Examining The Effectiveness Of Concept Mapping As Problem-Based Learning In Teaching And Learning Processes

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Abstract

Those who make it as doctors have knowledge structures that are vast, interwoven frameworks of different topics. Whether they are medical students or practicing doctors, this is relevant. Improving clinical problem-solving skills and other higher-level cognitive processes is one of many possible benefits that might result from expanding this body of knowledge. Using a technique called concept mapping, one may analyse how students conceptualise the ideas that form the basis of their learned material. While completing problem-based learning (PBL) tasks, students can find concept maps helpful. The field of learning theory provides the theoretical foundation for concept maps. Students may include important social and scientific concepts in their concept maps by working on them within the framework of problem-based learning (PBL) scenarios in the classroom. Concept maps can enhance project-based learning (PBL) sessions in several ways. Among these advantages are the following: the enhancement of communication, the detection of information gaps, the formulation of learning goals, the encouragement of cross-disciplinary application, and the assessment of individual students' progress. In addition to large-scale seminar discussions and other project-based learning (PBL) contexts that prioritise team-based learning, students may also discover that idea mapping is beneficial in these sorts of learning environments. Student understanding of the relationships between concepts and the PBL case under investigation may be enhanced in such Problem-Based Learning (PBL) settings. The widespread application of concept mapping in medical education is hindered, in part, by the lack of reliable tools backed by validity data.

Keywords: *Concept mapping, Problem-based learning, Assessment, Teachers learning.*

INTRODUCTION

Educators play a pivotal role in facilitating this transformation via the instructional framework's emphasis on skill development, attitude change, and the comprehension of basic scientific ideas. Because of the seriousness with which college students approach their own education, those who choose to take an active role in their studies should be treated like adults and given appropriate rights. Why? Because when students declare their intention to actively engage in class discussions, instructors naturally assume that they will do their utmost to fulfil that expectation. As an example, one perk is the opportunity to ask follow-up questions and clarify anything the recipient is still confused about. In this situation, the students are plainly looking to the teacher to take charge and steer the class in the right direction. Additionally, students have shown a need for a teacher who is able to be amusing, interactive, and who can clearly explain concepts with relevant examples. In today's classrooms, these qualities are universally acknowledged as essential for effective instruction. According to researchers, the purpose of the research was to achieve the objective of professional growth (Abbasi et al., 2021).

Accordingly, the subject of interest had a significant impact on the researcher's present academic practises. As university instructors, researchers have been having continuous conversations on how to improve the quality of

our day-to-day teaching methods and practises. Following these discussions, their group concluded that inclusive education is a very understudied topic. The phrase "inclusive education" is often used in a way that implies it is synonymous with specialist education for students with special needs when it comes to university settings. Whatever the case may be, they have found that many students with more life experience perceive barriers to their academic achievement inside the learning environment of higher education. A great deal of research has focused on how diversity, equality, and inclusion are addressed in classrooms and course offerings at the university level. This has led to considerable discussion between academics and government officials over the need to increase access to higher education. Therefore, we contend that promoting inclusive teaching and learning requires more than just a toolbox full of techniques. Providing inclusive education should be prioritised while developing curricula and deciding on student grading systems. This is why we need innovative strategies for education that can raise the standard for teaching and learning for all students. Several strategies might be used to include every learner. Finding out what goes into making a systematic strategy to improve the efficacy of classroom teaching was the major motivation for the study. The rationale behind this research is that evaluating current pedagogical and educational practises will reveal how effective they are. This led to the formulation of the following research question: What steps may be taken to create an environment conducive to learning and classroom instruction? The scientific and technological literacy required to thrive in the modern world is woefully lacking among today's youth, according to several studies. This is quite concerning since there is an increasing need for people who are scientifically literate, able to assess existing issues and foretell future ones without resorting to rote memorising irrelevant facts. On top of that, they must be able to think creatively and change quickly to thrive in this dynamic setting. A lack of proper laboratory work and the prevalence of misunderstandings are two potential causes of students' waning interest in and performance in science classes. The relevant scientific literature suggests many elements that might explain the phenomenon. Two of these characteristics are the lack of well-established concepts and the availability of several notation systems. In addition, many school curriculum are too linear and unfocused on developing students' ability to define and understand ideas, or to draw connections between different occurrences and concepts. There is a lack of opportunity for synthesis in many science courses, which teaches students to draw parallels between seemingly unrelated ideas and how to visualise the results of different approaches. Everyone would profit from continued development of these prospects. Students are under a lot of pressure to succeed academically because of the widespread belief that their grades are a predictor of their future success. These performance-based requirements provide the groundwork for entry into primary, secondary, and tertiary education institutions, as well as specialised vocational domains. After high school students had completed required scientific classes, the survey found that fewer of them enrolled in science programmes. This is one of the most striking findings from the research. Students, especially those in their later years of high school, have low enthusiasm for scientific courses, especially those dealing with the hard sciences (Soleymani et al., 2022).

