Concept Maps for Teaching-Learning

An Analysis of Teachers' Classroom Practices and Perspectives

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Abstract

The present research attempts to examine teachers' perspective and classroom practices in the use of concept maps in teaching-learning, assessment and the scores of assessment of the use of concept maps. Main objectives were to analyse teachers' classroom practices regarding the use of concept maps, their views about the use of concept maps in planning, teaching-learning and assessment tools and to find out a scoring system adopted by teachers to assess learner's learning through concept maps. A questionnaire was administered to 205 purposefully selected secondary school teachers from Bhopal district of Madhya Pradesh, India. The study revealed that about one third of teachers had used concept mapping as an approach for transaction purposes but a negligible or a few of them had used it as a tool for assessment. According to teachers concept map is a useful, effective and practical tool for transacting or teaching concepts; helps in retention and recall of concepts by learners and provides detailed feedback on the understanding of the concepts learnt. It was also found that the concept map was more valuable for formative assessment rather than summative assessment. Majority of the teachers reported that assessment through concept maps is a rigorous and time consuming process.

Keywords: *Concept Map, Classroom Practices, Teaching-Learning.*

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सार

प्रस्तुत शोध अवधरणा मानचित्रों के शिक्षण-अधिगम तथा मूल्यांकन में प्रयोग पर शिक्षकों के दृष्टिकोण तथा कक्षा गतिविधियों पर आधारित है। इस शोध के मुख्य-उद्देश्य शिक्षकों द्वारा अवधरणा मानचित्रों के कक्षा गतिविधियों में प्रयोग का विश्लेषण, अवधरणा मानचित्रों के प्रमुख प्रयोग जैसेः योजना बनाना, अध्ययन अधिगम तथा मूल्यांकन उपकरणों पर शिक्षकों के विचार एवं अवधरणा मानचित्रों द्वारा छात्रों की सीखने के स्तरों का मूल्यांकन करने के लिए उपयुक्त स्कोरिंग प्रणाली का पता लगाना था। इस शोध में आंकड़ों के सग्रह हेतु मध्य प्रदेश के भोपाल जिले के 205 उद्देश्यपूर्ण रूप से चयनित माध्यमिक विद्यालयों के शिक्षकों पर एक प्रश्नावली प्रशासित की गई। इस अध्ययन से यह ज्ञात हुआ है कि लगभग एक तिहाई शिक्षकों ने लेने-देन के उद्देश्यों के लिए अवधरणा मानचित्रण का उपयोग एक उपागम के रूप में किया, जबकि बहुत कम शिक्षकों ने इसका प्रयोग मूल्यांकन के लिए किया। शिक्षकों का विचार था कि अवधरणा मानचित्र अवधरणाओं को व्यवहार में लाने या सिखाने के लिए एक उपयोगी, प्रभावी और व्यावहारिक उपकरण है। यह अवधरणाओं को बनाए रखने और याद करने में मदद करता है और सीखी गई अवधरणाओं की समझ पर विस्तृत प्रतिक्रिया प्रदान करता है। शोध में यह भी पाया गया कि अवधरणा मानचित्र योगात्मक मूल्यांकन की अपेक्षा रचनात्मक मूल्यांकन के लिए अधिक महत्त्वपूर्ण है। अधिकांश शिक्षकों ने अपने अनुभव साझा करते हुए बताया कि अवधरण मानचित्रों के माध्यम से मूल्यांकन एक कठिन और समय लेने वाली प्रक्रिया है।

Introduction

An effective teacher is one who incorporates learner's prior knowledge and experiences in teaching-learning situations. The main focus of any education system is development of knowledge, skills and other higher order skills in learners and facilitate construction of knowledge by them. Learning integrating prior knowledge and experiences of a learner leads to meaningful learning. This knowledge construction is possible through understanding of the relationship and hierarchy formation between important sets of concepts, their interlinkages and creation of new knowledge. Concept mapping is a strategy that uses prior knowledge and experiences of learners' interrelationships of concepts and their implications in the generation of new knowledge. Concept mapping as teaching-learning strategy plays a vital role in systematic and structural form of knowledge construction which promotes meaningful learning (Mutodi and Chigonga, 2016; Rao, 2004).

