

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 1997 Proceedings

Americas Conference on Information Systems
(AMCIS)

8-15-1997

The Use of Gowin's Vee to Improve Post-Graduate Critical Analysis of Research Papers

Glenn Stewart

Queensland University of Technology, stewart@fit.qut.edu.au

Follow this and additional works at: <http://aisel.aisnet.org/amcis1997>

Recommended Citation

Stewart, Glenn, "The Use of Gowin's Vee to Improve Post-Graduate Critical Analysis of Research Papers" (1997). *AMCIS 1997 Proceedings*. 301.

<http://aisel.aisnet.org/amcis1997/301>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 1997 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

The Use of Gowin's Vee to Improve Post-Graduate Critical Analysis of Research Papers

[Glenn Stewart](mailto:stewart@fit.qut.edu.au)(stewart@fit.qut.edu.au)

tele +61 7 3) 864 1961

fax +61 7 3864 1969

School of Information Systems

Queensland University of Technology

2 George Street Brisbane Q 4001 Australia

Abstract

Teaching critical reviewing of research papers to budding post-graduate students is a difficult process. A method that focuses on the match of the theoretical and methodological components of well constructed research is invaluable in assisting students in a structured review of research papers. Gowin's "Vee" heuristic is such a method. This paper reports on the use of Gowin's Vee to post-graduate students of Information Technology in critiquing research papers and formulating their own research project. Preliminary results show an increased appreciation by students of critical elements of a well formulated paper.

1. Introduction

Many post-graduates in Information Technology have limited exposure to finding and critically reviewing research literature and are thus unprepared to conduct a literature review and to formulate a well grounded research proposal. This is a function of their focus to acquire skills leading to employment in the Information Technology Industry. These skills emphasise technical mastery and analytical ability. Most technology students in Australia have had negligible experience in writing discursive papers, finding and integrating results from the literature.

I have been teaching Research Methodology to post-graduate students in the Faculty of Information Technology for five years, and have found that the students struggle to effectively read research papers. I have tried using various methods to encourage critical evaluation: a seminar approach to dissect such papers; the use of journal review criteria; the promulgation of additional criteria. These methods met with limited success as evidenced in assessing their formal written critiques and literature reviews. Finally I turned to learning theory to assist in teasing apart the process, and was directed (by my colleague Christine Bruce) to an excellent resource - Gowin's Vee (Novak and Gowin 1984) which was developed to assist secondary school teachers to link theory and method to science experiences for their students.

In this paper, I first describe the Vee, and then discuss how students were encouraged to use the Vee in both critiquing research papers and in developing their research proposal. I close with some observation from students on their perceptions of the use of the Vee and indicate future research in developing IT student's critical reflection.

2. Gowin's Vee

Gowin's Vee (shown in Figure 1) was developed to assist science teachers help students make sense of results. It has been trialed in many settings to assist other students make sense of knowledge in their own field. The Vee draws students attention to the need to define a focus question. All subsequent work revolves around this focus question, commencing from the selection of research event or object. There are two sides to the Vee: a conceptual path and a methodological path.

This device is a visual aid, drawing student's attention to the relationship between the focus question and the research object, as well as showing the interplay between the conceptual framework surrounding the object and the means to conduct the research itself.

The conceptual path commences with the identification of regularities about the behaviour of the event or object. This leads to the proposal of an hypothesis, which is embedded in an over arching theory. The theory is, in turn, dependent upon the underlying philosophies inherent in that discipline. This conceptual path maps into a methodological trail. The nature of the focus question and supporting theory leads to a certain research design and data collection method. These aspects constrain the choice of data transformations, and influence the means to interpret the results, explain and generalise. New knowledge claims may then be made, but these are subject to certain belief states of the researcher.

