



Research Paper

## Vee Mapping: A Review

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### ABSTRACT:

When students perform experiments and explore experimental tools in a science laboratory it provides them a first hand experience and enables the learner to discover and/or verify the theoretical principle. But unfortunately, in school science laboratories, students may be engaged in making records of observations of objects or events, transforming these records into – tables, diagrams, or graphs and drawing conclusions, or knowledge claims- often without knowing why (Novak & Gowin, 1984). Thus a heuristic was developed by D.Bob Gowin in 1977 at Cornell University named Vee diagram/ V-Diagram/Vee map . Vee map is named so because of its structure, which is in the shape of English alphabet v. Vee diagram has two sides, left-hand side and right hand side. Left hand side is called conceptual/ theoretical side and the right-hand side is called methodological side. Conceptual/theoretical side of Vee diagram constitute world view, philosophy, theory, principle(s), constructs and concepts whereas the methodological side constitutes value claims, knowledge claims, transformations and records. Another element called events and/or objects lies at the bottom of the Vee whereas focus question/research questions are present at the top between the theoretical and methodological side. Thus, the first section of the article discussed the evolution of the Vee map. Whereas second section of the article highlighted the various learning outcomes on which the effect of Vee map has been observed among which achievement is the most commonly studied and the third section will describes the advantages of using Vee mapping method over traditional methods of teaching ( Traditional laboratory method/lecture method) which is followed by conclusion and discussion. The research article is based on secondary data which is collected from various data base, repositories and search engines.

**KEYWORDS:** Vee map, Science laboratory, Heuristic, Teaching method.

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### I. INTRODUCTION:

Science as a subject inhabited a significant place in school curriculum. Teaching and learning of science evolves scientific attitude which is symbolised by the development of critical thinking, making pupils open minded and develops unbiased and impartial thinking. Awodun (2017) viewed science as a foundation upon which the present technological breakthrough is built. Science works through its processes and science teaching and learning emphasizes the process skill through experimentation, observation and data collection (Jene, 2011). Laboratory work provides an opportunity to develop the process skills. When students perform experiments and explore experimental tools in a science laboratory it provides them a first-hand experience and enables learners to discover and/or verify the theoretical principle. But unfortunately, in school science laboratories, students may be engrossed in making records of observations of events or objects, transforming these records into graphs, tables, or diagrams, and drawing conclusions, or knowledge claims- often without knowing why (Novak & Gowin, 1984). Here in this article the author has intended to shed light upon a heuristic namely Vee mapping method/V-Diagram/Vee diagram. The article is based on secondary data.

Author has formulated three objectives which are as follow:

- (a) In what way does the V- map have evolved?
- (b) On what kinds of learning outcomes, the effect of V-mapping has been analysed?
- (c) Why should V- mapping be preferred over traditional laboratory methods?

There are three sections. First section deals with objective (a), second section deals with objective (b) third section deals with objective (c) which is followed by discussion and conclusion.

**SECTION: I**

Vee heuristic was developed by D.Bob Gowin in 1977 at Cornell University. It was evolved as a result of twenty-year research. D.Bob Gowin invented the Vee heuristic to help students in order to understand the structure of knowledge as well as to understand the process of knowledge construction. Thus, Vee map is a tool for acquiring knowledge about knowledge and how knowledge is constructed and used (Novak & Gowin,1984). Construction of the Vee map is based on five questions, these are (a) What is the telling question(s)? (b) What are the key concepts? (c) What methods of inquiry are used? (d) What are the major knowledge claims? and the fifth one is (e) What are the value claims?

Vee diagram has two sides, left-hand side and right-hand side. Left hand side is called conceptual/theoretical side and the right-hand side is called methodological side. Conceptual/theoretical side of Vee diagram constitute world view, philosophy, theory, principle(s), constructs and concepts whereas the methodological side constitutes value claims, knowledge claims, transformations and records. Another element called events and/or objects lies at the bottom of the Vee whereas focus question/research questions are present at the top between the theoretical and methodological side. Various constituting elements of Vee diagram are explained as:

**Focus question:** It is the question which is supposed to be answered at the end of the study.

**World view:** It represents the general belief system that motivates or guides the inquiry.

**Philosophy:** It talks about the nature of knowledge and knowledge that guides the inquiry.

**Theory:** It refers to general principles that guides the inquiry in order to explain why events or objects exhibit what is observed.

