

Concept Mapping as Problem-Based Learning: Assessing its Effectiveness in Teaching-Learning Processes

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Abstract:- Whether they are students or working doctors, effective people in the medical field have knowledge structures that are made up of large, integrated frameworks of linked topics. Improving clinical problem-solving along with other higher-level cognitive functions is one of the many potential results of developing this knowledge foundation. Concept mapping is a technique that makes it possible to see how students conceptualise the ideas that constitute the basis of the knowledge they have been given. Concept maps are based on theories from the academic field of learning theory and may be used by students as a support aid when they solve problems (PBL). In problem-based learning (PBL) classrooms, students may draw concept maps that integrate fundamental scientific and social concepts in addition to PBL cases. In addition to promoting communication, detecting knowledge gaps, coming up with ideas for learning goals, stimulating application across disciplinary boundaries, and evaluating each student's progress, the usage of concept maps in PBL lessons may also be advantageous. Concept mapping may also be useful for students in other PBL contexts, such as large-scale seminar discussion and team-based learning settings. Students may get a deeper understanding of the relationships between different concepts and the Problem-Based Learning (PBL) case that is being examined by using these kinds of PBL settings. The creation of reliable, validity-evidenced tools is one of the challenges preventing idea mapping from being widely used in medical education.

Keywords:- Knowledge Structure, Conceptual Mapping, Problem-Based Instruction, and Student Evaluation.

I. INTRODUCTION

Because of how teachers affect their pupils, learning may be seen as a permanent type of transformation. Learning may be seen as an irreversible type of change, whether it is via the realisation of hitherto unknown scientific principles, the implementation of new behaviors, or the collection of new information (Sequeira, 2012). However, each college student must be seen as a grown-up student with some degree of power over the classroom environment in order to participate in conversations and ask questions. People essentially want to feel as if they are in charge of their respective educational endeavors. Furthermore, researchers believe that having professors who are affable, funny, and adept at breaking down complex ideas into manageable chunks via the

utilisation of real-world examples is becoming increasingly important in today's schools. They started their investigation because they were eager to fulfil a major goal, they had set themselves to achieve on both a personal and professional level. The researcher's current academic work has been significantly impacted by the problem of interest. As university lecturers who are always debating how to make their lectures better, these discussions led them to the conclusion that a great deal more research on inclusive education is required. Increased participation rates in postsecondary education have been shown to greatly enhance inclusion and equity in teaching and learning, according to several research. Policymakers and scholars have been discussing the importance of this problem (Bradley, 2010). Because of this, they have always believed that meeting the necessities of all students may need more than just encouraging inclusive education and learning thanks to a variety of pedagogical techniques. Using inclusive education practices is crucial for creating new course offerings and evaluating each student's successes (Alfayad, 2017).

Even though it might be difficult at times to understand the stages needed in doing research, modern educational philosophies emphasise these difficulties while offering courses on research practice. Consequently, in this situation, educational modalities that are student-centered and engaging would be advantageous. The use of the technique has led to the accumulation of constructivist knowledge as a body (Mann, 2011). This has led to an increase in the popularity of education that emphasises students' personal responsibility. As a result, with the help of their teachers, students enhance their knowledge. Action-based learning, sometimes referred to as "learning by doing," is the process of picking up new knowledge and abilities via hands-on experience. To reiterate, it's a strategy for encouraging students to participate actively in their education in order to get the highest level of information retention. The approach empowers the learner to assume accountability for their own academic endeavours. However, it is the responsibility of the instructors to make it easier for the students to participate in the course of study by providing them with a variety of resources and possibilities (Keenan, 2012).

