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Concept mapping – a need for quality development in teaching

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Abstract

To make the teaching learning process more effective, the domain knowledge should be clear among the students. If the concept is not clear to the student, then development of knowledge may be arrested, as well as students lost their interest and motivation towards education. Therefore, it is the responsibility of the teacher to make the concept very clear, concrete and systematic. To make the concept clear, concrete and systematic, teacher can adopt various methods; the concept mapping is one of the best method. For this reason, teacher should have a clear idea about concept mapping. The main objective of this study to know about the necessity of concept mapping in teaching of higher secondary school and teacher's consciousness about concept mapping procedure. In this study the sample consisted of teachers of higher secondary schools of Purba Medinipur district. A standardized questionnaire was made by the researcher for collection of data. The findings reveal the necessity of concept mapping for quality development in teaching.

Keywords

Concept mapping, Higher Secondary School, Teaching-Quality Development

Introduction

Concept mapping is a method to visualize the structure of knowledge. The knowledge expressed in the maps is mostly semantic; concept maps are sometimes called semantic networks. Visual representation has several advantages. Visual symbols are quickly and easily recognized, and this can be demonstrated by considering the large amount of logos, maps, arrows, road signs, and icons that most of us can recall with little effort. Visual representation allows the development of a meaningful understanding that words alone cannot convey, because the graphical form allows representations of parts and whole in a way that is not available in

sequential structure of text.

A concept map is a graphical representation of the relationship among terms. It is one of the most important teaching and learning tool that promote meaningful learning. Concept maps found to be the best indicators and predictors of meaningful learning (Ahlberg, 2013). It's use as a representation of student's knowledge organization. Concepts play a central role in the acquisition and use of knowledge (Novak & Gowin, 1984). A concept map used as an assessment tool (Ruiz-Primo & Shavelson, 1996) and promote the meaningful and active learning, help students to understand, follow-up, and learn subjects with a high load of contents (Piá et al., 2011). The maps contribute to student success, foster a long-term change in thinking, and contribute to changing students' learning strategies (Asan, 2007). Concept mapping as a means of assessing the quality of student understanding from two perspectives: the analysis of the process of constructing meaning and the analysis of the products of this cognitive activity (Roth & Roychoudhury, 1993). Concept mapping can be used to reveal conceptual typologies and endeavors to place the concept-mapping method in the broader context of learning styles and learning theory (Hay & Kinchin, 2006). It provides a unique graphical view of how students organize, connect, and synthesize information. Concept maps give students an opportunity to think about the connections between the terms being learned, organize their thoughts and visualize the relationships between key concepts in a systematic way, and reflect on their understanding. Concept mapping as homework to engage students in constructing and altering their own knowledge structures, concept maps are successful tools in helping low achievers improve their grades and effective for high achievers if they are encouraged to periodically check their maps during the learning process (Boujaoude & Attieh, 2008). Concept maps are also valuable tools for teachers because they provide information about students' understanding. Teachers can examine how well a student understands subject by observing of their concept map. Teachers can quickly see gaps in learning and modify lesson plans based on the information from students' concept maps. The Genesis and development of concept mapping as a useful tool for science education (Novak, 1990). Concept mapping has a noticeable impact on student achievement in science classes and student attitudes; student attitudes toward the use of concept maps will be helpful to understand students' developing conceptual knowledge. Concept maps help students to understand the learning processes of developing interrelationships, creating meaning and constructing knowledge bases. Concept maps can effectively promote learning of students and thus, can be added to the teaching strategies of science teachers. Concept mapping can be used to transform abstract knowledge and understanding into concrete visual representations that are amenable to comparison and measurement. The concept-mapping method use as a tool for enhancing teaching quality in higher education (Hay et al., 2008). It can be used to measure prior knowledge and how simple mapping exercises can promote the integration of teachers' and students'

understandings in ways that are meaningful. The concept-mapping method facilitates quick and easy measures of student knowledge-change so that teachers can identify the parts of the curriculum that are being understood and those that are not (Hay & Kinchin, 2008). The use of concept maps in early childhood education; in light of a theory that suggests that information is processed and stored in memory in both linguistic and visual forms, it is argued that concept maps can be used in early childhood classrooms to help children organize and spatially represent both what they know and what they are thinking (Birbili, 2008). It also depicts students' knowledge structure from the domain of cell biology a significant increase in the depiction of concepts and propositions using the concept mapping method as compared to the descriptive method (Khatarmal, 2009). Concept maps as a tool for meaningful learning, student centered, active, new learning and teaching strategy in chemistry education (Kilic & Cakmak, 2013) and in engineering education in the field of electronics. It is underlined that the concept maps serve as a suitable tool to support instructors in promoting students' comprehension of the studying material and in improving their understanding of new concepts. Educational thesaurus can be build using the concept map; such thesaurus helps learners to see what they have acquired from the lessons (Vodovozov & Raud, 2015). Concept map is use especially for assessment. Concept mapping is a powerful method for assessing, teaching, studying, and collaborating (Reiska, & Soika, 2015).

