The book introduces the definitions of attitudes and epistemology and their related theories. Further, it provides an investigation on attitudes toward computer and internet usage as function of gender, field of study, ethnicity and age. Furthermore, it explores the relationship between attitudes toward ICT and epistemological beliefs among postgraduate students in Malaysian context. This book also, provides empirical evidences related to the relationships between attitudes toward ICT usage and epistemological construct and other demographical variables. Results reveal that: (1) participants have a high level perception of the usefulness and their control of the computer and Internet, (2) no significant differences were found between participants’ attitudes toward the Internet and computer related with gender, field of study, and ethnicity, (3) postgraduate student’s attitudes toward computer and Internet usage are age related, and (4) the findings affirm that the postgraduate students’ attitudes toward the Internet and computer usage are associated with their epistemological beliefs. These findings can be useful for scholars, instructors, students and decision makers.

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Personal Epistemology as Predictor of Attitudes toward ICT Usage

Epistemological Beliefs, Attitudes toward ICT
Nabeel Abedalaziz

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Chapter One
Epistemology and Attitudes

Introduction

Information and Communications Technology (ICT) is becoming increasingly widespread, influencing many aspects of our social and work lives, as well as many of our leisure activities. For instance, ICT dexterities constitute a major part of educational programs (Thomas & Stratton, 2006). In many developed countries, nearly all schools are equipped with the infrastructure to conduct ICT mediated teaching and learning. In Malaysia, the main goals of the Ministry of Education (MOE) in implementing ICT in the education system is to position ICT as a teaching and learning tool, to increase the productivity, efficiency and effectiveness of the management system. To achieve these goals, it is important to ensure students and educators are able to integrate ICT into their teaching and to enable them to adapt their environment and adjust their instructional approaches (Zhang & Espinosa, 1997). Some studies reveal that using ICT consistently develops more positive attitudes toward computers usage (Delcourt & Kinzie, 1993; Birisci, Metin, & Karakas, 2009; Teo, 2008). So the most important factor that affects teachers’ attitudes toward using information technologies in the classroom could be gaining of more positive attitudes. If teachers’ attitudes toward ICT are negative, they would not want to use ICT in the teaching and learning process. In particular, Kersaint et. al., (2003) have shown that the successful implementation of educational technologies depends largely on the attitudes of educators, who eventually determine how they are used in the classroom. Bullock (2004) found that educators’ attitudes are a major influence in the adoption of technology for teaching and learning.

The advent of technology and information systems and their importance in economic development has caused nations to create a more technologically literate workforce. Malaysian government implemented the first computer system in 1966. Since then, the Government has introduced various initiatives to facilitate the greater adoption and diffusion of ICT to improve capacities in every field. Malaysia also has a long-term vision, usually referred to as “Vision 2020” which calls for sustained,
productivity-driven growth, which will be achievable only with a technologically literate, critically thinking workforce prepared to participate fully in the global economy of the 21st century (Foong-Mae, 2002).

Malaysia plans a more widespread use of computers and related Information and Communications Technology in educational areas to ensure that graduating students are proficient in the use of such technology. To achieve this objective, the Malaysian government has formulated plans to improve the education system through the implementation of “smart schools.” Smart schools facilitated with multimedia technology and worldwide networking. The curriculum for these schools is to be individually-paced and include self directed learning experiences (i.e. student-centered), and open-ended curriculum (Ministry of Education Malaysia, 1999). In addition to the Smart School project, the Ministry of Education is also attempting to reduce the digital gap that exists in the different parts of the country by providing computer laboratories to thousands of schools. Other ICT-related projects involved the training of teachers, school administrators and other school staff. Innovative projects like the use of electronic books and e-learning are also being piloted to ensure their feasibility before any roll-out to all the schools in the country. Non-governmental agencies are also very much involved in the drive to introduce ICT into schools (Foong-Mae, 2002). Moreover, Malaysian teacher training objectives are all directed towards developing the skills of teachers to use ICT in teaching and learning processes (Tasir et. al., 2012).

The Ministry of Education has formulated three main policies for ICT in education. The first policy is that of ICT for all students, meaning that ICT is used as an enabler to reduce the digital gap between the schools. The second policy confirms the role and function of ICT in education as a teaching and learning tool, as part of a subject and as a subject by itself. ICT as part of a subject refers to the use of software in different subjects. ICT as a subject refers to the introduction of subjects such as “Information Technology” and “Computerization”. The third policy emphasizes using ICT to increase productivity, efficiency and effectiveness of the management system. ICT will be extensively used to automate and mechanize work processes
such as the processing of official forms, timetable generation, and management of information systems, lesson planning, financial management and the maintenance of inventories (Foong-Mae, 2002).

The Ministry of Education is committed to utilizing the following multi-pronged strategies to ensure that the objectives of ICT in education are achieved: preparation of sufficient and up-to-date tested ICT infrastructure and equipment to all educational institutions, roll-out of ICT curriculum and assessment and emphasis the integration of ICT in teaching and learning, upgrading of ICT knowledge and skills in students and teachers, Increased use of ICT in educational management, and upgrading of the maintenance and management of ICT equipment in all educational institutions (Ministry of Education Malaysia, 1999; Foong-Mae, 2002). In near future, every student will have access to a 4G network in school through 1BestariNet which serve as virtual learning platform that can be used by teachers, students and parents to share learning resources, run interactive lessons and communicate virtually (Malaysian Education, 2012).

Accordingly, all higher education institutions in Malaysia will be affected by these developments including the faculty of education at university of Malaya. The faculty must also be computer literate and competent enough to use those technologies that are available and to become innovative and receptive to change by knowing the strengths and the limitations of the technological tools available. While ICT receives wider acceptance in the field of education than in other fields, some teachers still exhibit a certain degree of anxiety toward ICT usage as a tool to be used in the fields of education and learning (Orhun, 2002; Albion, 2003). If high level of anxiety, low level of self-efficacy, and low level of attitudes toward ICT usage exist among postgraduate students they may choose not to use this computer technology even though they believe that ICT usage will lead to improve teaching and learning processes (Delcourt & Kinzie, 1993). For instance, faculty of education at university of malaya is now obligated to be knowledgeable and confident of their ability to use the new emerging computer technologies to deliver instruction more efficiently and
effectively. However, little is known about the characteristics of the postgraduate student’s attitude toward ICT usage.

The strong relationship of ICT related attitudes and ICT usage in education has been documented in many studies (e.g., Myers & Halpin, 2002; van Braak, 2001). For instance, Myers and Halpin (2002) argued that a major reason for studying teachers’ attitudes towards ICT is that it is a major predictor of classroom ICT usage. Attitudes towards ICT influence teachers’ acceptance of the usefulness of technology, and also influence whether teachers integrate ICT into their classroom (Clark, 2001). Huang and Liaw (2005) also state that among the factors that affect the successful usage of ICT in the classroom, teachers’ attitudes toward computers play a key role. For instance, van Braak et al. (2004) also supported that class use of computers was strongly affected by attitudes toward computers use in education. Taking the importance of attitudes toward computer into consideration, it is also important to understand what influences postgraduate student’s attitudes towards computers (Fisher, 2000). With this in mind, there is a need to assess postgraduate student’s attitudes toward ICT usage, and exploring factors relating to postgraduate students’ attitudes towards ICT.

Attitudes Formation

An attitude refers to one’s positive or negative judgment about a concrete subject. Attitudes are learnt; they are moldable and may change with experience of the stimulus objects and with social rules or institutions (Binder & Niederle, 2007). More recent research indicates that attitude represents a summary evaluation of a psychological object and is described both internally and externally in dimensions such as good-bad, likeable-dislikeable, harmful-beneficial, pleasant-unpleasant (Ajzen & Fishbein, 2000; Eagly & Chaiken 1998). Ajzen (1988) described an attitude as a predisposition to respond favorably or unfavorably to an object, person, or event. As implied in this definition, attitudes possess cognitive (beliefs, knowledge, and expectations), affective (motivational and emotional), and performance (behavior or actions) components. In their study of undergraduate student’s attitudes towards their use and engagement of ICT interactions, Siragusa
and Dixon (2008) indicated that attitude connotes a subjective or mental state of preparation for action. Attitudes find their roots in our beliefs and they influence our behavior. They represent the way in which we view the world and organize our relationships. Attitudes are literally mental postures and guides for conduct to which each new experience is referred before a response is made.

Attitudes toward ICT usage have been defined as a person’s general evaluation or feeling towards ICT and specific computer and Internet related activities (Smith, Caputi, & Rawstone, 2000). The learner attitude towards computer measures a person’s capabilities in effective learning. Garland and Noyes (2005) indicated that in the educational context, confidence should lead to more positive attitudes toward computers and Internet, and this will enhance learning and associated activities. Attitude, in turn, constitutes various dimensions. Some examples of these are perceived usefulness, computer confidence, anxiety, and liking. Rogers (1995) identifies four main attributes of technology that affect its acceptance and subsequent adoption: relative advantage, compatibility, complexity and observability. These attributes are investigated as a predictor in determining educators’ attitudes toward ICT.

**Theories of Attitudes**

1. **Theory of Reason Action (TRA)**

   The Theory of Reason Action (TRA) proposed by Fishbein and Ajzen (1975) postulates that an individual's behavior is determined by his/her intention to perform that both behavior and intention are influenced jointly by the individual's attitude and subjective norm (figure 1). According to Ajzen and Fishbein (2005) behavioral intentions are thought to result from beliefs about performing the behavior. The central premise of the model concerns the group of effects that start with the development of behavioral, normative and control beliefs. These in turn directly influence the formation of an attitude towards the behavior, the subjective norm and perceived behavioral control which then produces intention (to behave) and the behavior itself. Individuals who utilize this process are said to have engaged in reasoned action (Ajzen and Fishbein, 2005). While it is understood that shortcuts can
be made in this process, it is also accepted that over certain periods of time, attitudes, norms, perceptions of control and intentions are rehearsed and therefore become readily accessible to each individual. In this way a previously formed attitude towards interacting with technology for example, can be readily accessed without the need to debate all perceived advantages and disadvantages of doing so (Siragusa & Dixon, 2008). Fishbein and Icek Ajzen, believed two factors played a part in determining whether or not a person would perform a given behavior: 1) personal attitudinal judgments, this being one’s attitude toward the behavior, and 2) social-normative considerations, meaning what one believes others think about performing the action. Finally, Ajzen (1991) added a new construct to the TRA. This construct is the concept of perceived behavioral control which resulted in the Theory of Planned Behavior (TPB).

![Visual model for TRA theory](image)

**Figure 1: Visual model for TRA theory**

2. **Theory of Planned Behavior (TPB)**

The Theory of Planned Behavior (TPB) (see figure 2) as initially designed by Ajzen and Fishbein (1980) attempts to understand peoples’ intentions to engage in a number of activities. It appears that the application of the theory of planned behavior deals with the antecedents of attitudes, subjective norms, and perceived behavioral control. These antecedents determine intentions and actions. Human action is influenced by attitude towards the behavior, subjective norm and perceived capability to perform the behavior. In combination, attitude, subjective norm and
perceived behavioral control lead to the formation of a behavioral intention. In
general, the more positive the attitude towards performing the behavior, along with
substantial levels of social pressure to do so and perceived control over one’s actions,
the more likely the individual is to carry out the behavior. Often behaviors pose
difficulties with regard to execution. In this way it is useful to consider perceived
behavioral control in addition to intention. Depending on how realistic people are in
their judgments of the level of difficulty associated with behaviors, a measure of
perceived behavioral control can serve as a proxy for actual control and as such can
contribute to the prediction of the behavior in question. When applied to the
engagement with ICT, TPB suggests that intentions to engage and interact with a
particular ICT activity influenced by attitudes towards ICT usage (Fishbein & Ajzen,
2010; Ajzen & Fishbein, 1980).

3. Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) developed by Davis (1989) developed to
explain perceived technology usefulness and usage intentions by taking into account
social influence and cognitive processes. In its simplest 1989 form, Davis devised a
scale that produced measures on two factors, ease of use and perceived usefulness.
Scores on these two sub-scales have been shown to correlate with the use/acceptance
of technology, particularly in information systems (Davis, 1989).
TAM suggested attitude influences behavioral intention to use, and subsequent actual use. TAM also includes the constructs of perceived usefulness and perceived ease of use. Perceived usefulness is the extent to which a person believes that using a system will enhance their performance, whilst perceived ease of use is the extent to which a person believes that use of the system will be free from effort. These two constructs have an important impact on a person’s attitude toward using the ICT but, unlike the TRA, Davis found that attitude did not completely mediate between beliefs and intentions; this suggests that an individual could hold negative attitudes to a system, but would still use it because it has high-perceived usefulness (see figure 3).

Although the TAM model has evolved, the attitude towards behavior, subjective norm and behavioral intention components are common to both TAM and TRA models, acknowledging that attitude and subjective norms have an influence on the intention to use ICT leading to their actual use of ICT. The development of the Theory of Planned Behavior (TPB) (Azjen, 1985), which was developed from the TRA, led researchers to consider the use of the TPB for predicting people’s behavior towards technology use. Mathieson (1991) suggested that, while TAM is useful for gathering general information about people’s perception of a system, TPB can provide detailed information regarding each of its components that might relate to a specific group of people. The TRA and the TPB have continued to be employed and adapted by researchers to predict behavior towards ICT usage. Despite the wide application of the TRA & TPB these theories have been criticized. Both TRA and TPB are theories that predict behavioral intention and behavior but do not necessarily explain behavior change.
4. Self-Determination Theory (SDT)

*Self-Determination Theory (SDT)* is a psychological theory that aims at explaining psychological factors that promote well-being and development across various life activities (Ryan and Deci, 2000). *SDT* strongly emphasizes the influence of self-motivation on the behavioral regulation process which, in turn, affects behavioral outcomes. *SDT* focuses on the three motivational needs of autonomy, competence and relatedness. Autonomy concerns the individual feeling in control of their own actions, competence is effectiveness of the individual in the environment and relatedness is the need to feel connected to others, such as teammates or teachers (Deci & Ryan, 1985). *SDT* therefore reflects perceptions that arise from the individual’s interactions with the environment in which technology is used (Rob et al., 2012). Furthermore, *SDT* postulates that there are relationships among motivation, behaviors, and behavior outcomes. Typically, motivation is classified into two main classes: intrinsic and extrinsic. Intrinsic motivation refers to the drive to perform a behavior based on the enjoyment and satisfaction of a specific activity while extrinsic motivation refers to the drive to perform a behavior to attain specific goals. Intrinsic motivation relates to self-determined behavior which in turn enhances performance and leads to continuance of behavior. *SDT* extends the extrinsic motivation concept by relating it to the extent to which the behavioral regulation process is autonomous.
Roca and Gagne (2008) investigated the use of e-learning using an integration of TAM and self-determination theory (SDT). To the combination of TAM and SDT they added the construct of playfulness, which is about enjoyment in using the system (Rob et al., 2012). Their combined TAM/SDT model suggests that perceived autonomy, perceived competence and perceived relatedness exert a direct effect on perceived usefulness and perceived playfulness, which jointly with perceived ease of use are the most important influences upon e-learning regarding continuance of intention and use.

5. Expectancy-Value Theory of Achievement Motivation (EVAM)

The Expectancy-Value Theory of Achievement Motivation (EVAM) (Wigfield & Eccles, 2000) argues that an individuals’ choice, persistence and performance can be explained by their beliefs about how well they will perform an activity (expectancy) and the extent to which they value this activity (value). Motivation is the product of individuals’ expectancy and the individual’s value appraisal about a specific behavior. According to the EVAM, both expectancy and value are influenced by internal and external variables and processes (Pintrich & Schunk, 1996). The EVAM model stress at the one hand internal cognitive processes related to their perceptions of the way the external context reacts to their (present and future) behavior. Secondly the cognitive processes include the attributions that explain – according to the teacher – their success and/or failure to perform a specific behavior. The authors of the model position – on the other hand – a connected set of motivational beliefs that determine the value and expectancies in relation to behavior; such as ICT adoption and use in school. These motivational beliefs comprise affective memory, goals, the self concept and perceptions about the task (e.g., difficulty level). Next, self concept refers to a series of self efficacy beliefs and as such to the extent – postgraduate students in our case – perceive themselves as being able to carry out certain task, to adopt new behavior, to be involved in innovations, etc. (Wozney, Venkatesh, & Abrami, 2006). The latter competency judgments have been intensively studied under the umbrella of studies related to general and specific teacher beliefs. In line with the model of Clark and Peterson
(1986), the model of Wigfield and Eccles also stressed the reciprocal nature of their model. The motivational variables can both be considered as results and causes of behavior (see figure 4).

![Diagram](image)

**Figure 4**: A social Cognitive Expectancy-Value Model of Achievement Motivation (Wigfield & Eccles, 2000).

### 6. Teacher Thoughts and Action Process Model (TTAP)

*The Teacher Thoughts and Action Process Model (TTAP)* (Clark & Peterson, 1986) builds on two areas that play a role in the teaching process: (a) unobservable teacher thought processes (teacher planning, teachers’ interactive thoughts, teachers’ theories and beliefs) and (b) teachers’ actions and their observable effects (teachers’ classroom behavior, students’ classroom behavior and student achievement). The TTAP model helps to explain the mutual relationship between teacher thought processes and related teacher behavior. The TTAP model indicates the importance of internal processes as precursors of specific teaching activities. The actual behavior (and its effect in the environment) will also affect teacher thoughts. The TTAP assumes that teacher thoughts are varied and the interplay between the different teacher thoughts has to be taken into consideration (Clark & Peterson, 1986) (see figure 5).
7. The Self-Efficacy Theory (SET)

Self-efficacy Theory, derived from social cognitive theory (Bandura, 1986) explains individual behavior across life domains. Self-efficacy refers to an individual’s belief in his or her ability to successfully perform a specific behavior. Early research defined computer self-efficacy construct as “an individual judgment of one’s capability to use a computer” (Compeau & Higgins, 1995, p. 192). Marakas et al. (1998) proposed that computer self-efficacy operates at two interrelated levels: the general computing behavior level and the specific computer task or application level. General computer self efficacy refers to “an individual’s judgment of efficacy across multiple computer domains” (p. 129) while application-specific self-efficacy refers to “an individual’s perception of efficacy in performing specific computer-related tasks within the domain of general computing” (p. 128).

To sum up, the previous theories and models postulate that teachers’ behavior is associated with behavioral intentions to adopt and use ICT. That is to say, teachers’ decisions to (intend to) use ICT in their classroom teaching may be related to (a) teachers’ cognitive processes (e.g., their perceptions); (b) teachers’ attitudes towards ICT; (c) teachers’ aims (e.g., goal orientations); (d) teacher’s competency judgments as they are expressed via general and/or specific beliefs. TAM model suggests a causal pattern where perceived ease of use predicts perceived usefulness, which in turn predicts use. Additionally, usefulness is more strongly linked to usage than ease of use is linked to usage. This suggests users will put up with some difficulty in use, if the system provides some critical function. These theories have resulted in a useful conceptual framework which has at its centre the roles of beliefs, attitudes, norms, perceived behavioral control and intentions as crucial indicators of particular
behaviors. Reasoned action is best described as a process by which an individual arrives at an intention.

The TRA is appropriate when the behavior being studied is under the volitional control of the individual (Ajzen, 1988; Ajzen & Fishbein, 1980). As proposed by Ajzen and Fishbein (1980), external variables are related to behavioral intentions and behavior only through their impact on the behavioral and normative beliefs. Thus, an individual does not perform a particular behavior because of personality traits, attitudes toward people, or demographic variables such as cultural background. Instead, an individual will perform or not perform a particular behavior because of the traits or constructs specified in the theory (Ajzen & Fishbein, 1980). In another hand, The TPB is appropriate for use when the behavior being studied may not be completely under the control of the individual for a variety of reasons. Otherwise, the two models are similar.

Also, there are a number of alternative models of user acceptance of technology such as the motivational model (Vallerand, 1997) and innovation diffusion theory (Rogers, 1995).

Epistemological Beliefs

Beliefs influence a variety of cognitive processes and, ultimately, learning (Muis & Foy, 2010). That being said, it is necessary to define the term belief. According to Pajares (1992):

“As such belief is viewed as knowledge of a sort. All human perception is influenced by the totality of this generic knowledge structure – schemata, constructs, information, beliefs – but the structure itself is an unreliable guide to the nature of reality because beliefs influence how individuals characterize phenomena, make sense of the world, and estimate covariation”. (p. 310)

Calderhead (1996) pointed out that beliefs generally refer to “suppositions, commitments, and ideologies,” knowledge refers to “factual propositions and understandings” (p. 715). Pajares (1992) in his review, labeled individuals’ beliefs a “messy construct,” noting that “the difficulty in studying teachers’ beliefs has been
caused by definitional problems, poor conceptualizations and differing understandings of beliefs and belief structures” (p. 307). Unfortunately, there is a lot of confusion in the literature regarding both the labels and definitions used to describe individual’s beliefs. Despite the conceptual confusion, beliefs could be as varied as teaching itself and reflect issues related to learners (e.g., beliefs about inclusion, about diversity), knowledge (epistemological beliefs), teaching components (beliefs about the curriculum, beliefs about what learning content is important, beliefs about instructional media, teaching strategies, evaluation, etc.), parents, instructional context and organisational dimensions (Tondeur, Devos, Van Houtte, van Braak, & Valcke, 2009). A belief is a representation of the information someone holds about an object, or a “person’s understanding of himself and his environment” (Fishbein & Ajzen, 1975, p 131). Beliefs and beliefs system serve as personal guides in helping individuals define and understand the world and themselves (Pajares, 1992). Also, the nature of teacher beliefs has been characterized in terms of affective, evaluative, and episodic processes (Van Driel, Bulte & Verloop, 2007).

The term “beliefs” is used in an interchangeable way with concepts as conceptions (Erlwanger, 1975), a philosophy (Ernest, 1991), an ideology, a perception and a world view (Schoenfeld, 1985). Other researchers refer to ‘principles of practice’, ‘personal epistemologies’, ‘perspectives’ and ‘practical knowledge’ or ‘orientations’ (Kagan, 1992). “Beliefs cannot be directly observed or measured but must be inferred from what people say, intend and do” (Parajes, 1992, p. 314). It is therefore not surprising that Pajares considered it to be a “messy concept” (1992, p. 307). Because beliefs can not be directly observed and have to be inferred from behavior or teacher statements, it is difficult to put forward a precise definition of beliefs (Leder & Forgasz, 2002). Since beliefs reside in an individual's mind, they are often referred to as implicit beliefs (Epler, 2011). Muis and Foy (2010) pointed out that epistemological beliefs often function as an implicit belief.

Generally, “epistemology is a branch of philosophy concerned with the nature and scope of knowledge” (Edwards, 1967). Educational psychologists identify
epistemology in numerous ways. Personal epistemology can be divided into three major Epistemology from a developmental perspective is “a structure in which individuals construe the nature and origins of knowledge, of value, and of responsibility in a sequential and logical process” (Perry, 1970). Although the perspectives on epistemology are totally different, researchers usually examine individuals’ epistemic beliefs, “including beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs” (Hofer, 2001).

Personal epistemology is now a popular strand of research that examines students’ beliefs about the nature of knowing and knowledge (Hofer, 2002, 2004; Schraw & Sinatra, 2004; Sinatra & Kardas, 2004). There are currently different views regarding the nature of epistemological beliefs. Whereas some propose that beliefs about learning are particular kinds of epistemological beliefs or even precursors to students’ beliefs about knowledge (Schommer-Aikins, 2004), recent research generally considers epistemological beliefs as pertaining to beliefs about the nature of knowledge and knowing (Hofer, 2002, 2004).

