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**Research Article**

# Level of Awareness and Utilization of Concept Mapping Software for Teaching by Business Studies Teachers

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**Abstract:** The study investigated the level of awareness and utilization of concept mapping software by business studies teachers. Two research questions were answered and two hypotheses tested at 0.05 level of significance. Descriptive survey research design was adopted for the study. The population of the study was 291 business studies teachers in all the public secondary schools in Anambra State. There was no sampling as the population was of manageable size. The instrument for data collection was structured questionnaire prepared by the researcher but validated by three experts.
The questionnaire was structured on a five point rating scale. Cronbach Alpha method was used to test for reliability and the coefficient was 0.85.The arithmetic mean and standard deviation were used to analyze data for the research questions and z-test was used to test the hypotheses. The findings of the study revealed that business studies teachers are highly aware of concept mapping but lowly utilized concept mapping software in teaching. Based on the findings of the study, the researcher recommended that the institutions responsible for training teachers should equip them with skills on how to use concept mapping software in teaching.
**Keywords:** Concept mapping software, Awareness, Utilization, Business studies, Concept mapping.

## Introduction

Several decades before now, the teaching and learning process was done in the traditional way where the teacher is the embodiment of knowledge and delivers instruction while the students passively listens and receives the information. However, with the advent of Information Communication Technology (ICT) and its adoption in education, the process of teaching and learning has changed. Teachers now adopt student-centered methods where the teacher is only a facilitator that guides the students while the students actively participates and are responsible for their learning. The teacher needs to bring in innovative ideas and strategies that can help these learners learn effectively (Singah &Mishra, 2017). Teachers are faced with a new task of identifying student-centered teaching methods and how to maximize the benefit of ICT to promote learning. Furthermore, people learn differently. An effective teacher should be able to individualize instruction and diversify classroom activities to suit all kinds of learners especially in this era of inclusive education where both students with disabilities and those without disability attend the regular schools as opposed to special schools for children with disability previously practiced. The teacher needs to be acquainted with various techniques that can enable him/her diversity the classroom activities. Concept mapping is one of such techniques.

Concept mapping according to Okolocha and Ifi (2018) is a technique for visualizing the relationship among different concepts. It is a process of constructing concept maps. Novak and Canas in Okolocha and Ifi (2018) sees concept map as graphical tools for organizing and representing knowledge. They include concepts usually enclosed in circles of boxes and the relationship between concepts indicated by connecting lines linking two concepts. Concept mapping can be used as a technique in teaching to show the kind of understanding of concepts as held by the students and the relationship between concepts. It also helps to disclose misunderstanding or wrong conceptions held by learners. Alhomaidan (2015) found out in his study on the effectiveness of concept mapping as an instructional strategy that concept mapping had positive impact on students' learning as students taught using concept mapping performed better than their counterpart taught without concept mapping. There are also other authors who have discovered the effect of concept mapping on students' achievement (Chen, Liang, Lee and Liao, 2011, Patrick, 2011 and Martinez, Perez, Suero and Pardo, 2013).

Concept mapping can be used at different stages in teaching. It could be used during planning the instruction stage, during classroom delivery and during assessment stage. When planning instruction, a lot need to be conceptualized taking note of the various steps involved and how to connect them. Concept mapping lends itself a ready tool to aid the teacher in preparing for instruction. Concept mapping is also used in delivering classroom instruction. Ekima (2013) opined that concept mapping is a veritable tool that fosters meaningful learning.

Meaningful learning occurs when new knowledge is well integrated into the existing structure of what the learner already knows. Concept mapping helps the learner to anchor and relate new information to previous knowledge. It visualizes what goes on in the learner's mind and the kind of understanding that takes place. According to Okolocha and Ifi (2018), visual representation of knowledge helps to create lasting impact and retention on the minds of the learners. It has also been found to be useful in brainstorming and critical thinking. This in turn make learners active participants and responsible for their own learning.

Concept mapping as asserted by Langan (2015) can be used in assessing students' learning. It is used to assess students' understanding of concepts, how they are able to relate these concepts as well as misconceptions held by students. An effective concept map-based assessment must have three important feature as identified by Ruiz-primo and Shavelson in Trish, Robert, Erika and Dana (2000): (1) A task that requires student to give evidence of possession of knowledge structure of a domain (2) a format for students' response. (3) A scoring system by which concept maps produced by students can be evaluated consistently and accurately. Concept maps could be prepared by the teacher (serves as teaching aid) or jointly by the teacher and the learners during instruction or by the students as a means of evaluation. It could also be prepared manually by hand or using the software. Concept mapping software is the software used to create diagrams of relationship between concepts, ideas, or other pieces of information. It enables users to create concept maps on their computers.