Concept Map

Concept maps were developed in 1972 in the course of Novak's research programme at the Cornell University where he sought to follow and understand changes in children's knowledge of science (Novak and Mosonda, 1991). Since then concept maps have been used in various ways in teaching-learning process (Novak and Gowin, 1995). This technique or method is based on Ausubel's Assimilation Theory (1968). It assumes that learners construct new knowledge, being already influenced by their previous knowledge and experiences. "Concept maps are graphical tools for organising and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts is indicated by a connecting line linking two concepts. Words on the line, referred to as linking words or linking phrases, specify the relationship between the two concepts" (Novak and Canas, 2006). It expresses graphically structured meaningful relationships existing between different concepts (Ruiz-Primo et al., 2001).

Concept Mapping in Teaching and Assessment

Concept mapping as a tool can be used in a variety of contexts like planning for a theme, topic or unit, for transaction of a lesson and for meaningful learning and comprehensive assessment of learning by a teacher. It is an effective tool to assess various aspects like learner's knowledge, understanding and other higher level skills. Concept map are used in some of the following ways.

As a Planning Tool

Concept maps can be used for unit planning. It helps a teacher in planning of learning activities to enhance learning experiences of learners. As a planning tool, it can help teachers to plan, structure and sequence the content of their teaching. Concept maps help teachers to visualise what they want to teach, and how different themes or sub-themes are linked, so continuity of experiences is ensured. This planning role also helps teachers to develop and organise content points to be covered in a lesson in the stipulated time and subsequent activities that integrate different themes meaningfully. The mapping process also helps teachers to identify concepts that are linked to other disciplines, which may facilitate movement beyond the traditional disciplinary boundaries and integrate content in multi-disciplinary, interdisciplinary and

trans-disciplinary manner. This planning role also promotes collaborative teaching approach among teachers as teachers can plan their teaching in a group and subsequently relate each other's teaching points clearly.

As a Teaching-Learning Approach

Concept map can be used as an excellent approach for transaction of a theme or topic. As already mentioned earlier, it is based on Ausubel's theory of Meaningful Verbal Learning. This approach focuses on learners to learn about the structure of knowledge and the process of knowledge production. It helps learners in enhancing their retention and promotes holistic and integrated learning over rote learning. Teachers can use concept mapping to enhance learner participation and presentation skill, organise teaching during group discussions or presentations.

While introducing a theme or topic within a course, concept maps can be useful. They can be useful means of communicating to learners what they will be studying. Further they would help in assessing their prior knowledge and experiences and also provide them with a comprehensive or detailed overview of the topic. Presentation of concept maps may be done digitally, on smart boards or on simple blackboards. The teacher could either present or create a concept map on the board (or computer) or involve learners by inviting their comments and feedback. This will make a classroom teaching-learning experience an interactive, and participative process and result in meaningful learning.

As an Assessment Tool

Traditionally, teachers use paper and pencil tests to assess the learning. Advancements in the evaluation technology and adoption of improved assessment tools have made significant changes in the assessment practices. The introduction of Continuous Comprehensive Evaluation (CCE), assessment has changed the process and procedure a lot in schools. There is a drastic shift in the process of learning assessment, which is perceived as an integral part of the teaching-learning process. This shift has also brought a shift in the existing or traditional ways (tools and techniques) of assessment. Still in majority of the schools techniques like role plays, crossword puzzle, flow charts, field trips, class work/homework assignments, group work, survey, project work, worksheets, games, etc., are used, though all these are very useful in assessment too,

