Approach to Teaching Research Methodology for Information Technology

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ABSTRACT

The paper reports on an approach to teaching a course in information technology research methodology in a doctoral program, the Doctor of Management in Information Technology (DMIT), in which research, with focus on finding innovative solutions to problems found in practice, comprises a significant part of the degree. The approach makes a contribution by preparing doctoral students, who are experienced professionals studying part-time, for dissertation research. The rationale of the DMIT and the educational objectives of the course are presented. A research process model applicable to applied research in information technology (IT) is proposed and discussed. This model accommodates scientific methods of research, including empirical, quantitative, qualitative, case study and mixed methods. The course design and pedagogical approach are described in terms of thematic areas of scholarship and practice, and intended outcomes. The paper summarizes the topics of the syllabus, including proposal formulation; research design; methods of investigation; methods of demonstrating concept; approaches to research validation; and documenting research results in the form of technical papers and the dissertation. The purpose of the paper is to share the approach followed in teaching the course, the course design, a summary of lessons learned after several offerings of the course, and ideas for further improvement.

Keywords: Research Methodology, Information Technology, Research Process Model

1. INTRODUCTION

As advancements in information technology (IT) and information systems (IS) continue unabated in the "E-era" of innovation (Butler, 1999), enterprises have become increasingly dependent on IT and IS while striving to add value, streamline business processes and maximize their competitive advantage. Most successful enterprises today carry out or support business processes by IT-based systems that implement solutions for one or more business processes (Willcocks et al., 1997; Harmon, 2003; Steenkamp and Van, 2004). There is an increasing need to validate the success of system implementations and business process improvements, adopt best practices, and generalize lessons learned to increase the likelihood that future investments will yield their expected returns.

Many IT and IS research projects are conducted by vendors, services organizations, independent research organizations, higher education, and the military. We will refer to this research domain as "IT research" although it encompasses both IT and IS sub-domains. The IT research domain, meaning the subject matter being researched, is equally varied since research in IT deals with technology resources; managerial and technical employees; business processes in the enterprise value chain; and policies and procedures constraining IT systems. As a consequence, IT research conducted in university graduate programs is

frequently multi-disciplinary, with collaborative projects carried out in colleges of technology, management, business, information sciences, engineering, and non-technical disciplines.

As IT is now central to the contemporary enterprise, various methods for IT research have been actively explored and documented (Weber, 1987; Nunamaker et al., 1991; Davis, 1992; Brinkkemper and Falkenberg, 1992; Hevner et al., 2004). Some IT research projects are theoretical in nature, while others focus on the application of theoretical concepts to problems rooted in practice, whether within an enterprise or within a product. Barki et al. (1993) developed a keyword classification scheme for research literature which includes IT as one of the primary categories. Yin (2003) has examined the case study as a research method, focusing on the problem of designing and analyzing case studies in order to understand a research problem under study. He distinguishes between using case studies for theory development and theory testing.

Researchers in the IT field may choose from a range of methodologies when planning their research projects. Most of these methodologies were originally derived from research done in non IT fields such as the physical, economic, and social sciences. Nunamaker et al. (1991) classified research into five categories: 1) Basic and applied research; 2) Scientific and engineering research; 3) Evaluative and developmental research; 4) Research and

development; and 5) Formulative and verificational research. Remenyi et al. (1998) described an approach to empirical research that addresses some of the issues concerning a positivist strategy to research in the field of business and management for masters and doctoral degrees. As the IT field is maturing, several research classifications are emerging concurrently. Benbasat (1984), Scott Morton (1984), Galliers and Land (1987), Remenyi (1990) and Galliers (1992) reported on research paradigms for performing IT research. Many authors have remarked on the growing interest in empirical IT research, including Benbasat (1984), March and Smith (1995), Shull et al. (2001), Kitchenham et al. (2002), Choudrie and Dwivedi (2005), and have proposed research approaches, paradigms and methods for future researchers to follow. It is clearly important that appropriate research methods are selected to address a chosen IT research problem, and in many cases a mixed methods approach yields the best results.

A number of authors have described their approaches to planning, conducting and documenting research, and have stressed the importance of logical flow of presentation, sound language use, and editorial finish of technical articles and dissertations (Davis et al, 1997; Dunleavy, 2003; Anson et al., 2003). Most universities provide a prospectus with guidelines on authoring technical papers and dissertations. This paper reports on an approach to teaching a course in IT research methodology in a doctoral program, the Doctorate of Management in Information Technology (DMIT). Dissertation research is a significant part of the degree, and is focused on finding innovative solutions to problems found in practice. The approach makes a contribution by preparing doctoral students, who are experienced professionals studying part-time, for their dissertation research projects. Section 2 presents the rationale and structure of the DMIT, continuing with a review of the approach followed in the dissertation research phase of the program in Section 3. Section 4 discusses the context of IT research and reviews some applied research methods, and Section 5 describes the design and pedagogy of the IT research methodology course. A summary of lessons learned from multiple offerings of the course are provided in Section 6.

