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Assessing Individual-level Factors Supporting Student Intrinsic Motivation in Online Discussions: A Qualitative Study

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ABSTRACT

Research has established that intrinsic motivation has a positive effect on learning and academic achievement. However, little is known about the impact of different technology-supported learning activities on student intrinsic motivation or whether such learning activities significantly enhance student intrinsic motivation compared to traditional classroom environments without technological support. In order to investigate the phenomenon of intrinsic motivation in technology-supported learning environments, this paper examines factors that support individual student intrinsic motivation in online discussions. A research model is presented based on research into motivation, and the specific areas of self-determination and curiosity provide a framework for the model. A qualitative research methodology is used to validate the model. Results from the study indicate that five factors; perceived competence, perceived challenge, feedback, perceived interest and perceived curiosity, were strongly supported, with partial support for the construct of perceived choice.

Keywords: Intrinsic motivation, Self-determination, On-line Discussion, E-learning

1. INTRODUCTION

Today's learning environments have the technological means to open learning to the world and support interaction styles that are fundamentally different from those of a traditional classroom environment and no longer need to conform to the traditional classroom environment (Gulikers, Bastiaens, & Martens, 2005). Instead, using online or collaborative technology means that learners can participate actively in their own knowledge acquisition and development process which may "accelerate the pace of learning and create unlimited opportunities for collaboration, insight and knowledge production" (J. M. Keller & Suzuki, 2004).

Where previously only face-to-face interaction was possible, technology can be used to "transform" space and time and enables students to communicate, coordinate and collaborate their activities at any time without the need for face-to-face contact (Alavi, Wheeler, & Valacich, 1995). Little is known about the impact of different technology-

supported learning activities on student intrinsic motivation (Martens, Gulikers, & Bastiaens, 2004). In a prior related exploratory study, we examined the implications of various other learning activities on aspects of intrinsic motivation in e-learning (Shroff, Vogel, Coombes, & Lee, 2007). The results indicated that each learning activity carried with it support for some constructs and less for others. For example, video lectures fostered control in terms of an individual's ability to choose segments and duration but did not for providing challenges in terms of providing learner stimulation. On the other hand, most individuals found attending online discussions more intriguing, given the rich nature of the discussions, and the more personal interactions with each other and the teacher (Shroff et al., 2007).

Based on intrinsic motivational theories, this study may contribute to the future development of a framework explaining the potential role of intrinsic motivation and willingness to participate in e-learning environments. A stronger theoretical basis would prove enormously beneficial

since it would have the potential to provide a framework for guiding future research by identifying key research variables and relationships. It is believed that intrinsic motivation theory may provide important clues as to how e-learning technologies can become powerful catalysts for change as well as tools for redesigning our learning and instructional systems (Martens et al., 2004; Teo, Chang, & Gay, 2006).

The research question for this study is "What individual-level factors support intrinsic motivation in online discussions?" The preparatory step toward achieving these objectives was to conduct a review of literature on intrinsic motivation. Since the focus of this study is to assess the individual-level factors supporting student intrinsic motivation in online discussions effects of online and face-to-face discussions on factors supporting individual student intrinsic motivation, Self-Determination Theory (SDT) is used to identify the key individual-level factors supporting intrinsic motivation. In addition to its theoretical contribution, (i.e. the development of a research model for assessing the effects of online discussions on factors supporting individual student intrinsic motivation) this research presents important practical contributions through the identification of important factors that support students' intrinsic motivation in technology-supported learning environments.

For the purpose of this study, intrinsic motivation is defined as an individual's ability to demonstrate competence (E. Deci, Eghrari, Patrick, & Leone, 1994), a readiness to engage in an activity because of his or her own internal interests and curiosity (Lepper, Henderlong, & Gingras, 2000) and a desire to master the environment (Brophy, 1983). A better understanding of the nature of intrinsic motivation and the ability to gauge students' intrinsic motivation while interacting with technology-supported learning environments promises to contribute to the design of more effective educational programs and thus ultimately to higher educational performance.

2. LITERATURE REVIEW

Considerable discussions emanating from academic debate and research surround the emergence of new online environments. Central to such discussions are a variety of topics relevant as background to the purpose and problem statement presented in this research project. Specifically, this study's literature review integrates and synthesizes content regarding (a) technology-enabled learning environments and (b) intrinsic motivation. The following sections discuss some of the major work done in each of the above areas with special consideration for the relevance of these issues to the present study. This review represents the basis for the development of a theoretical framework of the present study.

The increasing numbers of university courses that apply computer technologies have created a need to understand how these technologies impact student learning. However, a major problem is that we presently lack information as to how to effectively make use of technology-supported learning environments in order to promote active learning, collaboration and problem solving skills of individual students. It is not only difficult to assess how students learn but also how well they adapt to these technology-supported learning environments. Consequently, what the use of

computer technology has brought about is a complete reconfiguration of today's learning process which is to date only partly understood.

Technology-supported learning environments are considered especially critical to the effectiveness of student learning and performance because these learning environments provide students with more opportunities to interact with instructors and peers than traditional face-to-face learning environments (Gulikers et al., 2005; Martens et al., 2004; Vogel & Klassen, 2001). Therefore, it is necessary to explain the use of technology and its potential to change the nature of learning environments and the way in which activities are designed to support intellectual development. Using technology could cultivate cognitive growth thus promoting motivation.

The advent of technology has provided a new avenue for instructional delivery. Many new technologies are interactive (Greenfield & Cocking, 1996), and thus, it is now relatively easier to form environments in which students can learn by doing, receiving feedback and continually refining their understanding to build on existing knowledge (Scardamalia & Bereiter, 1994). The utilization of technology has redesigned the way today's courses can be delivered to students with the result that time and space no longer constrain instructors and students. Technology can provide students flexibility with respect to how, when and where learning can occur. With technology, individuals can meet either synchronously using chat rooms, or asynchronously using threaded discussion boards, in which members contribute to the group discussion at times convenient to their schedules over a defined time period (Beaudin, 1999).

The interactive and collaborative features of asynchronous technology permit students to impart opinions, viewpoints and experiences, to form relationships, to seek out assistance (Chong, 1998), to impart and disseminate information that can impact intercultural ways of thinking and behaving (Müller-Hartmann, 2000) and to support and provide confidence to each other (Sengupta, 2001). Discussions and interaction are thereby increased in the learning process. Consequently, a growing demand for learning at any time and at any place has fueled a collaborative learning environment. Interactivity of this kind within the technology environment is an important feature for learning and effective for creating contexts that students can explore and reexamine collaboratively.