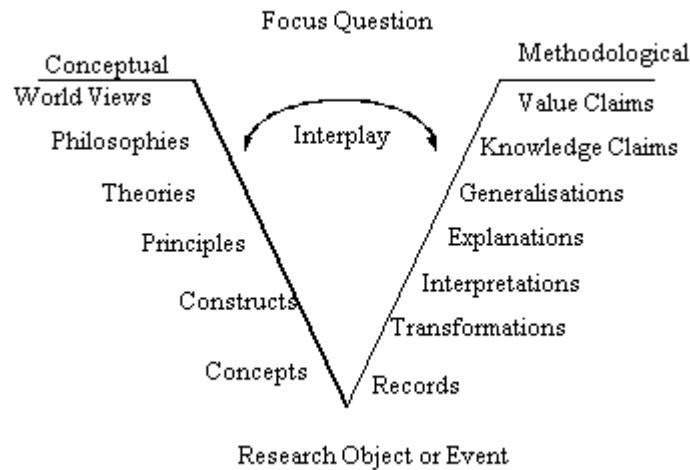


Figure 1
How to make sense of knowledge (from Novak and Gowin (1984))

The Vee may be used for evaluating the completion and linkage of research papers. It also assists in developing one's own research proposals. In applying the Vee to a research paper, the student is forced to ask the key question: what is this paper about? What is the focus question? For this question, what are the underlying theories and hypotheses? What objects or events should be examined and how? How should the data be treated? Are the reported results consistent with the theory and method? Are the knowledge claims consistent with the data? What are the value claims of the researcher? What are the underlying philosophical foundations for the work?

Waterman and Rissler (1982) showed that the Vee improved science teachers' analysis of research and research reports. After two attempts at using the Vee, students were able to 'use the literature study process properly' and 'learned to distinguish between low and high quality writing and research, both in its conception and execution' (Waterman and Rissler 1982 p.340). I similarly set out to test the use of the Vee with my post-graduate IT students. This is discussed in the next section.

3. Student's Use of the Vee

Research Methodology runs each semester. Student numbers vary between 12 to 15. Their interest areas cover the spectrum of research into Information Technology: Computer Science (compiler construction, neurocomputing, distributed systems), Information Systems (organisational informatics, information systems management, advanced database technology, object oriented technology), Data Communications (cryptography) and Information Management (organisational perceptions of information). This diversity makes the teaching of Research Methodology a challenge! Another point of diversity is student country of origin, with over 40% of students coming from Asia or India. Students are either undertaking an honours year, a course work masters degree, a research masters degree or a commencing a PhD.

Students are first introduced to the purpose of research, and given a framework to understand the differences between theory building, theory testing and theory refinement stages (Shanks, Rouse and Arnott 1993). Students have selected an area to work in, and an iterative refinement process commences to define their research problem precisely.

In order to define the students research problem, a significant paper in their problem domain is selected by their project supervisor. The students must then make sense of this paper. The students are introduced to the concepts of the Vee in a formal lecture, and then, through a workshop environment, apply the Vee to a standard paper. They then apply the Vee to their selected paper and present their findings in a seminar. Students then write up their critique based on feedback from this presentation.

In preparing their research proposal, students undertake an iterative process to distill their problem definition into action statements and to ground their work into the wider research context through conducting a literature review. The Vee is used as a quality check ensuring that the student understands the theoretical framework underpinning their problem and has clearly mapped out the methodological trail to be taken to solve their research problem.

4. Student's Perceptions

I first introduced the Vee in the second semester of 1996. The same structure of teaching was used in the first semester, other than using the Vee. Prior to the use of the Vee, students complained about the difficulties in reviewing research papers. They tended to focus on the mechanical aspects of the paper or the findings of the paper. Results for the student's critique were low (mean 6/10).

The second semester started similarly, with the Vee introduced in week 4. Students found the terminology of the Vee confusing at first, and needed significant discussions and review to see the links. They found applying the Vee difficult at first, because many papers were not hypothesis driven and had no theoretical foundation. This lack of proper foundation was precisely the points that I wished to drive home! After discussing these findings in the workshop environment, students were then able to perceive the structure of a paper, and successfully critique their paper. Results for this group were higher (mean 8/10), and the understanding of the process higher (as shown by the answers in the exam).