2. OVERVIEW OF DMIT PROGRAM

Organizations now use IT proactively as a principal enabler in their search to gain competitive advantage. This is done by means of new business initiatives and strategies driven by emerging trends and technologies, including technologies that have the potential to yield greater efficiencies and higher quality products and services. The body of knowledge represented in the IT research domain is evolving continuously as new research ideas are transferred into business and industrial processes aimed at optimizing the functioning of the enterprise at all levels.

The DMIT doctoral program is offered in the College of Management at a private university in Michigan, aimed at professionals with high levels of managerial, technical and analytical expertise working mainly in IT organizations in surrounding enterprises. The intent of the program is to provide advanced learning experiences focused on leadership through the integration of IT into business and industrial

processes to attain higher levels of efficiency and quality in enterprises. There are 48 students in the program at the time of writing, most of whom are sponsored by their institutions, and half of whom are in the research stage of the program.

The IT field is viewed as encompassing all the software, hardware, infrastructure, and process resources forming part of an IT system, which has the aim of adding value to the business processes of the organization. The DMIT curriculum consists of coursework and dissertation research components. Coursework is offered in three tracks: 1) the Major Track with focus on state-of-the-art knowledge in key subfields of IT; 2) the Research Methods Track which provides comprehensive coverage of quantitative and qualitative research methods; and 3) the Minor Track where courses in a cognate area are taken. Research in the DMIT program focuses on developing innovative solutions to real-world problems in accordance with the university motto of "Theory and Practice" (Steenkamp and DeGennaro, 2004). DMIT research endorses the editorial statement and policy in ISR (2002) that research in the IT/IS disciplines is intended to "further knowledge that aids in the productive application of IT to human organizations and their management". The IT Research Methodology course is offered as part of the Research Methods Track, and its design and pedagogy is described in Sections 5 and 6.

3. THE DMIT RESEARCH PROCESS MODEL

The DMIT dissertation research project represents the capstone learning experience of the program, integrating the academic content of the DMIT curriculum, prior academic knowledge, and student work experiences. DMIT students are encouraged to seek out a problem situated in a real-world environment with potential for an innovative IT-based solution: an innovation in technology; a unique application of a technology; or a technology-enabled business process. Where possible, applied research topics are drawn from problems observed in practice, and research is undertaken in partnership with the sponsoring enterprise under a collaboration agreement. The DMIT research project is conducted under the guidance of a supervisor who chairs the student's dissertation committee. A key stakeholder and/or domain expert from the sponsoring enterprise serve on the dissertation committee and play a significant role during the research endeavor.

The nature of applied research in the field of IT management necessitates that a flexible research process model be adopted which allows iteration among processes and eases management of the research project. For example, the model allows for return to earlier decisions in the project as insights are gained while the project progresses. The model should also accommodate the variety of methods used in IT research projects. A research process model was designed for the DMIT program to provide a common basis for collaboration between students and faculty during the dissertation research process. The process model divides dissertation research into five main phases as shown in Figure 1, where each phase is associated with one or more dissertation research "courses." This structure helps the dissertation committee and student gauge progress during the research project. Students register for one or more three
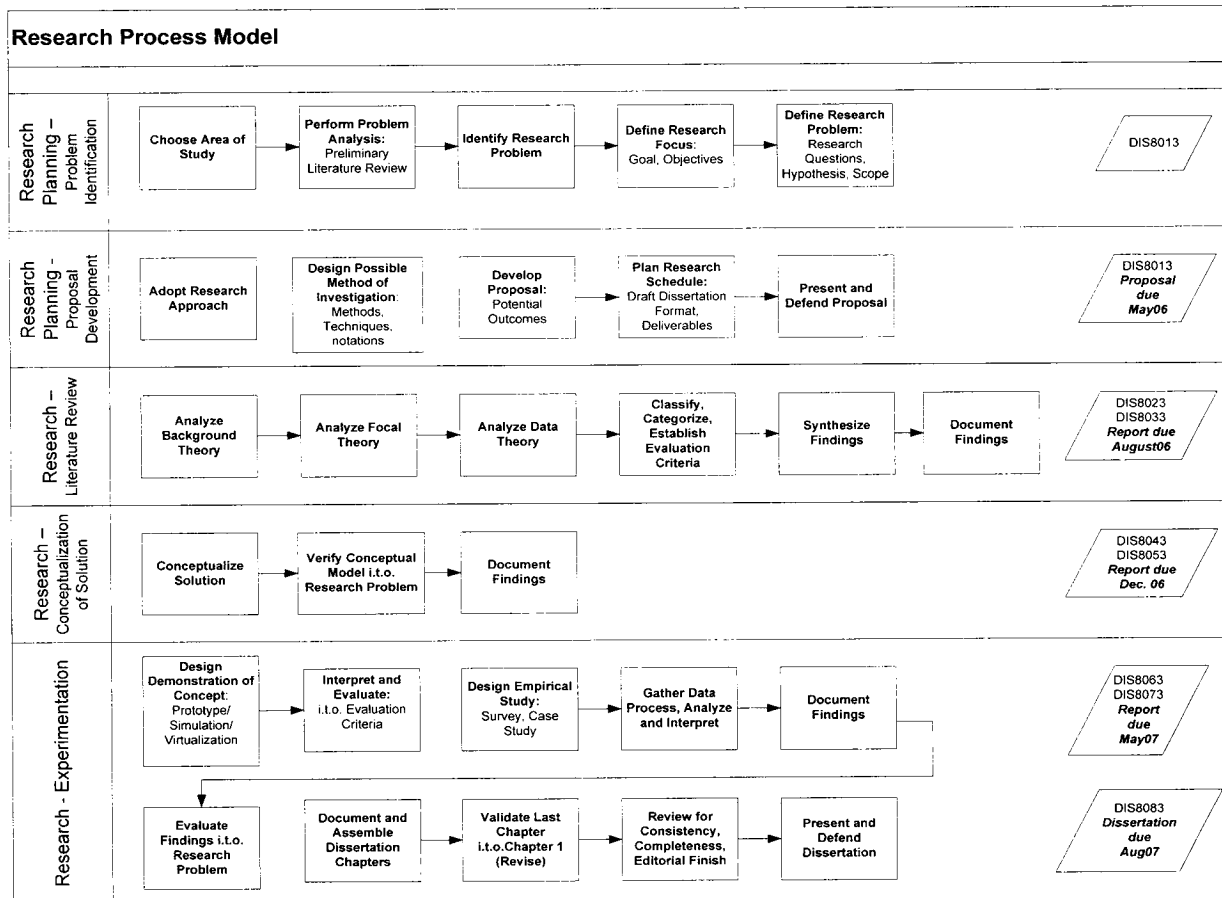
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Figure 1. Research Process Model for DMIT Research