Technology provides essential tools with which to accomplish the goals of supporting a collaborative and constructivist learning environment. Many universities are starting to use various computer course tools or platforms to promote online learning. These platforms, such as "Blackboard™" or "WebCT™," can be used to design either Web-based or Web-assisted courses. For example, electronic discussion boards and chat rooms in Web-based classes have been found to enhance communication and dialogue through use of these tools. Telecommunications tools such as electronic discussion boards provide a means for textual dialogue, discussion and debate -- interactivity that leads to the social construction of meaning.

Electronic class discussions have distinct advantages. Firstly, they extend class time by providing for the exchange

of ideas outside the class setting. Secondly, not being time or place dependent, additional work outside the class is possible for students who are not in close proximity or who have schedule or time constraints. Thirdly, online discussions can be archived easily so that the instructor has a record of the discussion, time spent participating in it and the thought processes involved in the ways in which students think. Lastly, online discussions enable timely feedback by the instructor or by peer learners and they can create a social environment that helps motivate the learners and establish a forum within which concepts, ideas, beliefs and views can be tested and applied.

The challenge of education is to apply technologies for learning and to draw from the knowledge of human behavior and cognition, as well as from practical applications of how technology can support collaborative and constructivist learning environments (Hiltz, 1990; Jonassen, Peck, & Wilson, 1999). In addition, students may be motivated to learn due to the meaningful nature of these learning environments and activities.

Despite the importance of motivation in education, intrinsic motivation has been studied primarily within the field of psychology. Only recently, scholars in education and psychology have started working together in an attempt to discover the underlying constructs of intrinsic motivation (Schunk, 2000). When students use technology as a tool or a support for communicating with others, they are in an active role, rather than the passive role of recipient of information transmitted by an instructor. The students are actively making choices about how to generate, obtain, manipulate or display information. Technology use allows them to actively think about information, make choices and execute skills compared to typical face-to-face classroom environments (Bordia, 1997). Moreover, when technology is used as a tool to support students in performing authentic tasks, the students are in a position to define their goals, make decisions and evaluate their progress (Leidner & Jarvenpaa, 1995).

Motivation research has addressed how classrooms are structured to promote intrinsic motivation and the methods for assessing student motivation. As such, classroom activities that support intrinsic motivation are thought to enhance feelings of competence and control one's learning (Howles, 2005; McCombs, 1991). Reviews of motivation in education (R. M. Ryan & D. L. Deci, 2000), recognize the importance of intrinsic motivation and have emphasized the role of intrinsic motivational processes in individual learning and achievement. Growing evidence in educational literature strongly suggests that such issues have significant implications that extend well beyond learning and achievement. Consequently, motivational strategies need to be assessed for their impact in the broader and more significant areas of individual development (Hodges, 2004; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

The central postulation of Self-Determination Theory is that individuals have a psychological need to feel competent, self-determined and related (E. L. Deci & Vansteenkiste, 2004; Ryan & Deci, 2002). Addressing these needs of competence, self-determination and relatedness promotes optimal motivation for a behavior. The three aspects of a motivationally supportive environment that correspond to

these three psychological needs are structure, autonomy support and involvement respectively. The structural dimension refers to the degree to which an individual is competent in an activity (i.e. able to understand the activity, with clear expectations from the same), finds the tasks within the activity challenging and where positive feedback is provided during the activity. In autonomy supporting contexts choices are given, pressure to engage in the behavior is minimized and individuals are encouraged to initiate actions by themselves. Involvement, finally, is characterized by interest in a particular social context (Ryan, 1994).

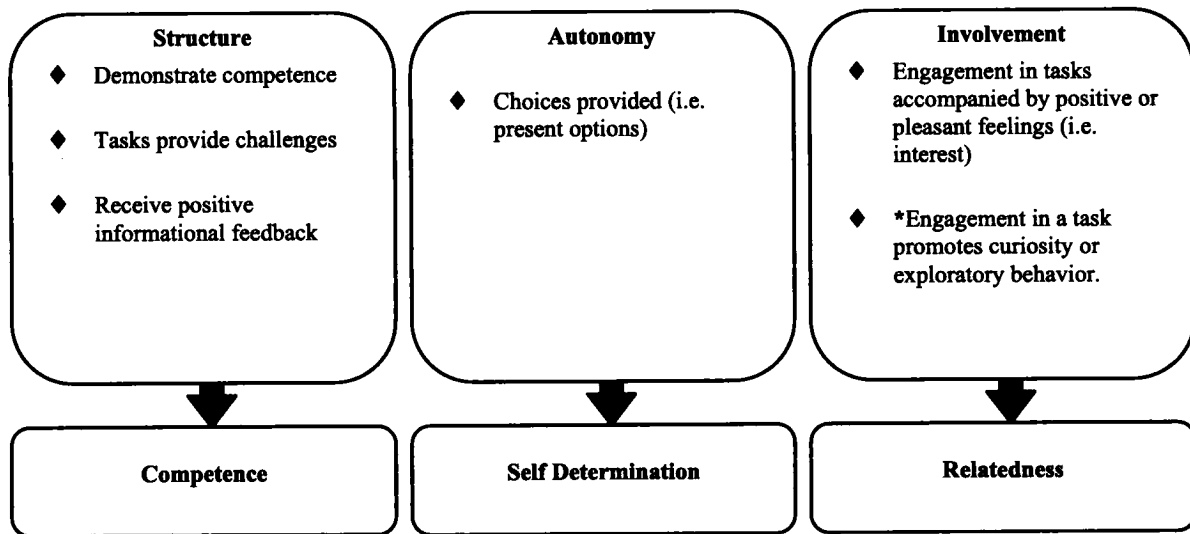
Self-Determination Theory (E. Deci & Ryan, 1985; E. L. Deci & Vansteenkiste, 2004; R. M. Ryan & E. L. Deci, 2000) assumes that an individual has inherent propensities to be intrinsically motivated, to assimilate his or her social worlds and to integrate external regulations into self-regulations (Brown & Ryan, 2004). Specific to Self-Determination Theory, is the proposition that these integrative tendencies operate in conjunction with the three basic psychological needs for competence, self-determination and relatedness (see Figure 1).

Self-Determination Theory suggests that social environmental settings can facilitate or hinder intrinsic motivation by thwarting an individual's innate psychological needs (E. L. Deci & Vansteenkiste, 2004). An individual's perception of competence is an important factor supporting intrinsic motivation (Vallerand & Reid, 1984). Therefore, an individual who does not feel he or she will perform successfully or do not feel a sense of competence will more likely be extrinsically motivated or not motivated at all to participate in the task or activity (White, 1959).