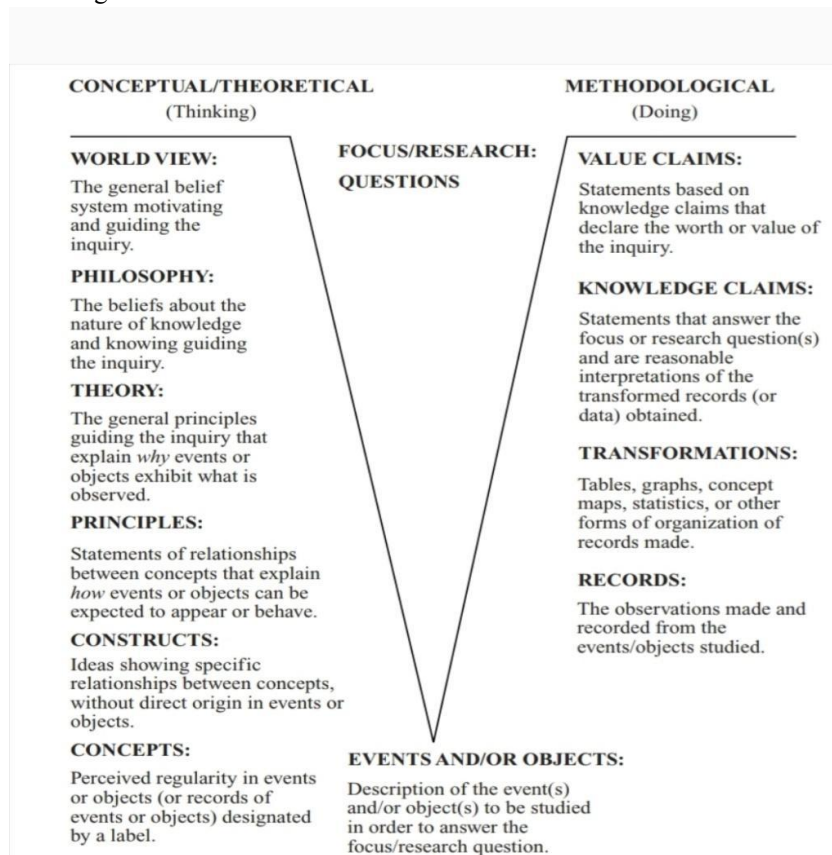
**Principles:** It represents the relationships between concepts that explain how event(s) or objects can be expected to occur/ behave.

**Constructs:** It is an idea showing a specific relationship between concepts, without direct origin in events or objects.

**Concepts:** It is a perceived regularity that occurs in events or objects.

**Event(s) and/or objects:** It describes the event(s)/or objects which are made to happen and studied to answer the focus question.

**Figure 1 :** Gowin's V-Diagram



Note: Gowin's v diagram, showing the epistemological elements that are involved in the construction or description of new knowledge. Adapted from *The art of educating with v diagram* (1<sup>st</sup> ed., p.36), by D.Gowin & M.Alvarez, 2005, Cambridge University press. Copyright 2005 by Cambridge University press.

Records: It is the observation made and recorded.

Transformation: It is the way in which the records are represented. It can be in the form of graphs, tables, statistics, concept maps, or any other forms of organization of records made.

Knowledge claims: It is a reasonable interpretation obtained from transformed records.

Value claims: It declares the value or worth of the inquiry.

