

**EPISTEMOLOGICAL BELIEFS AND THEIR EFFECTS
ON READING STRATEGIES, METACOGNITIVE
STRATEGIES AND PERFORMANCE
IN AN E-LEARNING ENVIRONMENT
AT SULTAN QABOOS UNIVERSITY**

by

Salim Rashid Sulaiyam Al Sakiti

Thesis submitted in fulfillment of the requirements

For the degree of:

Doctor of Philosophy

UNIVERSITI SAINS MALAYSIA

2007

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ABSTRACT

Studies have shown that lecturers contribute significantly to the choice and use of reading and meta-cognition strategies to affect student performance and achievement. The use of online e-learning removes the lecturers from the learning environment and puts the students in a situation where they have to generate or choose sets of reading and meta-cognition strategies on their own. It is hypothesized in literature that the generation or choices of these strategies are governed by the epistemological beliefs held by the students. Thus, this study investigates the types of epistemological beliefs held by students and their effects on reading strategies, meta-cognition strategies, and performance in an e-learning environment.

The sample consisted of 163 undergraduate students who were enrolled in a second-year online course at the College of Education at Sultan Qaboos University (SQU), Oman. The course was conducted with rich online references and materials through the learner-led e-learning format but with minimal online participation by the course lecturer. The study utilized three questionnaires for collecting data, namely, the Schommer's (1998) Epistemological Beliefs Questionnaire, the Reading Strategies Questionnaire, and the Meta-cognition Strategies Questionnaire. These questionnaires were administered at various stages throughout the semester and the students'

course grades were obtained at the end of the semester. Data was later analysed by gender and major using MANOVA.

Principal findings revealed that 73%, or three-quarter of the sample, held naïve epistemological beliefs and only 27% held sophisticated epistemological beliefs. Furthermore, there were significant differences between male and female students by total score whereas; there were no significant differences between male and female students by the score of each dimension. Significant differences in epistemological beliefs by major were observed. Students majoring in science almost always held sophisticated beliefs compared to students majoring in the humanities. The study also found that there were significant differences in the use of reading strategies and meta-cognition strategies between students who held sophisticated beliefs and those who held naïve beliefs and that these differences later produced significant differences in performance in the online e-learning course.

These findings showed that the epistemological beliefs held by the students affected their reading strategies, meta-cognition strategies, and performance, and that students with sophisticated epistemological beliefs benefited more from the online e-learning experience because they were able to generate and use more productive strategies than students with naïve epistemological beliefs. These findings suggest that the learner-led e-learning programmes for beginners must be implemented with strong and pro-active online and off-line involvement and scaffolding by the lecturers or instructors.

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**KEPERCAYAAN EPISTEMOLOGI DAN KESANNYA TERHADAP
STRATEGI BACAAN, STRATEGI METAKOGNISI, DAN PRESTASI
DI DALAM PERSEKITARAN E-PEMBELAJARAN
DI UNIVERSITI SULTAN QABOOS, OMAN**

ABSTRAK

Kajian menunjukkan bahawa para pengajar menyumbang secara signifikan pada pemilihan dan penggunaan strategi bacaan dan strategi metakognisi untuk mempengaruhi prestasi pelajar semasa belajar. Penggunaan kaedah e-pembelajaran secara dalam talian menghilangkan para pengajar dari persekitaran pembelajaran dan memaksa pelajar menjana atau memilih secara sendiri set-set strategi bacaan dan strategi metakognisi yang diperlukan. Tinjauan bacaan menyatakan bahawa penjanaan atau pemilihan strategi-strategi ini dikawal oleh kepercayaan epistemologi pelajar. Maka kajian ini meninjau jenis kepercayaan epistemologi yang dipegang oleh pelajar dan kesannya terhadap strategi bacaan, strategi metakognisi, dan prestasi kursus di dalam satu persekitaran e-pembelajaran

Sampel kajian terdiri dari 163 pelajar pra-siswazah yang mengikuti satu kursus tahun dua yang ditawarkan secara *learner-led e-learning* di Pusat Pengajian Ilmu Pendidikan, Universiti Sultan Qaboos (SQU), Oman. Kursus ini mengandungi bahan-bahan serta rujukan yang banyak di dalam talian tetapi tidak banyak melibatkan kegiatan atau sumbangan secara dalam talian oleh penyelarasnya. Kajian ini menggunakan tiga soalselidik iaitu Soalselidik Kepercayaan Epistemologi Schommer (1998), Soalselidik Strategi Bacaan, dan Soalselidik Strategi Metakognisi. Soalselidik-soalselidik ini ditadbirkan secara berperingkat sepanjang satu semester dan gred akhir pelajar

diperolehi pada akhir semester berkenaan. Data kajian telah dianalisis menggunakan MANOVA berasaskan jantina dan pengkhususan pelajar.