In addition to the technical skills associated with using the hardware and software, an individual may feel competent by utilizing his or her cognitive skills to successfully interact online versus face-to-face discussions which are significantly different. Thus, online discussions facilitate individual technical, cognitive and communication skills that create an individual learner who feels competent to achieve in the technology-supported learning environment. Therefore, perceived competence refers to perceived capacities that an individual has, thus leading to success in his or her tasks and activities. Communication resources such as the "Blackboard™ Virtual Classroom" may increase individual web etiquette, the skill of active listening, using concise communication, analyzing, synthesizing and evaluating information from multiple sources.

Deci and Ryan's Self-Determination Theory provides a solid framework for understanding the construct of individual perceived challenge. An individual is challenged when he or she perceives the challenge(s) of the activity to be balanced with his or her abilities to perform the task(s) (Reeve & Deci, 1996). According to Self-Determination Theory, being challenged is imperative to facilitating intrinsic motivation (E. Deci & Ryan, 1985).

Self-Determination Theory (SDT) (E. Deci & Ryan, 1985; E. Deci, Vallerand, Pelletier, & Ryan, 1991; R. M. Ryan & E. L. Deci, 2000) presupposes individuals to be actively seeking optimal challenges, so task difficulty in a given activity relies entirely on the perception of the individual who participated in the activity. Online



Source: Adapted from (Markland & Hardy, 1997) * Integrated into Self-Determination Theory framework for this paper
Figure 1: Self-Determination Theory Framework for Intervention

discussions may provide challenge because they facilitate individual learner stimulation and facilitate communication through interaction and collaboration ensuring that they benefit from participation by engaging in a rich dialogue that taps into processes of analysis, application, synthesis and evaluation.

Research on feedback has also demonstrated that the inclusion of feedback facilitates individual intrinsic motivation (Pittman, Davey, Alafat, Wetherill, & Kramer, 1980; Zinser, Young, & King, 1982), and it was demonstrated that the provision of positive feedback resulted in intrinsically motivated behavior over the provision of negative feedback (Zinser et al., 1982). For example, receiving positive feedback in the form of verbal praise can increase the intrinsic satisfaction derived from that activity, which can perpetuate a positive learning atmosphere and therefore raise quality.

Technology-supported electronic discussions can be used to demonstrate this distinction between behavioral and cognitive conceptions of learning. For example, the use of the "Blackboard™ Virtual Classroom" may engage the individual learner through the use of positive reinforcement (e.g., "correct," "very good," etc) that may encourage his or her continued interaction and facilitate an understanding of the content of the task. Hence, the use of electronic discussions may provide opportunities for positive feedback because discussions on a designated topic or issue, for example, may lead to individual reflection on the subject and thereby, sharing of knowledge. Hence, this delivery of different dialogues, interaction patterns and knowledge sharing, contributes to greater expectations for peer commenting positive feedback, elaboration on and justification of responses.

Self-Determination Theory has integrated the construct of perceived choice (E. Deci, 1975). Self-Determination Theory states that choice has a positive impact on cognitive and affective engagement because it increases intrinsic motivation (E. Deci et al., 1991; E. L. Deci & Ryan, 1987,

1992; Walker, Greene, & Mansell, 2006). In the case of online discussions, if an individual believes that he or she is engaged in the activity because he or she chose to be involved, that individual is more likely to continue to value it.

Online discussions may increase individual perceptions of choice because the interactive nature of the discussions increases individual volition, that is, it provides a sense of unpressured willingness to engage in the activity. For example, if an individual believes that he or she is engaged in online discussions, because he or she chose to be involved, that individual is more likely to continue to value it. Online discussions may increase an individual's perception of choice, because the interactive nature of online discussions, gives an individual choices in terms of how much he or she can participate in the topic of discussion or the choice of which discussions to engage in. As such, volition is high when actions are endorsed fully by the individual such that the individual experiences high freedom (E. Deci & Ryan, 1980; Reeve & Deci, 1996) and little or no pressure to engage in the activity (E. L. Deci & Ryan, 1987).

Interest is considered a powerful motivator (E. L. Deci & Ryan, 1992) and online discussions may increase individual perceived interest because the task of engaging in an electronic discussion is novel and may lure the participant into action (i.e. entice or intrigue them). Thus, online discussions may increase situational interest, because the richness of the interactive discussions through text or the sharing of topics or ideas may elicit behavior that is intriguing or enticing to an individual.

The construct of interest that falls under the involvement dimension and corresponds with the need for relatedness, may not adequately account for other phenomena that should be addressed in the context of technology-supported learning environments. We believe that the construct of curiosity can reasonably be integrated within the conceptual framework presented in Figure 1

above. Curiosity as an educationally relevant motivational concept is used as a basis for educational theories (D. E. Berlyne, 1978; Kashdan & Fincham, 2004) and thus can also be used in existing motivational theories such as Self-Determination Theory. If curiosity is to be stimulated, the role of the environment is to provide an individual with activities/opportunities to explore. Thus, online discussions can stimulate curiosity because the different dialogues and interaction patterns within the online discussions are conducive to facilitating effective communication and learner stimulation.

The constructs of interest and curiosity are related to the extent that they address complementary aspects of the need for relatedness. However, both constructs have a narrow and specialized meaning and prior research has operationalized them as separate constructs from one another (H. Keller, Schneider, & Henderson, 1994; Schiefele, 1991).

3. RESEARCH APPROACH

Based on literature on intrinsic motivation, a case study protocol was designed. The case study protocol was developed from a combined literature review of this paper and research question and then supplemented by the framework developed. By applying a theoretical interpretive model to the findings, the findings were mapped to their respective constructs. Individual student reflections served as an important element of the assessment process, since they penetrated deeper into the dynamic issues surrounding the interaction processes in the online discussions compared to quantitative assessments (Yin, 1994). This study is limited to online discussions, because, as our prior research suggests, these discussions have the potential to influence a wide spectrum of factors directly related to intrinsic motivation and thus appear as a favorable context to study the subject.

Students from the Bachelor of Business Administration (BBA) program taking the FB2501 "Management of Information Systems (MIS2)" course, constituted the pool of available interviewees. The selection of this course was based on the following criteria. Firstly, this course provided a rich opportunity for applying technology support in online classroom environments. Secondly, learning activities in the form of discussions were structured into the design and organization of the course. Thirdly, these online discussions were utilized for the purpose of understanding what individual-level factors support intrinsic motivation in online discussions.

