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Identifying A Learning Style Through Concept Mapping Technique: Based on Pilot testing

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Abstract

Considering the individual differences, active learning technique provide individual learning techniques to identify various learning style and involves learners in their own learning process. This paper has three purposes: first, to define and classify the concept of learning style; Second, an understanding of Howard Gardner's learning styles and an review of previous researches, third, an study of the pilot test. A learning program provided the theoretical framework for this investigation to identify student's learning style through concept mapping technique. The posttest-only control group design in the form of mixed methods was used to achieve the research objectives. In an effort to contribute to the body of research in this area and to enrich pedagogical practices, the author describe the pilot testing processes and feasibility issues explored, and the improvements made to the instrument and methodology before beginning the main research study on identifying a learning style through concept mapping technique.

Keywords: *Pilot testing, feasibility study, learning style, concept mapping technique.*

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Introduction

Individual difference is a universal fact. A unique combination of genetic particularities affect the way of learning. One's own way of learning, in which they absorb, comprehend, process and retain the knowledge in one or another way is known as a learning style. The idea of the term "learning style" was first recognized as early as 334 BC by Aristotle, who believed that, "each child possessed specific talents and skills" (Reiff & National Education Association, W. D., 1992). Since then the concept of learning styles has developed. And many researchers began to form their own ideas about learning styles.

Once different ideas were developed on how children learn, what children need to learn, and what it is that attracts children to learn in different ways, theories were then developed on the different types of learning styles that a child possesses. The most recent and prominent theories have been developed by Howard Gardner, Neil Fleming, and David Kolb.

As a precursor to the main experimental study on identifying learning style through concept mapping technique, a pilot study was conducted to determine the feasibility of using various tools and data collection process. A concept map program was structured that researcher had measured through pilot testing. It was believed that the program would provide an effective framework for identifying a various learning style to serve them better learning experiences.

In an attempt to contribute to the body of research in this area, the author describe the pilot testing process, the specific feasibility issues investigated and changes were made to prepare for the main experiment on identifying learning style through concept mapping technique. First some conceptual framework of learning style is provided, including concept and theory of learning style and previous researches conducted on learning style. In addition, background of pilot testing followed by a discussion of objectives, experiment timing, sample, material

and program, process, tools, data collection and observations are therefore included in the discussion in this paper.

Concept of Learning style

A learning style is "an individual's mode of gaining knowledge" (Dictionary.com, 2012). Individual has own way of assimilate, understand, process and remember the information. The term learning style refers to the idea that each learner learns in his or her own way. For example, some are best learning by listening, while others have to observe every step to learn. While some can learn through pictures, charts or diagrams, whereas some learners have to learn through hands-on activity. Eventually, how we learn depends a lot on what we are learning and the learning techniques of our choice may not, in fact, be the most useful. However, many scientists, psychologists and education experts have tried to identify different, congenital learning styles. Based on that here are some definitions of learning style that will help you to understand this concept.

Definition of Learning Style

- Different ways students processes information and thereby learn optimally; learning styles include concrete experience, reflective observation, abstract conceptualization and active experimentation.

- Penny de Byl and Jeffrey E. Brand

- An individual's preferred or comfortable approach to learning, corresponding with four fundamental forms: an accommodating learning style, diverging learning style, assimilating learning style, or converging learning style.

- Yoshitaka Yamazaki, Michiko Toyama and Thitiwat Attrapreyangkul

- Learning styles are the way that a student best processes and uses information. A variety of theories exist on types of learning styles, including multiple intelligences, emotional intelligences, brain-based learning, and VARK.

- Shellie Hipsky

The essence of each definition focuses on one thing, that is each learner is unique. Individuals see things differently and they have their own opinions, own personalities, even their own fingerprints. Just like unique fingerprint, everyone have a unique learning style. A learning style is a series of theories that explain the differences in individual patterns of understanding information. People learn differently, and prefer information to be presented in a particular way - a way that makes it easiest for one to understand.

Here we will understand the types of learning styles based on Howard Gardner's theory of multiple intelligence so that the learning style can be understood more clearly and more

categorically. According to this theory, learning style is divided into nine different styles, which can provide the most accurate information. These are nine different types of learning styles and each learning style is mentioned to different names. The nine learning styles include:

1. The Visual or Spatial Learning Style
2. The Aural or Auditory or Musical Learning Style
3. The Verbal or Linguistic Learning Style
4. The Physical or Kinaesthetic Learning Style
5. The Logical or Mathematical Learning Style
6. The Social or Interpersonal Learning Style
7. The Solitary or Intrapersonal Learning Style
8. The Naturalistic Learning Style
9. The Existential Learning Style

While each of us learns in a combination of several different learning styles. Each learning style is an individual way of learning with different characteristics that affect both learning and personality. Each of these learning style types should be considered in terms of their personality traits, their learning style and their identities.

