domain/subject (Rose-Duckworth, R., and Ramer, K. 2019). Relatively, adopting a curriculum that stresses breadth as opposed to depth will deprive the learners of effective organizing of acquiring knowledge to enable transferability. The syllabi in the current century are still knowledge-based and tend to cover a broader scope of learning contents without making it even an inch to the core of their concepts (Killen, Roy. 2016). Hence, it will be important that the curriculum is restructured even at the school-based level if any tinge of learning is to be realized. Also, it should be focused on the making for an understanding and the use of knowledge as opposed to isolated and unstructured knowledge accumulation. Essentially, the concept-based curriculum (teaching and learning) is essential in enabling the learners of today to guide/steer through their challenging education and professional environment (Jensen, R. A., and Kiley, T. 2015). This will allow them to exercise some elevated order/level of thinking skills, understand and appreciate different disciplines of studies, and apply skillful knowledge and understanding of the various studied subject and their relationship with the today's world (Tileston, D. 2015).

LIMITATION AND STUDY FORWARD

The study will be helpful in conducting the same research or exploring a new framework for all phases, while this study may not be used at the early stage of the schooling. However, in some methods to be applied in the classroom at the early stages of the school, the new studies should deal with these skills which are critical thinking.

AUTHORS CONTRIBUTION

Khadija Farhan Alhumaid gathered and analysed the data and also wrote the paper.

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