but they do not find a place for assessment of learner's knowledge and understanding. Novak and Canas (2006) advocated the need for better ways to represent learners' conceptual understanding in the form of concept maps as an alternative assessment tool. The presence of concepts and their relationships on a map can provide a teacher a snapshot of learner's knowledge and understanding. The proximity and connection of key concepts also provide insight for teachers attempting to evaluate how ideas from class are being incorporated. A graphical or visual representation of a concept map is given below:
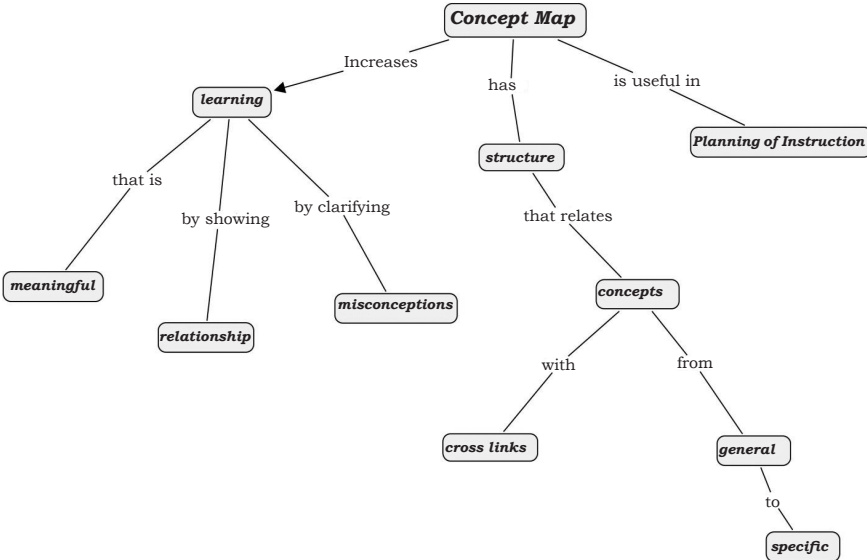

Figure 1: Concept Map on 'Importance of Concept Map (Prepared by the first author)

In recent years, along with the introduction and adoption of a number of innovative methods in the teaching-learning situations, constructivism as a theory has gained acceptance in the classrooms, and involves an individual's construction of meanings. New linkages or construction are built through their relations to prior knowledge in the learning contexts. Concept mapping as an approach, helps learners to create new knowledge on the background of prior knowledge, which is elaborated and changed on the basis of the new or fresh meaning negotiated with peers and teachers. So to make teaching-learning interactive and learner centred, teacher can use concept maps in planning, teaching as well as in assessment.

Considering the importance of concept mapping as a tool for teaching-learning process, the study was undertaken to examine teachers' views, beliefs and opinions on concept mapping as a planning, teaching and assessment tool. The main focus of this paper is to study teachers' perspectives on the effectiveness of concept maps as a planning, teaching and assessment tool and their use in assessing learners' knowledge structure.

Overview of Literature

A number of studies reported that when learners were taught through concept mapping strategy, their learning improved over conventional method (Filgona, J. et al., 2016; Ghorai and Guha, 2018; Martins-Omole, 2016; Sakiyo and Waziri, 2015; Shakoori, Kadivar and Sarami, 2017). Some studies were conducted on the relationship with other variables like concept mapping as a strategy and attitude towards science disciplines (Alebiosu, and Michael, 2011); the use of concept mapping as a strategy to enhance meaningful learning and to improve upon the process skills of learners in science (Rao, 2004). Hay, Kinchin and Lygo Baker, (2008) asserted that concept map measures those aspects of learning which conventional tests fail to measure such as learners' misconceptions. Mutodi and Chigonga (2016) found that mathematics teachers generally perceive that concept map is useful, effective and is a practical tool for teaching mathematical concepts, represents and organises knowledge, helps retention and recall of concepts learnt and provides feedback on the understanding of the concepts learnt. Chiou (2008) indicated in his study that concept mapping can help learners to understand, integrate and clarify accounting concepts and also enhance their interests in learning accounting. Vodovozov and Raud (2015) argued that a concept map is effective as a teaching and learning tool rather than as an assessment tool. The use of concept maps as an alternative assessment tool has been recognised but teachers continue to use it as an instructional tool rather than as an assessment device (Reyneke, Meyer and Nel, 2010).

Reviewing various research studies conducted in the area has helped researcher to zero down to the research questions and objectives of the present study. An overall view of the review of previous studies revealed that a lot of researches have been conducted in the area of concept mapping as a tool for teaching-learning. A few studies were done in the area of concept maps

as an assessment tool. The research gap is that though there are quite a good number of studies in this area, very few studies have attempted to find out practices and perspective on the use of concept mapping in all the three major aspects, i.e., planning, teaching-learning and assessment. Hence, the present study intended to explore secondary school teachers' classroom practices and their perspective regarding the use of concept mapping in their day-to-day teaching and assessment.

Research Questions

The study attempted to answer the following research questions.

- In what ways concept maps are being used by teachers in their day-to-day teaching-learning?
- What are the opinions of teachers about the use of concept maps in planning their teaching of a unit, theme or course?
- What are the views of teachers about the use of concept mapping as an approach for teaching-learning?
- What are the views of teachers about the use of concept mapping as an assessment tool to understand or judge their learners' achievement?
- What are the criteria or scoring systems adopted by the teachers to assess concept maps for learners' learning?