BACKGROUND OF THE STUDY

Because of this change, lower-income people might take part in the economy just as higher-income people. One kind of affirmative action that universities may use to support underrepresented groups is quotas. Here, those from lower-income families have an opportunity to acquire a degree, which could give them a leg up in the race for economic success. Statistics show that private, non-profit schools would account for an estimated 78.6 percent of all schools from 2001 to 2020, up from 42.6 percent in 2001. Private people either fund or own almost half of China's educational institutions. Even in the most inconvenient of locations, educational opportunities are proliferating. The federal and state governments also benefit from the savings. An increase in young job opportunities and financial help for college students leads to a rise in foreign direct investment (FDI), better business operations, and faster product growth rates (Khrais, 2020).

Privatisation and liberalisation have had unintended consequences, one of which is the deepening of social stratification in the area and among its residents. Because of the instructors' familiarity with the system, private organisations including non-governmental organisations, religious groups, and for-profit enterprises have been able to purchase educational buildings, thereby satisfying the nation's ever-increasing need for education. The professional growth of educators has led directly to many positive changes on a worldwide scale. Reducing the national debt was its first accomplishment. The burden on the state has also been lessened. Even these services have seen a significant increase in quality. There has been a plethora of domestic and international study on the topic of higher education. How various socioeconomic circumstances impact people's choices and results

regarding their pursuit of higher education is a central theme in the studies presented here. Education and human resource development have been the subjects of several research projects. The relationship between education and economic development has also been the subject of much research. However, there is a dearth of research that looks at how teacher training affects the education sector, which is concerning given the dynamic nature of both the need for and supply of teachers. This study is an excellent starting point for future research on the benefits and drawbacks of district-level teacher professional development. Since China's open-door policy and economic reforms were implemented in the late 1970s, the country's educational goals have undergone a substantial shift. Educational policy and system development in China have been significantly influenced by the country's current market-oriented reforms and its fast economic growth in a globalised economy. The decentralisation and commercialization of the country's educational system occurred after Mao Zedong's death, when a more pragmatic view of education's worth emerged. As a market-based economy grows and becomes more interdependent with global markets, this trend follows suit. This article studied and investigated the current trend in China's educational system, which is for teachers to learn and have greater freedom of choice. An introduction of China's educational courses before to and throughout the country's financial revolutions is provided in the article's first section. Next, they discussed how changes in politics and the economy led to school deregulation and new possibilities for teachers' professional growth. There has been a lot of talk in recent years on how decentralisation and teacher professional development have affected educational policy. The current disparity in educational attainment between urban and rural regions may have its roots in China's economic reforms and open-door policy, which have allegedly reduced the role of the state in education delivery. To achieve more equitable and balanced growth in the sector, the statement argues that re-establishing the role of the state in China's educational system is crucial. It was made quite clear in the article (Dhawo, 2019).

PURPOSE OF THE STUDY
Examine how students may utilise concept mapping to get a deeper understanding of difficult concepts. Assess the impact of concept mapping on students' critical thinking and problem-solving skills in a project-based learning (PBL) environment. Discover the ways in which concept mapping enhances classroom discussion and group work. Try out concept mapping to see whether it helps in remembering and applying knowledge. Learn how to use concept mapping into project-based learning (PBL) for increased student engagement and learning outcomes. Brainstorm potential benefits and drawbacks of using concept mapping in project-based learning environments so that educators and curriculum developers may make an informed decision. The purpose of this review is to enhance teaching and learning practices in the classroom.

LITERATURE REVIEW
The study's foundation was a literature analysis that examined the pros and cons of teacher education. A large body of recent research has contrasted various points of view on the matter. What characteristics connected to parents' backgrounds were correlated with their decisions to enroll their children in private schools? Researchers investigated this and published their findings. When public school options fail to meet their expectations, many parents choose to enroll their children in private schools. The academic achievement of Chinese students has parents thinking about sending their children to private schools. They were unanimous in their assessment that the school's stellar reputation was mostly formed by its stellar academic performance, and that this in turn impacted their decision to enroll their children there. Parental worries about the school's academic performance sprang from a desire to provide their children with a strong foundation for the future. Many parents (61.7%) who were asked why they chose a private school for their children emphasised the excellent educational possibilities that are provided by these types of schools. They outline the advantages of letting private companies manage public schools (Machado, 2020).
Elementary, vocational, regular, and adult education are the four tiers that make up China's educational system. A great deal has changed in China's educational system since the late 1970s, the most significant event being the 1985 presentation and subsequent execution of the first central policy paper on educational reform. A new era in Chinese education started with the 1985 Decision. The increasing use of market forces in education and the adoption of a decentralisation plan are encouraging more and more social forces to provide educational services. At the same time, individuals have urged local governments and schools to do more. This has led to a dramatic expansion in the breadth and depth of educational options. Regarding primary education, at the end of 2005, over