In 1997, I have students undertaking qualitative IS research, theoretical computer science research, experimental computer science research, classical IS empirical research and R&D projects in Multimedia. Application of the Vee was seen to be most difficult with both qualitative work and with theoretical computer science. Direct mappings into the Vee were more tractable to the other research areas.

Modification of the Vee to accommodate the methodological trail of theoretical work through the establishment of theorem, proof and implementation was made. This allowed the student to distinguish between the theoretical foundations of the discipline and the procedural aspects of conducting research using mathematical proof methods. The mapping of the Vee to qualitative work is still a topic of discussion at the time of writing this paper.

It is interesting to note how the heuristic assisted the students in the deconstruction of the research paper but hindered the students in reconstructing the work in an integrated fashion. The notions of analysis, synthesis and evaluation are seen as separate processes and the crafting of an integrated critique has required the students to undertake a process writing approach in order to finally yield an integrated product.

5. Current Work

Application of the Vee is being assessed in the 1997 intake, again through the lecture, workshop, seminar, critique process. Students observations of the nature of research are being recorded, and students will be interviewed on their perceptions of research pre and post exposure to the Vee. Students will be interviewed

during the conduct of their research project in the following semester. This interview will focus on their experience of the research process. In addition, their perceptions on the utility of the Vee will be assessed. These results will be available for the conference. These experiences and the various conceptualisations of the notion of research will be examined phenomenographically in order to determine the variation in these perceptions.

6. The Link with Philosophy

Students of all sub-fields are introduced to the underlying philosophies of research through an examination of positivism and interpretivism. The subject is taught in a very pragmatic manner, with reference given to actual projects. In computer science, the underlying tensions found between theoretical and experimental work is examined. Additionally, we discuss Cohen's (1991) paper. In this paper, Cohen clearly demonstrates the key differences in the method and manner of reporting results between research that develops or modifies models or algorithms and to that which develops or modifies systems. The distinction between research focused on Algorithms, Models or Systems is made clear by direct reference to research projects undertaken in the faculty. The philosophical basis for the scientific research program approach as conducted in Australia and Great Britain is critiqued. Key paradigms of Information Systems research are examined, and its link to method selection debated.

The use of the Vee has helped to provide a visual framework in which to present and discuss the tensions found in the philosophical underpinnings of research in Information Technology, to focus on issues in problem selection and reveal the issues in matching method to problem and method to philosophy.

7. Conclusions

Gowin's Vee has made the teaching of critical evaluation of research papers much easier. The students have found it to be a useful tool in looking for key components of a research paper and in making sense of their own research problem. In addition, they have found the Vee useful for constructing new knowledge by deliberating seeking concepts, principles or theories that could be applied in their work; understanding existing work by mapping results into concepts and concepts into data; and in detecting anomalies in presented research. We have been able to use the Vee to clearly show the fundamental relationship of problem and method to the philosophical roots of the research.

The claims made by Waterman and Rissler about Gowin's Vee seem to be valid; namely that students do become more effective in becoming aware of the conceptual and theoretical structures underpinning research and are able to map the selection of method to problem and philosophy.

Bibliography

Cohen, P.R. (1991) *Research Methodology in Artificial Intelligence* AI Magazine Spring pp 27-42

Novak, J, and Gowin, B. (1984) *Learning about Learning*

Shanks, G. Rouse, A., and Arnott, D.. (1993) *A review of approaches to research and scholarship in Information Systems*. In P. Ledington (Ed.) *Proceedings of the 4th Australian Conference on Information Systems*

Waterman, M.A. and Rissler, J.F. (1982) *Use of Scientific Research Reports to Develop Cognitive Skills* Journal of College Science Teaching vol 11 pp 336-340