In general, research on personal epistemologies is thriving, with alternative theories being advanced and tested and a new measurement tools being developed. The steady increase in the number of researchers investigating this topic suggests that ideas about epistemologies and epistemological development will play an important role in theorizing about how people learn and reason.

In conclusion, epistemological beliefs, historically the province of philosophers, concerns the origin, nature, limits, methods, and justification of human knowledge. From a psychological perspective, personal epistemology refers to individual conceptions of knowledge and knowing and how people develop, interpret, evaluate and justify knowledge (Hofer & Pintrich, 1997, 2002). Knowledge and knowing appear to develop in a patterned sequence across the life span. Understanding the trajectory of epistemological development and how it relates to learning and education can be useful for teachers, students, and educational researchers.
Theories of Epistemological Beliefs

Epistemic literature provides three different studies about epistemological beliefs including developmental models, a system of beliefs and alternative concepts. Developmental models provide the concept that students are in different stages based on their personal assumptions (Baxter Magolda, 1992; Belenky et al., 1986; King & Kitchener, 1994; Kuhn, 1991; Perry, 1970). Arguing unidimension and fixed sequential stages, Schommer proposed a system of beliefs that is composed of several more or less independent dimensions (Schommer-Aikins, 1990). Epistemological theories and epistemological resources appeared to examine the structural nature of epistemology. Epistemological theories suggested that the nature of knowledge including certainty of knowledge and simplicity of knowledge, and the nature of knowing including the source of knowledge and justification of knowledge (Hofer & Pintrich, 1997). Epistemological resources suggested by Hammer and Elby (2002) provided the concept that epistemology is viewed as consisting of fine-grained and context-specific epistemological resources.

In an early work, Schommer (1990) was the first who looked at the epistemological beliefs in more or less independent dimensions. She viewed epistemological beliefs as a multidimensional construct composed of relatively independent beliefs about the nature of knowledge and nature of learning. Nature of knowledge aspect is examined in terms of the knowledge’s structure and source. The structure of knowledge refers to whether it has simple or complex and absolute or tentative nature. The source of knowledge refers to whether the knowledge is coming from an authority or from reasoning. Nature of learning aspect is examined in terms of speed of learning as either quick or gradual and in terms of one’s ability to learn something as either an innate ability which is viewed as fixed or something that can be improved through time. Based on this view, Cano (2005) stated that according to Schommer’s view, a student might have a sophisticated belief in one or more dimensions but not necessarily in others. For example, a person may believe that knowledge is complex and involves a complex network of ideas, and at the same time the same person may believe that knowledge is certain and never changes.
(Schommer & Walker, 1995). Accordingly, Schommer (1994) suggested five dimensions for epistemological beliefs including Simple Knowledge (Knowledge is simple or complex), Omniscient Authority (Knowledge is handed down by the authority or derived from reason), Certain Knowledge (Knowledge is certain or tentative), Innate Ability (The ability to learn is innate or acquired), and Quick Learning (Learning is quick or gradual). The multiple dimensional conceptualizations of epistemological beliefs have also been upheld by other researchers (e.g., Jehng, Johnson, & Anderson, 1993). Hofer and Pintrich (1997) suggested that “individuals’ beliefs about knowledge and knowing are organized into personal theories, as structures of interrelated propositions that are interconnected and coherent” (Hofer, 2001).

Because epistemological beliefs about knowledge and knowing influence learning and can even enhance teaching effectiveness, Hofer points out that the study of personal epistemology as a construct with educational implications is at a critical point in time (Hofer, 2001). Bear in mind that the study of personal epistemology is important because it is likely that it plays multiple roles in students’ learning and problem solving ability. If beliefs are formed as a result of the structure of instructional contexts, then it is important for beliefs to be addressed directly in classrooms, teacher education programs and professional development programs. Teachers and students must be made aware of beliefs that may influence learning outcomes. Many researchers have extensively discussed the structure of epistemological beliefs, which have resulted in a growing common understanding, but there are still some major points of discussion, especially, the lack of consensus on the nature of epistemological beliefs deserves attention (Op’t Eynde et al., 2006).

Nevertheless, even if there are multiple dimensions of epistemological beliefs, there is still debate about the nature of the dimensions (Conley et al., 2004). Schommer’s (1990) multi-dimensional theory of epistemological characterized epistemological beliefs as a set of “more or less” independent dimensions. Schommer hypothesized five dimensions of epistemological beliefs including: Stability (tentative to un-changing), structure (isolated to integrated), source (authority to
observation and reason), speed of acquisition (quick or gradual) and control of acquisition (fixed at birth or lifelong improvement).

More recently, Schraw, Bendixen, and Dunkle (2002) developed the Epistemic Beliefs Inventory (EBI) to measure dimensions similar to those proposed by Schommer (1990). In factor analyses of data from college students, the epistemological beliefs inventory (EBI) yielded five reliable factors that matched Schommers dimensions, which they labeled: Certain knowledge (stability), simple knowledge (structure), omniscient authority (source), quick learning (speed) and innate ability (control).

The Schommer’s dimensions were found to be somewhat problematic by Hofer and Pintrich (1997). Hofer and Pintrich (1997) have argued that the last two dimensions, quick learning (speed) and innate ability (control), are not epistemological dimensions, as they do not really focus on the nature of knowledge and knowing, but rather on the nature of learning.

Hofer and Pintrich (1997) have suggested that there are four general epistemological dimensions including certainty of knowledge (stability), simplicity of knowledge (structure), source of knowing (authority) and justification for knowing (evaluation of knowledge claims). In addition, these four dimensions represent two general areas: Beliefs about the nature of knowledge and beliefs about the nature of knowing. The beliefs about Certainty of Knowledge were explained as absolute truth exists with certainty and as knowledge is tentative and evolving. At the lower level of beliefs about simplicity of knowledge, knowledge is explained as discrete, concrete and knowable facts and at the higher level, knowledge is explained as relative, contingent and contextual. At level of less sophisticated beliefs about source of Knowledge, the individuals believe that knowledge originates outside the self and resides in external authority and at level of more sophisticated beliefs about source of knowledge, the individuals believe that knowledge is constructed by the knower in interaction with others. Justification for Knowing dimension examines how individuals evaluate knowledge (Hofer & Pintrich, 1997).
To sum up epistemological beliefs theory, there are various theoretical models used to conceptualize personal epistemology. These include developmental models, cognitive models, multi-dimensional models, resource models, domain specific models, and finally, integrated models. For more details (see, Wheeler, 2007; Epler, 2011).
Chapter Two  
Related Literature

A person’s attitude toward computer and internet use is influenced by a variety of aspects, e.g., computer confidence (Teo, 2008), computer anxiety or comfort (Bandalos & Benson, 1990), age and gender (Kutluca, 2010), subject area and years of computer usage (Teo, 2008), For instance, Cavas et. al. (2010) explored Turkish primary science teachers’ attitudes toward ICT in education and (then) the relationship between teachers’ attitudes and the factors related to teachers’ personal characteristics (gender, age, computer ownership at home and computer experience). The instrument (STATICTE) was developed by researchers and administered to 1071 science teachers. The results indicated that the Turkish science teachers have positive attitudes towards ICT; no gender differences have been traced in their attitudes toward ICT but differences were found in terms of their age, their computer skills (experience) and their ownership of computers at home.

Cultural differences in beliefs need to be taken into account when studying instructional interventions (Brennan, McFadden & Law, 2001). Different cultures and races generate different educational philosophies and beliefs. With this in mind, researchers have studied the appropriateness of adopting western measuring instruments to be used in non-western cultural contexts. For instance, Lin and Gorrell (2001) explored pre-service teacher efficacy in Taiwan and clearly argued that teacher efficacy and beliefs are largely shaped by culturally and values. Culture and context have also repeatedly been reported as obstacles to the integration of ICT in education (Chai, Hong, & Teo, 2009; Tearle, 2003). For instance, Chai, Hong, and Teo (2009) argue that culture plays a mediating factor that influences how teachers relate their beliefs to ICT usage.

Since the introduction of ICT related activities have been viewed as a ‘male domain’ (Panteli, Stack, & Ramsay, 1999). There is a significant body of evidence supporting the notion that gender plays a vital role in actual ICT integration. Previous study findings related to gender differences in attitudes towards computer and Internet are inconsistent. Some of the previous studies reported gender related
differences in attitudes toward computers favoring males (Loyd & Gressard, 1986; Blackmore et al., 1992; Al Jabri, 1996; Brosnan and Lee, 1998; Graff, 2003; Shashaani, 1993; Sainz et. al., 2010; Tsai, Lin, & Tsai, 2001). Whereas, other studies reported that gender related differences in attitudes towards computers favoring females (Adebowale et al., 2010; Avraham, 2005; Meelissen & Drent, 2008). For instance, Loyd and Gressard (1986) found male teachers to be more confident and less anxious toward computers usage compared to their female counterparts. In another study, Blackmore et al. (1992) found males appear to be more positive in their attitudes toward computers than females. On the other hand, Pope-Davis and Twing (1991), and Teo (2008) did not find statistically significant gender differences. Since technologies have become a normal part of the workplace setting, a number of researchers argue that computing should no longer be regarded as a male domain (King, Bond, & Blandford, 2002; North & Noyes, 2002). This emphasizes the need to reconsider the potential impact of gender in the context of attitudes towards ICT usage.

The findings from the literature related to the impact of age on attitudes toward ICT usage are mixed. A study of Internet use in an academic library environment found that older librarians were less likely to use the Internet (Rosenthal & Spiegelman, 1996). (Spacey, Goulding, & Murray, 2003) reported that younger workers had higher average intention to use the Internet and ease of use scores than their older counterparts. Positive perceptions of one's computer skills might relate to the familiarity younger workers have with ICT since it is used extensively at school, college and university. As Swann (2003) observes, “Information Communications Technology (ICT) is so recent that most people over the age of 28 have not had the benefit of computer training in their own schooling”. Dyck and Smither (1994) found a significant relationship between age and levels of computer anxiety. In another study, Czaja et. al. (2006) found out those older and middle-aged adults had lower self-efficacy with respect to use of computers and higher computer anxiety than did younger adults. In his study, Maurer (2001) discovered that older participants reported lower self-efficacy for career-related training, revealing age related declines
for specific efficacies. Conversely, Teo (2008) reported that pre-service teacher’s attitudes toward computer usage are age-unrelated, whereas participants in different subject domains (Humanities, Sciences, Languages and General (Primary)) differed in their perceptions of ICT usage.

Siragusa and Dixon (2008) conducted a pilot study to determine undergraduate student’s attitudes towards their use and engagement of ICT interactions. They employed a mixed methods approach with the intention of combining the strengths of both quantitative and qualitative paradigms. The students were asked to complete a questionnaire, individually work though a brief ICT interaction activity and then participate in an informal interview. The questionnaire gathered data on each on the components of the theory of planned behavior, which is commonly used psychological research, in order to determine the students planned use of ICT. While the collected quantitative data revealed that students believed that interacting with ICT was pleasant, helpful and easy, the qualitative findings showed that some experienced feelings of anxiety and intimidation when working through the ICT interaction. Planned follow up studies will continue to investigate the causalities and relationships between variables to determine likely influences on ICT interaction behavior.

Mohammad and Alkaraki (2008) indicated that previous studies related to Internet usage revealed: (a) low degree of Internet users in university learning, (b) high degree of Internet usage, (c) significant gender related difference in Internet usage, (d) no significant relationships between major and Internet use with scientific branches predominance, (e) significant relationships between the Internet attitudes and field of studies, (f) the impact of Internet tool in learning process and (g) the most important aspects of using Internet was e-mail.