99% of children of school age were enrolled in these courses, and over 95% of those who completed primary school were given the opportunity to enter junior high schools. In 2005, the gross enrollment ratio of higher education reached 21%, with over 23 million students enrolled in all types of institutions. The 1985 Decision established the parameters for a nationwide nine-year education curriculum. By the turn of the millennium, researchers had essentially accomplished their aim. They have clearly succeeded in making elementary school attendance obligatory after six years. In 2005, almost every kid had enrolled in school—99.15% to be exact. Girls' enrollment is at 99.14% while boys' enrollment is at 99.16%. At this level, the gender disparity is diminishing, according to the Ministry of Education. The goal of universal primary school attendance up to sixth grade has remained unattainable despite several efforts. On the other hand, over 98% of elementary school graduates presently have alternatives for junior high involvement. In 2005, the country's junior secondary level had a gross enrollment ratio of 95%. Tragically, 2.62 percent of pupils at this level leave the programme in the same academic year. They may deduce that the three-year dropout rate in junior high school is around 8% from the data that is available. About half of China's teachers can continue their education after senior high school, according to the country's Ministry of Education in 2006 (Chen, 2022).

RESEARCH QUESTIONS
I.   In the classroom, how can one make the most of idea mapping?
II. How can an idea map be used to solve problems?

METHODOLOGY
Quantitative research: Research that wants to answer the research topic uses quantitative research methods. A more thorough comprehension of the subject at hand may be achieved via the use of mixed methods research, which is the best feature of quantitative approache. In complex situational or societal investigations, as well as collaborative situations, mixed methods research is often used in the health and medical disciplines, behavioral and social science sectors, and the medical sciences. Researchers using quantitative research methodologies use some quantitative research processes in their study. This kind of study is referred to as "quantitative research."
**Sampling:** The study's data was gathered using a specific technique. Using the Rao-soft programme, researchers determined a sample size of 600. Researchers sent out 775 questionnaires, got 662 back, and discarded 13 due to incompleteness. A total of 649 questionnaires were used for the investigation, including 297 females and 392 men.
Data Analysis Software– The researcher may use SPSS version 25 to analyse the data.
Statistical Tools- To comprehend the fundamental character of the data, descriptive analysis was used. Factor analysis was used to assess validity.
One-way Analysis of variance (ANOVA)- An unrelated group one-way ANOVA is conducted if there are two or more statistically significant independent variables. In this research, they used one-way ANOVA to see whether there was a correlation between gender, age, and occupational level and different aspects of brand equity awareness and surveillance. Researchers use the statistical significance threshold to determine statistical significance at 5% and 95% confidence intervals. To accept the null hypothesis, the p-value must be larger than 0.05. Despite being an all-encompassing test statistic, one-way ANOVA only tells the researcher that there were at least two groups that were different, not which ones were statistically significantly different. Post hoc tests are therefore required when the significance level is less than 0.05 and the data is shown to have an aberrant distribution according to the accepted alternative hypothesis. Utilising a post-hoc test allowed for the identification of groups that were statistically different from one another.

CONCEPTUAL FRAMEWORK
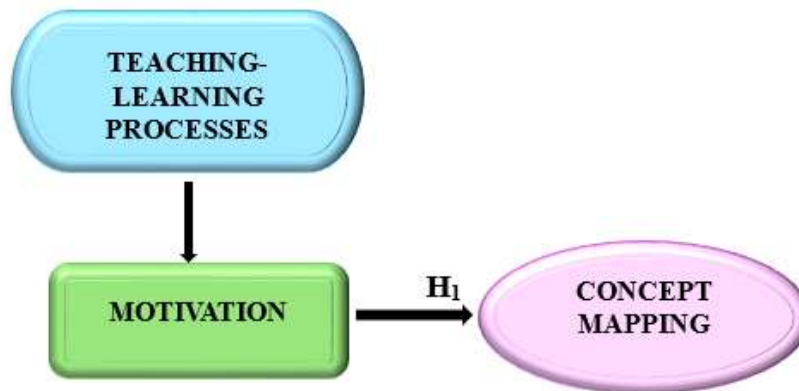
RESULT

❖ **Response**

600 questionnaires were sent out to anyone interested in participating. 775 sets of questionnaires were returned, and 649 of them were evaluated with the use of SPSS version 25.0.