The "Blackboard™" course management system was chosen to supplement this study for two reasons. Firstly, the software is an existing available resource acquired by the Faculty of Business at the City University of Hong Kong. The Faculty of Business has taken on the responsibility of this software management, staff in-service training and administration of "Blackboard™." The reasons for choosing "Blackboard™" also extend beyond the availability and convenience of the software. This software provides various pre-built course management solutions as well as the addition of an Internet-based component to the course. The software also provides a structure of customizable tools. Using these tools is easier than programming a website on the Internet, which requires web page programming

knowledge. In addition, "Blackboard™" provides password-protected access using a standard web browser (i.e. "Internet Explorer™" or "Netscape Communicator™"), which offers security for protecting student information.

Online discussion boards through "Blackboard™ Virtual Classroom" promote reflection and analysis, thus enabling discussions among all student participants. Knowing that their comments will be available at all time to the instructor, students should typically take more time to consider, write and edit their thoughts, as well as support them using quotes, hyperlinks and attachments. In addition, the online discussions help students learn to appreciate and evaluate positions that others express. This gives them the opportunity to be challenged, corrected and questioned by their peers, thereby inviting students into a community of practice that motivates them to learn the subject matter and helps them to gain social skills.

Once the overall course structure had been determined, learning activities were designed for online discussions. For example, online discussions using the "Blackboard™ Virtual Classroom" were structured around the case method to engage students in more expert-like ways of thinking, acting and problem solving (i.e. searching for learning resources, making interpretations, engaging in negotiations, providing rationales and reaching conclusions) (Collins, 1990). For example, students, working in groups of four, were told to examine one of the processes of the Information Systems Development Process. Each group of students was required to examine one the processes and present to the class the pros and cons in the form of a "PowerPoint™" presentation. The purpose of this activity was to allow students an opportunity to share their knowledge, to constructively critique each other's work and discuss improvements and new insights. Table 1 presents a sample activity which was organized around the online discussions within the "Blackboard™ Virtual Classroom" discussions.

Respondents were selected using a two-stage sampling procedure. In the first stage, the FB2501 "Management of Information Systems (MIS2)" course was selected and in the second stage individuals were chosen from the FB2501 course. Seven students who were exposed to the online and face-to-face discussions were interviewed from the course. The selection of this course was based on the following criteria: Firstly, this course provided a rich opportunity for applying both technology and non-technology support to both online and face-to-face classroom environments. Secondly, learning activities in the form of online and face-to-face discussions were structured into the design and organization of the course. We expected students to engage in "expert-like" ways of thinking, acting and problem solving (i.e. making interpretations, engaging in negotiations, providing rationales and reaching conclusions) in the online discussions.

Interviews for the "Management of Information Systems I" took place during the first half of semester B (Cohort 2003). The interview protocol minimized bias by providing a basis for a consistent sequence and approach to interviews (Appendix 1), by adopting consistent wording for the applicable questions and by asking each question in the same way to each participant to minimize bias. Interviewing a student sample from the BBA program, helped to ascertain

Activities	Outcomes of Activities
<p><u>Defining the problem:</u> Students were expected to identify the problem, consider the constraints around the problem, new meanings that arose from rephrasing the problem and the ways in which the meanings were focused or expanded, to provide a better understanding of the issues.</p>	<p>The activities led to discussions of the designated topics or issues and students were required to help each other in solving problems related to the project.</p>
<p><u>Developing and evaluating solution alternatives:</u> In seeking to develop a solution or possible solutions, students were asked to generate a set of important factors to be used in evaluating and fine tuning those possible solutions.</p>	<p>The activities helped students to utilize prior knowledge to understand new experiences and apply course experiences to build new knowledge.</p>
<p><u>Come to some resolution:</u> Students were required to present an argument for the position and implementation of a plan. After the presentation, students were required to vote on the most important factors of the content material and reach a consensus.</p>	<p>Problems were solved by working together to find the answers.</p>

Table 1: Sample Activity

generalizability of this study across populations, and helped to cross-check data and served, "As a strategy that added rigour, breadth and depth to [the] investigation" (Denzin & Lincoln, 1994). For this study, we interviewed a total of seven students enrolled in the BBA program. A small sample size of seven students was large enough to insure a rich and complete set of responses and justified given the preliminary nature of the investigation (Tesch, 1990; Yin, 1994).

The procedure used for conducting the interviews was as follows: Participants were scheduled for a 60-minute individual session in a private room. The description of the research was read, which allowed for the participant to ask any questions to clarify the nature of the study and his or her expectations for participation. Following the project description, participants were asked a series of open-ended questions in a semi-structured format from the interview guide, skipping any context irrelevant questions. Participants were encouraged to describe situations in significant detail and were asked follow-up questions to draw emerging meanings (Rubin & Rubin, 1995).

4. CASE STUDY MEASURES

The research question in focus is - what individual-level factors support intrinsic motivation in online discussions?" The specific type of learning activity is online discussions using the "Virtual Classroom" tool of the "Blackboard™" online learning platform. We believe that the interactive nature of these discussions may support intrinsically

motivated behavior of an individual, compared to other technology-supported learning activities. The "Virtual Classroom" is increasingly becoming a much wider used platform on which to teach a broad range of different topics and gives an opportunity for participants to engage in collaborative discussions.

A semi-structured interview outline was developed to study the impact of the online discussions on the six constructs (perceived competence, perceived challenge, feedback, perceived choice, perceived interest and perceived curiosity) chosen from the literature and research model previously described. Measures were developed for each of the following constructs covered in the interviews:

1. Degree of Individual Perceived Competence of Online Discussions: Questions relating to individual perceived competence were asked, such as the extent to which the online discussions promoted individual ability to evaluate, use and communicate information effectively and enabled him or her to see different perspectives and thereby, construct knowledge more effectively. The following three measures are factors supporting the degree of perceived competence in the online discussions. Perceived competence was measured by the extent to which these factors were present or not present in the assigned activity. Perceived competence was measured by the extent to which these factors were present or not present in the assigned activity.

Capability	The potential ability of an individual that enables him or her to execute courses of action required to attain designated types of performances.
Control	The belief in one's own capacity to achieve and perform may cause that individual to experience a sense of control.
Skill	The ability to perform a task or activity consistently over a period of time and the expertise required for a particular activity that may include manual dexterity and/or mental aptitude.

2. Degree of Individual Perceived Challenge of Online Discussions: Questions relating to individual perceived challenge were asked, such as the extent to which the online discussions raised levels of difficulties and whether the structure of the activities provided "conquerable" challenges or not. The following three

measures are factors supporting the degree of challenge in the online discussions. Perceived challenge was measured by the extent to which these factors were present or not present in the assigned activity.

Difficulty	The level of resistance to successful performance.
Problem	A question raised for inquiry, consideration or solution or a situation that requires further investigation.
Obstacle	Any factor or a combination of factors that interferes or hinders an individual's development, delays his or her progress and impedes fulfillment of a goal.

