Appropriate Frameworks for Understanding Educational Change and Culture to Use in Socio-Technological Innovation Studies in the Field of Information Management in Sri Lanka: A review of literature

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Abstract :

Information is considered a fundamental resource for improving the quality of governance and promoting socio-economic development in developing countries. In Sri Lanka, under the government's vision of higher education, Information Management (IM) education is seen as important for fostering the development of a high quality market-oriented and knowledge-based society. However, a number of barriers currently restrict access to IM education by Sri Lankan information workers: the provision of education is limited to face-to-face teaching at three institutions in the Colombo (capital city) area, and the country's physical infrastructure makes it difficult for full-time workers to attend classes without missing substantial work time. This results in IM employer reluctance to support education. Hence there is a growing need to provide equity of access to IM education. In response to World Bank reports (2007, 2009) the Quality Assurance and Accreditation Council (QAAC) of Sri Lanka aims to foster transformative change in IM education with the goal of increasing equality of access to IM education through the use of e-learning. A number of early attempts to implement e-learning in Sri Lanka have already failed (Anderson, 2008). There is no rigorous research that investigates what factors have an impact on the introduction and use of e-learning in tertiary-level IM education in the Sri Lankan context and what the barriers or enablers to doing so might be. Understanding of the cultural context is known to be critical for the success of e-learning.

Major research project has been carried out to fills these gaps in the literature. It was guided by two research questions: (i) what are the contextual factors that affect the introduction and use of e-learning in tertiary-level IM education in Sri Lanka? and (ii) how

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do these factors affect the introduction and use of e-learning? An interpretive case study research was conducted. Thirty semi-structured interviews were conducted with information management education providers, existing e-learning providers and relevant stakeholders, and three focus group discussions were conducted with information workers and academics. Relevant documents were also analyzed.

This paper presents how appropriate frameworks have been selected for understanding said educational change and culture to use in socio-technological innovation studies in the Field of Information Management in Sri Lanka by reviewing extensive literature. Accordingly, Fullan's (1991) educational change theory and Hofstede, Hofstede, and Minkov's (2010) cultural dimensions provided a basis for a conceptual model to guide the process of data collection and analysis in this study to gain an understanding of factors affecting the introduction and use of e-learning in tertiary-level IM education in Sri Lanka.

Keywords: *Educational Change, Culture, Socio-Technological Innovation, Information Management, Sri Lanka*

Introduction :

While this study focuses on socio-technological innovation in the field of information management education, the problem and research questions that underpin it are relevant to other fields in the social sciences including education and sociology. It is, therefore, necessary to consider insights that can be gained from theories from these related disciplines. In the first section of this article, several theories of potential relevance have been discussed. Among the theories considered, two theoretical frameworks are identified as particularly pertinent. They are Fullan's educational change theory (1982, 1991, 2001, 2007), and Hofstede's expanded dimension of cultures (1980, 1991, 2001, 2005, 2010).

Fullan's educational change theory can be seen as fitting the educational aspect of this study while Hofstede's cultural dimensions are relevant given the Sri Lankan context and findings that e-learning success relates to cultural understanding. This aspect is absent from most educational change frameworks and models. This article discusses each of these theories and their relevance to select the appropriate frameworks for understanding educational change and culture to use in socio-technological innovation studies in the Field of Information Management in Sri Lanka.

1. Frameworks for understanding educational change

A number of change frameworks and models can be used to understand educational change. For example, Ellsworth (2000) reviewed seven change frameworks and models (See Table 1) in his book Surviving change: A survey of educational change models to provide a theoretical road map for researchers and practitioners who seek guidance from educational change literature.

Based on Ellsworth's review of change frameworks, this paper reviewed two change models – Rogers' and Fullan's models – to use in socio-technological innovation studies in

the field of Information Management. Ellsworth (2000) noted that research in educational change has widely used both Rogers' and Fullan's models.