Teachers' epistemological beliefs and their attitudes toward ICT usage are identified as the second-order barrier for the integration of ICT in the classrooms. Research that studied the relationships between teachers' epistemological beliefs and their perception of ICT use generally suggests that teachers who hold constructivist beliefs are more likely to engage their students to use ICT (Becker & Ravitz, 1999).
For instance, Wozney, Venkatesh, and Abrami (2006) found a positive relationship between teachers' use of ICT and their perceived value of ICT. In another study, Chi, Hong, and Teo (2009) indicated that the pre-service teachers' attitudes toward ICT use do not seem to be associated with their epistemological and pedagogical beliefs. Zhao, Pugh, Sheldon, and Byers (2002) indicated that a successful integration of ICT depends on the interrelationships among the school contexts, the key drivers (teachers) of the integration project, and the information technology involved. Specifically, when the technology chosen for implementation is compatible with the teachers' pedagogical beliefs, there is a higher chance for integration to occur. Fox and Henri's (2005) investigation of Hong Kong teachers' perspective on the use of ICT reveals that a perception towards the goal of education as producing good examination results will inhibit teachers' use of ICT. Teo, Chai, Hung, and Lee (2008) pointed out that teachers' beliefs in teaching and learning played a significant role in teachers' ICT usage.

A major reason for studying teachers' attitudes toward ICT is that it is a major predictor of future classroom ICT usage (Myers & Halpin 2002). Woodrow (1992) asserts that any successful transformation in educational practice and process needs the development of positive user attitude toward ICT. Also, Huang and Liaw (2005) stated that teachers' attitudes towards computers affect the successful usage of computers in the classroom. In empirical study, Van Braak, Tondeur, and Valcke (2004) supported that class usage of computers was strongly affected by attitudes toward computers in education. Furthermore, the strong relationship of computer-related attitudes and computer usage in education has been emphasized in many studies (Van Braak, 2001). For instance, Khine (2001) found a significant relationship between computer attitudes and its usage in the institution. Attitudes toward computers influence teachers' acceptance of the usefulness of ICT, and also influence whether teachers integrate ICT into their classroom teaching processes (Akbaba & Kurubacak, 1999; Clark, 2001). Taking the importance of attitudes toward ICT into consideration, it is also important to understand what influences
postgraduate’ attitudes toward ICT (Fisher, 2000). These attitudes are related to other internal and external variables (e.g. gender, race, age, field of study, experience).

Li (2002) have pointed to a wide range of factors affecting attitudes towards ICT. The variations in the factors identified by different researchers might be attributed to differences in context, participants and type of research. A large body of literature review further explored the relationship between attitudes toward ICT and demographic variables such as gender, field of study, race, age, academic rank, teaching experience, computer experience and computer training, which revealed some interesting findings. While there are general consistencies in many of the findings, it should be noted that researchers have not been conclusive in regards to the relationship between attitudes towards ICT and gender. Some studies revealed significant differences between attitudes toward ICT and gender, but others revealed no significant differences. It is hoped that this study will shed some light in regards to the inconclusiveness of such earlier studies. Moreover, it is also hoped that this study will serve as a foundation for other technological studies in Malaysia to further understand factors that may influence integration of ICT among educators. It is also hoped that this book investigation will open a new frontier to achieve the Malaysian government’s objective to be a fully developed country by the year 2020 and to provide a technologically skilled and qualified workforce.

Determining postgraduate students’ beliefs and attitudes toward computer and Internet usage is so important because most of the postgraduate students at University of Malaya and in other universities are teachers in schools and some of them will be teachers. Therefore, exploring their attitudes towards computer and Internet usage might help the decision makers at university of Malaya and others to evaluate students’ ICT usage and attitudes. Moreover taking the necessary procedures to enhance postgraduate students’ usage of ICT skills will facilitate their professional life and instruction. As such, assessment of students’ attitudes toward technology use in teaching and learning is important for future introduction of ICT materials in education.
In most cases, the teacher is key to effective ICT implementation in the educational system; given that teachers have tremendous potential to transmit epistemological beliefs and values to students, it is important to understand the biases and stereotypes teachers have about ICT usage and to investigate the variables acting as facilitators to teachers’ positive ICT usage (Teo, 2008). Among the variables affecting successful use of computers and the Internet in instruction are teachers’ attitudes towards ICT (Huang & Liaw, 2005).

Common findings in the research show that attitudes and beliefs are linked, attitudes and behavior are linked and attitudes are essentially likes and dislikes. The word attitude connotes a subjective or mental state of preparation for action. Attitudes find their roots in our beliefs and they influence our behavior. They represent the way in which we view the world and organize our relationships. Attitudes are literally mental postures and guides for conduct to which each new experience is referred before a response is made (Siragusa & Dixon, 2008).

According to Fishbein and Ajzen (1975), a person’s attitude towards an object is primarily determined by no more than five to seven beliefs that are salient at any given time. It appears impossible to obtain a precise measure of the beliefs that determine an individual’s attitudes, since the number of salient beliefs may vary from person to person. However an approximation can be obtained by considering the first few beliefs. Fishbein and Ajzen (1975) postulated that attitudes are inextricably linked to and based upon beliefs and the evaluative responses associated with those beliefs. Ajzen and Fishbein (2000) went further to infer that evaluative meaning arises spontaneously and inevitably as we form beliefs about an object. Each belief associates the object with a certain attribute which is embedded in context, culture and memory.

Miniard and Barone (1997) pointed out that beliefs are only one possible influence on attitudes. As mentioned in the related literature, how epistemological beliefs and pedagogical beliefs are related to the teachers’ attitude towards ICT use is not a well-researched area; therefore, these results need to be verified with further studies (Chi, Hong, & Teo, 2009). With this in mind, there is a need to examine post
graduate students’ epistemological beliefs, and how these beliefs are related to their attitude towards ICT use.

With respect to the use of information technologies and teacher beliefs, most studies remain theoretical and refer to the importance of the linkage between beliefs, teaching methods, teaching management and teacher attitudes toward computers (Chen, 2007). For instance, Li (2003) discusses the relationship between teachers’ beliefs and e-learning. He states that teachers’ beliefs play crucial roles in teaching activities and strategies related to e-learning. Li & Xie (2009) argue that it is important to improve teachers’ beliefs about, and attitudes towards information technology. Lü (2008) claims that the reason of lower level ICT integration can be explained by the low adoption of student-centered and constructivist teacher beliefs.
Chapter Three
Empirical Study

Introduction

Based on the related literature, and the previous theories and models, the present study assessed the participants’ attitudes toward various aspects of computer usage (i.e., affective, perceived usefulness, perceived control, and behavioral intention). In the present study, affective refers to feelings toward computers, perceived usefulness refers to individual’s beliefs about the usefulness of computers in their study, perceived control refers to perceived comfort level or difficulty of using computers, and behavioral Intention refers to behavioral intentions and actions with respect to computers (Teo, 2008). Likewise, attitudes toward Internet are a multidimensional factor (Tsai, Lin, & Tsai, 2001). In the present study, attitudes toward internet usage assessed in term of the perceived usefulness, emotional response and perceived control. Perceived usefulness refers to individual’s beliefs about the usefulness of internet in their study. Perceived control refers to perceived comfort level or difficulty of using internet. On the other hand, emotional response refers to the level of feelings and anxiety when using the Internet. In the present study, postgraduate student’s attitudes toward computer and internet usage investigated through gender, age, ethnicity, personal epistemology, and field of study. Furthermore, the present study investigated the relationship between attitudes toward computer and internet usage and personal epistemology (see figure 6).
Problem Statement and Hypothesis

To date, no specific related studies were found at international and local levels. Moreover no direct relationships between ICT attitudes and various demographic variables such as, ethnicity and field of study is found to be reported at national local levels as well. Furthermore, this study reports on the empirical evaluation of two standard scales to assess Malaysian postgraduates’ attitudes toward internet and computer usage. To date, no similar instruments have been empirically evaluated in Malaysian community. Most research on gender differences in use of the Internet has been done in western countries (Nai Li & Kirkup, 2007:302).

However, studies that explored the relationships between teachers' epistemological beliefs, pedagogical beliefs and attitudes’ towards internet and computer usage are generally lacking, especially in the Asian context. Obviously, this area warrants further research since epistemological beliefs are closely linked individual’s attitudes.

In the light of the related literature, there is a need to understand the dimensions that influence teacher attitudes toward ICT (computer and Internet) use as a function of gender, field of study, age, personal epistemology, and ethnicity.
Accordingly, the present study aimed at exploring the overall postgraduate students’ attitudes towards computer and Internet usage. Furthermore, the present study tested the following null hypotheses:

1. Postgraduate student’s attitudes toward computer and Internet usage would not be significantly related to gender.
2. Postgraduate student’s attitudes toward computer and Internet usage would not be significantly related to ethnicity.
3. Postgraduate student’s attitudes toward computer and Internet usage would not be significantly related to the field of study.
4. Postgraduate student’s attitudes toward computer and Internet usage would not be significantly related to age.
5. Postgraduate student’s attitudes toward computer and Internet usage would not be significantly related to epistemological beliefs.

Methodology

Participants were informed of their rights, provided an explanation of the purpose of the study, Those who chose to participate were given a packet that included a brief demographic survey, the computer attitudes scale (CAS), the internet attitudes scale (IAS), and epistemological beliefs inventory (EBI). Data was collected from the participants on a voluntary basis during the first semester of the 2011 academic year. At all occasions, the author was present throughout the data collection process. After a brief introduction to the research, the survey questionnaires were distributed to students. On the average, students took about 60 minutes to complete the survey forms. There were also no queries from the participants.

Therefore, this study is considered as a quantitative study with multi-factor multivariate design and correlational design. All analyses were conducted using SPSS 20.0 and AMOS 20.0. Traditional psychometric analysis of the CAS, IAS, and EBI included exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the dimensional structure of each scale followed by reliability analysis. Multi factors MANOVA analyses follow up by univariate analysis were
conducted to study the effect of various demographic variables as independent variables (i.e. gender, ethnicity, age, and field of study) on the CAS and IAS subscales scores as the dependent variables. Further, Multiple regression was used to assess the relationship between epistemological beliefs and postgraduate students’ attitudes toward computer and internet usage. Prior to regression analysis, regression assumptions have been tested.

Samples

The participants in this research were 289 postgraduate students enrolled in four educational master degree programs at university of Malaya (i.e., educational psychology and counseling, teaching English as a second language (TESL), educational foundations, and educational management). Of these, 155 were males and 134 were females. Students’ ages ranged from 24 to 53 (Mean= 31.45, SD= 6.76) years old. Table 1 shows the sample distribution by gender, race, and department (field of study).

<table>
<thead>
<tr>
<th>Table 1: Samples Distribution by Gender, Race, Department, and Economic Level</th>
<th>Number</th>
<th>Percentage</th>
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</thead>
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<tr>
<td>Gender</td>
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<td></td>
<td>Female</td>
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</tr>
<tr>
<td>Total</td>
<td>289</td>
<td>100</td>
</tr>
</tbody>
</table>

Instruments

This section provides a detailed description of the validation processes of two instruments used to measure postgraduates students attitudes toward internet and computer usage (i.e. Computer attitudes scale and Internet attitudes scale) Further, this section provides a detailed description of the validation processes of epistemological beliefs inventory.

1. Computer Attitudes Scale (CAS)

The computer attitudes scale (CAS) (Selwyn, 1997), was used to assess the attitude of students towards computer usage. The scale consists of 21 statements
representing attitude towards various aspects of computer (i.e., affective, perceived usefulness, perceived control, and behavioral intention). In the present study, affective refers to feelings toward computers, perceived usefulness refers to individual’s beliefs about the usefulness of computers in their study, perceived control refers to perceived comfort level or difficulty of using computers, and behavioral Intention refers to behavioral intentions and actions with respect to computers (Teo, 2008). Participants responded to the CAS using a five-point Likert scale of strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). Furthermore, the negative items were reverse coded.

Prior to analyzing data using factor analysis, data collected in this research went through Bartlett’s Test of Sphericity meant to measure the applicability of factor analysis. Kaiser-Meyer-Olkin measure of sampling adequacy recorded at.77 (> .5), hence it is good enough to use factor analysis in determining the number of factors to be retained and loading factors on the items.