Dapatan utama menunjukkan bahawa 73%, atau hampir tiga suku dari sampel kajian melaporkan memegang kepercayaan epistemologi naif (*naïve*) dan hanya 27% memegang kepercayaan canggih (*sophisticated*). Juga diperolehi ialah perbezaan yang signifikan di antara jantina mengikut skor keseluruhan kepercayaan epistemologi, tetapi tidak terdapat perbezaan yang signifikan di antara jantina mengikut dimensi-dimensinya. Kajian ini juga mendapati bahawa terdapat perbezaan yang signifikan di dalam kepercayaan epistemologi mengikut pengkhususan di mana pelajar-pelajar sains hampir seluruhnya berkepercayaan canggih berbanding pelajar kemanusiaan yang rata-rata berkepercayaan naif. Kajian ini juga mendapati bahawa terdapat perbezaan yang signifikan di dalam penggunaan strategi bacaan dan strategi metakognisi di antara pelajar yang berkepercayaan canggih dan yang berkepercayaan naif, dan perbezaan ini kemudiannya menyebabkan perbezaan yang signifikan pada prestasi kursus.

Dapatan-dapatan ini menunjukkan bahawa kepercayaan epistemologi pelajar mempengaruhi strategi-strategi bacaan, strategi-strategi metakognisi, serta prestasi pelajar, di mana pelajar yang berkepercayaan canggih menerima lebih banyak manfaat daripada persekitaran e-pembelajaran kerana mereka lebih berupaya untuk menjana atau memilih strategi-strategi yang lebih produktif berbanding pelajar yang berkepercayaan naif. Dapatan ini mencadangkan bahawa untuk kursus-kursus *learner-led e-learning* di dalam persekitaran e-pembelajaran para pengajar atau penyelaras perlulah

terlibat dengan lebih giat dan pro-aktif di dalam menyediakan perancangan kepada pelajar-pelajar mereka.

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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LIST OF PUBLICATIONS & SEMINARS

		Date
1	Using E-learning at Omani Basic Education Learning Resource Centers to enhance the Curricula. Paper presented at the Ministry of Education, Oman.	August 2005
2	Reading Strategies and their Effects on Academic Performance Among students of different majors and genders in an E-Learning Environment at Sultan Qaboos University. Paper presented at the International Conference for Online Learning, University of Science of Malaysia, Penang.	June 2007

ABSTRAK

Kepercayaan epistemologi dan kesannya terhadap strategi bacaan, strategi metakognisi, dan prestasi di dalam persekitaran e-pembelajaran di Universiti Sultan Qaboos

Kajian menunjukkan bahawa para pengajar menyumbang secara signifikan pada pemilihan dan penggunaan strategi bacaan dan strategi metakognisi untuk mempengaruhi prestasi pelajar semasa belajar. Penggunaan kaedah e-pembelajaran secara dalam talian menghilangkan para pengajar dari persekitaran pembelajaran dan memaksa pelajar menjana atau memilih secara sendiri set-set strategi bacaan dan strategi metakognisi yang diperlukan. Tinjauan bacaan menyatakan bahawa penjana atau pemilihan strategi-strategi ini dikawal oleh kepercayaan epistemologi pelajar. Maka kajian ini meninjau jenis kepercayaan epistemologi yang dipegang oleh pelajar dan kesannya terhadap strategi bacaan, strategi metakognisi, dan prestasi kursus di dalam satu persekitaran e-pembelajaran

Sampel kajian terdiri dari 163 pelajar pra-siswazah yang mengikuti satu kursus tahun dua yang ditawarkan secara *learner-led e-learning* di Pusat Pengajian Ilmu Pendidikan, Universiti Sultan Qaboos (SQU), Oman. Kursus ini mengandungi bahan-bahan serta rujukan yang banyak di dalam talian tetapi tidak banyak melibatkan kegiatan atau sumbangan secara dalam talian oleh penyelarasnya. Kajian ini menggunakan tiga soalselidik iaitu Soalselidik Kepercayaan Epistemologi Schommer (1998), Soalselidik Strategi Bacaan, dan Soalselidik Strategi Metakognisi. Soalselidik-soalselidik ini ditadbirkan secara berperingkat sepanjang satu semester dan gred akhir pelajar diperolehi pada akhir semester berkenaan. Data kajian telah dianalisis menggunakan MANOVA berasaskan jantina dan pengkhususan pelajar.

Dapatan utama menunjukkan bahawa 73%, atau hampir tiga suku dari sampel kajian melaporkan memegang kepercayaan epistemologi naif (*naïve*) dan hanya 27% memegang kepercayaan canggih (*sophisticated*). Juga diperolehi ialah perbezaan yang signifikan di antara jantina mengikut skor keseluruhan kepercayaan epistemologi, tetapi tidak terdapat perbezaan yang signifikan di antara jantina mengikut dimensi-dimensinya. Kajian ini juga mendapati bahawa terdapat perbezaan yang signifikan di dalam kepercayaan epistemologi mengikut pengkhususan di mana pelajar-pelajar sains hampir seluruhnya berkepercayaan canggih berbanding pelajar kemanusiaan yang rata-rata berkepercayaan naif. Kajian ini juga mendapati bahawa terdapat perbezaan yang signifikan di dalam penggunaan strategi bacaan dan strategi metakognisi di antara pelajar yang berkepercayaan canggih dan yang berkepercayaan naif, dan perbezaan ini kemudiannya menyebabkan perbezaan yang signifikan pada prestasi kursus.