1) The Visual or Spatial Learning Style

The first is Visual-Spatial learning style. Learner with visual-spatial learning style enjoy reading and writing for fun. They are good at solving puzzles. These learners have ability to interpret pictures, graphs and charts well. They also identify patterns very easily and even have interest in drawing, painting and visual arts.

2) The Aural or Auditory or Musical Learning Style

The second is Aural or Auditory or Musical Intelligence, They can process oral instructions very clearly. It is very easy for them to memorize verbal information. They are usually accustomed to reading aloud. learner who have strong musical intelligence are excellent at thinking in terms of patterns, notes, rhythms and sounds.

3) The Verbal or Linguistic Learning Style

The third learning style mentioned by Howard Gardner in his Multiple Intelligence Theory is linguistic-verbal intelligence. Learners who excel in linguistic-verbal intelligence can memorize written and spoken information well, they are at the forefront of reading, discussions and motivational speeches. They are able to explain the situation well and often use humour when narrating stories.

4) The Naturalistic Learning Style

People with a physical-kinaesthetic learning style prefer to learn through an activity. They have excellent physical coordination. Learns and remembers things through an activity. In short, prefers learning in a way that involves physical activity. Participates enthusiastically in sports, dance competitions, yoga etc.

5) The Logical or Mathematical Learning Style

Logical or mathematical learning style is that when a person has excellent problem solving skills, prefers to do scientific experiments, enjoys thinking about abstract ideas and can also solve complex calculations. This type of student has expertise in computational subjects as well as they can quickly understand logical information.

6) The Social or Interpersonal Learning Style

According to Howard Gardner, interpersonal intelligence is the sixth type of learning style. People with strong interpersonal intelligence are excellent at understanding and communicating with others. They are able to evaluate the feelings, motivations, desires and intentions of those around them. Proficient in verbal and non-verbal communication. They can understand the situation by looking at it differently, they can see the point of view of others. They can perform very well in a group.

7) The Solitary or Intrapersonal Learning Style

In this learning style the person prefers to learn on his own. They can evaluate their personal strengths, have the ability to self-reflect. Aware of their emotional state, emotions and motivations. Has the ability to analyze theories and ideas, and understand the origin of one's feelings. They have difficulty working with others.

8) The Naturalistic Learning Style

People with this learning style are more in tune with nature. Interested in learning about nature and new species. They are also very much aware of the subtle changes taking place in the environment around them. These students are very interested in subjects like Botany, Biology and Zoology. Can easily categorize and list information. In particular, they enjoy adventures such as hiking, camping, and gardening. They don't like to learn about things that have nothing to do with nature.

9) The Existential Learning Style

The ninth and last is the existential learning style. They have deep questions about human existence. Like the meaning of life, why we die, how we got to where we are today. Such questions that go beyond vision are too serious and too big to be understood by sensory systems.

After understanding each of these types of learning styles, we now look at some of the research that has been done with a focus on learning styles. Which supports the above information.

Review of Previous Work

Hawkar Akram Awla has carried out a research on Learning styles and their relation to teaching styles. The study takes a theoretical approach to review relevant literature on the topic and present various view points on matching and/or mismatching leaning styles with teaching styles.

Richard M. Felder has conducted a research on Opinion: Uses, Misuses, And Validity of Learning Styles. This paper describes and reviews the origins of a learning style model that has been applied extensively in engineering education and an online instrument that has been accessed by millions of users to assess students' preferences for different approaches to instruction defined by that model.

Jennifer Perna has carried out a research on Learning styles and their effect on student learning. This paper describes different learning styles, discusses a range of learning style inventories and research in this area, and analyzes the impact of learning styles on student performance in an American government class.

Nahla M. Moussa has conducted a research on The Importance of Learning Styles in Education. This literature review reviews various dimensions of learning styles in an effort to bring to light their contribution to both the learning and teaching process.

Maya, J., Luesia, J.F., and Pérez-Padilla, J. **(2021)** has carried out a research on The Relationship between Learning Styles and Academic Performance: Consistency among Multiple Assessment Methods in Psychology and Education Students. The results reveal Psychology students to be more assimilative (theoretical and abstract). This study highlights the importance of promoting abstract conceptualization.

Rona A. Banas **(2018)** has conducted a research on Perceptual Learning Styles of Students and its Effect to Their Academic Performance and result revealed that The results suggest that visual and auditory learners excels in class mainly because their perceptual learning styles are assessed well by the strategies of the teachers.