3. Degree of Feedback of Online Discussions: Questions relating to feedback were asked, such as the extent to which the online discussions promoted and generated positive feedback (i.e. verbal praise) between individuals.

The following three measures are factors supporting the degree of feedback in the online discussions. Feedback was measured by the extent to which these factors were present or not present in the assigned activity.

Compliment	A remark or act expressing praise or approval.
Opinion	A personal belief, judgment or appraisal formed in the mind about a particular matter.
Comment	The information provided by any individual involved in the evaluation process.

4. Degree of Individual Perceived Choice of Online Discussions: Questions relating to individual perceived choice were asked, such as the extent to which the online discussions provided an individual with choices in terms of the level of participation and contribution and the option to share information. The following

three measures are factors supporting the degree of perceived choice in the online discussions. Perceived choice was measured by the extent to which these factors were present or not present in the assigned activity.

Alternative	Providing or expressing a choice.
Preference	The extent to which an individual brings forward for consideration or gives favorable priority or opportunity for choosing.
Selection	The opportunity or privilege of an individual to choose freely, which may require an exercise of judgment in his or her respective tasks or activities.

5. Degree of Individual Perceived Interest of Online Discussions: Questions relating to individual perceived interest were asked, such as the extent to which the online discussions evoked pleasure, appealed to or stimulated the faculties of an individual and lured him or her to the respective

activity. The following three measures are factors supporting the degree of perceived interest in the online discussions. Interest was measured by the extent to which these factors were present or not present in the assigned activity.

Stimulation	Tasks or activities that are demanding to the extent that they engage the attention or arousal of an individual.
Appeal	The degree of influence an individual has in evoking satisfaction and stressing the appeal of the tasks or activities.
Enjoyment	The extent to which an activity is perceived to be pleasurable in its own right.

5. Degree of Individual Perceived Curiosity of Online Discussions: – Questions relating to individual perceived curiosity were asked, such as the extent to which the online discussions promoted the ability of an individual to investigate, study or analyze - look

into or explore, etc. The following three measures are factors supporting the degree of perceived curiosity in the online discussions. Perceived curiosity was measured by the extent to which these factors were present or not present in the assigned activity.

Discover	Get to know or become aware of or make a new finding.
Explore	The potential ability of an individual to investigate and explore the relationship between the tasks and his or learning abilities.
Query	A request for information or posing a question in an attempt to search for information.

The interview questions were generated using the constructs in the literature review and research model. These constructs are highlighted in the work on Self-Determination Theory by Deci and Ryan (1985) and related work on curiosity by Berlyne (1954) and others (Dember & Earl, 1957; H. Keller et al., 1994). Individual students with acceptable English skills were selected to be interviewed from the FB2501 course. The objective was to interview them with a motive to explore the influence of the online discussions relative to each intrinsic motivation construct. Semi-structured interviews were used with leading open-ended questions, so that participants were able to reflect on the meaning of their experiences during the interviews and thus engage themselves in a deeper exploration of the ascribed meaning of their motivational behaviors.

5. DATA ANALYSIS PROCEDURES

In our data analysis, information was represented in the form of matrices that displayed information (tabular information showing relationships among categories of information) in a spatial format, thereby presenting that information systematically to the reader (Miles & Huberman, 1984) and enabling the identification of the coding procedures to be

used in order to reduce information to themes/categories (Tesch, 1990). The stages of the coding process are shown in Figure 2.

Coding was guided by a coding scheme that was derived from constructs and ideas found in the relevant literature (a so-called start-list of codes). Data refinement included selecting and thus simplifying the data that appeared in the transcriptions. The objective was to code the categories and group and organize these categories, so that conclusions could be reasonably drawn and verified. Data were displayed in matrices and charts (see Table 2 for example), thereby illustrating the patterns and findings from the data.

Analysis and coding of the data transcript, presented in matrices and displays, were used to visualize and represent the data, thus enabling further discovery of patterns in the issues raised by the participants

6. RESULTS

The results are summarized in Table 3, aligned with the embedded units design with “+” and “-,” indicating positive and negative comments, respectively based on the coding scheme illustrated in Table 2. For example, “+CH” under

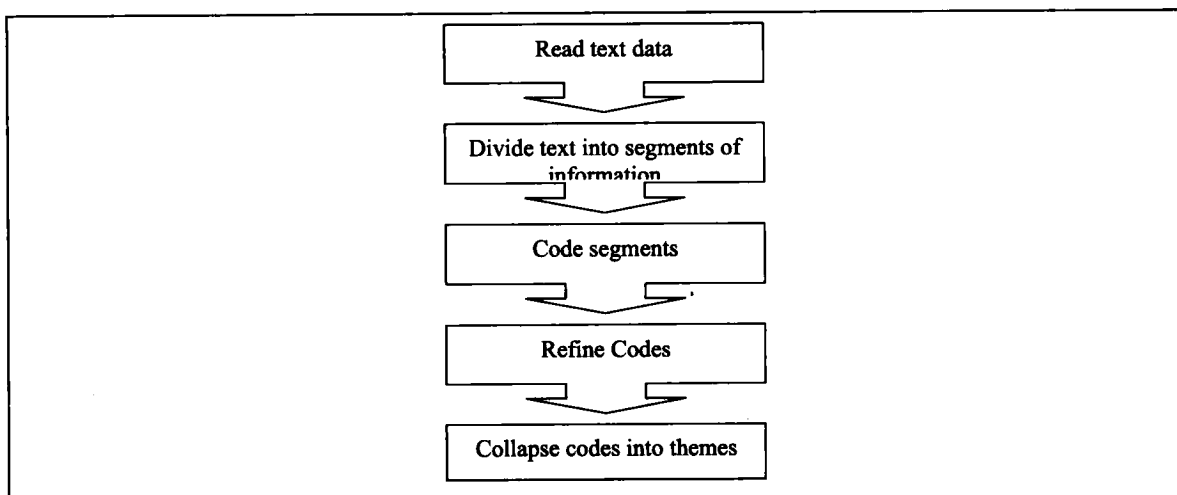


Figure 2: Coding Process

Construct/ Concept	Code	Measure	Sub-Code
1. Competence	CM	Capability	CM-CAP
		Control	CM-CNT
		Skill	CM-SKL
2. Challenge	CH	Difficulty	CH-DIFF
		Problem	CH-PRO
		Obstacle	CH-OBS
3. Feedback	FE	Compliments	FE-COM
		Opinion	FE-OPI
		Comments	FE-CMT
4. Choice	CO	Alternative	CO-ALT
		Preference	CO-PRE
		Selection	CO-SEL
5. Interest	IN	Stimulation	IN-STM
		Appeal	IN-APP
		Enjoyment	IN-ENJ
6. Curiosity	CU	Discovery	CU-DIS
		Exploring	CU-EXP
		Query	CU-QUE

Table 2: Classification for Coding of Interview Response

Interviewee 1, indicates a positively related comment with respect to the “perceived challenge (CH)” construct. Similarly, “-CM” under Interviewee 4, indicates that this student made a negative comment with respect to the “perceived competence (CM)” construct, with regard to the online discussions.