Dapatan-dapatan ini menunjukkan bahawa kepercayaan epistemologi pelajar mempengaruhi strategi-strategi bacaan, strategi-strategi metakognisi, serta prestasi pelajar, di mana pelajar yang berkepercayaan canggih menerima lebih banyak manfaat daripada persekitaran e-pembelajaran kerana mereka lebih berupaya untuk menjana atau memilih strategi-strategi yang lebih produktif berbanding pelajar yang berkepercayaan naif. Dapatan ini mencadangkan bahawa untuk kursus-kursus *learner-led e-learning* di dalam persekitaran e-pembelajaran para pengajar atau penyelaras perlulah terlibat dengan lebih giat dan pro-aktif di dalam menyediakan perancangan kepada pelajar-pelajar mereka.

ABSTRACT

Studies have shown that lecturers contribute significantly to the choice and use of reading and meta-cognition strategies to affect student performance and achievement. The use of online e-learning removes the lecturers from the learning environment and puts the students in a situation where they have to generate or choose sets of reading and meta-cognition strategies on their own. It is hypothesized in literature that the generation or choices of these strategies are governed by the epistemological beliefs held by the students. Thus, this study investigates the types of epistemological beliefs held by students and their effects on reading strategies, meta-cognition strategies, and performance in an e-learning environment.

The sample consisted of 163 undergraduate students who were enrolled in a second-year online course at the College of Education at Sultan Qaboos University (SQU), Oman. The course was conducted with rich online references and materials through the learner-led e-learning format but with minimal online participation by the course lecturer. The study utilized three questionnaires for collecting data, namely, the Schommer's (1998) Epistemological Beliefs Questionnaire, the Reading Strategies Questionnaire, and the Meta-cognition Strategies Questionnaire. These questionnaires were administered at various stages throughout the semester and the students' course grades were obtained at the end of the semester. Data was later analysed by gender and major using MANOVA.

Principal findings revealed that 73%, or three-quarter of the sample, held naïve epistemological beliefs and only 27% held sophisticated epistemological beliefs. Furthermore, there were significant differences between male and female students by total score whereas; there were no significant differences between male and female students by the score of each dimension. Significant differences in epistemological beliefs by major were observed. Students majoring in science almost always held sophisticated beliefs compared to students majoring in the humanities. The study also found that there were significant differences in the use of reading strategies and meta-cognition strategies between students who held sophisticated beliefs and those who held naïve beliefs and that these differences later produced significant differences in performance in the online e-learning course.

These findings showed that the epistemological beliefs held by the students affected their reading strategies, meta-cognition strategies, and performance, and that students with sophisticated epistemological beliefs benefited more from the online e-learning experience because they were able to generate and use more productive strategies than students with naïve epistemological beliefs. These findings suggest that the learner-led e-learning programmes for beginners must be implemented with strong and pro-active online and off-line involvement and scaffolding by the lecturers or instructors.

CHAPTER ONE

1.0 Introduction

Throughout the world, using technology in educational institutions has become a global phenomenon. Today, educators look to the use of technology such as e-learning as a necessary part of the enhancement of education because it plays many roles in the learning process in general and reading and metacognitive strategies in particular. These technologies can stimulate the development of reasoning and problem-solving skills as well as learning how to learn reading skills and creativity. This means that different pedagogical use of the technology has shown differences in student performance on strategic skills.

An e-learning strategy encompasses a wide variety of activities and resources. It does not replace the traditional class but enhances it and makes learning exciting, flexible, interactive and successful. Oliver and Herrington (2001) have described a range of strategies that have been used to develop and support online learning. These range from simply “putting lecture notes on the Web” to a fully integrated Virtual Learning Environment to complement (but not necessarily replace) the more traditional methods of face-to-face teaching on-campus. These make the, often blurred, distinction between e-learning that supports on-campus students, and distance learning for remote students.

As technology has developed very fast, there are now many types of e-learning which are used by students. The common classifications as Horton

(2000) presented are learner-led e-learning, facilitated e-learning, instructor-led e-learning, embedded e-learning and telementoring and e-coaching.

Learner-led e-learning aims to deliver highly effective learning experiences to independent learners. It is sometimes called standalone or self-directed e-learning. The content may consist of Web pages, multimedia presentations, and other interactive learning experiences housed and maintained on a Web server. The content is accessed through a Web browser.

The experience of taking learner-led e-learning is not unlike that of taking a computer based training (CBT) course from CD-ROM. In learner-led e-learning, all learners are provided with the instruction through the course materials. In this category of e-learning there is no instructor or facilitator to help learners over the rough spots. The learner is truly independent (Horton, 2000).

Facilitated e-learning makes use of the capabilities of learner-led e-learning and add the benefit of having an instructor guiding the learner. This required the use of e-mail, discussion forums, and chat capabilities depending on whether communication will be synchronous or entirely asynchronous. Assignments are typically made by posting them to a class discussion forum, where learners can also “hand in” their completed homework. The facilitator’s role in this case is to answer questions from learners and help them to solve their learning problems. The facilitator also assesses their learning and evaluates assignments (Al Musawi, El-Tahir, & Abdul Rahim, 2000).