❖ **Factor analysis**

The concealed component composition of a collection of measurement items may be confirmed via commonly used factor analysis (FA). The assessments of the measurable variables are thought to be due to latent, or invisible, components. Reliability analysis (FA) is a model-based method. Its primary goal is to model the interplay between observable events, hidden variables, and measurement errors. To ascertain if the data is appropriate for factor analysis, one may use the Kaiser-Meyer-Olkin (KMO) Methodology. Researchers evaluate the whole model and each model variable separately to find out whether they sampled them enough. According to statistical analysis, the potential common variation among many variables may be quantified. The smaller the proportion, the more suitable the data is for factor analysis.

Values between zero and one are returned by KMO. A sufficient sample is one with a KMO value between 0.8 and 1.

If the sample size is too little and the KMO is below 0.6, then action has to be taken to rectify the situation. This is where writers' discretion is required, because some use 0.5 and others 0.6.

• KMOs It is indicative of bigger magnitude component correlations when the total value of a correlation is near zero. A major challenge of component analysis, in other words, is large-scale correlations.

Here are the cutoffs for acceptability according to Kaiser:

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as low as 0.059 to 0.050.

Relative to the mean, it is 0.60 to 0.69 Average for a student in middle school:

The quality point count falls somewhere between 0.80 and 0.89, and the range is 0.70-0.79.

It is remarkable that the range is between 0.90 and 1.00.

Table 1: KMO

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	6850.175
	df	190
	Sig.	.000
a. Based on correlations		

Claims made for the sake of sampling are thus shown to be valid. The significance of the correlation matrices was further confirmed by using Bartlett's Test of Sphericity. The sampling adequacy value according to Kaiser-Meyer-Olkin is 0.927. There was a 0.00 p-value for Bartlett's sphericity test. A significant test result from Bartlett's sphericity test demonstrated that the correlation matrix is not an identity matrix.

❖ **Hypothesis testing**

Concept mapping:
In the same way that a visual sketch or flowchart may be used to represent or arrange learning, so can an idea map. In contrast to the conventional outline, concept maps show not only one-way but also two-way interactions between ideas. Nodes and connections are the building blocks of an idea map. Concepts are shown as nodes, which are often circles, and the relationships between them are shown as lines. The author can see the relationships between the nodes since the link labels are words. When complete, an idea map provides a visual representation of the author's (or writers') reasoning behind a given point. It reveals the individual's knowledge of the organisation system. "Concept mappings are two-dimensional models of cognitive processes showing organisational structures and interactions of concepts that comprise a field of study or a subdiscipline," basically says it. Concept maps weren't used before. The idea of concept maps originated in the constructivist pedagogical movement. Concept maps demonstrate how the mind operates by showing the relationships between various domains of knowledge. Teachers use concept maps to help students do more than just "know" the material; they want them to understand how different ideas relate to one another.

Teaching learning processes:
The process is all-encompassing and includes checking the student's understanding, setting clear learning objectives, developing strategies for instruction and memorising, creating a work plan, and finally, checking the student's progress. When they teach, they consider the needs, experiences, and emotions of their students while simultaneously interfering with their learning process to transfer knowledge. Imparting meaning and value onto the educational experience is the main goal of learning. This process would logically culminate because of instruction.

Motivation:
A single description of motivation is the inclination or drive to begin and complete an activity. A student's interest in reading about the Civil War is indicative of their desire to have a better understanding of American history. On the other hand, the student could see a TV show about his favourite musician and opt out of reading history that day. A person's behaviour is driven by their level of motivation, which may be defined as an inner urge to achieve something. Without intrinsic motivation, students will not participate in any learning activities and will not be prompted to change their behaviour. For a long time, scholars in the field of education have acknowledged the importance of intrinsic motivation in learning and have investigated it from a variety of angles. A wealth of incentive theories may be attributed to their work. The classical behaviourist view, which held that reinforcement and punishment were the bedrock of motivation, was evident in the first theories of motivation. Other hypotheses considered desires and requirements. On the other hand, social cognitive theory has dominated research on

motivation over the last three decades. Beliefs and environmental variables are the main foci of this method, which seeks to understand motivation. Instructional design technology has been greatly influenced by the key social-cognitive theories of motivation.