credit hour dissertation course each semester, and may only register for the next dissertation "course" when all members of the dissertation committee support the status of the research project at the conclusion of each term. The processes in the research phases are typically carried out sequentially, with iteration and feedback loops resulting from insights gained during the research. The insights and the contributions made in each of the research phases are outlined below and summarized in Table 1.

3.1 Research Planning – Problem Identification
Here an analysis is performed of problems in the research domain. Problems are typically situated within the enterprises where students are employed, and a research project is frequently sponsored by an employer who has a vested interest in the solution. The student should display insight into the application domain and knowledge of the applicable theories when focusing on a particular topic, and the problems related to it.

3.2 Research Planning – Proposal Development.
The project starts by formulating a research proposal which outlines the problem to be investigated, the scope of the project, the research approach to be followed, the method of investigation and estimated project schedule. The proposal also includes a preliminary analysis of the literature dealing

with other approaches to the problem. It contains the following elements:

- A statement which outlines the area of the investigation and the context, including the related theories, called the background theory.

- The focus of the topic to be investigated, and the concepts and/or theory on which it is based, called the focal theory. Here the problems related to the topic are determined and some research questions identified. One or more hypotheses or propositions are stated which will guide the rest of the investigation. Some key literature references in both the background and focal theories must be provided in support of this section of the proposal.

- The research approach, research design and method of investigation to be followed, such as an empirical study using qualitative, quantitative, or mixed methods. The methods and techniques that will be adopted are refined after the literature review is complete.

- A proposed list of dissertation chapters that will document the outcome of the investigation.

- A proposed schedule against which the investigation will be conducted. The schedule is determined in collaboration with the dissertation supervisor and dissertation committee.

3.3. Research - Literature Review.

Here the analytical abilities of the student are applied to analyze and interpret the work of others regarding the research problem and question(s). The student synthesizes ideas, practices, and personal insight to form the basis for conceptualizing a solution to the research questions. Often there is a certain amount of iteration in refining research questions and the direction of the research as the researcher becomes increasingly more informed about the issues under study. This may lead to an update of the research design for the rest of the research project.

3.4 Research - Conceptualization of Solution.

During this phase the researcher formulates a theoretical conjecture representing a potential conceptual solution to the research question. The conceptualization may be a graphic model of an empirical generalization, a mathematical formula representing the conceptual solution, or a description of a grounded theory. A grounded theory is formulated using an inductive discovery approach that allows the researcher to develop a theoretical description of a topic, while at the same time "grounding" the description in empirical observations or evidence (de Villiers, 2005). The key variables and their relationships and dependencies on each other are determined and expressed in terms of a model.

3.5 Research – Experimentation.

In this phase the design of the rest of the research project is determined to enable the conceptual model to be demonstrated and the proposition(s) or hypothesis (es) validated. Research methods and techniques are discussed in Section 4. Typical methods to demonstrate concept include the following:

- Design and development of prototypes;
- Design and execution of simulations;
- Design and development of virtualization solutions;
- Gathering of data and development of case studies;
- Design of a survey, its execution, data analysis, statistical processing, and interpretation;
- Evaluation of findings in terms of criteria and forming conclusions;
- Validation of research outcomes in terms of research questions, hypothesis(es) or proposition(s);
- Final writing and production of the dissertation;
- Arrangements of submission for review and dissertation defense.