If we examine the issues from the six primary constructs previously discussed, we find that:

Perceived Competence (CM) was especially recognized in our online discussions. We interpreted from the following statements that perceptions of individual competence were higher in online discussions, as compared to face-to-face discussions. “...I chat online using ICQ or something...so I think I’m very competent.” “I feel it is easy to control [the

Virtual Classroom discussion] because it’s just like the way we do our online chatting.” “...because our generation are used to chatting online, so it is familiar with us to use such software to chat with others. So, I think I am very skillful in the online discussions.”

Control, which is one aspect of competence, was especially recognized in the online discussions. It was a compelling indicator, given the ability of an individual student’s own capacity to achieve and perform, which may cause him or her to experience a sense of control. There were also numerous positive comments about skill, which is another significant measure of individual perceived competence.

Perceived Challenge (CH) was positively supported by all seven interviewees and recognized in the online discussions with regard to difficulty, problems and obstacles. We interpreted from the following statements that perceptions of individual challenge were higher in online discussions, as compared to face-to-face discussions. “Yeah...actually when we are talking about something we try to explain and use some examples, but when we do online discussion, we can only give some abstract concepts...we cannot say a long story to say what I’ve just mentioned about this point...and this part is the most challenging.” “...it may be difficult because if one types one sentence and the other types one sentence, then the previous sentence will go up. Sometimes a sentence comes up and others may not understand what this sentence relates to.”

Feedback (FE) was positively supported by all seven interviewees and recognized as being important in the online discussions with regard to compliments, opinions and comments generated by students. We interpreted from the following statements that online discussions led to higher positive feedback, as compared to face-to-face discussions. “I think their feedback is of very high quality because to my concern I feel their points are considered carefully before they have typed them in and entered actually onto the board. It was just like some chatting and of course the compliments are very useful to encourage you. Their feedbacks may be useful and when we are discussing about some controversy problem, may be our points are more or less the same or we may have different opinions about one question, so may be their feedback at that time is useful.” “...whenever I say something my team member will say, “I cannot agree with you more, I totally agree with you or I have different opinions.” This will stimulate my thinking because of the

Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6	Interviewee 7
+CM	+CM	+CM	-CM	+CM	+CM	+CM
+CH	+CH	+CH	+CH	+CH	+CH	+CH
+FE	+FE	+FE	+FE	+FE	+FE	+FE
-CO	-CO	+CO	-CO	+CO	+CO	+CO
+IN	+IN	+IN	+IN	+IN	+IN	+IN
+CU	+CU	+CU	+CU	+CU	+CU	+CU

Table 3: Summarized Results

good feedback." "...we can give our very positive and constructive opinions about something and we don't need to care about others' opinions." "Yes, because it [online discussions] made me think more critically and more actively because I needed to give my own opinion."

Perceived Choice (CO) was positively supported by four of the seven interviewees. The measures of alternative, preference and selection were factors supporting individual student intrinsic motivation in the online discussions. Perceptions of freedom to choose from alternative methods of participation seemed to be higher in online discussions, as compared to face-to-face discussions: "...sometimes may be I have my own ideas about the questions or I will type a lot or may be sometimes may be I'm confused...I have no idea about it...so I just sit there and watch what the others say and form my own opinions later on. So I can have that choice." "I can choose when to discuss - depends on myself and what to discuss depends on may be the topic the teacher has offered." "Choice...hmm...because we have more people I think the choices...we had more choices of course." "Mostly it was all up to me I think."

However, three of the interviewees disagreed they had much choice when engaged in the online discussions and noted that: "I think there aren't many choices for me because the topic is assigned to us and the only way is to type." "Actually, if the online discussions could be open to us at any time, then I think it's more convenient, but according to our course we can only choose the time as defined in the tutorial and topics are also assigned." "I don't think there was a lot of choice because we had to participate in the online discussions and the time was very limited."

Perceived Interest (IN) was positively supported by all seven interviewees. We interpreted from the following statements that perceptions of individual perceived interest were higher in online discussions, as compared to face-to-face discussions. Here the students also sought engagement in the activity because using the computer technology was both interesting and enjoyable. Yet, they also recognized that being interested precipitated their learning process: "...it's very interesting and I think it's a good way for me...it is so efficient for me. It's more efficient I think, as compared with the face-to-face discussions." "...the virtual classroom is different. It can arouse some different opinions." "I think online discussions are more interesting than face-to-face discussions because it is more interesting to use the computer." "I think it was very interesting because the tutorial last semester was very boring; the teacher would just say something and we would listen, but now we can participate more, so it is interesting. I think the online discussions are a very appealing way of learning."

Perceived Curiosity (CU) was positively supported by all seven interviewees and recognized in the online discussions with regard to discovery, exploration and query. We interpreted from the following statements that perceptions of individual perceived curiosity are higher in online discussions, as compared to face-to-face discussions. "If I

typed in my own comments and didn't look at theirs, they will tell me that next time I need to look more at their comments, their opinions and not just formalize my own, so I need to explore different options" "...sometimes you want to say something but you find that others have already pointed it out, so it will encourage you to search for more points so you can add more opinions." "Quite motivated I think. I haven't fully adapted to it, but I think it has many advantages like new ideas...hmm...may be more complete opinions and things...it's quite good." "Hmmm...I will motivate myself to think about more points and offer more information to others and then we can form our solution in our group. I felt motivated because a lot of different opinions rush to you and a lot of fresh ideas come to your mind."

This indicated that the importance of the human dimension and need for interactivity were significant motivational forces in all online discussions. Commenting on this, a student said, "I think I am highly motivated by using the online discussions." A key feature that emerged from these evaluations is an individual student's intrinsically motivated desire for learning through online discussions. Thus, the online discussions enabled and encouraged a "learning to learn" approach as is evident from the following opinions of some of the students: "As I mentioned before with the online discussions, we can learn from others but we have to concentrate more and it is easy to move onto other topics with the face-to-face discussions. As we could chat about other things very easily, the online discussions increased our efficiency." "I think it's also highly effective because of the information ways...the ways the information is provided and also I said it's more efficient to use this, because we cannot discuss about some stupid things. So I feel it is [online discussions] very effective in assisting my learning."