➤ Background of the Study:

Numerous additional technological advancements are also being used in schools around the nation, including blended learning. It hasn't taken long for this novel method of schooling to gain widespread acceptance, but not before encountering some teething issues. One such innovation that

has gained traction lately is blended learning, which combines traditional in-person instruction with internet resources. However, widespread adoption of these programs is still a ways off, particularly in the world's less developed regions. Blended learning has some obstacles to overcome before it can be regarded as a practical educational alternative. One of the most challenging tasks is figuring out how to get people to utilise the technology effectively, given the diverse variety of pupils and the differing degrees in which they have interacted with it in the past (Hofmann, 2014). According to Hofmann, when people find it difficult to utilise a piece with technology, individuals are far more inclined to simply give up and cease trying to figure out how to use it properly, which might lead to the technology not performing as intended. A sizable minority of students—16%—have negative opinions about blended learning, and a sizable number of students—26%—are concerned that students who use this approach won't complete their assignments on time. This data will be extracted from studies conducted by the University Group (2013). Since they are integral parts of the academic community, learners bring unique perspectives and life experiences to the classroom. These perspectives and experiences in the setting of mixed educational experiences might be impacted by the layout of the tools which have been used. No studies have looked at the efficacy of online education in the setting of a Chinese university; instead, prior research on the topic has focused on measures like course completion, average grade point average, particularly student retention. Information gathering for the suggested project is the aim of this study. Effectively incorporating mixed learning as a new type of instruction delivery requires knowing which factors are predictive of success. However, a variety of other variables, such as learner characteristics, design elements, and learning objectives, may also have an impact on how successful blended learning really is. Due to the possibility of both of these variables, there may not be much time for studying, which might lead to disengagement among students (Demirkol, 2014).

➤ Problem Statement:

"In today's world universities are under pressure to change their courses to satisfy the demands of government initiatives that stress using technology in the classroom. Two problems exist. Most of today's instructors were taught using a totally different paradigm; they were likely solely exposed to education through a classroom speaker, in which new technologies were not considered. Current tactics were outmoded in a few years owing to the requirement to stay up with electronic communications improvements. Educators must adjust to changing conditions or lose their jobs. This study was examined whether integrating new technological practices with online and face-to-face education increases student learning."

According to this qualitative case study, educators who are not tech-savvy are unintentionally ruining their pedagogical practices. Enhancing classroom learning involves incorporating student input and summative and formative assessment. The multidisciplinary teaching profession can gain valuable insights from the perspective of its most important stakeholders, the students, if they hold the

belief that learning is a comprehensive collaborative encounter (Garrison, 2015), involving an elaborate dynamic of reciprocal connection between teachers and students. If education is a comprehensive process that involves collaboration (as the phrase "community of inquiry" suggests). To provide light on mixed classroom educational and instructional interactions, a case study is conducted. This research sheds light on their relationships. Studying complex interactions, data feedback looping structures, and participant perspectives of the problem are all made easier with this qualitative method. Issue analysis is a good use for this approach. This makes problem research using this strategy beneficial. At this liberal arts college in the Chinese metropolis, most of the teachers and pupils belong to native English speaker as well as people who were born abroad but are fluent in the language (Fryer, 2016).

II. LITERATURE REVIEW

Research on the efficacy of mixed-media education from the perspectives of learner characteristics, overall background, design elements, and learning outcomes is included in this review. Furthermore, the context offers a summary of the elements that are thought to be necessary for blended learning to be successful. The components that were chosen are the outcome of the researcher's work at a Chinese university. China is home to the aforementioned institution (Abubakar, 2015). This assesses the effectiveness and user base of an online learning platform. The qualifications of the instructors are the three most essential criteria that affect how successful blended learning and e-learning are. This indicates that studying student characteristics is necessary to make successful use of instructional technology (Yasin, 2011). The focus of study has been on learner characteristics that have been shown to affect performance assessment scores. They spoke about mental toughness, personality, and achievement in the context of distant learning. This proves that their method of addressing the special qualities of blended instruction in this research is accurate. There is a lack of research comparing the academic performance on male and female students using blended learning environments, despite the fact that attributes of the students, such as gender, have been demonstrated to have a substantial influence on academic attainment. The degree of success that may be attained by online instruction and blended-learning programs has often been underscored as being contingent upon possessing a solid command of the internet and a variety of computer applications (Cohen, 2012).