Exploratory factor analysis (EFA) and principal component analysis with varimax rotation on the 21 items suggested four interpretable factors: affective (5 items), perceived usefulness (4 items), perceived control (4 items) and behavioral intention (4 items). Items loading more than ±.40 were retained on the relevant factor, and items loading less than ±.40 were omitted (Field, 2000). Thus, item analysis reduced the original 21 items to 17 items with four independent constructs. The results show that the factor loadings range between .47 and .88 on the affective subscale, between .53 to .69 on the perceived usefulness subscale, between .41 and .79 on the perceived control subscale, and between .51 and .77 on the Behavioral Intention subscale. The Eigen values of the first four factors from principal component analysis were larger than 1: 5.48, 3.49, 1.58, and 1.22 respectively. These four factors accounted for 58.82% of variance in the final version of the scale.

The behavior of individual items in relation to others within the same subscale provides good evidence for content validity because the highest factor loading is central to the domains assessed by these subscales (Francis, Katz, & Jones, 2000). The Cronbach alpha coefficients calculated for the affective, perceived Usefulness,
perceived control, and behavioral intention subscales were .77, .78, .77 and .78, respectively, and it was calculated to be .81 for the entire scale. The scale correlation coefficients ranged between .35 and .47 on affective, between .36 and .56 on perceived usefulness, between .34 and .62 on perceived control, between .41 and .61 on Behavioral Intention. It is generally agreed that correlations in the range of .35 to .65 are useful and statistically significant beyond the 1% level, whereas correlations less than .25 are not useful and statistically non significant (Brown 1983; Bryman & Cramer, 1997). Thus, the results show that the alpha coefficients for all subscales were significantly high, suggesting that the internal reliability index of the four constructs and the entire scale is adequate. In addition, the results of inter correlations show that each subscale correlates significantly with other subscales and the entire scale. According to Harrison, Seeman, and Behm (1991), this result provides at least further evidence for the consistency of the entire scale and for the convergent validity of each subscale. Therefore, it can be concluded that the four factors measure computer attitudes in a coherent way. All subscales correlate significantly at the $p < .01$ level and the coefficients range from .32 to .51. This suggests that the four components were fairly independent to be used as independent variables. This allows us to examine the computer attitudes of students by each subscale.

Moreover, Confirmatory Factor Analysis (CFA) seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of pre–established theory and EFA findings. A CFA was conducted to test the fit between the four–factor model and the data. The maximum likelihood estimation method was used.

Prior to CFA analysis, the data were examined for multivariate normality, multicollinearity and outliers. The bivariate correlations, tolerance, and variance inflation values indicated that neither bivariate nor multivariate multicollinearity was present. Because maximum likelihood estimation assumes multivariate normality of the observed variables, the data were examined with respect to univariate and multivariate normality. No items showed skew or kurtosis that exceeded the cutoffs
of $|3|$ or $|8|$ (Kline, 2005), respectively, indicating no problems with univariate nonnormality. The Mardias coefficient is a standard measure of multivariate normality and its value obtained in this study is 167.87. This value is less than the recommended value $(p (p+2))$ where $p=$ total number of observed indicators; $21(23)= 483$ by Raykov and Marcoulides (2008) hence the requirement of multivariate normality is satisfied. On this basis, the data for this study was considered adequate for confirmatory factor analysis.

In general, multiple goodness–of–fit tests were used to evaluate the fit between the hypothesized model and the data to determine if the model being tested should be accepted or rejected. These are Normed Fit Index (NFI; Bentler & Bonett 1980), the Comparative Fit Index (CFI; Bentler 1990), the Root Mean Square Error Approximation (RMSEA; Steiger & Lind, 1980), and the minimum fit function Chi–Square ratio degrees of freedom (CMIN/DF, Marsh & Hocevar, 1985). NFI and CFI greater than .90 indicates a good fit to the data, and the RMSEA of about .05 indicates a close fit of the model and .08 represents a reasonable error of approximation. CMIN/DF valve in the range of 2 to 1 or 3 to 1 are indicative of an acceptable fit between the hypothetical model and the sample data (Arbuckle, 2006). All coefficients are significant at $p<.01$. NFI= .96; CFI= .97; RMSEA= .05; CMIN/DF=1.86

2. Internet Attitudes Scale (IAS)

The instrument developed to measure attitudes toward Internet use was adapted from Tsai, Lin, and Tsai (2001) and from Tendency Towards Internet designed by Kilincoglu and Altun (cited in Isman, 2004); it contained 22 items in Likert Type (strongly agree = 5, agree = 4, undecided = 3, disagree = 2, strongly disagree = 1). Prior to analyzing data using factor analysis, data collected in this research went through Bartlett’s Test of Sphericity meant to measure the applicability of factor analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy recorded at .74 (>.5), hence it is good enough to use factor analysis in determining the number of factors to be retained and loading factors on the items.
Exploratory factor analysis and principal component analysis with varimax rotation on the 22 items suggested three interpretable factors: perceived usefulness (10 items), emotional response (6 items) and perceived control (5 items). In this study, perceived usefulness was defined as participant's perception of the positive impacts of the Internet on society and the individual, emotional response was defined as the participant’s feelings and anxiety when using the Internet and perceived control was defined as participant’s confidence in the independent control of the Internet (Tsai et. al., 2001). Items loading more than ± .40 were retained on the relevant factor, and items loading less than ± .40 were omitted (Field, 2000). Thus, item analysis reduced the original 22 items to 20 items with three independent constructs. The results show that the factor loadings range between .42 and .83 on the perceived usefulness subscale, between .41 and .79 on the emotional response subscale, and between .51 and .77 on the perceived control subscale. The Eigen values of the first three factors from principal component analysis were larger than 1: 5.11, 3.45 and 1.40 respectively. These three factors accounted for 46.74% of variance in the final version of the scale.

The behavior of individual items in relation to others within the same subscale provides good evidence for content validity because the highest factor loading is central to the domains assessed by these subscales (Francis et. al., 2000). The Cronbach alpha coefficients calculated for the perceived usefulness, emotional response and perceived control subscales were .77, .78, and .76, respectively, and it was calculated to be .81 for the entire scale. The scale correlation coefficients ranged between .34 and .45 on perceived usefulness, between .36 and .59 on emotional response, and between .38 and .69 on perceived control. It is generally agreed that correlations in the range of .35 to .65 are useful and statistically significant beyond the 1% level, whereas correlations less than .25 are not useful and statistically non significant (Brown, 1983; Bryman & Cramer, 1997). Thus, the results show that the alpha coefficients for all subscales were significantly high, suggesting that the internal reliability index of the three constructs and the entire scale is adequate. In addition, the results of inter correlations showed that each subscale correlates
significantly with other subscales and the entire scale. According to Harrison et al. (1991), this result provides at least further evidence for the consistency of the entire scale and for the convergent validity of each subscale. Therefore, it can be concluded that the three factors measure Internet attitudes in a coherent way. All subscales correlate significantly at the $p < .01$ level and the coefficients range from .27 to .58. This suggests that the three components were fairly independent to be used as independent variables; it allows us to examine the Internet attitudes of students by each subscale.

Confirmatory Factor Analysis (CFA) seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of pre–established model. A CFA was conducted to test the fit between the three–factor model and the data. The maximum likelihood estimation method was used. Prior to CFA analysis, the assumptions of CFA were verified. No violations to access CFA were found. Moreover, all coefficients are significant at $p<.01$. $NFI=.95; CF={.95; RMSEA=.05; CMIN/DF=1.88}$.

3. Epistemic Beliefs Inventory (EBI)

The epistemic beliefs inventory (EBI) developed by Schraw et al. (2002) is thirty two items; Likert-type five point scale was validated and adapted to measure the same five dimensions first hypothesized by Schommer including: certain knowledge, simple knowledge, quick learning, omniscient authority, and innate Ability. Before analyzing the data, 7 items (item2, item6, item14, item20, item24, item30, item31) were reverse coded because those items were negatively stated. Further, innate ability items and quick learning items were reverse coded. A high score indicated a favorable response toward the measured construct.

Prior to principal components analysis (PCA), the bivariate correlation matrix was visually inspected as a preliminary assessment of inter-item correlation. Most values were in the low to moderate range (.07- .37). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was then calculated, which is a ratio of the sum of the squared correlations to the sum of the squared correlations plus squared partial correlations. As the partial correlations decrease in size, which indicates distinct
factors may emerge from the factor analysis, the KMO value will approach 1.0. Thus, the KMO is useful to predict if data are likely to factor well. The KMO value for the EBQM was acceptable at .87, indicating factor analysis was appropriate for the scale. Additionally, Bartlett’s test of sphericity was significant [$\chi^2 = 23830.395; (p=.000)$], which rejected the null hypothesis that the correlation matrix was an identity matrix. By rejecting the null hypothesis the correlation matrix was deemed acceptable for factor analytic techniques. Initial results revealed high communalities ranging from .58 to .72, and nine factors with eigenvalues greater than 1.00, accounting for 61.57% of variance. All items had factor loading of at least .30. The screeplot was investigated to select the correct number of factors to be extracted. This inspection revealed a clear break between the fifth and sixth factors, and that first five factors explain the much more of the variance than the remaining factors. Hence, using Catell’s (1966) scree test it was decided to retain five factors for subsequent analyses. This was further supported by the results of parallel analysis.

The second exploratory factor analysis (EFA) was conducted by 31 items using an extraction to five factors. The five factor structure explained 39.32% of the total variance, with factor 1 contributed 13.89%, factor 2 contributed 9.19%, factor 3 contributed 5.95%, factor 4 contributed 5.52, and factor 5 contributed 4.97%. Regarding the Oblimin rotation, the five factors were interpreted in terms of the pattern and structure matrices. The careful examination of the factor loadings showed that items 9, 11, 14, 15 and 22 were problematic as their loading was less than .30, and needs to be deleted. Moreover, their communality was less than .30. It was suggested that communality values less than .30 indicate that the item does not fit well with the other items in its factor (Hair et al, 2010). Thus, within these considerations these items were dropped.

Consequently, the third EFA was conducted to determine the common factor structure of the remaining 27 items with oblimin rotation of five factor extraction. The KMO and BTS which yielded an index of .74 and 1069.47, respectively, ensured that the characteristics of the data set were suitable for EFA. The interpretation of the five factors with regard to the oblimin rotation in terms of the pattern and structure
matrices demonstrated that all factor loading and communality values were above .30, concurrent with the suggestion of Hair et al (2006). This analysis revealed that eight items constituted the first factor, four items constituted the second factor, six items constituted the third factor, four items constituted the fourth factor, and five items constituted the fifth factor. Items in factor 1 revolved around innate ability, items in factor 2 revolved around structure of knowledge, items in factor 3 revolved around speed of knowledge, items in factor 4 revolved around source of knowledge, items in factor 5 revolved around certainty of knowledge. Minimum eigenvalues of these factors were 1.38 and together they explained 46.83% of the common variance in item responses. In terms of variance explained by each factor, innate ability accounted for 16.73%, structure of knowledge accounted for 8.77%, speed of knowledge accounted for 6.95%, source of knowledge accounted for 6.84%, and certainty of knowledge accounted for 6.54%. Along with the suggestion of Pett, Lackey, and Sullivan (2003) both the pattern and structure matrices were the focus of evaluation.

Analysis of data from this EFA guided to form the final version of the EBI with twenty seven items on five subscales. These subscales along with the definitions are:
1. Innate ability (8 items): The ability to learn is innate rather than acquired. A person with a fixed or naïve view of innate ability generally takes a deterministic view of intelligence and would endorse the idea that you have only what you are born with and no more. The person with a more sophisticated or incremental view of innate ability believes that intelligence functions more like a skill that can be improved with effort (Wheeler, 2007).
2. Structure of knowledge (4 items): This belief reflects a continuum ranging from understanding knowledge as isolated bits to an understanding of knowledge as interrelated concepts.
3. Speed of knowledge (6 items): This belief ranges from the naïve view that learning happens quickly or not at all to the more sophisticated view that learning is a gradual process that requires continued effort and persistence.
4. Source of knowledge (4 items): This belief reflects a range of views regarding the role of an authority figure. The naïve view is the belief that knowledge is external to the learner and thus knowledge must be obtained from an authority. The more sophisticated view reflects a constructivist understanding of the learning process as an interactive event with the learner functioning as an active participant rather than a passive recipient.