Rationale of the Study

This study sought to find out in what ways concept maps are used in the teaching-learning process in the classrooms and also to gain insights into teachers' perspectives about the use of concept maps in planning, teaching-learning and assessment purposes. It also focused on how concept maps are used by teachers in their day-to-day teaching-learning and their views on the use of concept mapping in meaningful learning and assessment of learners' overall understanding of conceptual structure. It also intended to prove further in studying the opinions of teachers about learners' abilities to link and relate ideas across topics and/or subjects in the form of a conceptual map. Although some of the studies reported in the review section supported concept mapping as a teaching and learning strategy, it mainly focused on the use of concept mapping as a tool to assess learner understanding rather than as planning and assessment tools. Through this study, an

attempt has been made to find a scoring system used by teachers to assess concept maps. Therefore, the objective of the study is to investigate teachers' classroom practices regarding the use of concept mapping in various ways; their views, feelings and beliefs about the use of concept maps in planning, teaching-learning and assessment and also scoring criteria used for the assessment of concept maps.

Objectives

The specific objectives of the study were:

- To explore teachers' classroom practices regarding the use of concept maps.
- To analyse teachers' views about the use of concept maps in the planning of unit, theme or course.
- To examine views of teachers about the usability, advantage and limitations of concept mapping as an approach for teaching-learning.
- To assess the teachers' views on usability, importance and limitations of concept maps as an alternative assessment tool.
- To find out the scoring criteria adopted by the teachers for the assessment of concept maps.

Delimitations

This study was limited to teachers working in the Central Board of Secondary Education (CBSE) affiliated secondary schools of Bhopal city of the Madhya Pradesh, India.

Operational Definitions

Practices: Practices in the present study means — current practice of the use of concept maps in planning, teaching-learning and assessment in the day-to-day classroom processes.

Perspective: A perspective is a particular way of thinking about something or to view things in their true relations or relative importance. In the study, teachers' perspective means views of teachers about the use of concept map as a planning, teaching-learning and assessment tool. In this study perspective towards concept mapping for teaching-learning process has been categorised under the following sub-categories:

- Perspective towards concept maps as a planning tool

- Perspective towards concept mapping as a teaching-learning approach, and
- Perspective towards concept maps as an assessment tool.

Method

Research Design

This study was a descriptive survey. It was a quantitative cum qualitative study conducted on teachers. The survey was conducted through Google form.

Sample

The target population for the study consisted of teachers working in the CBSE affiliated secondary schools of Bhopal. Using convenient sampling, 205 secondary school teachers of science, social science and language disciplines were drawn from 10 private-management and four government-management schools. A graphical presentation of school wise and discipline-wise distribution of sample is given in the following table.

Table 1

School-wise and Discipline-wise Sample Distribution

Type of School, Discipline	Private-management School- Teachers (120)	Government-management School-Teachers (85)	Total number of teachers (205)
Science	45	33	78
Social Science	46	37	83
Language	29	15	44

Tools for the Study

A questionnaire was developed by the researcher and administered online to collect the data. The questionnaire had four sections, i.e., A, B, C and D. Section A contained questions on teachers' biographic information. Section B had five closed ended questions with yes/no responses related to teachers' views on their classroom practices regarding the use of concept maps. Section C had 30 closed-ended items on 3 points rating. These items are related to

usability, advantages and limitations of concept maps as a planning tool, teaching-learning approach and assessment tool and the last Section D had one open ended question based on a scoring system used by teachers to assess concept map(s) and also their learner's performance. Section D was applicable only for those teachers who had used concept maps as a technique in their classrooms for assessment of performance of their learners.

Validity of the Tool

To establish content validity of the tool, a total of twelve teachers and teacher educators were consulted. The initial draft of tool had four sections, i.e., A, B, C and D: Section A contains questions on teachers' biographic information and Sections B, C and D contains 6, 33 and 2 items respectively. Based on their comments some items were dropped and some were modified. So revised tool contains 5, 30 and 1 items, in Sections B, C and D respectively.

Analysis and Interpretation

The responses under each close-ended question were classified thematically according to their frequency and percentage of occurring. The data are presented in the given tables.