Throughout the research project, outcomes and deliverables are documented in the form of progress reports, draft chapters of the dissertation, and drafts of scholarly articles. The final deliverable is the dissertation, which is examined by the dissertation committee and is the basis for recommending a candidate for promotion to doctoral graduate status. There are three main milestones in the doctoral research project: the proposal defense; the dissertation defense; and the graduation ceremony. Students maintain close contact with their supervisors throughout the research project and have regularly scheduled meetings. The general approach to managing the dissertation project is determined by the supervisor. All scheduled dissertation meetings should have an agenda, and outcomes and decisions of all meetings are documented.

Contributions made during the doctoral research project fall in a number of categories and occur as the research processes unfold during the dissertation research phase of the DMIT curriculum. Table 1 summarizes the insights gained and a number of potential research contributions in terms of the research process model introduced in Figure 1.

4. APPLIED IT RESEARCH

The IT research domain may be viewed in terms of the elements in Figure 2 which depicts an IT system situated within a business or physical domain. An IT system is created by technical developers following accepted IT life cycle processes, adopting frameworks, reference models and methodologies, supported by the use of automated tools. The IT system consists of an IT architecture which supports of the business processes of the enterprise which are improved through the use of applications. The diagram also shows the users of an IT system as knowledge workers. Research on IT systems and processes draws on research methods used in several main disciplines, including systems theory, computer science, design science, engineering, cybernetics, and information systems.

4.1 Information Technology Management

IT Management within the context of the DMIT program is depicted in Figure 3 as an organizational function, performed by IT people, utilizing IT resources by means of IT processes in support of the business processes of a contemporary technology-enhanced enterprise.

In addition to the research methods used in researching IT systems, research on IT management is also informed by the behavioral sciences, including management, sociology, and psychology, in recognition of the people who participate in IT system development, deployment, use, and control. IT research differs significantly from Computer Science and Software Engineering in its focus on the behavior of people within the context of technology (Glass et al., 2004).

Many IT research projects today are performed using an empirical approach, based on the belief that practical application of a theory leading to evidence, rather than initial generation of theoretical ideas, represents innovation and the research contribution. IT professionals conducting IT research often function as "reflective practitioners," linking the interests of the professional and scholarly communities (Heiskanen and Newman, 1997; Moody, 2000). This is the dominant paradigm in management and IT research today (Remenyi et al, 1998), and is the approach followed in most DMIT research projects, where the nature of the research problem determines the choice of research methods.

4.2 Taxonomy of IS/IT Research Methodologies

The IT Research Methodology course introduces students to a number of broad categories of research methods, summarized in Table 2. Examples in each of these categories aid students to examine the nature of their own research problems and determine the applicability of the methods. Students are made aware of the fact that in applied IT research, where the innovative application of theory to practice is important, a strategy which adopts a combination of more than one research method in a research project is

Research Process	Insight	Contribution
Research Planning – Problem Identification	• Focus of research problem to be investigated	• Formulation of research problem • Research questions • Propositions • Hypotheses
Research Planning – Proposal Development	• Scope of investigation • Context and focus • Research approach • Method of investigation	Rationale (why?, what?, how? relevance of research)
Research – Literature Review	• Determination of the current state of theory and application	• Analysis of focal theory, application, and supporting technology
Research – Conceptualization of Solution	• Concept discovery • Theoretical conjecture (displaying creativity in solving the research problem) • Potential for empirical generalization	• Development of grounded theory • Empirical generalization • A conceptual model in terms of variables (research constructs) giving nature of their relationships • Alignment with research questions, propositions, hypotheses
Research – Experimentation	• Designing approach to be followed to demonstrate conceptual solution • Establish validation criteria • Answering research questions • Validating propositions, hypotheses	• Confirmation of theoretical conjecture