SamsonDamtew, AdamuAssefa, AbinetMengiste and Bhatara Mohit **(2019)** have carried out a research on The Relationship between Study Skills and Learning Styles: The Case of Underachieving Students in Some Selected Secondary Schools in Wolaita, Ethiopia and result indicated that dimensions of active-reflective and visual-verbal learning styles had significant effect on concentration subscale of study skill.

Rajshree S. Vaishnav **(2013)** has carried out a research on Learning Style And Academic Achievement of Secondary School Students and findings of the study reveal that, kinaesthetic learning style was found to be more prevalent than visual and auditory learning styles among secondary school students.

Background on Pilot Studies

In general, pilot studies are seen as a small part of the main experiment. pilot is often viewed synonymously with a "feasibility study intended to guide the planning of a large scale investigation" (Thabane et al., 2010, p. 1). In short, the pilot study has a strategy to reduce the risk to decrease the possibility of failure in the main experiment.

The presented paper contains information on objectives, sample, literature and research program, research process, tools, data aggregation, data analysis (qualitative and quantitative) and observations by the researcher.

Objectives of the Study

The objectives of the present study were as follows.

1. To develop a learning programme based on concept map for 11th grade students of Economics.
2. To try out learning programme based on concept map for 11th grade students of Economics.
3. To know the effectiveness of learning of the control group and experimental group in terms of long lasting impact.
4. Based on the result obtained, finding out for which kind of learning pattern, the concept map is the most effective learning technique for student.

Sample

The sample selection was processed by the random sampling method. A list of Gujarati medium schools in Bhavnagar city which had the internet connection was drawn up and Saint Xavier's Higher Secondary School was selected. 17 students of Economics subject of 11th grade were selected by stratified random selection technique on the base of performance of last examination of particular subject.

Research Program and Process

17 students were involved in this pilot testing. The pilot test was conducted for a total of ten days. In the first five days, the students were trained to make concept maps. A content material was made available to the students for learning during the training. For this, the researcher prepared literature on a topic called Goods and Services from Economics subject, which all the information related to the subject and topic was included, besides other helpful

books as well as internet facility was provided. During this training, students were taught to create concept maps with various information. Over the next five experiment days, literature was provided on a topic called demand, which the students were to use to create various concept maps. Students were engaged in active activities and various aspects of the student were observed by the researcher.

The process of learning from concept maps was divided into five sections in total. In which students had to find information related to the topic from textbooks, given materials, other helpful books as well as internet. Necessary points had to be noted, key words had to be found and concept maps had to be started. At this stage the students worked to create a map by sifting through the necessary as well as unnecessary information pertaining to the topic. The whole process involved the following five steps.

(1) Content Analysis, (2) Rummage of Source, (3) Selection of Source, (4) Creation of Concept Map and (5) Presentation of Concept Map.

Timing of the Research

The entire program was conducted for 23 hours (Including 10 hours training + 10 hours learning by concept map + 20 minutes opinionnaire + 40 minutes post test + 85 minutes interview + 40 minutes retention test).

Research Instruments

Five instruments were used for the presented study. These include (1) Economics Achievement Test, (2) An Inventory, (3) Observation Schedule, (4) Semi-Structured Interview and (5) Retention Test. Detailed information regarding the instrument was as follows.

1. **Economics Achievement Test:**

The Economics Achievement Test was designed by the researcher to examine the learned information. In the first section, questions were asked about the learned topic, while in the second section, questions were asked about making concept maps regarding topic.

2. **An Opinionnaire**

An opinionnaire was created by the researcher. In which students were to give their opinions regarding their experiences during the study and learning through concept map. Nine questions were asked in this opinionnaire.

3. **Observation Schedule**

The observation schedule was used to collect data on class interactions. Observations were recorded for any actions of students that indicated interactions or non-interactions. In addition, the researcher were checked the students' notebooks to check their daily activities.

4. Semi-Structures Interview

The researcher arranged for a semi-structured interview form to find out students' views on the subject of economics learning through concept maps. After the pilot testing implementation, face-to-face interviews were conducted with the students. To prevent data loss, interviews were recorded and then transcribed.

5. Retention Test

A retention test was taken after a period of one month. The main purpose behind taking this test was to find out how long the effect lasts on the brain after being studied by concept map technique. All the questions in this test were the same as those asked earlier in the post test.

Data Collection

All the work done by the students during the training and experiment was noted on a daily basis. In which their notebooks, their observations and the concept maps they made were collected. In addition quantitative and qualitative information was obtained through post-tests and opinionnaire respectively. Every detail was recorded by the researcher through written as well as video. After a period of one month, data from retention test was also taken.