Ellsworth's book has been recognized as a comprehensive guidebook of change frameworks (Roberts, 2010; Johnson, Zhang, & Gallagher, 2002). For example, Roberts (2010) in his book review highlighted that Ellsworth's survey of change frameworks has been used in research for decades. Johnson, Zhang, and Gallagher (2002) identified that the primary strength of Ellsworth's review of change frameworks was being descriptive, not prescriptive. They further recognized that Ellsworth's analysis of change frameworks is useful for researchers to help with their theoretical frameworks. For example, in each chapter, the change models are discussed by citing individual studies which helps researchers (as well as readers) to understand the applicability of each change model. According to Google Scholar, from 2000 to March 2022, Ellsworth's review of change frameworks has been cited by 558 researchers in their studies which were published mostly in peer-reviewed journals and focus on introducing new technologies at the organizational level, in order to select suitable change theories.

Name of the change framework/model	Author(s) and year of publication	Main focus
Diffusion of Innovation	Rogers, E.M. (1995)	Innovation attributes and their effect on adoption rate
Conditions of Change	Ely, D.P. (1990)	Environmental conditions and their influence on the change process
Meaning of Educational Change	Fullan, D.P. Stiegelbauer, S.M. (1991)	Implications of educational change for people or organizations promoting or opposing it at particular levels
Change Agent's Guide	Havelock, R. Zlotolow, S. (1995)	The process by which change agents determine when their work with a given innovation and change agents can guide its successful transition from implementation to institutionalization
Concerns-Based Adoption Model (CBAM)	Hall G. Wallace, R. Dossett, W. (1973)	Assessing and tracking change's progress at the level of individual adopter
Strategies for Planned Change	Zaltman, G. Duncan, R.B. (1977)	Eighteen issues in four major categories (cultural, social, organizational, psychological)
Systematic Change in Education	Reigeluth, C.M. Garfinkle, R.J. (1994)	Understanding the complex, nested interdependencies among system components that allow the system to function as more than the sum of its parts or leave it unable to function

Table 1 - Overview of Elsworth's (2000) review of seven change frameworks and models

1.1 Theory on Diffusion of Innovation

Rogers' (2003) theory on Diffusion of Innovation (DOI) is among the most frequently applied and has been extensively used in studies that examine ICT uptake at the level of a social system (Hassan, 2010). Rogers identified five attributes of innovations which affect the decision to adopt an innovation: i) relative advantage, ii) compatibility, iii) complexity, iv) trialability, and v) observability. Further, Rogers classifies the members of a system on the basis of their innovativeness because the characteristics of individuals or groups can affect the rate of adoption. He categorized these types of adopters as i) innovators, ii) early adopters, iii) early majority, iv) late majority, and v) laggards.

However, some critics have pointed out that Rogers' DOI theory conceptualizes an innovation as a fixed/discrete 'thing' and mainly focuses on simple, product-based innovations where the unit of adoption is the individual. For example, Greenhalgh et al. (2004) argued that Rogers' DOI theory is inappropriate to use for process-based innovations in service organizations, for which the unit of adoption is the team, department, or organization. Cranefield (2009) also argued that the theory is less applicable to the 'adoption' of a programme (e.g., an e-learning programme) because unlike a specific technology (which can be seen as a 'fixed entity', e.g., smart phone), an ICT programme varies in its local application. For example, ICT programmes which integrate ICT with new practices or approaches like a student-centred, ICT-enabled teaching approach (i.e., an e-learning programme) need to be better suited to the organizational and individual contexts. Therefore, adoption of an ICT programme has multiple variables that depend on the context. The studies which focus on adoption of an ICT programme (i.e., e-learning) in a specific organizational context (i.e., tertiary-level IM education in Sri Lanka), Rogers' theory is limited in its ability to guide such studies because the DOI theory ignores the role of organizations and relies on individual adoption issues.