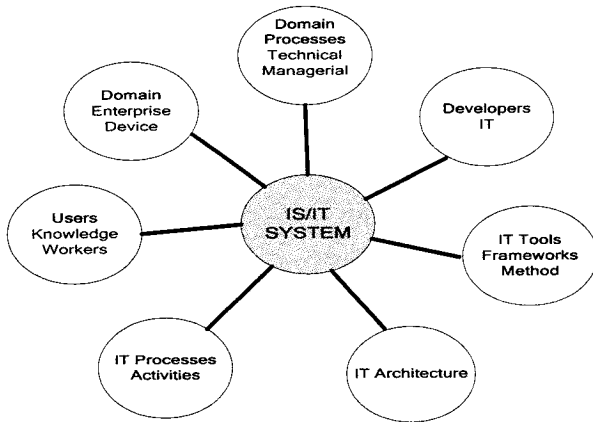**Table 1. Insights and Contributions in a Doctoral Research Project**
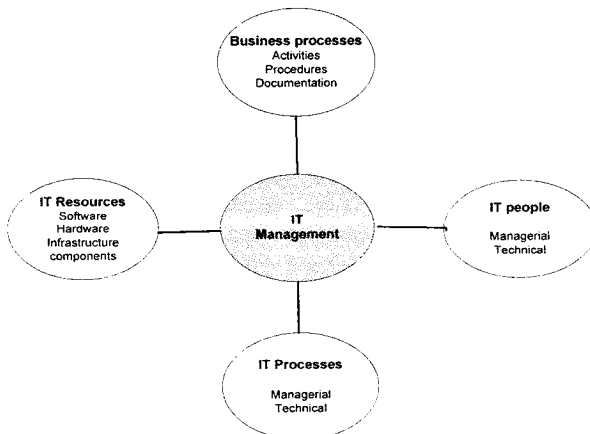

Figure 2. The Context of an IT System

Figure 3. Context of IT Management

sometimes necessary. This is referred to by some as mixed methods, pluralism or triangulation (Mingers, 2001; Remenyi et al., 1998; Cresswell, 2003; Kaplan et al., 2004). Students are mentored in methods to develop a conceptualization of an innovative solution to the problem under study, demonstrate concept, and validate a research hypothesis or proposition.

5. COURSE DESIGN AND PEDAGOGY

The IT Research Methodology course was designed within the context of the DMIT research process model, and is the last Research Methods Track course in the DMIT curriculum (see Appendix 3 for a representative curriculum schedule). The course prepares students to develop a research proposal for a given research problem, defend the proposed research and the hypothesis or proposition, conduct the research project according to a sound research design, validate the hypothesis, and answer to the stated research questions. This section describes the course design and pedagogical approach used.

5.1 Course Design
The goal and objectives of the IT Research Methodology course was designed to cultivate the necessary competencies to conduct doctoral dissertation research (see Table 3). The design endorses outcomes in the following categories consistent with the rationale of the DMIT program:

1. Theoretical outcomes - define the concepts, principles and methods in the field of applied IT research.
2. Informing of practice - knowledge and awareness of best practices in applied research methodology found in business and industry in the field of IT Management.
3. Informational outcomes – awareness of leading-edge trends and topics in IT research.

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Method	Nature	Applicability
Quantitative	Relies on the collection of quantitative data resulting from formal controlled experiments.	Appropriate to replicate or build upon existing quantitative research, or to test candidate independent and dependent variables identified from qualitative studies.
Qualitative	Relies on the collection of qualitative data from interviews, questionnaires, surveys, observations, and inference.	Appropriate to understand the behaviors of systems or people in specific social and cultural contexts, and to validate findings by interpretations of the data.
Case study	An empirical study which relies on observations made during or following a real-world project.	Appropriate to discover potential behaviors of systems or people, and to identify candidate independent and dependent variables.
Positivist	An empirical study which is based on observation and interventions using several methods.	Appropriate for research in IS/IT, business and management where phenomena, behaviors, processes and inanimate objects form part of the domain.
Non-Positivistic	Derives from phenomenology where human behaviors and organizations are studied and interpreted from individual perspectives.	Appropriate when the context within which research is performed has social or cultural significance for the research problem.
Mixed	Uses a pluralistic approach and relies on several methods, known as pluralism and triangulation.	Appropriate for situations where some phenomena are well understood, while others are less understood. Enables researcher to support/disagree or confirm/refute hypothesis or proposition

Table 2. Taxonomy of IS/IT Research Methodologies

4. Skill sets – competencies in initiating, planning and executing IT research projects.

In addition the following thematic areas of scholarship and practice are addressed:
1. Abstraction - understanding, analyzing and modeling of the problem space at various levels of abstraction. This involves complex learning with the ability to generate innovative application of theory corresponding to levels 4 and 5 of Bloom's learning taxonomy (Bloom, 1956).
2. Process - knowledge of best practices in planning and conducting the processes involved in applied IT research. The process model in Figure 1 is viewed as a guideline from which the students evolve their own conception of research, while providing a common language and process for collaboration between students and supervising faculty members.
3. Leadership – prioritizing and specifying a research agenda in terms of an IT strategy that aligns with enterprise business strategy.

5.2 Pedagogy
The course pedagogy is based on the objectives outlined in Table 3 to best address the syllabus topics (see Appendix 1), is informed by the overall design and delivery of other DMIT courses, and reflects the research interests of DMIT faculty members. The course is offered as a series of hybrid research seminars, where each seminar is led by a DMIT faculty member addressing a predetermined selection of syllabus topics. Each on-ground seminar includes one or more lectures, presentations, and discussions during which sharing of ideas are encouraged. The on-ground seminars are scheduled every two weeks during the semester, with the intervening time devoted to online sessions during which students participate in online collaboration and completion of the assignment given in the prior on-ground seminar (see Table 4). Seminar assignments are completed under the guidance of the respective faculty members (see Appendix 2 for examples). The course is supported by the Blackboard® Learning System, which enables faculty members and students to share articles, input, and feedback throughout the course.