Instructor-led e-learning commonly uses Web technology to conduct conventional classes with distant learners. These classes consist of video and

audio conferencing, chat, screen-sharing, polling, whiteboards, and the plain old telephone. The instructor transfers presentations through the web by a streaming media server along with the instructor's voice and possibly a video image of the instructor. Learners can use a media player for the presentation and they can ask questions by typing their questions into a chat window or sending them by e-mail. Instructor-led e-learning will seem familiar to learners. It has the same structure and expectations as the type of training they have experienced most of their lives. It requires the least effort to convert materials. Just hold them up in front of the video camera or scan them in. Unfortunately these similarities are deceptively seductive. Much material does not work when filtered through the medium of Internet video, and few instructors yet know how to teach remotely (Horton, 2000).

Embedded e-learning provides users task guidance and support when they need it (just-in-time). It is also called the Electronic Performance Support Systems (EPSS). This is done via the use help, reference information, guided instruction, and searchable banks of subject matter expert advice on how to perform a task more effectively. For example, a number of technologies can be used for these purposes but web technology is often a good match for EPSS as it can deliver text, graphics, sound and video. This kind of capability is also known as "embedded e-learning" when there is no comprehensive EPSS system but some of the above features are offered (Jolliffe, Ritter, & Stevens, 2001).

Telementoring and e-coaching use the latest technologies for one of the oldest forms of learning. For example, it uses video conferencing, instant

messaging, Internet telephones, and other collaboration tools to help mentors guide the development of protégés. Mentors offer learners a more knowledgeable and perhaps more mature partner from whom they can learn things not written in books or taught in classes. Online coaching has a more short-term, project-specific goal. In online coaching, the contact between adviser and learner is more precisely defined. It is usually limited to a specific subject, such as the solution of a particular problem or completion of a specific project. Many large and medium-sized companies recognize the value of telementoring in capturing and communicating higher-level knowledge and wisdom. It plays a big part in knowledge management initiatives. From the technology viewpoint, telementoring may require just a telephone and e-mail (Rosenberg, 2001).

On the other hand, blended learning is used to describe a solution that combines several different delivery methods, such as collaboration software, Web-based courses, and knowledge management practices. Blended learning is also used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning. Unfortunately, there is no single formula that guarantees learning, but Thorne (2003) presents some guidelines to order students' learning activities as follows:

- skill-driven learning, which combines self-paced learning with instructor or facilitator support to develop specific knowledge and skills
- attitude-driven learning, which mixes various events and delivery media to develop specific behaviors

- Competency-driven learning, which blends performance support tools with knowledge management resources and mentoring to develop workplace competencies.

Most courses at the Sultan Qaboos University (SQU) use e-learning for delivery. An instructor provides a syllabus and establishes a preliminary schedule for completing the course content. The students work individually or in groups to complete the course content. Students may communicate with the instructor in the same course or other courses by using e-mail, bulletin/discussion boards, chat rooms, and instant messaging.

The academic program at SQU generally implements the blended learning approach, but one optional course is offered in the learner-led mode. Students learn in different ways. Instead of relying on face to face, the Academic program mixes e-learning tools depending on specific studying goals in a blended approach. This includes a combination of instructor-led and Web-based learning. Blended learning utilizes all of the optimum qualities from each type of learning (Al Musawi, El-Tahir, & Abdul Rahim, 2000).

All students at SQU are provided with an ID and password for their course. This allows them to access the course through WebCT an online learning content management system. WebCT is used at SQU as it is a flexible, integrated environment where students can integrate course experiences with the real world communities for work and play.

Overall, WebCT is one of the main components of the e-learning environment. Instructors can distribute their courses and deliver their educational materials to their students via WebCT.

1.1 Background of the Study

The concept of task complexity was born from the need to establish criteria for sequencing syllabus tasks as easy/simple to difficult/complex in a reasoned way that would foster learning development. Syllabi that have categorized tasks as units have focused on task design in order to find out how tasks impose cognitive demands on students. One of the first attempts at sequencing tasks from simple to complex was advanced by Brown et al. (1984). They distinguished among three different types of tasks which they presented as ranging from easy to difficult. They are static tasks, dynamic tasks, and abstract tasks. On the other hand, Robinson's (2001) Cognition Hypothesis provides a rationale for designing tasks and organizing them into a coherent program that will lead to better performance and development. For Robinson (2003) task complexity "refers to the intrinsic cognitive demands of the task", and it can be manipulated during task design along resource-directing and resource-dispersing dimensions. Task complexity is an external factor introduced into the learning environment to trigger higher mental processes among the learners.

Task complexity accounts for within learners' variation. By managing task complexity or difficulty, educators understand what learners bring to the task, and see that differentials in ability variables (e.g. working memory capacity) affect students' perceptions of the task with consequences for performance and learning (e.g. a student with low proficiency may find a task

so hard that he or she cannot produce or learn anything from it). Finally, task conditions have to do with how information is distributed and flows among the learners (e.g. a one-way task in which information is held by only one of the learners in a pair who communicates it to the other participant or a two-way one in which information is equally shared by both learners who must interact in order to accomplish the task objectives) (Gill & Hick, 2006).