Similarly, the Boston University School of Public Health (2013) in the US also reported that Rogers' DOI was not meant to explicitly apply to adoption of new behaviors or new programs. Moreover, Lyytinen and Damsgaard (2001) examined the usefulness and applicability of DOI to theoretical constructs that help address adoption of complex and networked IT solutions. They recognized that the DOI theory is not suited for developing theoretical constructs "to understand the local complex, network, and learning intensive features of technology" (p. 14). For example, DOI does not include four key areas: "1) analyzing the impact of the nature and meaning of the technology, 2) the role of institutional policies and regimes, 3) the impact of the industrial policies and strategies, and 4) the importance of the installed base and learning inertia" (p. 14). Due to these limitations, some researchers avoid using the DOI theory for research examining adoption of a program which not only involves technology but also new behaviors and practices. For example, Salmon (2005) conducted research to develop a strategic framework for e-learning and pedagogical

innovation in higher education institutions. Salmon did not use Rogers' DOI theory, arguing that it is too simple to be useful as a for considering the complexity involved in e-learning in higher education institutions.

For example, the study focuses on the introduction of e-learning in tertiary-level IM education in the social and cultural context of Sri Lanka which involves more than the introduction of new technology. It entails adoption of a program (i.e., e-learning) that includes educational aspects and new practices. These new practices relate to pedagogy and changing attitudes and behavior. Hence, Fullan's educational change theory is a more suitable theory as discussed below.

1.2 Educational Change Theory

Fullan's educational change theory (also known as educational technology and change theory, or innovation theory) is one of the most comprehensive and up-to-date views of innovation in education (Lopez, 2010). Fullan has been recognized as a well-published international leader on educational change; he has been studying, leading, and writing about educational change since the 1970s (Lopez, 2010; Ellsworth, 2000). His personal experiences as a practitioner engaged in training, consulting, and evaluating change projects around the world, as well as in reviewing literature on educational change over the past 25 years, led him to propose three stages of the change process: initiation, implementation, and institutionalization. Fullan's educational change theory has been widely used in studies (Beeharry-Konglar, 2013; Brummelhuis, 1995; Foster et al., 1999; Hargreaves, 2005; Huan, 2013; Neumann, 2013; Tondeur et al., 2009; Williams & Williams, 2007; Wong et al., 2008) that examined the introduction of technology to educational organizations at secondary and tertiary levels. Although Fullan's focus when developing his theory was on secondary school education in a western developed country setting, some of these studies applied Fullan's theory in a tertiary education setting and/or developing country contexts (See Appendix 1). Among these studies, those of Brummelhuis (1995) and Foster et al. (1999) provide more central themes that relate to use in Socio-Technological Innovation Studies in the Field of Information Management and are discussed below. Other recent studies that have made use of Fullan's educational change theory are outlined in Appendix 1.

Brummelhuis (1995) conducted research with the aim of exploring, testing, and respecifying a model for the implementation of computers in Dutch schools (as a specific case of educational change) while taking the interrelatedness of influencing factors into account. For this purpose, Brummelhuis developed a statistical model based on a review the literature on educational change and added Fullan's three Rs: readiness, relevance, and resources. Brummelhuis' study confirmed that a model including a set of factors derived from theories on educational change (including Fullan's three Rs) fits the data on implementation of computer use in education. Foster et al. (1999) did a survey and evaluation of the views

of a variety of stakeholders (academics, management, and support staff) on the readiness of a traditional research-led university for implementing ICT-based learning and teaching (largely at the initiation stage). They used the initiation stage of Fullan's change theory as a guide for analyzing a number of factors relevant to a discussion of institutional readiness for networked collaborative learning. Foster et al. (1999) found that a university's readiness to implement networked learning needs to be identified at an early stage and more attention needs to be paid both to the internal infrastructure within the institution and to collaboration with external agencies to support the delivery of networked learning.