Educational Goal
To expose students to a range of research methods, including methods of investigation in preparation for the dissertation research project.

Objectives
•   Assist students in identifying pertinent research topics that call for innovative solutions using IT systems.
•   Equip students with the ability to critique research ideas and designs.
•   Examine scientific methods of research as relevant to the application of IT theory to innovation in practice.
•   Enable students to formulate a research proposal which includes an appropriate research design for the topic under study.
•   Determine an appropriate method of investigation for the chosen research topic.
•   Select appropriate research validation methods.
•   Communicate the requirements and expectations of doctoral level inquiry.
•   Communicate practical issues of the research and dissertation process.
•   Equip students to document their research in a dissertation and research articles.

Table 3. Educational Goal and Objectives of Research Methodology Course

Seminar	On-ground	Online	Assignment Due	Credit
1	September 9	September 16	September 23	200
2	September 23	September 30	October 7	200
3	October 7	October 14	October 21	200
4	October 21	October 28	November 4	200
5	November 4	November 11	November 18	200
6	December 2	December 9	Portfolios – December 2	200

Table 4. Representative Seminar and Assignment Schedule

The course concludes with a final seminar attended by all students and participating faculty members. At this seminar, students present a portfolio of their work as well as a candidate research problem, hypothesis, and research design.

The pedagogical approach used in the Research Methods course provides students with the opportunity to produce authentic work which directly supports potential dissertation research topics. This is similar to the approach reported by Schaffer (2006). As students need to develop their own unique perspective on the research process, a range of research techniques and perspectives are provided to help students understand that there is no one "correct" approach to designing a research project. In preparing for the course, participating faculty members collaborate to determine the content of the individual seminars. Faculty members present the selection of syllabus topics from their individual perspectives, which allows students to evaluate and integrate these perspectives to obtain their own insight. This approach has resulted in a rich learning experience, where students and faculty alike are encouraged to reflect, compare, challenge, restate, summarize, integrate, and apply their ideas thereby enhancing their skills to define, design and conduct research projects.

The seminars are briefly reviewed below:

- Seminar 1 provides an overview of the approach to be followed and explains the relevance of the course for research in terms of the DMIT research process model Students are informed about the relationship of the syllabus and the processes in the research process model and encouraged to interpret it for their own prospective research projects (Steenkamp, 2005).

- Seminar 2 provides frameworks for developing and assessing research questions, for mapping the results of a preliminary literature review, and for iteratively improving research questions on the basis of the literature. A university research librarian reviews the available digital journals and databases accessible on and off campus. This provides further linkage to the DMIT research process model and insures that students use academic journal resources for their work in the course (McCord, 2005).

- Seminar 3 reviews the use of qualitative research techniques, focusing on case study methods. The design of the case study, approaches to data collection (such as interviews, surveys, and focus groups), and data analysis are covered. Action research methods are also discussed in Seminar 3.

- Seminar 4 focuses on various methods of investigation including problem analysis, theory development, and conceptual modeling. Techniques of analogy, decomposition and recombining, heuristic reasoning, and induction are addressed. The use of experimental, quasi-experimental, and non-experimental designs is also covered.

- Seminar 5 focuses on statistical methods that support various research designs, including approaches to research validation and concepts of validity and reliability.

- Seminar 6 provides an opportunity for students to demonstrate their own ideas about IT research to the teaching team by means of individual presentations and facilitated discussions. Students may present a research proposal being considered for possible dissertation research. Students provide an overview of the research topic and explain the rationale for the research approach that may be used to conduct the investigation. Students are encouraged to relate their presentation to the processes and frameworks introduced during each of the seminars. A facilitated discussion follows each presentation where students and faculty members pose follow-up questions and offer suggestions to improve the research proposal. This capstone seminar introduces students to the type of questioning and dialog that they will experience in working with their dissertation committees and during their proposal defenses.

5.3 Seminar Assignments and Assessment

Seminar assignments are designed by the teaching team to reinforce the topics addressed in the respective seminars, and are intended to inform students about a set of research processes, methods, and tools to conduct their own dissertation research project. Examples of individual seminar assignments by the authors are summarized in Appendix 2. Additional assignments are available on request.

The final assignment requires that each student prepare a portfolio containing all the course materials, research articles, and deliverables of the five seminars, as well as a copy of the student's Seminar 6 presentation. The portfolio serves as a personalized record of the Research Methods course, and students refer to this document as they prepare their dissertation proposal and conduct their research.

Faculty members assess the students' performance on individual assignments in their respective seminars, and provide written feedback to the students on their work. During Seminar 6 each faculty member provides a written critique of the students' presentations using a pre-designed template; students also comment on their peers' presentations, and these remarks are summarized and returned to the students along with comments from faculty members. Faculty members evaluate the student portfolios and submit all grades to the course coordinator, who is responsible for integrating the grades.