Because student attitudes influence student actions and ultimately determine how much time students spend in a given classroom setting, the efficacy of blended learning depends on how the students feel about the process. Furthermore, one internal component that has been linked to learner attrition is an absence of learner connectedness. Low learner involvement in online courses has been connected to learner failure and attrition. It was additionally reported that without someone to hang out or converse with students would cease engaging in their blended instructional sessions. When students can interact with both their professors and other classmates during blended learning, it works better than when

pupils are forced to study alone. One of the key factors that determined the degree to which students were satisfied with blended learning was a malfunctioning system (Shrain, 2012).

It is commonly known that a student's contentment with their educational management system may reveal a lot about how successfully blended learning was executed. Students expressed gratitude for the enhancement that Moodle brought to their learning process. They like it since it improves their understanding of the subject matter as a whole. The descriptive data provided by shown that using the course's online course materials, such as lesson plans and syllabi, increased students' ability to learn (Goyal, 2015).

➤ *Research Objectives:*

- To investigate how features of blended learning design relate to student characteristics and how those factors impact student satisfaction, performance, knowledge generation, and intrinsic motivation in a mixed learning environment.
- To look at techniques employed in university classrooms to evaluate each lecturer's efficaciousness.
- To evaluate a higher education setting's instructional efficacy.
- To create a concept map and can be used to the process of teaching and learning.
- To list the different attributes of a concept map.

III. RESEARCH METHODOLOGY

Researchers conducted a thorough cross-sectional study from Jan to June 2022. A single point for data collection was required due to the cross-sectional design, which was rapid and inexpensive. The researcher used a quantitative technique due to the constrained resources and short timeline. The sample size of 1560 was estimated using Rao-soft software;

1700 questionnaires were disseminated; 1663 were returned; and ultimately, 63 questions were discarded because they were incomplete. For the research, 1,600 Chinese individuals were contacted and interviewed. Convenience sampling was used to approach each respondent at the locations mentioned above. The respondents were requested to participate in a factory monitoring scheme. The researcher informed the participants who chose to take part in the study and was available to them for any inquiries throughout the time they waited to complete their monitoring program. on cases where a participant had access to a wheelchair or lacked the ability to read or write, the investigator read the survey queries and categories of responses to them. They were then instructed to register their answers on the survey form. People were provided with questionnaires to fill out and give back all at once in certain locations.

➤ *Sampling:*

Data for the study was collected through a questionnaire. Sample Size calculated through Rao-soft software was total 1560.

➤ *Data and Measurement:*

The researcher also conducted quantitative research in the form of survey collection. Respondents first answered control questions regarding concept mapping as problem-based teaching learning process. This left a sample size calculated from Rao Soft and the sample size was 1560.

➤ *Statistical Software:*

MS-Excel and SPSS 25 were used for Statistical analysis.

➤ *Statistical Tools:*

Descriptive analysis was applied to understand the basic nature of the data. Validity was tested through factor analysis.