5. Certainty of knowledge (5 items): This belief describes a continuum that ranges from a naïve view of knowledge as absolute truth to a more sophisticated view that knowledge is tentative and evolving. The foundation for this element of personal epistemology was the observation of developmental theorists that students tended to move from an absolutist to a relativistic understanding of knowledge as they progressed through higher education.

The confirmatory factor analysis supported the five factor solution that emerged from EFA in the first phase. The maximum likelihood estimations appeared between .39 and .66 and all t-values were significant at $p<.05$. The factor loadings of each item on the related dimension were at a reasonable size to define the five-factor model. Results of the five-factor model $\chi^2/df=2.93$, $RMR=.05$, $GFI=.93$, $AGFI=.93$, $RMSEA=.06$, $CFI=.92$. Results from the $CFI$ suggested that the five-factor structure fit well to the sample data with all fit indices ($RMR$, $GFI$, $CFI$, $AGFI$ and $RMSEA$) indicating a good fit except for ($\chi^2/df$) which exhibited a reasonable fit. Furthermore, all parameters were found to be significant which indicated that each item contributes significantly to the corresponding subscale.

The overall alpha coefficient of the entire scale was .71. The individual alpha coefficients for different scales were: .73 for quick learning, .74 for certainty of knowledge, .71 for simple knowledge, .89 for omniscient authority, and .85 for innate ability.

Results

Attitudes Profile toward Computer and Internet Usage

The overall profile of the participants’ attitudes toward computer usage was measured in terms of the affective, perceived usefulness, perceived control, and
behavioral intention. The mean scores and standard deviations were used to explain the participant’s attitudes profile. According to Birisci et. al. (2009), ranges of agreement with the attributions on the survey was determined by using the \((n-1)/n\) formula and after calculation the interval width of the range between 1 through 5 was calculated as .8. As such, the interval width of 1-1.80 showed very low level, the 1.81-2.60 intervals showed low level, the 2.61-3.40 intervals showed medium level, the 3.41-4.20 intervals showed high level and the 4.21-5.00 intervals showed very high level of agreement with the statement on the survey. The results of the descriptive statistics indicated that participant’s attitudes toward computer as indicated by the mean scores ranging from 3.37 to 4.00 on a five point scale. *Perceived usefulness* dimension had the highest mean value \((\text{Mean} = 4.00, \text{SD} = 3.03)\), followed by *perceived control* \((\text{Mean} = 3.54, \text{SD} = 2.52)\), then by *affective* \((\text{Mean} = 3.40, \text{SD} = 5.46)\) and then by *behavioral intention* \((\text{Mean} = 3.37, \text{SD} = 3.65)\). The means suggest that participants have high level perceptions of the usefulness of the computer and their control of the computer. On the other hand, the participants have moderate level perceptions about their affect towards computers and intention to use computer.

Overall profile of the participants attitudes toward Internet usage were measured in terms of the perceived usefulness, emotional response and perceived control. *Perceived usefulness* dimension had the highest mean value \((\text{Mean} = 4.03, \text{SD} = 4.96)\), followed by *perceived control* \((\text{Mean} = 3.69, \text{SD} = 2.29)\) and then by emotional response \((\text{Mean} = 2.85, \text{SD} = 4.59)\). The means suggest that participants have high level perceptions of the usefulness of the Internet and their control of the Internet. On the other hand, the participants have a moderate level of feelings and anxiety when using the Internet (Emotional response).
Table 2: Descriptive Statistics for Each Subscale (n=289)

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<th>Affective</th>
<th>Perceived Usefulness</th>
<th>Perceived Control</th>
<th>Behavioral Intention</th>
<th>Perceived Usefulness</th>
<th>Emotional Response</th>
<th>Perceived Control</th>
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<td>3.87</td>
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<td>4.77</td>
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<td>5.13</td>
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<td>3.37</td>
<td>4.03</td>
<td>2.85</td>
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<tr>
<td></td>
<td>S.D</td>
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<td>3.03</td>
<td>2.52</td>
<td>3.65</td>
<td>4.96</td>
<td>4.59</td>
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</tbody>
</table>

Multivariate Analysis (MANOVA)

 Assumptions were checked before conducting Multivariate analysis (MANOVA). MANOVA has seven assumptions: sample size, independence of observations, normality, outliers, linearity, multicollinearity and singularity, and homogeneity of variance-covariance matrices. No violations were found on multivariate normality and equality of variance.

A multivariate analysis was conducted to investigate the effects of gender, field of study, and ethnicity on participants’ attitudes toward computer usage. In order to evaluate multivariate significance, Wilks Lambda statistic was used. MANOVA results regarding gender, field of study, and ethnicity are presented in Table 3. The results indicated no statistically significant effect of gender on the combined dependent variables ($F$ (4, 284) = 1.12, Wilks lambda = 0.94, partial Eta = 0.06, $p = 0.36$). The partial eta squared value of 0.06 represented that 6% of the variance in dependent variables could be explained by gender. Moreover, no statistically significant effect of ethnicity on the combined dependent variables ($F$ (8, 280) = 2.04, Wilks lambda = 0.80, partial Eta = 0.10, $p = .07$). The partial Eta squared value of 0.10 showed that the 10% of the variance in dependent variables could be explained by ethnicity. Furthermore, no statistically significant effect of field of study was observed on the combined dependent variables ($F$ (12, 276) = 1.61, Wilks lambda = .77, partial Eta =.08, $p =.09$). The partial Eta squared value of
0.08 showed that the 8% of the variance in dependent variables could be explained by field of study. 

Table 3: MANOVA Results for Gender, Field of study, and Ethnicity (computer)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Wilks lambda</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>p-value</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.94</td>
<td>1.12</td>
<td>4.00</td>
<td>71.00</td>
<td>.36</td>
<td>.06</td>
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<td>Ethnicity</td>
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<td>2.04</td>
<td>8.00</td>
<td>142.000</td>
<td>.07</td>
<td>.10</td>
</tr>
<tr>
<td>Field of study</td>
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<td>1.61</td>
<td>12.00</td>
<td>188.14</td>
<td>.09</td>
<td>.08</td>
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</table>

In order to investigate on which dependent variables participants in different group of gender, field of study, and ethnicity differed in their attitudes toward computer usage, multivariate analyses of variance between groups was conducted. Table 4 shows the summary results of MANOVA analysis. Males and females are similar in affective $F(1, 287) = 1.58, p > .05$; perceived usefulness $F(1, 287) = 1.17, p > .05$; perceived control $F(1, 287) = 0.38, p > .05$; and behavioral intention $F(1, 287) = 2.74, p > .05$. Moreover, the three groups of ethnicity are similar in affective $F(2, 286) = 2.30, p > .05$; perceived usefulness $F(2, 286) = 2.78, p > .05$; perceived control $F(2, 286) = 2.79, p > .05$; and behavioral intention $F(2, 286) = 0.93, p > .05$. Also, participants in different field of study are similar in affective $F(3, 285) = 2.91, p > 0.05$; perceived usefulness $F(3, 285) = 2.20, p > .05$; perceived control $F(3, 285) = 0.22, p > .05$; and behavioral intention $F(3, 285) = 0.48, p > .05$.

Table 4: Results of MANOVA Analysis for Differences between the Means of the Participants Attitudes toward Computer Usage with Respect to Gender, Field of study, Ethnicity

A multivariate analysis was conducted to investigate the effects of gender, field of study, and ethnicity on participant’s attitudes toward the internet usage. In order to evaluate multivariate significance, Wilks Lambda statistic was used. MANOVA results regarding the gender, field of study, and ethnicity are presented in Table 5 The results indicated no statistically significant effect of gender on the
combined dependent variables \((F(3, 285)= 2.40, \text{ Wilks lambda}= .91, \text{ partial Eta}= .09, \ p= .08)\). The partial eta squared value of .09 represented that the 9 % of the variance in dependent variables could be explained by gender. Moreover, no statistically significant effect of ethnicity on the combined dependent variables \((F (6, 282) = .98, \text{ Wilks lambda}= .92, \text{ partial Eta } = .04, \ p= .44)\). The partial Eta squared value of .04 showed that the 4 % of the variance in dependent variables could be explained by ethnicity. On the other hand, no statistically significant effect of field of study on the combined dependent variables \((F (9, 279) = .83, \text{ Wilks lambda} = .90, \ \text{ partial Eta } = .03, \ p= .59)\). The partial Eta squared value of .03 showed that the 3 % of the variance in dependent variables could be explained by field of study.

Table 5: MANOVA Results for Gender, Field of Study, Age, and Ethnicity (Internet)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Wilks lambda</th>
<th>(F)</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>(p)-value</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td>2.40</td>
<td>3.00</td>
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<td>.09</td>
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<td>Ethnicity</td>
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<td>.98</td>
<td>6.00</td>
<td>144.00</td>
<td>.44</td>
<td>.04</td>
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<tr>
<td>Field of study</td>
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<td>.83</td>
<td>9.00</td>
<td>175.38</td>
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<td>.03</td>
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</table>

In order to investigate on which dependent variables participants with different gender, field of study, and ethnicity differed in their attitudes towards Internet usage, multivariate analyses of variance between groups was conducted. Table 6 shows the summary results of MANOVA analysis. Males and females are similar in perceived usefulness \((F (1, 287) = 2.10, \ p> .05)\; \text{emotional response } \ (F (1, 287) = 3.10, \ p> .05); \text{ and perceived control } \ (F (1, 287) = .16, \ p> .05). \) Moreover, the three groups of ethnicity are similar in usefulness \((F (2, 286) = 1.51, \ p> .05); \text{ emotional response } \ (F (2, 286) = .84, \ p> .05); \text{ and Perceived control } \ (F (2, 287) = .23, \ p> .05). \) Furthermore, participants in different field of study are similar in perceived usefulness \((F (3, 285) = .73, \ p> .05); \text{ emotional response } \ (F (3, 285) = 1.43, \ p> .05); \text{ and Perceived control } \ (F (3, 285) = .58, \ p> .05). \) Also, participants at different economic levels are similar in usefulness \((F (2, 286) = 2.07, \ p> .05); \text{ emotional response } \ (F (2, 286) = 1.26, \ p> .05); \text{ and perceived control } \ (F (2, 287) = 1.12, \ p> .05). \)
Table 6: Results of MANOVA Analysis for Differences between the Means of the Participants' Attitudes toward Internet Usage with Respect to Gender, Field of study, Ethnicity

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent variable</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean square</th>
<th>F-value</th>
<th>p-value</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
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<td>37.82</td>
<td>2.10</td>
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<td>emotional response</td>
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<td></td>
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<td></td>
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Analysis of Variance (ANOVA)

Univariate analysis was conducted to investigate the effects of age on participant’s attitudes toward the internet and computer usage. As we seen in Table 7, participants in different group of ages are differ in their attitudes toward computer usage ($F(2,286) =53.06, p<.05$); and their attitudes toward internet usage ($F(2,286) =3.76, p<.05$). The partial Eta squared showed that the 27 % of the variance in participant’s attitudes toward computer usage could be explained by age. On the other hand, the partial Eta squared showed that the 5 % of the variance in participant’s attitudes toward Internet usage could be explained by age.