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The course is concluded with a debriefing session where students comment on their experiences in the course, and offer suggestions for improving individual seminars, the linkage between seminars, and the course as a whole. Students also complete a confidential course evaluation administered by the College of Management.

6. LESSONS LEARNED AND CONCLUSIONS

The IT Research Methodology course represents an innovative approach to teaching research methods to doctoral IT students. The course benefits from the active participation of supervising faculty members in leading individual seminars, and in providing their unique perspectives on the research process. Consistent with the university's model of "Theory and Practice," students benefit from applying the theories, processes, and frameworks, introduced in each of the seminars, to potential research questions relevant to their own research interests. Students also benefit from presenting a research proposal for a potential research project to the faculty team and their fellow students. This presentation helps students to focus on a specific topic, and provides an orientation for their future work with their dissertation committee and for their proposal defense.

The course prepares students for entering the research phase of their DMIT experience, and provides them with common processes and frameworks for considering research questions, conducting literature reviews, mapping concepts and the lineage of ideas, writing research questions, propositions and hypotheses, and considering appropriate research methods. Students and faculty members therefore share a "common research language" which promotes information exchange and dialog among students and faculty members.

Confidential student course evaluations for the first two offerings of the Research Methods course are summarized in Table 5. Students are asked to evaluate the instructors as well as the course content. Evaluation questions are coded numerically as "4" (Excellent), "3" (Very Good), "2"

(Satisfactory), "1" (Marginal), and "0" (Poor). Results are sorted from highest to lowest mean score in Table 5.

The overall course rating of 3.21 is slightly above "Very Good" on the rating scale. All questions scored above the "Satisfactory" level, with the highest scores reserved for the instructors, who students found to be very enthusiastic, knowledgeable about the subject matter, and able to impart knowledge. The lowest scores related to instructor organization, returning assignments promptly, providing prompt and constructive feedback, usefulness of the course materials, and usefulness of the Blackboard™ course management system. All of the low-scoring questions seem to relate to the challenges of coordinating the contributions of five instructors across six on-ground meetings and intervening online experiences.

Based on student feedback and faculty experience in offering the course in three semesters, several areas for improvement have been identified as discussed below.

6.1 Approach and pedagogy
Students have generally responded positively to the approach and course pedagogy, appreciating the wide exposure to the field of research methodology. It is inevitable that some duplication occurs in the seminars when covering topics such as proposal development, the research process and methods of investigation, but this is regarded as beneficial since more than one perspective is provided and students and faculty alike are encouraged to review their perspectives as the course unfolds.

6.2 Coordination and refreshing of assignments
Students commented on specific coordination gaps or conflicts between individual seminars, and these issues are being addressed in the current version of the course. Feedback from students indicates that the seminar assignments give them the opportunity to explore a variety of topics in the area of interest, and clarify their understanding of the research process. The coordination between assignments and the promptness of assignment grading should be improved.

Area of Focus	Measure	Mean Score
Instructors	Enthusiasm for the subject	4.00
Instructors	Classroom presence	3.89
Instructors	Instructor knowledge	3.52
Course Content	Overall pace of the course	3.50
Instructors	Ability to impart knowledge	3.48
Instructors	Encourage intellectual growth	3.14
Course Content	Course meets student expectations and supports student goals	3.10
Course Content	Effective and fair measures of performance	3.10
Course Content	Appropriateness and usefulness of homework assignments	3.00
Course Content	Appropriate use of course management system	2.94
Course Content	Usefulness of course materials	2.90
Instructors	Return assignments and exams within reasonable time period	2.88
Instructors	Organizational abilities	2.80
Instructors	Provide prompt and constructive feedback	2.70
	Overall Course Rating	3.21

Table 5. Summary of Student Evaluations for the IT Research Methodology Course

6.3 Integration of Course Management System

Another area for improvement is the extent to which the Blackboard™ course management system can be used to provide logical transitions between the individual seminars. To date, instructors have been responsible for developing and loading their own learning materials into the Blackboard™ environment. As expected, the depth and organization of content varies among the seminars. Attention is being given to developing a standard template for seminar content and organization.

6.4 Placement within curriculum

As mentioned earlier, the IT Research Methodology course is offered in the last term of DMIT coursework prior to beginning the dissertation phase. Based on student feedback, we are considering moving the IT Research Methodology course earlier in the DMIT curriculum. Students are surveyed regarding their areas of interest during the admission interview process. Faculty members are encouraged to discuss potential research interests with students from the start of their DMIT experience. Furthermore, the core courses address research-based issues and students would benefit from having exposure to research processes and methods earlier in their curriculum.

6.5 Choice of textbooks

Several textbooks have been used as prescribed reading, including a text on qualitative, quantitative, and mixed methods approaches to research design (Cresswell, 2003), a text on problem solving (Polya, 1957), a text on a systematic approach to writing a doctoral dissertation (Davis et al, 1997), and a text on case study research (Yin, 2003). In addition to other recommended references a text focusing on research in business and management (Remenyi et al, 1998) has been chosen for the current offering of the course. Students contribute to the list of research literature as they complete their seminar assignments.