➤ *Conceptual Framework:*

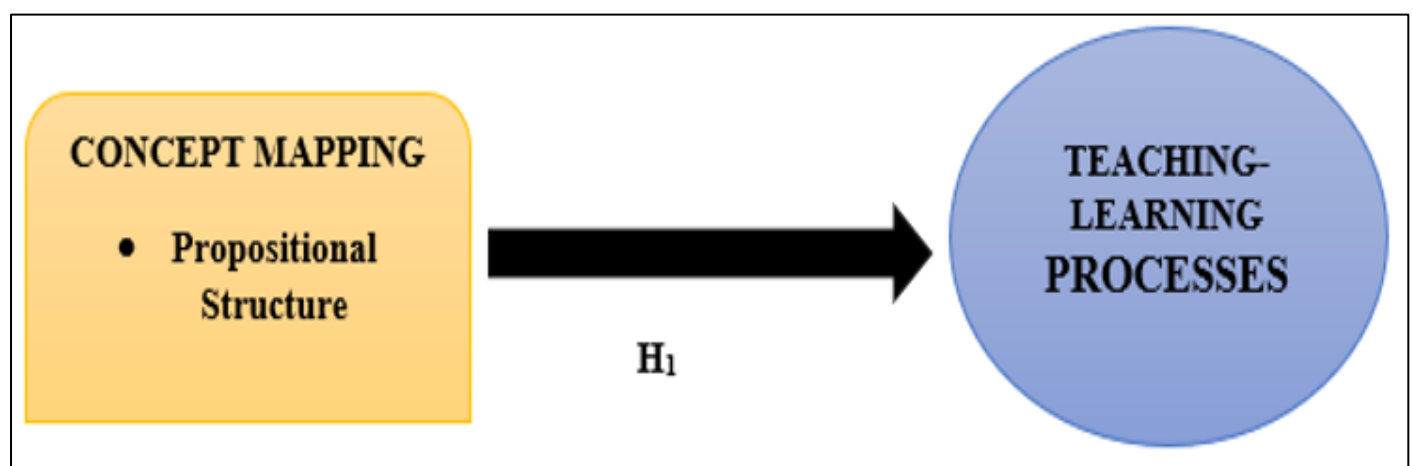


Fig 1 Conceptual Framework

IV. RESULTS

A total of 1700 questionnaires were distributed, out of which 1663 questionnaires were received back, and 63 questionnaires were rejected because they were incomplete, and 1600 questionnaires were analysed using the Statistical Package for social science (SPSS version 25.0) software.

➤ Factor Analysis:

Commonly used factor analysis (FA) confirms the concealed component makeup of a set of measurement items. It is believed that latent, or unseen, factors account for the evaluations on the observable, or measured, variables. The approach known as reliability analysis (FA) is model based. Its main emphasis is on simulating the causal relationships between measurement error, unseen factors, and observable events.

The Kaiser-Meyer-Olkin (KMO) Methodology may be used to determine if the data is suitable for factor analysis. To determine if they were sufficiently sampled, the whole model as well as each model variable are assessed. The possible shared variance among several variables is measured by the statistics. The greater the degree of suitability of the data for factor analysis, the lower the percentage.

KMO returns integers between 0 and 1. The sample is deemed adequate if the KMO value falls between 0.8 and 1.

Corrective intervention is necessary if the sample is inadequate and the KMO is less than 0.6. Some authors utilise a value of 0.5 for this; thus, they must use their best judgement between 0.5 and 0.6.

- KMO When a correlation's total value is close to zero, it means that the component correlations' magnitude is larger overall. Put differently, large-scale correlations provide a significant obstacle to component analysis.

➤ The following are Kaiser's Acceptability Cutoffs:

- A pitiful 0.059–0.050.
- 0.60 to 0.69 less than the mean
- Normal range in a middle school student: 0.70–0.79.
- with a quality point count ranging from 0.80 to 0.89.
- The range between 0.90 and 1.00 is quite impressive.

Table 1 KMO and Bartlett's Test

KMO and Bartlett's Test ^a		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.935
Bartlett's Test of Sphericity	Approx. Chi-Square	6850.175
	df	190
	Sig.	.000
a. Based on correlations		

This demonstrates the validity of assertions for sampling purposes. To further verify the relevance of a correlation matrices as a whole, Bartlett's Test of Sphericity was performed. Kaiser-Meyer-Olkin Sampling Adequacy Value is 0.935. The p-value for Bartlett's sphericity test was determined to be 0.00. Bartlett's test of sphericity showed that the correlation matrix isn't an identity matrix, with a significant test result.

➤ Test for Hypothesis:

Because teachers assist students in acquiring new knowledge and skills, changing their opinions and beliefs, and comprehending the scientific doctrines that underpin education, learning could be seen as a permanent transformation. Students aged; however, all college students need to feel like professionals with basic classroom management skills. They want authority over their education. Additionally, they believe that modern educators ought to be approachable, humorous, and skilled at breaking down difficult ideas into manageable chunks. An inquiry started in order to reach this professional benchmark. The problem affects the researcher's work and instruction. When they were talking about ways to make their teaching environments as university professors better, they realised there was still a lot of research to be conducted concerning inclusive education. They use "inclusive learning," which may seem like special education, since they are employed in higher education. However, research has shown that a large number of senior college students have learning challenges. Policymakers and academics have emphasised the need to expand tertiary education participation in the wake of several studies on inclusion and equality in higher education.