Darisipudi (2006) mentioned that task complexity should be the sole basis for making prospective sequencing decisions, since task condition (participation and learner variable) and task difficulty (affective and ability variable) cannot be predicated before a course starts. Also, task performance conditions are determined by a needs analysis. Information about the effects of task complexity on production should help.

In general, task complexity effects students' learning and previous studies indicated that instructors try to control it and reduce its effects by facilitating the teaching and learning inside the classroom. On the other hand, the role of the instructor to control the effects of task complexity in the e-learning environment is missing.

The instructor plays critical and multiple roles in the classroom to overcome task complexity in the learning-teaching situation and guides students to acquire the best quality of learning. These roles are enhancing the quality of learning through suitable tools or methods and then providing mechanisms that allow and guide them to interact with each other, helping both parties to better understand how different learning issues affect others, and clarifying any areas of misunderstanding. The instructor can use case studies and localized examples to make the event more relevant and

interesting. The instructor also partly helps overcome the problem of isolation, which student may feel as a result of studying alone such as in an e-learning environment.

The efforts of the instructor to facilitate learning help reduce the task complexity that students encounter when studying. Learning with direct instructor support and input is more effective and efficient and can be successful despite individual differences and poor preparedness by students. So, task complexity does not represent a major factor in learning when there is full and immediate instructional support by the instructor

On the other hand, in an e-learning environment the role of the instructor is reduced to a minimum. After delivering the notes and instructional materials to the students via WebCT, for example, the instructor then sends all the assignments to the students' email and sometimes contributes ideas and participates at the chat room discussion. Students receive all the feedback from the instructor also by email. In this situation the students do not meet their instructor face to face (e.g. learner-led e-learning) and they do not have direct external support to monitor and facilitate their learning, so they have to monitor their learning by themselves and have to generate and use many learning strategies on their own to overcome the Task Complexity. Thus, to be successful in the e-learning situation, students must generate and use appropriate and efficient strategies to manage their learning in the complex learning environment.

1.2 Problem Statement.

Students at different levels of learning have encountered many challenges in their learning through the e-learning environment. Despite the best of efforts and technology, problems such as misconceptions, misinformation, and misinterpretation of the content, and poor performance continue to arise. These problems may be attributed to poor design of the e-learning environment or more importantly to individual differences that trigger the sets of strategies used by the students when they come into contact with the learning materials.

This condition attracts researchers to investigate factors which influence learning in the e-learning environment. Major factors identified are the lack of adequate and productive learning strategies which should be employed by students and used effectively at the appropriate occasions. Learning in an e-learning environment requires a different set of learning skills and strategies and students do not easily transfer successful classroom learning and reading strategies to the e-learning environment (Anderson, 2003).

Studies have found that students' choice of reading and metacognitive strategies are strongly influenced by internal factors such as their beliefs about knowledge (Schommer, 1994). These beliefs are called epistemological beliefs. Theories of epistemological beliefs focus on individuals' perceptions about the nature of knowledge and knowing, including definitions of knowledge, how knowledge is constructed, and how knowledge is evaluated. Schommer (1994) defines the dimensions of epistemological beliefs as certainty of knowledge, structure of knowledge, source of knowledge, control

of knowledge, and speed of knowledge. The levels of beliefs held range from naïve, where the thinking is black and white to sophisticated, where the thinking is relativistic. These beliefs are linked to cognitive processes such as reading comprehension, and learning in complex, and ill-structured domains. In other words, epistemological beliefs are about how individuals come to know and construct knowledge (Schommer, 1994). Because the instructor's direct instructional role in an e-learning environment is very minimal, students must compensate by reflecting, identifying, generating, and using efficient learning strategies to meet the perceived requirements of the given tasks and manage their own learning. And according to Schommer (1994), their choices of strategies are determined by their epistemological beliefs. Thus, the students' choices of the learning strategies are guided by their interpretations of the learning tasks and task complexity according to their epistemological beliefs.

Also, Kardash and Scholes (1996) reported that students' epistemological beliefs play a critical role in determining learning strategies in general and higher-order thinking and problem solving in particular. More specifically, sophisticated epistemological beliefs have been associated with more sophisticated thinking, problem-solving skills, higher motivation, and persistence (Schommer, 1994). On the other hand, students with simple (naïve) epistemological beliefs have difficulty with their learning. Thus, it appears that students' epistemological beliefs will affect the way they engage in reading and utilize learning resources that in turn will influence their epistemological development (Hofer, 2001).

Researchers have investigated the influence of epistemological beliefs in learning strategies in normal classroom situations. The results indicate that students with naïve epistemological beliefs tend to employ surface-level strategies such as collecting isolated facts and rehearsing and memorizing concepts and key terms to prepare for an exam while students with sophisticated epistemological beliefs tend to employ deep-level strategies such as elaboration and organization of knowledge (Hofer, 1994; Schommer, 1994). Epistemological beliefs have also been found to influence students' learning in general and students' reading and metacognitive strategies in particular. Thus, differences or changes in students' views of the nature of knowledge will lead to observable changes in the manner of reading and the use of metacognitive strategies.