Our findings from the qualitative study also illustrated that some students would have preferred the convenience to attend the online discussions or participate from wherever they were. As a student pointed out, "I think only this course has provided the online discussions and we have only been able to discuss in the class, in this tutorial and we don't have time to discuss online outside of the class on other occasions." Finally, a more widely held perception among students was that the skills of presentation and communication in the online discussions were useful and convenient from a practical standpoint. For example, a student was of the opinion that, "Of course we pay more attention to both the skills of presentation and skills from the book during the presentation. The presentation is mixed with those most useful things and that's the part I like very much."

From an overview, the results demonstrated that students were comfortable using technology supported online discussions, through application of the "Blackboard™ Virtual Classroom." Students excelled in the use of the "Blackboard™ Virtual Classroom" and these online discussions demonstrated strong support for the six intrinsic motivation constructs (i.e. perceived competence, perceived challenge, feedback, perceived curiosity, perceived interest and perceived choice). The results from this study paint a realistic account of the factors supporting individual student

	<u>Competence</u> (6/7)	<u>Challenge</u> (7/7)	<u>Feedback</u> (7/7)	<u>Choice</u> (4/7)	<u>Interest</u> (7/7)	<u>Curiosity</u> (7/7)
<u>Interviewee 1</u>	Supported	Supported	Supported	Unsupported	Supported	Supported
<u>Interviewee 2</u>	Supported	Supported	Supported	Unsupported	Supported	Supported
<u>Interviewee 3</u>	Supported	Supported	Supported	Supported	Supported	Supported
<u>Interviewee 4</u>	Unsupported	Supported	Supported	Unsupported	Supported	Supported
<u>Interviewee 5</u>	Supported	Supported	Supported	Supported	Supported	Supported
<u>Interviewee 6</u>	Supported	Supported	Supported	Supported	Supported	Supported
<u>Interviewee 7</u>	Supported	Supported	Supported	Supported	Supported	Supported

Table 4: Summary of Qualitative Results

intrinsic motivation in technology-supported online discussions. Findings from the qualitative research were able to unravel which factors support individual student intrinsic motivation. Results showed that five constructs (i.e. perceived competence, perceived challenge, feedback, perceived interest and perceived curiosity) were strongly supported, with partial support for the construct of perceived choice (Table 4).

Though generally consistent, some students felt that their choices in the online discussions were limited because they did not have the options of when or where they could discuss online. The following emergent trends were noticeable:

All the students found the online discussions most stimulating. These types of synchronous activities seemed more familiar to them and gave them ample opportunities to influence the directions of the topics under discussion. A significant benefit arising from the online discussions was that these discussions compelled students to give more serious thought to the issues being discussed online and the effects the use of technology has on their learning behaviors. Another significant benefit of communicating via computer seemed to include individual development of thoughts and ideas, feeling part of an online community, gaining insights about different people and learning from each other. Students felt that by using the computers for online discussions, they could learn faster, become more creative and write better. They felt they had more control over their learning behaviors and more opportunities to practice their written English dialogue skills. As a result, the online discussions appeared to enhance their opportunities for learning. Participants in the online discussions seemed less apprehensive about evaluation felt less affected by wait time and other elements of traditional face-to-face interactions, thereby enabling consistent participation. Students who were shy or felt inhibited in face-to-face discussions, found a "voice" in online discussions and tended to participate more actively in these discussions.

7. DISCUSSION AND FUTURE WORK

The findings of the study indicated that online discussions are significantly and positively related to higher levels of individual perceived competence. In general, we found that individual perceived competence developed out of an innate desire to achieve success in the online discussions in this study. The positive relationship between online discussions and individual perceived competence could result in an increase in an individual's intrinsic motivation.

The results of the study indicated that the subjects found the tasks to be the most challenging. Expectations of personal efficacy determine whether an individual's coping behavior will be initiated, how much task-related effort will be expended and how long that effort will be sustained despite disconfirming evidence (Deng, Doll, & Truong, 2004; Stadjkovic & Luthans, 1998). The online discussions in our study seemed to emphasize the success-feedback loop quite well. When student were please with their efforts, especially when they saw improvement, they invested more effort. Improvement came through self-evaluation, practice and more evaluation. This enhanced success and perpetuated a positive learning atmosphere.

The findings in this study indicated that online discussions were found to lead to more positive feedback in the form of verbal praise. This indicates that individual feedback in the form of verbal praise was an important factor supporting individual intrinsic motivation. The online discussions seemed to encourage positive feedback offered by subjects in this study, by providing clear (quality rather than amount of) information about the success of their discussions.

Individual perceived choice was a significant factor supporting individual intrinsic motivation in online discussions. As such, an individual may invariably be intrinsically motivated in technology-supported contexts offering choice, whereas no-choice contexts may be

associated with decreased levels of individual intrinsic motivation. Clearly, different individuals have different preferences and certainly the more choices there are available, the more these individuals will be able to find and select alternatives that best match their personal preferences. Making choices in online discussions may also give a sense of autonomy, control and empowerment.

The findings also indicated that the online discussions were found to lead to a more positive perception of an individual's interest. Certain subjects may have had a more positive perception of their interest in the online discussions, as they may have been more motivated to do so across time and in different situations, so their behavior may have been intrinsically motivated and consequently, directed by a deep, long-lasting interest that emanated from within (Renninger, 2000).

Online discussions were also found to lead to a more positive perception of an individual's curiosity. Subjects seemed to derive pleasure from the online discussions, as this provided them with a level of surprise, conflicting discrepancy and novelty. Designing technologies to stimulate curiosity is about designing effective strategies that are more appropriate for existing and available technologies. It is imperative to address an individual's differences in his or her pre-disposition to be curious when presented with novel, incongruous, complex and unfamiliar stimuli (factors that stimulate curiosity). This is especially relevant in designing interactive learning environments, such as online discussions that could extend an individual's state of curiosity into what Csikszentmihalyi (1988) refers to as flow - where just the right amount of stimulation leads to intrinsic motivation.

For future research, we strongly suggest investigation of the various aspects of Malone and Lepper's individual intrinsic motivation types such as fantasy, playfulness and control (Malone & Lepper, 1987). Valuable information can be garnered from such research. For instance, Malone and Lepper (1987) mentioned that, the extent to which individuals are treating technology systems, "Not as tools to achieve external goals, but as toys to use for their own sake," increases the fantasy and control aspect of the system, thus increasing intrinsic motivation. By redesigning these environments in which fantasy and control are present, in an intrinsically appealing way, higher levels of motivation could result, along with more time spent interacting with the technology.