Objective 1

The first objective of the study was to explore teachers' classroom practices regarding use of concept maps. The inputs gathered by survey were consolidated and are presented in Table 2. understanding.

On the basis of teachers' response it was found that, out of 205 teachers, 181 or about 88 per cent were familiar with the use of concept mapping in their day-to-day classroom teaching process. Further analysis of the data revealed found that teachers teaching language discipline were least aware of this technique in comparison to science and social science disciplines teachers. Nearly three-fourth or 74 per cent of teachers indicated that they have got training about the use of concept mapping in teaching-learning situations. Only 38 teachers (18 per cent) had used concept mapping as a tool for unit planning and only half of them were from science discipline. Out of the 40 teachers (20 per cent) who

had used concept mapping as an approach for transacting a lesson, only three of them were teachers from language discipline.

Table 2

Teachers' Classroom Practices Regarding Concept Maps

S.No.	Statement	Respondent Frequency for (Yes)			
		Science Discipline	Social Science Discipline	Language Discipline	Total
1.	Have you heard about the use of concept mapping in the day-to-day classroom teaching process?	70 (90%)	75 (90%)	36 (68%)	181 (88%)
2.	Have you got any training or exposure in either pre-service or in-service related to the use of concept mapping?	65 (83%)	71 (85%)	16 (36%)	152 (74%)
3.	Do you use concept mapping for planning of a theme or planning of classroom instructions?	20 (25%)	15 (18%)	3 (6%)	38 (18%)
4.	Do you use concept mapping as an approach for delivering a lesson?	25 (32%)	12 (14%)	3 (6%)	40 (20%)
5.	Do you use concept map(s) for assessment of learner performance?	9 (11%)	6 (7%)	Nil (0%)	15 (7%)

Out of the total of 205 teachers, only 15 had used concept mapping as an assessment tool and none of them were from a language stream. Thus, very few teachers had used concept maps as an assessment tool. The findings support the study of Reyneke, Meyer and Nel (2010) who indicated that the use of concept map as an alternative assessment tool has been recognised by teachers, but they continue to use it as an instructional tool rather than as an assessment device. By the overall analysis of data shown in Table 2, it may be concluded that teachers of language discipline had very less classroom practices regarding the use of concept mapping as compared to the teachers of Science and Social Science disciplines.

Objective 2

The second objective of the study was to analyse teachers' views on the use of concept maps in planning their classroom practices. Table 3 shows frequency and percentage wise distribution of responses of teachers.

Table 3

Teachers' Views on Concept Maps as a Planning Tool

S.No.	Item Statement	Disagree	Neutral	Agree
1.	Concept map is an excellent tool for unit planning.	3 (1%)	15 (8%)	187 (91%)
2.	Mapping the concepts for a unit or theme may help teachers to identify transactional strategies, assessment techniques, learning activities, etc., that are well integrated, logically sequenced and have continuity.	8 (4%)	32 (15%)	165 (81%)
3.	Concept maps may facilitate a teacher to identify sub-themes, concepts and sub-concepts that they want to emphasise in day-to-day teaching.	11 (5%)	35 (15%)	159 (77%)
4.	The mapping process may help teachers to identify concepts that are linked to more than one discipline, which may facilitate the integration of content.	9 (4%)	28 (13%)	168 (81%)
5.	Concept maps help to understand the relationship between facts and concepts through cross-links, which leads to the development of lesson plans based on constructivist pedagogy.	5 (2%)	27 (13%)	173 (84%)

Table 3 presents frequencies of teachers' responses to statements related to the second objective. Majority (91 per cent) of the teachers indicated that concept map was an excellent tool for unit planning. It shows that the teachers are well aware about the use of concept mapping in unit planning and more than four-fifth or 84 per cent of teachers mentioned that unit planning through concept mapping leads to the development of lesson plans based on constructive approach. Further, more than four-fifths

(81 per cent) of teachers believed that mapping the concepts for units helps in the identification of appropriate teaching-learning and assessment strategies. So it may be concluded that most teachers have a positive view and believe in the use of concept maps as a planning tool.

Objective 3

The third objective was to study teachers' views on the usability, advantages and limitations of concept mapping as an approach for classroom practice. Table 4 presents the distribution of data showing frequency and percentage of responses of teachers.