Manually constructing concept maps limits the amount of information that can be contained and what could be done with it. Conversely, concept mapping software allows the user to easily re-arrange concepts, attach files and notes and convert to a Word document, PowerPoint Presentation or Excel file when necessary. Using concept mapping software in teaching entails leveraging on ICT to facilitate effective learning. It is a form of e-learning. E-learning puts the learner at the centre and also helps to address many problems associated

with the traditional learning method (Gongden & Delmang, 2016). It presents the content material in a variety and interesting manner. This helps to encourage learners to explore more since they are responsible for their own learning. The process of actually constructing concept maps is a significant learning strategy as it forces the learner to brainstorm in order to make connections between concepts.

A concept mapping software could be used for asynchronous and synchronous. (Klitos, 2010). It has been proven that using concept mapping software improves learning far above the conventional note taking or manually constructing the map using paper and pen (Mahasneh, 2017). Concept mapping software can be used in teaching business studies as it involves many concepts that have real life implications.

Business studies is one of the pre-vocational electives in the upper basic education. It is a fundamental subject considering its importance and objectives. One of the objectives of business studies according to NERDC (2009) is to provide basic business skills for personal use now and in the future. This buttresses the fact that the knowledge of business studies is indispensible for every consumer in order to make rational decisions.

Teachers being the key player in curriculum implementation should embrace student-centered techniques such as concept mapping in order to realize the stated objectives. However, one needs to have awareness before being able to utilize it. Therefore the researcher sought to find out the level of awareness and utilization of concept mapping software by business studies teachers in teaching.

**Statement of the Problem**

Business studies is an integrated subject with many concepts. The understanding of these concepts and their relationship is a step towards achieving the stated objectives. Examining the objectives of business studies at the upper basic education level, it is very important that these concepts are well understood by all the students in order to understand and appreciate the role of business in the society as well as be able to make rational decision as a consumer.

Furthermore, the Education For All agenda of the United Education, Social and Cultural Organization (UNESCO) propagates an inclusive form of education where all children are accommodated in the regular classroom whether with or without disability. Teachers therefore should discover ways of individualizing instruction and making the classroom activities beneficial to all students. Concept mapping based instruction is a good approach towards achieving student-centered inclusive teaching. Also the application of ICT in education has given a lift to the teaching and learning process.

Leveraging on new technologies to ensure effective teaching, concept mapping software provides answer to the search by teachers for techniques to be used in individualizing instruction. Incorporating concept mapping software in an inclusive classroom will provide the students with hands- on for practice, make for collaboration among students, facilitate peer tutoring, serve as a summary for the day's lesson and also provide the visuals the make learning easier and faster.

However, there is tendency for teacher to stick to traditional pedagogy that they are conversant with instead of being open-minded. This necessitates this study in order to find out the level of awareness and utilization of concept mapping software for teaching by business studies teachers.

**Purpose of the Study**

The main purpose of the study was to determine the level of awareness and utilization of concept mapping software in teaching by business studies teachers. Specifically, the study sought to determine:

1) Business studies teacher's level of awareness of concept mapping.
2) Business studies teachers' level of utilization of concept mapping software in teaching.

**Research Questions**

The following research questions guided the study.

1) What is the business studies teacher's level of awareness of concept mapping?
2) To what level do business studies teachers utilize concept mapping software?

**Hypotheses**

The following null hypotheses were tested at 0.05 level of significance.

1) Business studies teacher do not differ significantly in their mean ratings on the level of awareness of concept mapping based on years of experience.
2) Business studies teachers do not differ significantly in their mean ratings on the level of utilization of concept mapping software based on years of experience.

**Concept Mapping Software in Education and Empirical Studies**

Concept mapping software refers to computer programs that are used in constructing concept maps. Concept mapping software can be effectively used in the classroom instruction. Karchmor-Klein, MacArthur and Najera (n.d) studied the effect of electronic concept mapping on fifth grade students' writing. Three research questions guided the study. Quasi-experimental design was used for the study and the population was fifty-seven fifth grade students.

The findings of the study indicated that both students in concept mapping group and concept mapping transfer group outperformed their counterpart in word processing group in writing essays. Ferreira, Cohrs and DeDomenico (2012) studied the challenges and contributions of CMAP tools software in building concept maps to solve clinical cases. The findings of the study revealed that the formatting and auto-formatting resources of Cmap tools facilitated the construction of concept maps. They however suggested that orientation strategies should be used for initial stage of software utilization.