There are many current efforts to study the influence of epistemological beliefs on various strategies. Educators concentrate on the types of reading and metacognitive strategies to solve the problems that encounter students' reading and metacognitive strategies such as, using problem solving strategies, rehearsal strategies, and organization strategies (Miller & Pilcher, 2002). These studies investigated the use of strategies for specific tasks and in the contexts of traditional classroom learning. However, little work has been done to evaluate the epistemological beliefs of students in general and evaluate the effects of the epistemological beliefs on reading and metacognitive strategies in the context of e-learning. Moreover, given an integral part of e-learning in higher education, the question arises of what role epistemological beliefs play and can play in students' reading and metacognitive strategies within these contexts. Thus, this research

investigated whether epistemological beliefs influenced students' reading and metacognitive strategies and performance in an e-learning environment.

1.3 Research Questions

In the context of this objective, this study addressed the following questions:

- 1- What types of epistemological beliefs are held by the students?
- 2- Do the epistemological beliefs differ according to gender and major?
- 3- Do students' epistemological beliefs affect their reading strategies?
- 4- Do students' epistemological beliefs affect their metacognitive strategies?
- 5- Is student performance affected by the dimensions of epistemological beliefs, reading strategies and metacognitive strategies?

1.4 Purpose of the Study

The purpose of this study was to investigate the types of epistemological beliefs that are held by students at SQU. Also the purpose of this study was to investigate if the students' epistemological beliefs differ according to their gender and major. This study was developed to investigate the effects of students' epistemological beliefs on their choice of reading and metacognitive strategies, and their performance through WebCT environment. This study attempted to identify students' performance according to their reading strategies, metacognitive strategies and the dimensions of students' epistemological beliefs that are used by the students at SQU.

1.5 Rationale of the Study

Recently students' epistemological beliefs have received more attention from educators. Based on the data from classroom learning, there is growing evidence that epistemological beliefs play a critical role in students' learning in general. Epistemological beliefs also influence many aspects of metacognitive strategies and reading strategies environment such as comprehension, higher order thinking and problem solving. Epistemological beliefs are related to a wide variety of complex cognitive outcomes. As epistemological beliefs change and become sophisticated, thinking problem solving skills and strategies of reading and metacognitive have changed, as well (Pan, 2000).

On the other hand, Sultan Qaboos University recognizes the technical and educational value of e-learning. It has established the Center for Educational Technology to provide the necessary support to its faculties and students. It also established many academic departments in different colleges with different specializations and programs in related fields of technology. All students at SQU have access to study by e-learning mode either with WebCT or Moodle. However, many instructors in higher education institutions are merely transferring their course syllabi, lecture notes, and tests to the web, and expecting that students will learn better online than in traditional classrooms (Al Musawi, El-Tahir, & Abdul Rahim, 2000).

Also e-learning at SQU is used by the students in the form of individual learning. Most studies which were conducted at SQU about e-learning merely investigated the effects of using e-learning on the achievement of students and their attitudes toward it. This study will identify

the students' epistemological beliefs and determine their relationships to the students' choice of reading and metacognitive strategies to explain the reported student achievement.

This study investigated the types of epistemological beliefs that are held by students at SQU and whether they differ according to gender and major. This study also investigated the effect of students' epistemological beliefs on their reading strategies and metacognitive strategies and their performance.

1.6 Significance of the Study

It was anticipated that the results of this study would:

- 1- Enhance theoretical development to support e-learning strategies.
- 2- Emphasize the critical roles of epistemological beliefs in influencing e-learning strategies.
- 3- Emphasize the suitability of the WebCT mode and tools for meaningful e-learning.
- 4- Provide a set of principles for providing a set of meaningful and effective learning experiences in e-learning.
- 5- Provide a set of principles for creating an e-learning environment that would enhance students' development of sophisticated epistemological beliefs.

1.7 Limitations of the Study

This study was conducted in view of the following limitations:

1. This study involved male and female undergraduate students who are majoring in science and humanities at SQU, Sultanate of Oman.
2. This study involved students who enrolled in a second-year online course as an optional course at the College of Education at SQU.
3. This study involved students who were already somewhat familiar with the computer and the e-learning environment.
4. This study used Web CT as the delivery tools of e-learning.

1.8 Definition of Terms

For the purpose of this study, the terms used were defined as follows:

Learner-led e-learning: student centred-learning that is facilitated by the use of WebCT as a mode of delivery, teaching and learning, and based on transparent communication amongst all parties involved within a course.

Epistemological beliefs: "how individuals come to know, the theories and beliefs they have about knowing, and the manner in which such epistemological premises are part of and an influence on cognitive processes of thinking and reasoning" (Hofer & Pintrich, 1997, p.435)

Sophisticated Beliefs: refer to the beliefs that knowledge is tentative, complex, derived by reason, acquired gradually, and that the ability to learn can be changed.

Naïve Beliefs: refer to the beliefs that knowledge is absolute, simple, handed down by authority, acquired quickly or not at all and that the ability to learn is fixed at birth.

Reading Strategies: reading strategies are complex behaviors which involve conscious and unconscious use of various strategies, including problem solving strategies, making connections, questioning, visualizing, taking notes, summarizing strategies, make inferences, and synthesizing information to build a model of the meaning through an e-learning environment.