Table 4

Teachers' Views on Concept Maps as a Teaching-Learning Approach

S.No.	Statement	Disagree	Neutral	Agree
1.	Concept map is an effective teaching-learning approach to develop conceptual understanding.	11 (5%)	19 (9%)	175 (86%)
2.	Concept map facilitates meaningful learning.	21 (10%)	14 (6%)	170 (84%)
3.	Concept maps can prevent rote learning.	27 (13%)	13 (6%)	165 (81%)
4.	Concept mapping teaching strategy helps development of higher level thinking skills in learners.	25 (12%)	17 (8%)	163 (80%)
5.	Concept map is a useful technique to assess prior-knowledge of learners while or before introducing a new topic ortheme.	28 (14%)	23 (11%)	154 (75%)
6.	Concept maps can be used in any content area.	10 (5%)	155 (75%)	40 (19%)
7.	Concept map as a teaching-learning approach is suitable for secondary as well as elementary classes.	21 (10%)	155 (75%)	29 (14%)
8.	Concept maps help learners to make meaningful connections or relationships between/among the main idea and other information.	31 (15%)	11 (5%)	163 (80%)
9.	Concept maps help in brain storming and generate new ideas.	19 (8%)	22 (11%)	164 (80%)

10.	Concept map facilitates the teacher to conceptualise the course or unit content.	31 (15%)	14 (6%)	160 (78%)
11.	Concept maps approach support integrated and holistic style of learning.	19 (9%)	9 (4%)	177 (86%)
12.	Concept mapping is a type of knowledge representation tool or strategy.	35 (17%)	10 (5%)	160 (78%)

Majority of the teachers (84 to 86 per cent) were in agreement that concept map is an effective teaching-learning approach to develop conceptual understanding among learners, support integrated and holistic style of learning and also facilitates meaningful learning. Similarly 165 (81 per cent) teachers indicated that concept maps can prevent or reduce rote learning in learners. So it could be inferred that most teachers have a positive view and believe in the use of concept maps in teaching-learning. .

Data analysis on the other hand pertains to the third objective which portrays that around three-fourth (75 per cent) of teachers possessed a neutral view on concept map as a teaching-learning approach. It further states its suitability for secondary as well as elementary classes at school level and indicated that it can be used within any content area. It may indicate that teachers may not be quite clear or somewhat confused about the usability of concept maps in subject-wise or learners'-age wise teaching-learning processes.

Objective 4

The fourth objective was to analyse teachers' perspective on usability, advantages and limitations of concept maps as an assessment tool. Table 5 presents data distribution of teachers' responses to statements that were generated under the objective.

Table 5

Teachers' Views on Concept Map as an Assessment Tool

S.No.	Statement	Disagree	Neutral	Agree
1.	Concept map is a useful tool for assessing learners' conceptual understanding.	14 (7%)	19 (9%)	170 (83%)
2.	Concept maps could be used in classroom situations as an alternate assessment technique.	11 (5%)	10 (5%)	170 (83%)

3.	Concept map facilitates or helps teachers to assess learners' retention of learned concepts.	22 (11%)	18 (8%)	165 (81%)
4.	Concept map provides a snapshot of learners knowledge and understanding.	21 (10%)	12 (6%)	172 (84%)
5.	Learners would construct different concept maps, even if they want to communicate same knowledge.	10 (5%)	35 (17%)	160 (78%)
6.	Concept maps help the teacher to identify misconceptions in learning of particular discipline in learners.	12 (6%)	13 (6%)	180 (88%)
7.	Concept map is an assessment tool suitable for secondary classes.	25 (12%)	17 (8%)	163 (8%)
8.	Concept map is a useful tool for formative assessment.	22 (11%)	13 (6%)	170 (83%)
9.	Concept map is a useful tool for summative assessment.	165 (81%)	14 (7%)	26 (12%)
10.	Concept map is a useful tool to assist in evaluating end-of-course or terminal or summative assessments, complementing or even replacing the prevailing examination format.	163 (80%)	12 (6%)	30 (14%)
11.	Assessing of learners' performance/learning using concept maps requires thorough preparation.	13 (6%)	17 (8%)	173 (85%)
12.	Concept maps require much more time to interpret and to provide feedback to learners.	17 (8%)	22 (14%)	175 (86%)
13.	Concept maps could be used to evaluate the effectiveness of classroom teaching.	23 (11%)	160 (78%)	22 (11%)