Concept mapping is a very influential tool in teaching learning process. So, teachers should be aware about the necessity and consciousness of concept mapping in the class room, which can make the teaching learning process more effective and enjoyable.

Objectives

i) To determine the relationship on the necessity of the concept mapping in teaching of higher secondary school on the basis of gender.

ii) To determine the relationship on the consciousness about the concept mapping in teaching of higher secondary school on the basis of gender.

iii) To study the relationship between the necessity of concept mapping and consciousness about the concept mapping.

Research Hypothesis

$H_0$1: There would be no significant difference on the necessity of the concept mapping between male and female in teaching of higher secondary school.

$H_0$2: There would be no significant difference on the consciousness about the concept mapping between male and female in teaching of higher secondary school.

$H_0$3: There would be no significant relationship between the necessity of the concept mapping and the consciousness about the concept mapping.

Method of Study

A questionnaire has been developed by the researcher as a tool to collect data for the study. The questionnaire consists of two components; necessity of concept mapping (CMN) and consciousness of concept mapping (CMC) of teacher.

Sample

Random sampling technique has been adopted for the study. Samples are collected from higher secondary schools in Purba Medinipur district of West Bengal, India.

Delimitation

The study is restricting to higher secondary school in Purba Medinipur district of West Bengal.

Analysis and Data Interpretation

Depending upon three research objectives total sixteen numbers of questions are constructed. Eight questions are based on the importance of teacher's consciousness about concept mapping procedure; another eight questions are based on concept mapping necessity in teaching of higher secondary school to ensure teaching quality.

Independent Sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CMN TOTAL	Equal variances assumed	6.854	.010	1.537	98	.127	1.359	.884	-.395	3.113
	Equal variances not assumed			1.609	95.856	.111	1.359	.844	-.317	3.035

Table 1: Necessity of Concept Mapping (CMN)

In case of comparing the mean score of male and female in the necessity of concept mapping, it was observed that mean score of male is 30.73 and SD 5.03. In case of female is 32.09 and SD is 3.38. To determine whether this difference in mean score is statistically significant or not, further t test was done. Table 1 shows that calculated t_{98}=1.537, p=0.127(>.05). Hence t is not significant at 0.05 level. Therefore null hypothesis $H_0$1 accepted. So it is interpreted that male teachers are not significantly different from female teachers in the necessity of concept mapping.

Independent Sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CMC TOTAL	Equal variances assumed	.010	.920	.842	98	.402	.760	.902	-1.030	2.550
	Equal variances not assumed			.846	93.858	.400	.760	.898	-1.024	2.543

Table 2: Consciousness about Concept Mapping (CMC)

In case of comparing the mean score of male and female in the consciousness about concept mapping, it was observed that mean score of male is 33.53 and SD 4.54. In case of female is 34.29 and SD is 4.39. To determine whether this difference in mean score is statistically significant or not, further t test was done. Table 2 shows that calculated t_{98}=0.842, p=0.402(>.05). Hence t is not significant at 0.05 level. Therefore null hypothesis $H_0$2 accepted. So it is interpreted that male teachers are not significantly different from female teachers in the consciousness of concept mapping.

Correlations

		CMNTOTAL	CMCTOTAL
CMNTOTAL	Pearson Correlation	1	.491**
	Sig. (2-tailed)		.000
	N	100	100
CMCTOTAL	Pearson Correlation	.491**	1
	Sig. (2-tailed)	.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Correlation between CMN and CMC

To study the relationship between the necessity of the concept mapping and the consciousness about the concept mapping, it has been found from analysis table 3 that correlation coefficient(**r)** between the necessity of the concept mapping and the consciousness about the concept mapping is 0.491 and **p** value is 0.000(p<0.05) which is significant at 0.01 level. Hence $H_0$3 is rejected. So it can be interpreted that there exists a moderate positive correlation between the necessity of the concept mapping and the consciousness about the concept mapping.

Findings

This study shows that teachers are aware about the concept mapping method and procedure. It is found that male teachers are not significantly different from female teachers in the necessity of concept mapping and in the consciousness of concept mapping. There exist a moderate positive correlation between the necessity of the concept mapping and the consciousness about the concept mapping.

Conclusions

Concept mapping is the powerful method that helps teacher and student both in the higher secondary education. Teachers are using concept mapping in their classes. Concept mapping is the one of the best method which helps students to understand the domain knowledge specifically. Teachers are regularly applying the concept mapping technique in their teaching processes. It helps students in the better understanding and knowledge coordination. In this manner, concept mapping is added to prospective teachers' instructional strategies. The use of concept mapping in teacher education programs may play a useful role to improve the overall quality of education.

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