Metacognitive Strategies: mental processes that relate to awareness and understanding of own skills, performance, and habits in the process of learning. These strategies consist of two aspects, namely having knowledge and awareness of one's self-as-learner, and conscious self-control and self-regulation of cognitive processes (Anderson & Krathwohl, 2001; Angelo & Cross, 1993).

Performance: the students' achievement in the online course as measured by the quizzes, assignments, and tests conducted throughout the course.

CHAPTER TWO

Literature Review

2.0 Introduction

This study investigated students' epistemological beliefs and their effects on reading and metacognitive strategies and performance in an e-learning environment. This chapter reviews the related studies to gain an understanding and outline the theoretical framework of the research. The chapter includes five sections. They are epistemological beliefs, learning strategies, reading strategies, theoretical framework, and metacognitive strategies.

2.1 Epistemological Beliefs

The interest of psychology in epistemological beliefs and in their development can be traced back to Piaget (1972), who referred to his inquiry into intellectual development as a study in genetic epistemology. The study of epistemology was also spurred by an exploration by Perry (1970) that sought to understand how individuals make sense of their experience, particularly with respect to formal education. Even though this effort attempted to better describe personal epistemology, the real advent of epistemological beliefs began when Perry (1968) introduced the theory of college students' beliefs about the nature of knowledge.

Perry (1968) found that most students, although having different starting positions, go through the developmental stages in the same order. However, although some got stuck for a year or more, some became alienated and escaped, and some retreated to the previous positions many

students, however followed the developmental stages until they reached the highest stage as follows:

- Stage 1 (strict dualism): students at the first see the world in polar terms of we-right-good vs. others-wrong-bad. Right answers for everything exist in the Absolute, known to Authority whose role is to mediate (teach) them. Knowledge and goodness are perceived as quantitative accretions of discrete rightnesses to be collected by hard work.
- Stage 2 (dualism with multiplicity perceived): at this stage, students perceive diversity of opinion, and uncertainty, and account for them as unwarranted confusion in poorly qualified Authorities or as mere exercises set by Authority 'so we can learn to find The Answer for ourselves'.
- Stage 3 (early multiplicity): students here accept diversity and uncertainty as legitimate but still temporary in areas where Authority 'hasn't found The Answer yet'. They suppose Authority grade them in these areas on 'good expression' but remains puzzled as to standards.
- Stage 4 (late multiplicity): (a) students perceive legitimate uncertainty (and therefore diversity of opinion) to be extensive and raise it to the status of an unstructured epistemological realm of its own in which 'anyone has a right to his own opinion,' a realm which they set over against Authority's realm where right-wrong still prevails, or (b) students discover qualitative contextual relativistic reasoning as a special case of 'what They want' within Authority's realm.

- Stage 5 (relational knowing): students perceive all knowledge and values (including Authority's) as contextual and relativistic and subordinate dualistic right–wrong functions to the status of a special case, in context.
- Stage 6 (anticipation of commitment): students apprehend the necessity of orienting themselves in a relativistic world through some form of personal Commitment (as distinct from unquestioned or unconsidered commitment to simple belief in certainty).
- Stage 7 (initial commitment): students make an initial Commitment in some area.
- Stage 8 (multiple commitments): the students experience the implications of Commitment, and explore the subjective and stylistic issues of responsibility.
- Stage 9 (resolve): students reach the highest stage in this developmental stages of Perry so, they experience the affirmation of identity among multiple responsibilities and realize Commitment as an ongoing, unfolding activity through which they expresses their life style.

Many educators have investigated the epistemological beliefs since that time. For example, Magolda (1992), and Belenky, Goldberg, and Clinchy (1986) extended the study of epistemological beliefs to the exploration of gender differences. They tried to identify potential dimensions of epistemological beliefs specific to women, which therefore would not have emerged in Perry's work with an almost all-male sample. Then, King and Kitchener (1994) focused their attention on epistemic cognition, or "the ways that people understand the process of knowing and the corresponding ways

they justify their beliefs about ill-structured problems”. According to the Reflective Judgment Model of King and Kitchener (1994), it consisted of seven stages. Students move through these stages and follow the developmental stages until they reach the highest stage.

The seven stages of King and Kitchener are divided into three levels, namely, a) pre-reflective, involving stages 1, 2 and 3; b) quasi-reflective, involving stages 4 and 5); and reflective, involving stages 6 and 7. In the pre-reflective level, students are unlikely to perceive that problems exist for which there may be no correct answer. At this stage knowledge is seen as simple, concrete and absolute, needs no further justification, and that true reality is known only by authority. Some students can go easily to the next stage of quasi-reflective thinking. In this stage they are capable of relating two abstractions and can thus relate evidence and arguments to knowing, although the ability to coordinate these into well reasoned arguments to knowing is not yet present.

In the reflective thinking stage, students can coordinate knowing and justification to draw conclusions across perspectives from one side and from another side students are also able to determine that some judgments are reasonable or valid than others, but with an awareness that all conclusion maybe need to be re-evaluated. Kuhn (1991) investigated the influence of epistemological views on the ways people reason about complex, real-world scenarios such as urban social problems and found similar patterns.