Table 5 presents frequency and percentage wise teachers' responses to statements that were generated from the fourth objective. About 88 per cent teachers indicated that concept maps help them to identify misconceptions in learning of a particular discipline in learners. One hundred and seventy five (175) (86 per cent) of the participants subscribed to the notion that concept

maps require much more time to interpret and provide feedback to learners and 173 (85 per cent) indicated that assessing a concept map requires thorough preparation on the part of a teacher. It further showed that teachers faced difficulty in the assessment of concept maps. One hundred and seventy two (172) (84 per cent) of teachers agreed that the concept map provides a snapshot of learner or learner knowledge and understanding and 165 (81 per cent) indicated that concept map is not a useful tool for summative assessment on one hand and on the other agreed that concept map is a useful tool for formative assessment. It may indicate that teachers think that concept maps are not a perfect tool to assist in evaluating end-of-course or terminal or summative assessments and cannot be used as a substitute for examinations. Though around 78 per cent of teachers showed a neutral view on concept map and mentioned that it could be used to evaluate effectiveness of classroom teaching-learning practices. It further indicates that teachers may not be clear or confused about the usability of concept maps to assess their teaching competency skills.

So it may be inferred that most of the teachers have a positive view and believe in the use of concept maps as an assessment tool for school learners and more so for the secondary classes. However, the responding teachers were strongly opposed to the use of concept maps for assigning final grades in a learning area and reiterated that concept maps are suitable for assessment of learning rather than assessment for learning. Finally, teachers expressed discontentment over the use of concept maps as a possible replacement to the traditional examination pattern; this may be due to their familiarity, acceptance of existing practice and not ready to innovate. It may therefore be concluded that teachers regard concept maps as a valuable tool for formative assessment or summative one.

Objective 5

The fifth objective was to understand the scoring system or criteria adopted by them to assess learners using concept maps. The information collected is then categorised into different areas. A detail of the distribution of data is presented in Table 6.

Table 6

Analysis of Scoring System or Criteria Adopted by Teachers for the Assessment of Concept Maps

S.No.	Statements	Number of respondent frequency)
1.	Measuring the patterns or structure like linear, for linear with branching, Web	8
2.	By counting the number of concepts and sub-concepts	8
3.	Measuring proper use of linking lines and linking verbs	7
4.	Counting the total number and accurate use of preposition	5
5.	Concept map compared with teacher's model concept map	6
6.	Through peer assessment	2
7.	Each learner/learner compares own concept map with their peers/others or concept maps	2
8.	By checklist	1
9.	By rating scale	1

Out of the total of 205 teachers responding to the questionnaire, only 15 teachers had used concept maps as an alternative assessment tool to assess learner's or learners' achievement. The analysis was based on the nature and types of responses of the teachers' on the scoring system or ways adopted by them for the assessment of concept maps constructed by learners. While analysing teachers' response on the scoring system of concept maps it was found that the majority of teachers set some criteria for the assessment of concept maps. Criteria was based on pattern, number of concepts, linking verbs, linking lines, prepositions, etc., of the concept map developed by learners. Out of all the responding teachers only one of them had used peer assessment. One teacher had reported that they developed a checklist and another said that they used a rating scale. None of them developed rubrics or e-rubrics to assess concept maps. So it may be concluded that assessment of concept maps is very subjective, time-consuming and different teachers use different ways to assess concept maps prepared by their learners.

Conclusion

The results of the study revealed that around one third teachers had used concept mapping as an approach for transaction of the their teaching-learning processes but very few of them had used concept mapping as a tool for assessment. Even though mostly teachers had a positive view and believe about the use of concept maps as an assessment tool. Result of the study also revealed that the teachers of language discipline had very less classroom practice regarding the use of concept mapping as compared to the teachers of Science and Social Science disciplines, so specific training is required to make them aware about how concept maps can be used in language teaching-learning process. This reiterates the need to train our present and prospective teachers in this technique. For this, we will have to include concept mapping in the pre-service teacher education curriculum, such as B.Ed., D.El.Ed., inservice training programmes, etc. Seminars, workshops, training programmes may be organised for orienting the teachers in this technique in order to make classroom interaction robust, lively and fruitful. We believe that the usage of concept maps is a must for the educational process, an addition to the classical methods, appealing to the individual character of each student.

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