According to Fullan (2007), there are three aspects of educational change in practice which are essential to achieve an educational goal or set of goals. They are: (1) the possible use of new or revised materials (direct institutional resources such as curriculum materials or technologies); (2) the possible use of new teaching approaches (e.g., new teaching strategies or activities); and (3) the possible alteration of beliefs (e.g., pedagogical assumptions and theories underlying particular new policies or programs) (p. 30). This study involves all three of these changes because this study focuses on introduction of e-learning in the Sri Lankan tertiary-level IM educational sector where face-to-face teaching is still practiced in the conventional classroom and where there is little familiarity with e-learning.

Use of IT in education involves not only a change of teaching resources but also of teaching strategies and beliefs (Scott & Robinson, 1996). Research further shows that new practices (including new educational practices) cannot be sustained without changes of values and beliefs (Handal, 2004; Handal & Herrington, 2003; Richardson & Placier, 2001; Smith et al. 2005). Unlike Rogers' model, Fullan's model explicitly focuses on educational change and provides useful insights to guide the study since all three of these change elements (materials, teaching strategies, and beliefs) are major dimensions of educational change.

Research in the educational field reflects two broad ways to look at educational reform. One is an innovation-focused approach which examines specific innovations to see how they fare and to determine which factors are associated with success. The other one has a capacity-building focus and examines how to develop the innovative capacity of organizations and systems to engage in continuous improvement (Hall, 2013; Grossman, 2013; Harris & Jones, 2013; Fullan, 2007). Educational change which is viewed from an innovation perspective i.e. looks at e-learning as a large-scale system innovation and seeks to identify the factors and to understand how these factors affect the introduction of e-learning in tertiary-level IM education in Sri Lanka. Because of the focus on educational change in the innovation-focused approach and the importance of the organizational context, Fullan's educational change theory can be recommended to use as the main theoretical framework to guide such studies.

1.2.1 Fullan's Educational Change Theory (1982, 1991, 2001, 2007)

Fullan's framework for understanding and managing educational change was published in his first edition of the meaning of educational change in 1982. For his second edition,

Stiegelbauer joined as a co-author. To date Fullan has published four editions of the meaning of educational change and the evolution of this theory is depicted in Appendix 2.

Fullan (2007) introduced three stages of the change process in relation to outcomes as a means of helping "make sense" of planning, implementation strategies, and monitoring in the process of educational change. As Fullan (2001) points out, as educational change is multidimensional and involves many levels (e.g. classroom, school, district, and government), his theory operates at the macro level (system level) as well as at organizational level. Fullan (2007) states that there are number of factors operating at each stage and he also stresses it is not a linear process. The first stage of Fullan's change theory is initiation (variously labelled as mobilization or adoption). It refers to "the process that leads up to, and includes a decision to adopt or proceed with a change" (2007, p. 65). Fullan argues that the source of an innovation should always be investigated before it is put forward for adoption. He therefore introduced eight sources affecting initiation: 1) existence and quality of innovations; 2) access to innovation; 3) advocacy from central administration; 4) teacher advocacy; 5) external change agents; 6) community pressure/support/apathy; 7) new policy funds; and 8) problem-solving and bureaucratic orientations. Fullan discusses each of these sources in turn and in his second edition (1991, p. 63), he concluded that the best ways to begin the initiation stage combine the three Rs, i.e., relevance, readiness, and resources. The second stage is implementation (or initial use). It involves "the first experiences of attempting to put an idea or reform into practice" (2007, p. 65). Institutionalization (or continuation, incorporation, or routinization) refers to "whether the change gets built in as an ongoing part of the system or disappears by way of a decision to discard, or through attrition" (p. 65). The outcomes refer to the complete overview of the change process. The initiation stage and the implementation stage of Fullan's change theory are the most relevant components for Socio-Technological Innovation Studies focuses on early implementation of technologies in the Field of Information Management as discussed below.