Constructing concept maps using computer programs can be achieved in two ways: (1) A combination of standard general-purpose word processing program, a statistical package which has routine for multi-dimensional scaling and cluster analysis and has fairly flexible data manipulation capabilities and a graphic program to plot the final map. (2)Using computer programs specifically designed for concept mapping. There are several computer programs or tools for constructing concept maps. They could be on-line tools, or stand-alone tools. Some of them are free while others are commercialized.

Different packages may differ in their features. Some of these computer programs specially for constructing concept maps are:

**Stand-alone tools:** CMap, XMind, Freemind, VUE, SimpleMind.

**On-line tools:** Gliffy,Lucid chart, bubbl.us, mindmeister, Examtime, poppler, Coggle.it, prezi creately, Connected Mind ,Goggle Docs, Unconcept.

**Free software packages:** Bubbl.us, prezi.

**Commercialized software:** imindmap, inspiration, mindmanager, Novamind. Matching the appropriate tool to the right task leads to efficiency. An awareness of these tools and its peculiarities will enable one to use the right tool in the right situation.

**VUE:** Visual Understanding Environment (VUE) provides a visual environment for structuring, presenting and sharing digital information. Using VUE's concept mapping interface, people can design semantic networks of digital resources drawn from digital libraries, local and remote file systems and the web. The resulting

**XMind:** This is a software tool for brainstorming and mind mapping. It helps to capture ideas, organize it into various charts and share them for collaboration. It is used for knowledge management and meeting minute. Its pro-version has annual subscription cost. XMind is not web-based.

**Bubbl.us:** Bubbl.us is an online concept mapping tool. It is also free of charge. Clark (2011) identified some peculiarities of this tool as: **(**1) Easy to use interface (2) Export as widget code (3) Ability to zoom and print (4) Export as bitmap.

**Cmap:** Cmap tool allows users to search for information based on a concept map and learn more about the topic, leading to an improved map with linked resources. Cmap permits access to **www** resources that can be screened to suit the context of meanings defined by the concept map. The Cmap tool can record the process of constructing a concept map for later play back.

**Method**

The design of the study was descriptive survey design. The study was carried out in Anambra State, Nigeria. The population of the study consists of 291 business studies teachers in the entire 257 public secondary schools in Anambra State. There was no sampling since the population size is manageable. The instrument for data collection was a structured questionnaire. It was divided into two sections: A and B.

Section A was for personal data while section B contained 33 items based on the research questions raised. It was rated on a five-point rating scale of Very Highly Aware (VHA), Highly Aware (HA), Moderately Aware (MA), Lowly Aware (LA), and Very Lowly Aware (VLA)for section B1 and Very Highly Utilized (VHU), Highly Utilized (HU), Moderately Utilized (MU), Lowly Utilized (LU) and Very Lowly Utilized (VLU) for section B2 with values 5, 4, 3, 2, 1 respectively. The instrument was subjected to validation by three experts, two in business education and one in measurement and evaluation.

The inputs and corrections from these experts were used in the production of the final copy of the instrument. Reliability of the instrument was also ascertained using Cronbach Alpha method to test the internal consistency and a coefficient of 0.85 was gotten which was considered as reliable. The instrument was distributed by the researcher with the aid of two research assistants. A total of 280 copies of the questionnaire distributed were collected out of the 291 copies distributed.

Data collected were analyzed using arithmetic mean and standard deviation for the research questions and z-test for the hypotheses. The mean ratings were interpreted using real limit of

numbers of Very Highly Aware/Very Highly Utilized (4.50–5.00), Highly Aware/Highly Utilized, (3.50-4.49), Moderately Aware/Moderately Utilized (2.50-3.49), Lowly Aware/Lowly Utilized (1.50-2.49) and Very Lowly Aware/Very Lowly Utilized (0. 5-1.49).

The z-test statistical tool was used to test the hypotheses at 0.05 level of significance. A null hypothesis was accepted where z-calculated value was less than or equal to the z-critical value but where z-calculated was greater than the z-critical value, the null hypothesis was not accepted.

## Results

### Research Question One

What is the business studies teachers' level of awareness of concept mapping?