Relationship between Motivation and Concept mapping:

Being motivated to employ learning techniques to attain academic objectives is just as crucial, if not more so, than having learning methods, which are essential for building conceptual comprehension. The most thorough theory on the value components of an expectation/value system and their motivational effects on learners is provided by researchers. To anticipate accomplishment behaviour, two crucial factors must be considered: task value and expectation. Students have high expectations for achievement when they see a task as valuable, according to research. Cognitive engagement through elaboration, use of metacognitive learning strategies (planning, checking, and monitoring work), and "deeper processing" of course content is associated with students' expectations and perceptions of their ability, according to other researchers. An excellent metacognitive method to promote and improve meaningful learning in scientific classrooms is concept mapping, which has been well-established. The question of whether it works with all students has, however, remained unanswered. Out of all the research that was reviewed, only three investigated how much of an impact idea mapping had on students' opinions. On the other hand, not a single study defined attitude in terms of the motivating factors that influence the desire to do a job. Furthermore, several researchers in the field of education have looked at how intrinsic motivation influences students' use of cognitive learning strategies like concept mapping, but no one has tested how intrinsic motivation influences students' level of conceptual understanding in this context. Consequently, this researcher is curious to find out how open and enthusiastic students are about using and mastering concept mapping. In this article, we look at the findings of a research that looked at how much of an impact idea mapping had on getting students to take a more meaningful approach to studying biology and, in turn, become better self-regulated learners.

Based on the previous debate, the researcher analysed the relationship between Motivation and Concept mapping.

H_{01}: There is no significant relationship between Motivation and Concept mapping.

H_1: There is a significant relationship between Motivation and Concept mapping.

Table 2: ANOVA

ANOVA					
Sum					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	75213.353	182	4424.315	537.029	.000
Within Groups	675.557	466	8.239		
Total	75888.910	648			

The outcome of this research is noteworthy. With a p-value of .000 (less than the .05 alpha level), the value of F, which is 537.029, approaches significance. That the null hypothesis is not true and that "*H_1: There is a significant relationship between Motivation and Concept mapping.*" is indeed true.

DISCUSSION

A positive aspect of the existing system in terms of student accomplishment is that private schools provide a better level of education, according to respondents. Many students are choosing to attend overseas private schools because of the high-quality education they are being offered. They should still look at private schools if they want to see more involvement from the business sector in education. From fifth to eighth place, most of the top-performing schools are privately sponsored institutions, according to data acquired from 10 schools last year, according to the National Centre for Measuring. Also, private schools that adopt public school practices are great, according to the NCP. Some public-school models exhibit exceptional educational standards, claims the study. The Royal Commission and the Aramco schools are two such instances. Specifically, the National Centre for Policy Analysis (NCP) states that private organisations may successfully implement the public-school model. This implies that the level of excellence in private schools' instruction is heavily dependent on the strength of their

school governance. Several scholars have proposed that private management and other strategies to enhance teacher learning would be the best answers to the problem of underperforming public schools. Private schools are known for offering a top-notch education, according to the interview findings. Given the studies highlighting the significance of excellent instructors as the key factor impacting student accomplishment, one may argue that improving educational results would need more than simply correcting economic and governance inefficiencies. Thus, without well-defined strategies to increase teacher quality, attempts to reform China's (KSC) educational system would be in vain.

CONCLUSION

Although teacher professional development has opened numerous doors for students, it has not reduced the strain on publicly supported institutions and violates laws enacted to safeguard human rights. After state-of-the-art infrastructure and teaching methods were put into place, business activity increased. There has been an emphasis on the requirement of keeping a careful eye on schools to ensure they are obeying regulations such as providing enough funding, treating pupils equally, and respecting human rights. The educational system in China has undergone significant transformation since the late 1970s when the nation started its process of opening to the outside world. These changes have been influenced by a lot of recent things, such as economic reforms that are focused on the market. As a result of rising globalisation, the value of education to regional economies has come into sharper focus. The educational requirements and expectations of the populace have also grown as a result of this integration. The Chinese government, constrained by fiscal limitations, attempted to enhance the country's financial situation and optimise the distribution of resources by using these strategies. As a result of these shifts, the relationship between the federal government and local governments, as well as between the state and educational institutions, has changed significantly. The federal government's involvement has diminished because of the increasing accountability for educational spending at the local level, which has resulted in a transfer of authority from the central government to the provinces and counties. Through the implementation of fees and the integration of different funding systems, school autonomy has been enhanced while the role of the federal and state governments in educational financing has been reduced. The decentralisation and commercialization of education, however, have widened existing inequities in both access and quality of education. After decentralisation policies were implemented, non-state enterprises and local governments began to play an ever-larger role in education development. On the other side, this has made regional disparities in educational outcomes much worse.

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