The initiation stage represents a combination of the three Rs – relevance, readiness, and resources (Figure 1) – which are critical factors prior to implementation. Thus, the three Rs are useful for identifying factors/issues that have an impact on the adoption decision which seeks to understand i.e. factors which may influence change in the Sri Lankan tertiary-level IM education sector.

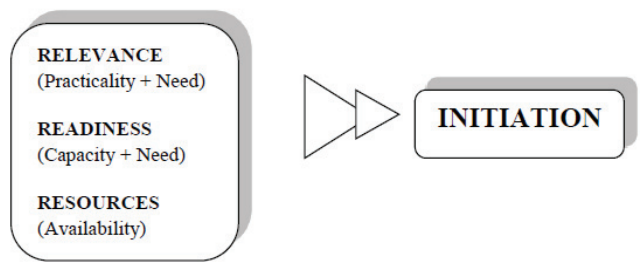


Figure 1 - Considerations in planning for adoption
Source: Fullan, 1991, p. 63 (copied with permission)

'Relevance' includes need, clarity of innovation (about goals and means), and utility (Fullan, 1991, p. 63). For example, relevance can be identified as "practitioners' understanding or being agreeable to innovation" (p. 63). 'Readiness' involves the "organizations'/ individuals' practical and conceptual capacity to initiate, develop, or adopt a given innovation or capacity to use reform" (p. 63). 'Resources' concern the "accumulation of, and provision of, support as a part of the change process" (Fullan, 1991, p. 64). The three Rs of the initiation stage, therefore, include discussion of clarity of the innovation (i.e., about goals and means, for example, understanding of essential features of the innovation), agreeability of the innovation and practical and conceptual capacity to initiate a given innovation, all of which are relevant to the context of Sri Lankan tertiary-level IM education for identifying practitioners' understanding of e-learning, identifying IM education providers' practical and conceptual capacity to initiate e-learning, and identifying resources to introduce and use e-learning. Foster et al. (1999), who used Fullan's change model to understand institutional readiness for implementing ICT-based learning and teaching, found that a combination of the three Rs should exist before putting into practice an idea, programme, or set of activities and structures that is new to the people attempting or expected to change.

Fullan (2007) argued that the required changes cannot all occur and be resolved at the initiation stage (i.e., adoption decision) and therefore, some of the changes and lack of resolution continue in the implementation stage. They become much more noticeable/clearer at this stage. Therefore, the implementation stage of Fullan's change theory can be also selected for the studies such as identifies potential post-adoption issues in the early stages of e-learning implementation in the tertiary-level IM educational sector (including IM education) in Sri Lanka. Fullan (2007) argued that the identified factors have an impact on initiation and implementation, operating over many innovations as well as many levels of the system.

The implementation stage represents critical factors that commonly influence changes in practice. These critical factors as shown in Figure 2 are divided into three categories. They are a) characteristics of change, b) local characteristics (roles), and c) external factors.

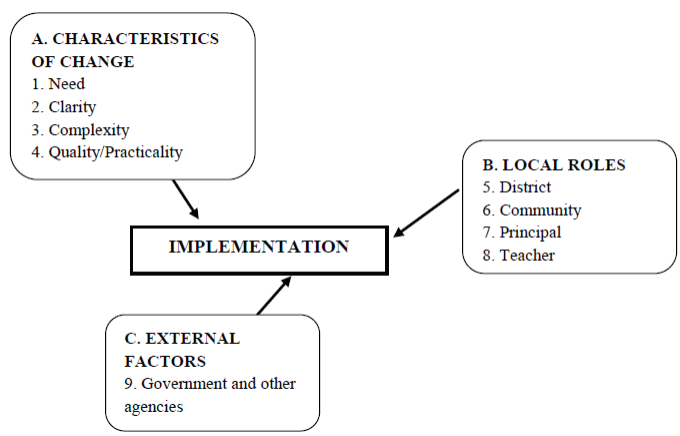


Figure 2 - Interactive factors affecting implementation
Source: Fullan, 2007, p. 87 (copied with permission)