## **SECTION- II**

The section of the article briefly describes the kinds of learning outcomes on which the effect of vee mapping has been studied/analysed/observed. Such as Thorn and Myers (2010) conducted a comparative study of Vee mapping and standard laboratory report with respect to achievement of students content knowledge in Agriscience at Florida. Similarly, Tekeş and Gönen (2012) used to study effects of Vee mapping in comparison to traditional laboratory method on student's achievement in Physics in Turkey. Further, Evren and Sülün (2010) from Turkey investigated the effects of Vee diagrams in Biology laboratory on success and retention of students. Whereas Olubunmi (2017) from Nigeria and Ameyao and Kyere (2019) from Ghana also observed the effect of Vee diagram on student's performance in Chemistry and Biology respectively. Calais (2009) from Louisiana, research titled "The Vee Diagram as a problem-Solving Strategy: Content Area Reading /Writing Implications" worked on problems in probability and incorporated it with writing. Whereas, Fuata'i (2004) from University of New England used Vee diagram as a tool to not only asses students' proficiency in solving a problem but also the depth and extent of the conceptual bases of this proficiency requiring students to identify the mathematical principles and concepts underlying listed methods and procedures. Thus, effects of Vee mapping were mostly observed on achievement. Although it was not only limited to the science subject but its effects were analysed on other subjects too, which includes Mathematics.

## **SECTION-III**

This section of the article will describe the advantages of using Vee mapping method over traditional methods (Traditional laboratory method / lecture method). Roehrig, Luft and Edwards (2001) mentioned three important reasons which govern/ favours the use of vee diagram. First one is, use of Vee map provides a format for students to construct their knowledge about a science concept, secondly vee maps can demonstrate the process by which a student constructs knowledge and third one is vee maps can be graphical formats which encourage communication. Findings of the research conducted by Thorn and Myers (2010) reported a statistically significant difference in content knowledge achievement of students taught through Vee mapping (treatment group) to students taught through traditional laboratory reports. It further adds that students taught through vee mapping method achieved higher than those who taught through traditional laboratory report. Kumuda (2009) analysed relative effects of vee mapping method in comparison with lecture method on achievement in Physics of standard XII students and reported that the gain score obtained by students taught through vee mapping method is significantly higher than the gain score obtained by students taught through lecture method. Evren and Sülün (2010) concluded that V-Diagram has more positive effects on student's achievement and retention when compared to the effects of teaching carried out through laboratory methods. Thorn and Myers (2010) mentioned that when students utilised Vee map, they no longer conduct laboratory activities to just answer questions on a report. Now students conduct and form their own conclusions rather than try to reproduce the same answers as their peers or what they read from the book.

## **II. DISCUSSION AND CONCLUSION:**

In the above sections authors have briefly discussed upon three objectives. Which has aimed to explore the evolution of Vee map, different learning outcomes with respect to which the effects of Vee map/diagram/heuristic have been studied and advantages of using Vee map over traditional methods (laboratory report/ lecture method) of teaching. Vee map was raised as a heuristic which is said to be an alternative to traditional laboratory methods. As Roehrig, Luft, and Edwards (2001) stated that "Vee maps can be used in place of any laboratory report" whereas Tekeş and Gönen (2012) suggested to use V-Diagram instead of using usual experiment reports in Physics lessons. Most of the studies compared the effectiveness of Vee map in counter to traditional laboratory method/report/lecture method (Kumuda,1999; Evren & Sülün,2010; Tekeş & Gönen,2012). Achievement and retention as dependent variables are most commonly studied learning outcomes of Vee maps. Author found that the majority of the research has been conducted in the science stream/subject

(discussed in section II & III). But it's noteworthy that the effect of the Vee map was also studied in other subjects too, which includes mathematics (Fuata'i,2008). In order to analyse why Vee map should be preferred over traditional laboratory method, authors studied and analysed the various researches, which shows its effectiveness over traditional laboratory reports methods or lecture methods. Thus, authors opined that Vee mapping is a useful method and it should be used to impart lesson in the classroom/laboratory but simultaneously, there still needs researches to conduct and explore the effects of Vee map on various other untouched dimensions of learning which may be related to cognitive, affective or psychomotor.

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