Furthermore, Post hoc analysis indicated that the mean scores of participant’s attitudes toward computer and internet usage were significantly related to age, with lower age related to higher mean scores (see Table 8, and Table 9). As we seen in table 8, the youngest participants (< 30 years old) significantly scored higher than the participants in the older groups of age. Table 9 shows that the youngest participants (< 30 years old) significantly scored higher than the participants in the older group (more than 40). In general, postgraduate students toward computer and Internet usage decrease by the increase of age.
Table 7: Results of Univariate Analysis for Differences Between the Means of the Participants Attitudes toward Internet and Computer Usage with Respect to the Age

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<tr>
<td></td>
<td>Corrected Total</td>
<td>53090.15</td>
<td>288</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Internet | Age group | 7106.70 | 2 | 3553.35 | 3.76 | .02* |
|          | Error     | 269675.31 | 286 | 942.92 |    |      |
|          | Total     | 609236.00 | 289 |          |    |      |
|          | Corrected Total | 276782.01 | 288 |          |    |      |

Table 8: Results of Post hoc Analysis for Differences between the Means of the Participants Attitudes toward Computer Usage with Respect to the Age

<table>
<thead>
<tr>
<th>Group of Age by years</th>
<th>Less than 30</th>
<th>From 30 to 40</th>
<th>More than 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30</td>
<td>--</td>
<td>14.35**</td>
<td>15.57**</td>
</tr>
<tr>
<td>From 30 to 40</td>
<td>-</td>
<td>-</td>
<td>1.22</td>
</tr>
<tr>
<td>More than 40</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 9: Results of Post hoc Analysis for Differences between the Means of the Participants Attitudes toward Computer Usage with Respect to the Age

<table>
<thead>
<tr>
<th>Group of Age by years</th>
<th>Less than 30</th>
<th>From 30 to 40</th>
<th>More than 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30</td>
<td>--</td>
<td>9.37</td>
<td>11.20**</td>
</tr>
<tr>
<td>From 30 to 40</td>
<td>-</td>
<td>-</td>
<td>1.83</td>
</tr>
<tr>
<td>More than 40</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Epistemological Beliefs Profile

Overall profile of the students’ Epistemological beliefs was measured in terms of the quick learning, certainty of knowledge, omniscient authority (Source of knowledge), innate ability, and structure of knowledge. All 289 participants responded to all items in the scale and no missing data was found in the survey. The mean scores and standard deviations were used to explain the students’ epistemological beliefs profile. The results of the descriptive statistics showed that students generally had naive epistemological beliefs as indicated by the mean scores ranging from 2.53 to 3.40 on a five point scale. Certainty of knowledge dimension had the highest mean value (Mean=3.40, SD= 1.40), followed by structure of knowledge (Mean=2.76, SD= 6.37), then by Innate ability (M=2.57, SD= 1.24) and then by quick learning (Mean=2.54, SD= 2.13). The lowest mean score appeared for the omniscient authority dimension (Mean=2.39, SD= 2.15). The mean scores indicated that the participants have a highly level of naïve belief in quick learning, certainty knowledge, omniscient authority, innate ability and structure of knowledge.
Table 10: Descriptive Statistics for Each Subscale of EBI (n=289)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innate ability</td>
<td>2.57</td>
<td>1.24</td>
</tr>
<tr>
<td>Structure of knowledge</td>
<td>2.76</td>
<td>6.37</td>
</tr>
<tr>
<td>Quick learning</td>
<td>2.54</td>
<td>2.13</td>
</tr>
<tr>
<td>Certainty of knowledge</td>
<td>3.40</td>
<td>1.40</td>
</tr>
<tr>
<td>Omniscient authority</td>
<td>2.39</td>
<td>2.15</td>
</tr>
</tbody>
</table>

Correlation

The Pearson Product Moment correlation coefficient was used to represent the relationship between postgraduate students’ attitudes toward computer and internet usage and their epistemological beliefs. In the present study, the correlation coefficients were interpreted by employing Davis (1971) descriptors (negligible = .00 to .09; low = .10 to .29; moderate = .30 to .49; substantial = .50 to .69 and very strong = .70 to 1.00).

The correlations show a statistically significant relationship between four of epistemological beliefs dimensions and students’ attitudes toward computer usage. There is a positive, weak relationship between structure of knowledge and attitudes toward computer usage ($r = -.154, p < .01$). Further, there is a moderate, positive relationship between certainty of knowledge and attitudes toward computer usage ($r = .377, p < .01$). There was also a moderate, positive relationship between innate ability and attitudes toward computer usage ($r = .442, p < .01$). Furthermore, there is a substantial, positive relationship between omniscient authority (source of knowledge) and attitudes towards computer usage ($r = .545, p < .01$).

Further, the correlations show a statistically significant relationship between four of epistemological beliefs dimensions and students’ attitudes toward internet usage. There is a positive, weak relationship between structure of knowledge and attitudes towards internet usage ($r = .154, p < .01$). There is a moderate, positive relationship between certainty of knowledge and attitudes towards internet usage ($r = .377, p < .01$). There was also a moderate, positive relationship between Innate ability and attitudes toward internet usage ($r = .442, p < .01$). Furthermore, there is a substantial, positive relationship between omniscient authority (source of knowledge) and attitudes toward internet usage ($r = .545, p < .01$).
To sum up the correlation results, the more sophisticated epistemological beliefs associated with high level of attitudes toward computer and internet usage. Table 11 illustrates the individual correlations between epistemological beliefs and attitudes toward computer and internet usage.

<table>
<thead>
<tr>
<th>Table 11: Correlation Coefficients between Epistemology and Attitudes toward Computer and Internet Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Innate ability</td>
</tr>
<tr>
<td>Structure of knowledge</td>
</tr>
<tr>
<td>Quick learning</td>
</tr>
<tr>
<td>Certainty of knowledge</td>
</tr>
<tr>
<td>Source of knowledge</td>
</tr>
</tbody>
</table>

Regression Analysis

Before conducting multiple regression analysis, some assumptions have been checked, they include lack of multicollinearity, normality, linearity, homoscedasticity, influential points and outliers and independence of participants’ scores (Stevens, 1990). No violation for conducting multiple regressions was found. Hence multiple regression analysis was conducted to identify the best predictors of the dependent variables and to show the proportion of variance in the dependent variables (i.e. attitudes toward computer and internet usage) explained by the independent variables (innate ability, structure of knowledge, certainty of knowledge, source of knowledge and quick learning). A direct method entry was used for multiple linear regression analyses. The standard multiple regression with a direct method entry was used to measure the relationships among variables. $R^2$ is called “multiple correlation” Stevens, 1990, p. 231), R is a measure of the association between the dependent variable and independent variables (Stevens, 1990). R Square ($R^2$) represents the proportion of the dependent variable’s variance, which is accounted by the linear combination of the independent variables (Stevens, 1990). Adjusted R Square ($R^2$) is the population $R^2$ that can be used to generalize the findings from the sample (Stevens, 1990).

The results indicated that 35.9% of the variance in postgraduate students’ attitudes toward computer usage was explained by the independent variables (see table 12). The test statistic was significant at the .01 level of significance ($F(5,283) =$ 48
The standardized regression coefficients (Beta), give an indication of the contribution of each independent variable in predicting the dependent variable (Aron, Aron, & Coups, 2005) (see Table 14). The Sig (p) for each independent variable represent a measure of the significance of this variable in predicting the dependent variable.

For the first independent variable (innate ability), the test was statistically significant (t = 2.414, Beta = .166; p < .05). These suggested postgraduate students’ beliefs about their innate ability were significantly predictor of their attitudes toward computer usage.

For the second independent variable (structure of knowledge), the test was statistically significant (t = 2.320, Beta = .115; p < .05). These suggested students’ beliefs about the structure of knowledge were significantly predictor of their attitudes toward computer usage.

For the third independent variable (quick learning), the test was statistically significant (t = 4.395, Beta = .239; p < .01). These suggested postgraduate students’ beliefs about the quick learning were significantly predictor of their attitudes toward computer usage. The quick learning variable had a negligible, positive relationship with the dependent variable (attitudes toward computer usage), but this relationship was significant when it examined in context of other independent variables as group.

For the fourth independent variable (certainty of knowledge), the test was statistically significant (t = 2.216, Beta = .142; p < .05). This suggested postgraduate student’ beliefs about the certainty of knowledge were significantly predictor of their attitudes toward computer usage.

For the fifth independent variable (source of knowledge), the test was statistically significant (t = 5.356, Beta = .389; p < .01). These suggested postgraduate students’ beliefs about the source of knowledge were significantly predictor of their attitudes toward computer usage.

Table 12: Standard Regression Model Summary (Computer)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.599</td>
<td>.359</td>
<td>.348</td>
<td>2.891</td>
</tr>
</tbody>
</table>
Table 13: ANOVA: Regression Significance (Computer)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1326.162</td>
<td>5</td>
<td>265.232</td>
<td>31.728</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>2365.734</td>
<td>283</td>
<td>8.359</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3691.896</td>
<td>288</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 14: Regression Coefficients of Standard Regression Model (Computer)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Std error</td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innate ability</td>
<td>.118</td>
<td>.049</td>
<td>.166</td>
<td>2.414</td>
</tr>
<tr>
<td>Structure of knowledge</td>
<td>.131</td>
<td>.057</td>
<td>.115</td>
<td>2.320</td>
</tr>
<tr>
<td>Quick learning</td>
<td>.260</td>
<td>.059</td>
<td>.239</td>
<td>4.395</td>
</tr>
<tr>
<td>Certainty of knowledge</td>
<td>.124</td>
<td>.056</td>
<td>.142</td>
<td>2.216</td>
</tr>
<tr>
<td>Source of knowledge</td>
<td>.264</td>
<td>.049</td>
<td>.389</td>
<td>5.356</td>
</tr>
</tbody>
</table>

Further, the results indicated that 39.2% of the variance in postgraduate attitudes toward internet usage was explained by the independent variables. The test statistic was significant at the .01 level of significance ($F(5, 283) = 36.442; p < .01$). The standardized regression coefficients (Beta), give an indication of the contribution of each independent variable in predicting the dependent variable (Aron, Aron, & Coups, 2005) (Table 11). The Sig ($p$) for each independent variable represent a measure of the significance of this variable in predicting the dependent variable.

For the first independent variable (innate ability), the test was not significant ($t = 1.690, Beta = .113; p > .05$). These suggested postgraduate students’ beliefs about their innate ability were not significantly predictor of their attitudes toward internet usage.

For the second independent variable (structure of knowledge), the test was statistically significant ($t=3.066, Beta=.149. p<.05$). These suggested students’ beliefs about the structure of knowledge were significantly predictor of their attitudes towards internet usage.

For the third independent variable (quick learning), the test was statistically significant ($t=4.282, Beta=.227; p<.01$). These suggested postgraduate students’ beliefs about the quick learning were significantly predictor of their attitudes toward internet usage. The quick learning variable had a negligible, positive relationship with the dependent variable (attitude toward internet usage), but this relationship was significant when it examined in context of other independent variables as group.
For the fourth independent variable (certainty of knowledge), the test was statistically significant ($t = 2.371$, $\text{Beta} = .148$; $p < .05$). These suggested postgraduate students’ beliefs about the certainty of knowledge were significantly predictor of their attitudes toward internet usage.

For the fifth independent variable (source of knowledge), the test was statistically significant ($t = 6.290$, $\text{Beta} = .445$; $p < .01$). These suggested postgraduate students’ beliefs about the source of knowledge were significantly predictor of their attitudes toward internet usage.