Future comprehensive research designs may require attention to be paid to both environmental and individual variables. One environmental dimension, understudied but with likely implications for individual intrinsic motivation, is the social environment. Social information processing (Salancik & Pfeffer, 1978), may affect individual attitudes and responses and has been shown along with objective task characteristics, to influence task perceptions and task behavior (Griffin, Bateman, Wayne, & Head, 1987). Opinions of in-groups may undermine intrinsic motivation or be a source of it, perhaps with more impact in collectivistic, rather than in individualistic cultures (Iyengar & Lepper, 1999).

Future research may also benefit from using other sources of data such as, computer file exchange, electronic meeting logs and online discussion transcripts. Data could be

analyzed in relation to specific key participants, settings, behavior and activities, relevant to the theoretical framework and the emergent interests and outcomes. Additionally, other dependent variables, such as fantasy (Malone & Lepper, 1987; Parker & Lepper, 1992) and control (Harter & Connell, 1984), referred to earlier and creativity (Amabile, 1996), relevant to assessing the effects of online and face-to-face discussions on factors supporting individual student intrinsic motivation, could also extend the scope of future studies.

The above suggestions for future research could potentially build upon our results, because such research may be essential in order to improve our understanding of the effects of online and face-to-face discussions on factors supporting individual student intrinsic motivation. For example, the results of this study can be used as base-line data for future studies. In addition, the results garnered from this study may also enable the development of improved methods of integrating technology into the classroom environment and consequently be used as a knowledge construction tool in which individual students work together in a collaborative setting. Such a learning environment allows students to actively discover their own thought processes and apply new knowledge appropriately.

8. CONCLUSION

In our research, six types of individual factors were examined - perceived competence, perceived challenge, feedback, perceived choice, perceived interest and perceived curiosity. The findings from our study reveal that there is neither an exclusive list of influential factors nor a universal model for all situations supporting individual student intrinsic motivation in technology-supported environments. What this study endeavors to contribute, instead, is to construct a framework that illustrates a holistic approach integrating individual-level constructs and establishing a model that describes the effects of these factors in online discussions.

Our study of assessing the individual-level factors supporting student intrinsic motivation in online discussions is significant to future reviews, undertaken to study the Motivation Theory and its research and application. Intrinsic motivation represents a generalized tendency to be active in an individual's encounters with the environment. As we have demonstrated in our literature review of this paper, intrinsic motivation is based on the self-determining needs for competence, autonomy and relatedness (Reeve, Deci, & Ryan, 2004; Ryan & Deci, 2004). Evidence from prior research, indicates that the intrinsically motivated activity that an individual participates in, tends to be associated with increased cognitive flexibility and higher self-esteem, compared to an externally controlled activity (E. L. Deci & Ryan, 1992).

In the course of this study, examining technology-supported classroom contexts and integrating the findings into theory and research was a challenging task. However, findings from the qualitative research were able to unravel which factors supporting individual student intrinsic motivation in online discussions, may significantly enhance student intrinsic motivation in technology-supported learning

environments. The disparity between online and face-to-face discussions will narrow in the future as technology advances and students feel less inhibited (and have more control) in its use (Vogel, Shroff, Kwok, & Coombes, 2002). We have seen that online discussions (i.e. synchronous communication technology) provide unlimited opportunities for quick exchange of ideas, while asynchronous communication technology affords users more time to analyze and prepare contributions, as a result of the self-paced nature of the medium (Bonk, Fischler, & Graham, 2000). Online discussions may also facilitate a more inclusive environment, by providing more opportunities for equal participation and collaborative learning than traditional face-to-face discussions, thus enabling shy or reluctant students to communicate more comfortably with their peers. This presents a more egalitarian environment than the traditional face-to-face discussions.

The use of interactive technologies may provide educators a valuable guide for designing technologies that considers principles of all three pedagogies where the individual learner may find him or herself in an environment that both instructs about subject matter and encourages him/her to construct knowledge from subject matter more meaningfully and effectively than ever before (Bendar, Cunningham, Duffy, & Perry, 1992). As such, these social interactions have the potential to enhance individual construction of knowledge by engaging the individual learner in activities that are interesting, challenging but not too difficult, arousing his or her perception of curiosity, permitting him or her to make decisions and allowing him or her to exercise control in terms of setting his or her own pace in the technology-supported online activities (T. Duffy & Jonassen, 1992; T. M. Duffy & Cunningham, 1996).

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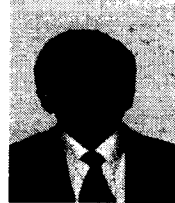
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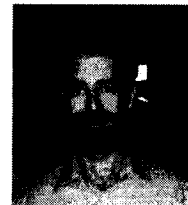
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APPENDIX

Student Interview Protocol

For Case Study on intrinsic motivation in online learning

(Note: Interviews will be conducted with FB2501 students. This document focuses on the student interview protocol)

[Interviewer Note: As the opening of the interview, the interviewer will introduce himself and provide a brief idea of the interview objective]

[Interviewer Note: The following demographic and general questions will be used to provide additional background and engage the interviewee in talking about the topic area]

Demographics

Personal information (introduction icebreaker)

- a. Can you give me a brief overview of yourself?
- b. What general aspects of education do you find most interesting?

The course in general

1. In general, why did you choose to study this course?
2. What are your course expectations?

[Interviewer Note: The type of learning activity to be examined within the FB2501 course is the online discussions using "Virtual Classroom" of "Blackboard™". The following sections strive to examine the use of the "Virtual Classroom" relative to the theoretical constructs underlying this interview.

Perceived Competence

3. How competent did you feel when engaged in the online discussions?
4. To what extent did you feel you were skillful in the online discussions?

Challenge

5. To what extent did you feel the online discussions were challenging to you personally?
6. What kinds of difficulties/problems did you encounter in the online discussions and were you able to overcome them?

Feedback

7. To what extent do you think the other group members provided effective feedback in the online discussions?
8. Did you find the feedback provided by the group members useful to you and if so in what ways?

Perceived Choice

9. How much choice did you feel you had in the online discussions?
10. To what extent could you choose when and what to discuss in the online discussions?

Interest

11. What kinds of things captured your interest in the online discussions? Could you please provide an example?
12. How effective were the online discussions in creating interest in the subject?

Perceived Curiosity

13. Did the online discussions arouse your curiosity about the topics being discussed?
14. Did the online discussions encourage you to probe and explore a variety of issues you might not have otherwise considered? What are some specific examples?

[Interviewer Note: the focus of the following section would be to get some specific feedback related to technology support that may inhibit or encourage intrinsic motivation]

Technology Support

15. Overall, how self-motivated were you in the online discussions? Can you provide some specific examples
16. How effective were the online discussions in assisting you in your learning?

Final Comments

17. Are there any other things you would like to add or comment upon?



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