**Table 1. Mean ratings of respondents on level of awareness of concept mapping (N=280)**

| S/N | **Awareness of concept mapping** | **Mean** | **SD** | **Remarks** |
|---|---|---|---|---|
| 1 | Planning instruction | 3.59 | 0.75 | Highly aware |
| 2 | Brainstorming | 3.53 | 0.77 | Highly aware |
| 3 | Critical thinking | 3.59 | 0.72 | Highly aware |
| 4 | Internet searches | 3.58 | 0.76 | Highly aware |
| 5 | Classroom instruction | 3.57 | 0.79 | Highly aware |
| 6 | Teaching aid | 3.41 | 0.74 | Moderately aware |
| 7 | Oral presentation | 3.65 | 0.78 | Highly aware |
| 8 | Video presentation | 4.06 | 0.76 | Highly aware |
| 9 | Group collaboration | 4.00 | 0.77 | Highly aware |
| 10 | Preparing skeletal maps | 4.05 | 0.80 | Highly aware |
| 11 | Summarizing lessons | 4.04 | 0.77 | Highly aware |
| 12 | Graphics presentation | 3.84 | 0.80 | Highly aware |
| 13 | Giving out assignments | 3.93 | 0.76 | Highly aware |
| 14 | Administering tests | 3.77 | 0.73 | Highly aware |
| 15 | Post-test assessment | 2.81 | 0.74 | Moderately aware |
| 16 | Report preparation | 2.88 | 0.73 | Moderately aware |
| 17 | Multi-disciplinary integration | 2.63 | 0.74 | Moderately aware |
| 18 | Data interpretation | 2.04 | 0.75 | Lowly aware |
| | **Cluster Mean** | **3.50** | | **Highly Aware** |

The result in Table 1 shows that business studies teachers in Anambra State are moderately aware of post-test assessment, report preparation, teaching aid and multi-disciplinary integration with mean ratings between 2.63 and 3.41. They were also found to have low awareness of data interpretation with mean rating of 2.04.

Business studies teachers in Anambra State are highly aware of the remaining items as their mean ratings were between 3.53 and 4.06. The cluster mean of 3.50 indicates that business studies teachers are highly aware of the concept mapping. The standard deviations for the items were within a close range 0.72 - 0.80 which shows that the respondents were homogeneous in their opinions.

### Research Question Two

To what level do business studies teachers utilize concept mapping software in teaching?

**Table 2. Respondents mean rating on utilization of concept map software for teaching (N=280)**

| S/N | Items | Mean | SD | Remarks |
|---|---|---|---|---|
| 19 | **Visual Display Environment** in collaboration with students | 1.88 | 0.40 | Lowly utilized |
| 20 | **Mindmeister** to export your maps | 1.86 | 0.44 | Lowly utilized |
| 21 | **Cmap** to search for information relating to the concept map | 1.81 | 0.42 | Lowly utilized |
| 22 | **Xmind** for brainstorming | 1.74 | 0.48 | Lowly utilized |
| 23 | **Gliffy** for editing maps | 1.77 | 0.41 | Lowly utilized |
| 24 | **Lucid chart** to play back corrections made on the maps | 1.82 | 0.47 | Lowly utilized |
| 25 | **Examtime** to assess students' learning | 1.90 | 0.40 | Lowly utilized |
| 26 | **Poppler** for monitoring misconceptions | 2.02 | 0.40 | Lowly utilized |
| 27 | **Goggle Docs** for video presentation | 2.01 | 0.41 | Lowly utilized |
| 28 | **Connected mind** for pretest assessment | 1.86 | 0.42 | Lowly utilized |
| 29 | **Bubbl.us** in giving take home assignment | 1.87 | 0.44 | Lowly utilized |
| 30 | **Prezi** for video presentation | 1.88 | 0.43 | Lowly utilized |
| 31 | **Inspiration** for sharing maps | 1.86 | 0.41 | Lowly utilized |
| 32 | **Imindmap** for drawing concept maps | 1.99 | 0.44 | Lowly utilized |
| 33 | **Coggle** for note taking | 1.88 | 0.43 | Lowly utilized |
| | **Cluster Mean** | **1.88** | | **Lowly utilized** |

The result in Table 2 shows that all the items raised were lowly utilized by respondents. The cluster mean of 3.89 indicates that business studies teacher's lowly utilized concept mapping software for teaching. The standard deviations for the items are within a close range of 0.40-0.48 which shows that the respondents were homogeneous in their opinion.

**Hypothesis 1**

Business studies teachers do not differ significantly in their mean ratings on the level of awareness of concept mapping based on years of experience.