More recently, Schommer has become one of the important researchers interested in epistemological beliefs. She pointed that, “... there is enough evidence to say that epistemological beliefs are critical to the learning

process.” (p315). Similarly, Schraw (2001) indicated that, “results of studies that examine epistemological beliefs and their effects on learning are considerable importance to educators ... because ...epistemological beliefs are related to a wide variety of complex cognitive outcomes” (p460).

2.1.0 The Dimensions Epistemological Beliefs

The concept of epistemological beliefs was introduced by Perry (1968) and was refined by Schommer (1990) in her system of five dimensions for epistemological beliefs as follows:

- 1) Certainty of knowledge (absolute to tentative).
- 2) Structure of knowledge (simple to complex).
- 3) Source of knowledge (handed down by authority to derive by reason).
- 4) Control of knowledge (ability to learn is fixed at birth to ability to learn can be changed). Sometimes called innate ability.
- 5) Speed of knowledge acquisition (knowledge is acquired quickly or not-at-all to knowledge is acquired gradually).

The first dimension: “certain knowledge” refers to the belief that knowledge is absolute. Students believe that things are black or white, true or false, right or wrong; it is commonly found that these beliefs are held by students in the first year. At this level, students want the instructor to give them an answer. In addition, they may not be open to exploring or, in some cases, even being exposed to alternative explanations of the world (Schommer, 1989).

The second dimension: “simple knowledge” is the extent to which a person sees knowledge as a group of individual facts or as concepts that are related to each other (Schommer, 1990). For example, two students who are studying

for their social studies can follow different methods. One student believes that knowledge is a series of unrelated facts, so he tries to memorize all of the concepts and key terms to prepare for the exam. The other student believes that knowledge consists of interrelated ideas, so he tries to understand the information and concepts and make connection when he studies for the exam. The first student does not even attempt to link ideas together because his beliefs are such that he actively attempts to keep each concept isolated.

The third dimension: “source of knowledge” is the extent to which students believe that knowledge is external and is transferred to persons from an outside authority such as teachers, or instructors (Schommer, 1989). Often a number students of the first year in college hold the belief that their instructors own the key to their learning instead of believing that learning should be a shared experience and require students’ efforts. Hence, students believe that their instructors are responsible for their learning. Those students become passive participants in the learning process because they believe that their instructor’s role is to provide them with all of the important information and the student’s role is to receive it. In this case Bromme and Stahl, (2003) concluded that students who struggle in the course or perform poorly on exams can always say that the instructor was not a good instructor. On the other hand, when they succeed, they are likely to say that it was because they had a good instructor.

The fourth dimension: “quick learning” concerns beliefs about the speed of learning. Some college students believe that learning happens quickly or not at all, while others believe that learning happens gradually.

These beliefs may arise regarding the previous learning experiences. Students have been given tasks that required little time to complete. In addition, many students believe that if learning is going to happen, it is going to happen immediately or not at all rather than perceiving the learning process as something that is gradual. Students who believe in quick learning find it difficult to persist with a task or to make endeavors to test a different approach when the first doesn't work. These beliefs sometimes formulate their attitude such as "if I can't learn this quickly, I can't learn it at all" (Bromme & Stahl, 2003).

The fifth dimension is "control of knowledge" (innate ability). This dimension refers to the beliefs about the ability of learning (Schommer, 1989). Some students believe that the ability to learn is fixed at birth while others believe that people can learn how to learn and their ability developed. For example, if students have always struggled with any subject matter, they may believe that they "just can not do or understand this subject" whether they work hard or not. Students who hold this belief will not make much effort to learn because they believe that their success is related to their lack of ability. Students like those also tend to give up when they don't understand something. Although most students are stronger in some subjects than others, students who believe that they cannot learn a specific discipline show poor persistence and often will avoid enrolling in those courses (Hofer, 1994).

Simple or naïve epistemological beliefs are associated with those who consider knowledge to be absolute, simple, handed down by authority, acquired quickly or not at all and that the ability to learn is fixed at birth. With simple beliefs students are likely to engage in study habits in which they rely

on authority to provide clear answers. Such students are likely to be satisfied with the first information they find that they believe provides a suitable answer, and not persist if they do not get information quickly and easily. They are not likely to seek information from multiple sources, or integrate ideas. With more sophisticated epistemological beliefs students are more likely to consult multiple sources, integrate ideas, value different opinions and persist if not successful at first (Nist & Holschuh, 2005).

Many studies have investigated the influence of epistemological beliefs on learning strategies (Hofer, 1994; Kardash and Scholes, 1996) in traditional contexts. The results indicate students with naïve beliefs tend to use surface-level strategies to collect isolated facts and try to rehearse and memorize concepts and key terms to prepare for the examinations, while students with sophisticated epistemological beliefs tend to apply deep-level strategies such as elaboration and organization. Overall, students with more sophisticated epistemological beliefs were likely to exhibit better learning strategies, metacognitive strategies and academic performance (Hofer, 1994).

2.1.1 Epistemological Beliefs and Students' Reading Strategies

There is growing evidence in the literature that indicates epistemological beliefs influence students' learning in general and students' reading strategies in particular. Perry has suggested that changes in students' views of the nature of knowledge will lead to observable changes in the manner of reading. This notion was also supported by Hofer (1994) as he stated, "beliefs about knowledge may affect one's perception of the educational process and the type of work necessary to accomplish reading