6.6 Grading

Each seminar is graded by the responsible faculty member. The final seminar takes the form of student presentations, with student portfolios due at the same time. The presentations and portfolios are assessed jointly by the teaching team. The course grade is the summation of the student's performance in all seminars and is compiled by the course coordinator. This assessment approach appears to be effective and is being continued.

As the course matures and faculty become more attuned to the issues of research methodology that DMIT candidates experience during their dissertation research, faculty members will continue to improve the course pedagogy, seminar content, and assignments in response to student learning outcomes and suggestions from both students and faculty members. With the potential improvements identified above this course can be an even more beneficial for students in the DMIT program, and can serve as a model for similar courses in other IT doctoral programs.

7. ACKNOWLEDGEMENTS

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APPENDIX 1. OVERVIEW OF RESEARCH METHODS COURSE SYLLABUS

Course Topics	

Dissertation Research Prospectus
   Research approach
   Methods of investigation
   Research process models
   Research planning
   Research design , experimental, quasi-experimental and
   non-experimental designs
   Research deliverables
Proposal Development
   Problem statement
   Scope determination
   Hypotheses and axioms
   Methods of investigation
   Validation of hypotheses
   Format of research proposal
Research Methods
   Scientific Methods of Research, theoretical and
   empirical approaches
   Positivist approach, Empirical approaches
   Non-Positivist approach, Phenomenology
   Qualitative versus Quantitative Paradigms
   Modeling approaches and taxonomies
Research Techniques
   Problem analysis and definition
	Review, analysis, evaluation, interpretation, synthesis
	Theory development and conceptual modeling
	Analogy
	Decomposing and recombining Heuristic reasoning
	Induction
	Testing by dimension
	Identifying a variation of the problem
	Qualitative Techniques
	   Collect, organize and analyze qualitative data
	   Interviewing
	   Focus groups
	   Action research
	   Content analysis
	   Secondary data
	   Experimental research
	   Survey research
	   Design, sampling
	   Field research
	Demonstration of concept
	   Prototyping, simulation, virtualization
	Approaches to research validation
	   Concepts of validity and reliability
	Critiquing of research articles
	Format of dissertation

APPENDIX 2. REPRESENTATIVE SEMINAR ASSIGNMENTS

Assignment 1
Students are asked to identify a research question in a journal article and to determine and explain what approach would be best to study the question. Students locate a journal article which represents quantitative, qualitative or mixed methods research, and identify the "markings" that indicate its method. Next, students are asked to select a topic they would like to study and, using the combinations of knowledge claims, strategies of inquiry, and methods described in the Cresswell (2003), discuss how the topic might be studied using each of the combinations. As a follow-up students prepare an outline proposal of a research project related to their topic. Lastly students critique an assigned article using evaluation criteria including: relevance to IT research, clarity of objectives, quality of planned methodology, quality of evidence, logical development and flow of arguments, appropriateness of citations, and editorial consistency and finish.

Assignment 2
Students are provided with a model framework for identifying, assessing, and improving research questions, and for reviewing academic literature sources in the realm of focal theory. Students are asked to propose multiple research questions using the model framework to identify the most promising of these questions. Students then identify several academic journal articles in the related focal area, review those articles, and use concept mapping software to map the relationships between the concepts and citations found in the articles. While FreeMind, an open source concept mapping tool, has been recommended (see http://freemind.sourceforge.net), any concept mapping software may be used. Following the review of focal theory literature, students are asked to propose improvements to their most promising research question.

APPENDIX 2. REPRESENTATIVE DMIT CURRICULUM SCHEDULE

Term	Major Track	Total Credits	Minor Track	Total Credits	Research Methods	Total Credit	Running Total
Fall 2006	MIS8013 IT Life Cycle Processes	3			MIS7823 Quantitative Methods I	3	6
Spring 2007	MIS8023 Advanced Data Management	6	Minor 1	3			12
Summer 2007			Minor 2	6			15
Fall 2007	MIS8033 IT Leadership & Management	9			MIS7833 Quantitative Methods II	6	21
Spring 2008	MIS8043 IT Systems Architecture	12	Minor 3	9			27
Summer 2008					MIS7843 Modeling and Simulation	9	30
Fall 2008	MIS8053 Advanced Topics in IS	15			MIS7813 IT Research Methodology	12	36
COMPREHENSIVE EXAMINATION							
Spring 2009	Dissertation Proposal DIS8013	3					39
Summer 2009	DIS8023 & DIS8033	9					45
Fall 2009	DIS8043 & DIS8053	15					51
Spring 2010	DIS8063 & DIS8073	21					57
Summer 2010	DIS8083	24					60
DISSERTATION DEFENSE							
EARLIEST GRADUATION - FALL 2010							

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