**Table 3. z-test analysis of respondents' mean rating on awareness of concept mapping as a technique for effective teaching based on years of experience (N=280)**

| Years of Experience | n | X1 | X2 | SD | α | Df | z-cal | z-crit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 0-5 | 89 | 4.35 | | 0.39 | | | | | |
| | | | | | 0.05 | 278 | 0.41 | 1.96 | Not significant |
| Above 5 | 191 | | 4.07 | 0.74 | | | | | |

The result in Table 3 shows that the calculated z - value of 0.41 is less than the critical z - value of 1.96 at 0.05 level of significance and 278 degree of freedom. This means that business studies teachers did not differ significantly in their mean ratings on their level of awareness of concept mapping based on years of experience. Therefore, the null hypothesis is accepted.

**Hypothesis 2**
Business studies teachers do not differ significantly in their mean ratings on the level of utilization of concept mapping software based on years of experience.

**Table 4. z-test analysis of respondents mean ratings on utilization of concept mapping software in teaching based on years of experience (N=280)**

| Years of Experience | n | X1 | X2 | SD | α | Df | z-cal | z-crit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 0-5 | 89 | 4.35 | | 0.39 | | | | | |
| | | | | | 0.05 | 278 | 0.41 | 1.96 | Not significant |
| Above 5 | 191 | | 4.07 | 0.74 | | | | | |

The result in Table 4 shows that the calculated z - value of 0.6 is less than the critical z -value of 1.96 at 0.05 level of significance and 278 degree of freedom. This means that business studies teachers did not differ significantly in their mean ratings on the level of utilization of concept mapping software in teaching. Therefore, the null hypothesis is accepted.

**Discussion of Findings**
The findings of this study are organized and discussed under the following headings:

**Awareness of Concept Mapping as a Teaching Technique**
The result of the study revealed that business studies teachers in the area studied are highly aware of concept mapping as a teaching technique. They understand how it can be used in planning instruction, brainstorming, critical thinking, internet searches, classroom instruction, video presentation, group collaboration, summarizing lessons, giving assignments and administering tests.

Ahmed (2010) asserted that the knowledge of concept mapping provides a teacher with a meaningful, practical and structured approach to teaching. It was also revealed that business studies teachers in Anambra State are lowly aware of concept mapping for data interpretation. This was against the view of Canas (2003) that teachers use concept mapping in analyzing and interpreting students' data. It shows that business studies teachers' knowledge of concept mapping is limited to some areas.

Furthermore, the result of the test of the first hypothesis revealed that business studies teachers do not significantly differ in their mean ratings on awareness of concept mapping as a technique for effective teaching based on years of experience. This is in contrast with Gray (2013) who found out that knowledge and skills in the use of teaching methods and techniques are mainly acquired while on the job. However, Henderson (2014) opined that recently, emphasis is made on the use of teaching techniques that are student-centered. Therefore, the implementers of the teacher education currriculum have also began to lay emphasis and the creation of awareness on student-centered methods and techniques.

**Utilization of concept mapping software for teaching**

The result of the study showed that business studies teachers lowly utilized concept mapping software. The teachers used the visual understanding environment (VUE), mindmeister, cmap, xmind, lucid chart, examtime, poppler, goggle docs, connected mind, bubbl.us, prezi, inspiration, imindmap and coggle to a low extent in teaching. This is in agreement with Nwaokwa (2015) who stated that there is low level of utilization of e-learning tools particularly concept mapping software among business teachers in secondary schools. The low level of the use of e-learning tools is due to poor internet facilities, inadequate computer facilities, irregular supply of electricity, shortage of staff with the necessary skills, lack of interest in using them to teach and unwillingness on the part of teachers to embrace technology and change (Udegbunam, 2016).

The result of the test of the fifth hypothesis revealed that there was no significant difference in business studies teachers' mean rating in their utilization of concept mapping software based on years of experience. Nwaokwa (2015) supported this view by pointing out that years of experience should not affect business teachers readiness to adopt e- learning tools in teaching. Similarly, concept mapping software as an e-learning tool could be used synchronously or asynchronously, hence every teacher should embrace it in order to foster cooperative learning among the students, promote collaboration between the teacher and the students, and make the teaching-learning process interesting and student-centered.

## Conclusion

It is concluded that business studies teachers in secondary schools in Anambra State were highly aware of concept mapping as a teaching technique but lowly utilized concept mapping software in teaching. This low utilization of concept mapping software could affect their effectiveness. It is very important that business studies teachers should incorporate this tool in their teaching because the world of today is technology driven.

## Recommendations

Based on the findings and conclusion of the study, the following recommendations are made:

1) Institutions responsible for training teachers should equip with the trainees with adequate knowledge and skill on the use of concept mapping software and how to use it to differentiate instruction.
2) Government should ensure the provision of reliable supply of electricity, internet facilities and computers so as to facilitate the use of concept mapping software as well as other computer aided programmes in the school.

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