➤ Teaching Learning Process:

It is a Comprehensive process in which the instructor evaluates the student's level of comprehension, determines specific learning goals, formulates teaching tactics and memorization techniques, implements a plan of work, and evaluates the student's progress as a result of the instruction. Teaching is a way of attending to people's requirements, experiences, and emotions while also interfering with their learning in order to impart certain information. The primary purpose of learning is to impart value and significance onto the educational experience. As a result of education, this procedure would reach its natural conclusion.

➤ Concept Mapping:

Learning may be represented or organised using a concept map, which has similarities to a visual outline or flowchart. However, the concept maps go above the standard outline in that idea maps depict links between concepts, including both directions interactions. A typical idea map has separate nodes and connections between them. Different ideas are represented by nodes (often represented by circles) and the connections between them are represented by lines. The labels on the links are words, making the connections clear.

When finished, an idea mapping is an illustration that displays the author's (or authors') thinking processes on a certain issue, topic, etc. It displays how knowledge is

organised for the person. Basically, "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".

Before, people didn't utilise concept maps. The constructivist educational philosophy is responsible for the development of concept maps. The way the mind works is shown in concept maps, which reveal the connections people make between different areas of knowledge. When a teacher creates a concept map, she wants pupils to do more than simply "know" the facts; she wants them to grasp the connections among them.

➤ *Propositional Structure:*

In addition to being the items conveyed by declarative sentences and the carriers of truth and falsehood, propositions are also regarded to have a variety of additional purposes. When two speakers of different languages have a common belief, such as that the world is round, such belief is called a proposition rather than a sentence. For example, an English speaker would say "The earth is round," whereas a German speaker might say "Die Erda its round." As a result, propositions are the objects of belief, skepticism, and knowledge for human beings. Last but not least, modal qualities like necessity, possibility, and contingency are not inherent to the phrase but rather to the proposition it conveys.

On the basis of the above discussion, the researcher formulated the following hypothesis, which was analysis of the relationship between Propositional Structure and Teaching learning process.

- H_{01} : There is no significant relationship between Propositional Structure and Teaching learning process.
- H_1 : There is a significant relationship between Propositional Structure and Teaching learning process.

Table 2 H1 ANOVA

ANOVA					
Sum					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	59456.424	603	5825.517	695.853	.000
Within Groups	862.460	897	9.651		
Total	61081.290	1599			

In this study, the result is significant. The value of F is 695.853, which reaches significance with a p -value of .000 (which is less than the .05 alpha level). This means the " **H_1 : There is a significant relationship between Propositional Structure and Teaching learning process.**" is accepted and the null hypothesis is rejected.

V. CONCLUSION

Teachers can't make the required changes to their behaviors or techniques without first understanding the dynamics underplay among themselves. Again, students may have different needs, approaches, or learning styles; consequently, it is the responsibility of teachers to identify these factors and adapt their teachings accordingly. Rapid diagnosis of student struggles is a top priority for teachers. A language barrier, low self-esteem, lacking assurance, a fear of being inappropriate, etc., might all lead to a learner's disruptive conduct. Instead of merely providing warnings, teachers would perform better if they knew why students were acting this way. As a tonic, positive feedback from a teacher may do wonders for a student's self-esteem and motivation. Finally, it is essential for teachers to use assessments to guarantee that the outcome lives up to the requirements set by both faculty and students, and to increase student involvement by means of active learning and the promotion of student inclusivity through the process of education (including through experiential along with combined learning). Teacher ability in the areas of communication, leadership, regulation consistency, choice for students, flexibility, and creative behaviors control makes this a real possibility.

VI. LIMITATION

The study's limitations provide some first insights into the efficacy of learning-by-doing approaches. In spite of this, the following factors suggest that it may not be a true reflection for the sector of higher education overall. First of all, the pupils' individual interpretations of the material they were given serve as the only basis for the statistics. It is thus inadequate to assess other elements just on the basis of this one factor. Secondly, the research only attracted a relatively limited number of participants.

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