Analysis and Interpretation of Data

The statistical tool used to interpret the gathered data are: especially Percentage were used to identify the strength of the student's learning style preference from the sample. Quantitative data were analyzed on the basis of details obtained through post-test and retention test and qualitative data were analyzed on the basis of details obtained through observations, opinionnaire and information from the interviews.

Observations for Improving the Instrument and Methodology

Pilot testing results can help identify real and potential problems that researchers may address before beginning an expected future study. The main purpose of this paper was to identify potential difficulties arising in pilot testing and to improve it in the main experiment. For this, the situations that have arisen during the entire pilot test and their possible improvements are discussed here.

Irregularity of students

Due to the Covid-19 pandemic, the attendance of students in the school was low. Due to which only seventeen students were present in the pilot test instead of twenty students. So that the number of participants for the main experiment could be estimated.

Lack of Concentration

One of the initiatives to improve was that the pilot test was performed in the post-covid-19 pandemic period, due to this student's' fears, anxieties and uneasiness were observed to affect

their studies. So the researcher felt the need to increase more active and interesting activities in a main experiment.

Time schedule

- Students were scheduled to arrive two hours earlier than school hours for the pilot study. Which made the students look tired. Which may have affected their learning. So it was concluded that main experiment must be done during school hours.
- During the pilot-test period, it was found that as the students were learning faster than expected, the two-hour study was completed in one and a half hours. So for the remaining half an hour more activity seemed to be needed.
- In addition to this, due to the enthusiasm for learning, the students completed the work very fast, and the prepared literature became fewer, so that the researcher had to prepare more literature.
- Some students found it difficult to learn from the concept map, the researcher needed to give more time to work on which learning style would be suitable for these students.

Research Program

The students seemed to have failed to find more information for the topic. Because all the information about the concept map was available in English language on the internet, it seemed that the students had more difficulty in finding and understanding it. In this regard, it was concluded that additional information related to the topic, which is available on the Internet, also needed to be translated into Gujarati language.

Instrument

- In the post-test, students were asked to create a concept map on a topic, but examining the answers in the test, the researcher found that it was difficult for them to create a concept map just by giving a topic. It was therefore felt necessary to give the students some words based on the subject, using which the students could make a proper concept map.
- Based on the analysis of the opinionnaire, it was found that it can provide information only on the effectiveness of the concept mapping program, but it is not enough to provide information related to the learning style. The best way to address this imperfection was to use inventory instead of opinionnaire.
- It was difficult for the researcher to teach as well as observe. Since quality seemed to be lost in performing both tasks simultaneously, so it was necessary to allot half an hour by the researcher only for the observation of the students.

All of these improvements were noted, with the necessary corrections being made in the main experiment.

Conclusion

The pilot study undertaken to test the feasibility of the research process and identifying a learning style, was vital for informing the main study on evolving a learning program based on concept mapping. The planned procedures for Concept map program and retention ability of participants, the usability of the post-test, and the technique employed for data collection were all tested. The positive responses and relatively good response rate in the pilot from individuals who benifit by learning through concept map, confirmed the feasibility of a larger investigation.This was an important result considering the individual differences that support the identification of students' learning style and giving them tailored educational experiences. Finally, it became clear through the pilot that in terms of learning style, concept mapping techniques were effective in helping students learn meaningful learning and by which the information learned could be remembered for a long time. This paper highlights the value of pilot testing in terms of improving the design of research studies, enhances knowledge on pilot studies and contributes to the development of best practices in terms of concept maps and learning styles.

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In this paper the author has resorted to the following website regarding the definitions of learning style. Which is noted at this stage.

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First definition taken from Handbook of Research on Improving Learning and Motivation through Educational Games: Multidisciplinary Approaches.

Authors: Penny de Byl (Bond University, Australia) and Jeffrey E. Brand (Bond University, Australia)

Second Definition taken from Handbook of Research on Cross-Cultural Business Education

Authors: Yoshitaka Yamazaki (Bunkyo University, Japan), Michiko Toyama (Bunkyo University, Japan) and Thitiwat Attrapreyangkul (Rajamangala University of Technology Lanna, Thailand)

Third Definition taken from Encyclopedia of Information Technology Curriculum Integration

Author: Shellie Hipsky (Robert Morris University, USA)

Howard Gardner's theory of multiple intelligence was used to describe the style of learning. Which was taken from the following website. https://learn.podium.school/personality-

development/9-multiple-intelligences-types-by-howard-gardner/ Which has been noted on this occasion.

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