<p>| Table 15: Standard Regression Model Summary (internetr) |
|----------------|------------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adjusted $R$ Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.626</td>
<td>.392</td>
<td>.381</td>
<td>3.71838</td>
</tr>
</tbody>
</table>

<p>| Table 16: ANOVA: Regression Significance (Internet) |
|----------------|------------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>$df$</th>
<th>Mean Square</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2519.325</td>
<td>5</td>
<td>503.865</td>
<td>36.442</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>3912.848</td>
<td>283</td>
<td>13.826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6432.173</td>
<td>288</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Table 17: Regression Coefficients of Standard Regression Model (Internet) |
|----------------|----------------|----------------|----------------|----------------|---------|---------|</p>
<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>$t$-value</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innate ability</td>
<td>.107</td>
<td>.063</td>
<td>.113</td>
<td>1.690</td>
</tr>
<tr>
<td>Structure of knowledge</td>
<td>.223</td>
<td>.073</td>
<td>.149</td>
<td>3.066</td>
</tr>
<tr>
<td>Quick learning</td>
<td>.325</td>
<td>.076</td>
<td>.227</td>
<td>4.282</td>
</tr>
<tr>
<td>Certainty of knowledge</td>
<td>.171</td>
<td>.072</td>
<td>.148</td>
<td>2.371</td>
</tr>
<tr>
<td>Source of knowledge</td>
<td>.399</td>
<td>.063</td>
<td>.445</td>
<td>6.290</td>
</tr>
</tbody>
</table>

To determine the best predictors among the independent variables in predicting students’ attitudes toward computer usage, standardized regression coefficients ($\text{Beta}$), partial correlation coefficients and part correlation coefficients were used. Table 18 shows that source of knowledge has the greatest value of Beta, partial correlation coefficient and part correlation coefficient. Source of knowledge variable was the best predictor of students’ attitudes toward computer usage that had the most significant effect in predicting attitudes toward computer. This predictor accounted to 6.5% of the total variance of students’ attitudes toward computer usage after controlling for the other four independent variables in this study.
To determine the best predictors among the independent variables in predicting students’ attitudes towards internet usage, standardized regression coefficients (Beta), partial correlation coefficients and part correlation coefficients were used. Table 19 shows that source of knowledge has the greatest value of Beta, partial correlation coefficient and part correlation coefficient. Source of knowledge variable was the best predictor of students’ attitudes toward internet usage that had the most significant effect in predicting attitudes toward internet usage. This predictor accounted to 8.5% of the total variance of students’ attitudes toward internet usage after controlling for the other four independent variables in this study.

Table 19: Correlations Coefficients and Beta Values. (Internet)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Zero-order</th>
<th>Partial</th>
<th>Part</th>
<th>Part squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innate ability</td>
<td>.439</td>
<td>.100</td>
<td>.078</td>
<td>.006</td>
</tr>
<tr>
<td>Structure of knowledge</td>
<td>.190</td>
<td>.179</td>
<td>.142</td>
<td>.020</td>
</tr>
<tr>
<td>Quick learning</td>
<td>.006</td>
<td>.247</td>
<td>.199</td>
<td>.040</td>
</tr>
<tr>
<td>Certainty of knowledge</td>
<td>.403</td>
<td>.140</td>
<td>.110</td>
<td>.012</td>
</tr>
<tr>
<td>Source of knowledge</td>
<td>.574</td>
<td>.350</td>
<td>.292</td>
<td>.085</td>
</tr>
</tbody>
</table>

Discussion and Conclusion

In general, postgraduate students showed positive attitudes toward computer and Internet usage. The overall positive level of computer and Internet attitudes could be attributed to the availability and accessibility to computers and Internet given to postgraduate students at the University of Malaya. Moreover, in Malaysia, the Ministry of Education (MOE) has given approval to implement ICT in education. Therefore, the Malaysian government has facilitated computer integration in schools to improve the usefulness of the student’s education on a personal and national level. Chronologically, the participants of this study would have benefited from the goals of the Plan of Implementing ICT in ways that may have shaped their ICT attitudes in a positive direction, and contributed towards increasing home computer ownership.
among them, which could have promoted greater opportunities with ICT (Teo, 2008). Moreover, the reason for these high attitudes toward computer usage can be attributed to high usage of the computer and its various applications in instruction and being assigned homework and various tasks requiring computer usage. The moderate emotional response mean scores for participants were indicative that they were likely to be less anxious about future usage of the internet.

Further, results revealed no gender related differences of postgraduate students’ attitudes toward computer usage. These findings are consistent with the earlier studies (Teo, 2008). Moreover, North and Noyes (2002) felt that increased usage of computers for teaching and learning in schools has worked against the development of gender differences. Contrary to the findings of these studies, previous studies reporting sex related differences in attitudes toward computer (Adebowale et. al., 2010; Sainz et. al., 2010; Meelissen & Drent, 2008; Avraham, 2005; Graff, 2003; Brosnan & Lee, 1998; Shashaani, 1993). Also, results revealed gender related differences of postgraduate students’ attitudes toward Internet usage. The results of this study are consistent with the earlier studies (Luan, Fung & Atan, 2008; Shaw & Gant, 2002; Duggan et. al., 2001; Odell et. al., 2000). For instance, Duggan et. al. (2001) reported that university students usually used the Internet for term paper research, retrieval of course notes and spent longer hours on these functionalities. Luan et. al. (2008) reported that the lack of gender differences could possibly be attributed to the sample being studied. The participants involved in this study were students at university of Malaya. They were likely to posses some experience in using the internet. Additionally, the university has continued to upgrade the internet infrastructure to enhance internet accessibility around the campus, making these services readily available to all students. With the improved facilities, both females and males have equal access and opportunities to use the internet with no disparity between them.

Further, results indicated no significant differences existed in postgraduate students’ attitudes towards internet and computer usage by field of study and ethnicity. This is expected as the respondents were university students and their
search in the internet would have been related to the fulfillment of their educational tasks. Moreover, Malaysia is a multiethnic society where all races have the same opportunities in ICT practice and training at schools and universities. Moreover, all participants were from faculty of education, so further studies are needed to assess postgraduates students attitudes towards computer and internet usage from different faculties.

Further, data analysis indicated existence of significant differences between postgraduate students’ age and their perceptions toward computer and internet. In conclusion, ceteris paribus, participant’s attitudes toward computer and internet usage decreased as a function of age. This means those students’ attitudes toward computer and internet increase as their age decreases. The significance differences between the age and attitudes towards ICT are probably due to the presence of a wide age gap among postgraduate students. Contrary to these findings, Teo (2008) reported no significant relation between student’s age and their attitudes toward computers.

Epistemological beliefs (i.e., certainty of knowledge, omniscient authority, innate ability and structure of knowledge) are significantly correlated with postgraduate student’s attitudes toward computer usage. Furthermore, epistemological beliefs predict attitudes toward computer and internet usage very well. As such, the more sophisticated beliefs, the higher level of attitudes toward computer and internet usage.

Results of the present study revealed that the participants generally hold naive beliefs about nature of knowledge and knowing. For the five dimension (i.e., quick learning, certainty of knowledge, omniscient authority or source of knowledge, innate ability and structure of knowledge) students obtained a mean value that was lower than the mid-point of the five-point scale, implying that participants generally tended to believe that (a) learning happens quickly, (b) knowledge cannot change in time, and a person sees knowledge as a group of individual facts, (c) knowledge is certain, (d) knowledge is constructed by only authority (e.g., teachers, books) and (e) the ability to learn is fixed at birth. These results were inconsistent with those
reported in the literature (e.g., Özkal, 2007; Kızılgüneş, 2007; Conley et al., 2004). For instance, Kızılgüneş (2007) reported that the students generally have tentative epistemological beliefs. Özkal (2007) found that students tended to believe scientific knowledge can change with time and that it is not certain. In one study, Conley et al. (2004) found out students’ hold sophisticated beliefs about structure of knowledge, source of knowledge and certainty of knowledge.

In conclusion, postgraduate students showed positive attitudes toward computer and internet usage. Furthermore, Postgraduate students’ attitudes toward computer and internet usage were unrelated to gender, field of the study, and ethnicity. In the contrast, students’ attitudes towards internet and computer usage were age related. This implies that if postgraduate students (pre-service teachers) adopt favorable attitudes towards ICT in education, they are more eager to integrate ICT into their teaching and learning. This finding is in accordance with the findings of previous study of van Braak, Tondeur and Valcke (2004). They observed that a favorable attitude towards computers did positively and directly affect the degree of computer use in classroom. Moseley & Higgins (1999) also stated that teachers who adopt positive attitudes towards ICT efficiently use technology in classroom teaching. For pre-service teachers, attitudes toward computer use in education seem to be the strongest predictor of prospective ICT usage (Myers & Halpin, 2002; Teo, 2008).

According to He (2006), although teachers take positive attitudes toward educational technology, they are not confident in their usage abilities. They state that teacher education programs have not resulted in a sufficient proficiency level about technology use. If teachers hold underdeveloped (naïve) beliefs about teaching, learning and ICT, the innovation of teaching and the integration of information technology will continue to face difficulties. In this context some authors stress that a key factor to influence teacher beliefs is the actual involvement of teachers with ICT in their own teaching and learning activities (Li, 2003). The latter fits into the reciprocal nature of the relationship between teacher cognitions and ICT use.
As expressed in our research question, a major interest in the present study is to look at ways in which postgraduate students’ epistemological beliefs are related to their attitude towards ICT usage. Results indicated that postgraduate students hold naïve beliefs about knowledge and learning. These results imply that the participants of this study generally agreed with the idea that knowledge is not an evolving and changing subject that knowledge is certain and there may be one right answer and that knowledge is constructed only by the teachers and other experts.

Epistemological beliefs (Innate ability, Source of knowledge, Structure of knowledge, Certainty of knowledge and Quick learning) are significantly correlated with postgraduate student’s attitudes toward computer usage. Furthermore, epistemological beliefs predict attitudes toward computer usage very well. These results indicate that postgraduate student’s attitudes toward ICT usage and their epistemological beliefs are linked.

This study illustrated that these epistemological beliefs may influence postgraduate students’ attitudes toward internet and computer usage. With this in mind, it is important to understand how beliefs are formed, and if needed, how beliefs can be changed. Because beliefs about teaching are often established by the time postgraduate students enter college, educators must consider what postgraduate students think they already know about knowledge and learning. If educators wish to have a significant impact on postgraduate students’ beliefs about teaching, they must consider the currently held knowledge base (Anderson, 1989).

Attempting to modify one’s beliefs is an arduous process. Even so, because researchers have illustrated the importance epistemological beliefs and beliefs about intelligence play within a classroom, the naïve beliefs of postgraduate students should be challenged. To promote conceptual change in postgraduate students, teacher educators and school administrators first must identify the beliefs being held. The use of quantitative, self-report questionnaires has proven to be a reliable method for identifying postgraduate student’s beliefs, and qualitative methodology can also be used (e.g. case studies, semi-structured interviews, observations) effectively. Since our results in the present study revealed that postgraduate students hold naïve
beliefs about knowledge and learning, they should be offered opportunities to become aware of those beliefs. These individuals should be encouraged to explicitly discuss their beliefs, how their beliefs were formed, how their beliefs might impact their teaching, and, if needed, examples should be provided that challenge their beliefs (Epler, 2011).

It is important to note that, in order for postgraduate students to perceive alternative beliefs as credible, they have to be presented with evidence that challenges their currently held beliefs. For instance, naïve epistemological beliefs can be challenged through explicit reflection and through an environment that endorses advanced beliefs. Furthermore, clinical experiences can also provide opportunities for postgraduate students to challenge previously held beliefs. These experiences can include early observations in schools and classrooms to working one-on-one with students in a tutoring context, co-planning and co-teaching with the clinical faculty, to teaching independently. Furthermore, educators should emphasize reflection on these experiences to facilitate the development of advanced beliefs (Epler, 2011).

Limitations

The results of the current study may be subject to the following limitations: Firstly, the data collected was through self reports and this may lead to a common method variance. Secondly, the sample size was not large enough to allow for cross validation of results. Additional research will be needed to validate the results of the current study. Furthermore, factor analytic results are inherently subjective in nature, as the numerous decisions regarding factor extraction, rotation, and interpretation can lead to different outcomes. Thirdly, the data were collected using a cross-sectional, single administration design and it was not possible to establish the stability of the participants’ attitudes. Moreover, Some reasons from the limitation of study, postgraduate students showed positive attitudes toward computer and Internet usage on account of the availability and accessibility to computers and Internet given to postgraduate students at the university of Malaya. Fourthly, the variables chosen in this study were limited in number. As a result, other significant variables that influence computer and internet attitudes are excluded. Future studies could add
other variables to examine their impact on computer and internet attitudes. Finally, the study is limited because it was conducted in a specific university and only at the Faculty of Education. Replicating this study with a large and more representative sample of postgraduate students from different faculties and subjects from different universities and with a more rigorous design is likely to shed more light on differences of mean computer and Internet attitude score in relation to gender, field of study, age, and ethnicity.

References


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