The first category of the implementation stage is characteristics of change. It includes four factors: 1) need (what are the perceived priority needs?), 2) clarity (clarity of innovation, i.e., about goals and means, 3) complexity (difficulty and extent of change required of the individuals responsible for implementation), and 4) quality/practicality (understanding the quality and practicality of the change project) (Fullan, 2007, pp. 88-92). These factors are similar to the three Rs: relevance (practicality and need), readiness (capacity and need), and resources (availability). However, in the implementation stage, the factors are identified when practitioners actually start doing things, that is, during the early stages of implementation.

The second category of the implementation stage is local characteristics/roles. Fullan emphasized that these roles are based on social level. They include district level roles (district administrators), community level roles (parents and school boards), principal, and teacher. Fullan used them to identify the meaning of change for people in the role under discussion and to generate ideas as to what they could/should do about change. The study which was taken as an example of this paper, focuses on tertiary-level IM education in Sri Lanka. Therefore, this study selected local roles at the university level in Sri Lanka. They are academics, administrative staff (head of the department/director of the institution), support staff (technical officers, librarians), and existing e-learning providers. This study can be used these roles as participants to identify what factors have an impact on the introduction and use of e-learning and how these factors affect the introduction and use of e-learning in tertiary-level IM education in Sri Lanka.

The third category of Fullan's implementation stage is external factors. It includes government and other agencies and identifies their role in the implementation.

Accordingly, the initiation stage (three Rs) and the implementation stage of Fullan's change theory can be used to develop the conceptual model for the said studies. The identified factors could have an impact on the i. e. introduction of e-learning in tertiary-level IM education in Sri Lanka.

However, Fullan's educational change theory only briefly discusses changing cultures and working conditions in organizations (2007, p. 291) and pays no attention to cultural aspects on a broader level such as the national level. Studies done by Ma (2010), Olaniran (2007), and Downey et al. (2005) show that cultural context matters when introducing or implementing e-learning. Further, there is literature that also shows that culture is an important facet of the e-learning system. For example, Adeoye and Wentling (2007) and Strother (2003) consider that the appropriate awareness of cultural differences and their effects on the individual user are vital to the success of e-learning systems. McLoughlin (1999) reported that e-learning systems often appear to be modified to the needs of a particular cultural group, recognizing the specific learning needs, preferences and styles of a single, perhaps homogeneous, group of learners. Culture is an important facet in the Sri Lankan context

especially when introducing constructivist-based e-learning. Therefore, when understanding how e-learning can be utilized to facilitate education in a specific context, there is a need to understand cultural influences on behavior, especially in teaching and learning.

2. Dimensions of national culture

2.1 Choice of culture model

A number of cross-cultural studies, frameworks and models can be used to analyze the cultural differences among nations or organizations. For example, there are cultural models that deal with multiple dimensions: Hofstede's (1980, 1991, 2001, 2005, 2010) has six, Hampden-Turner and Trompenaars' (1993) has seven, House et al.'s (2004) has nine and Minkov's (2007) has three. Table 2 outlines the cultural dimensions of four models and overlaps among the factors with Hofstede's model.

Cultural models with multiple dimensions	Hofstede's Six Cultural Dimensions (2010)					
	Power Distance	Masculinity vs. Femininity	Uncertainty Avoidance	Individualism and Collectivism	Long- vs. Short-Term Orientation	Indulgence vs. Restraint
Hampden-Turner and Trompenaars' Seven Cultural Dimensions (1993)						
1. Universalism vs. Particularism			√			
2. Neutral vs. Emotional	√	√	√			
3. Individualism vs. Collectivism	√	√		√		
4. Specific vs. Diffuse	√		√			
5. Achievement vs. Ascription		√				
6. Attitudes to time		√	√			
7. Attitudes to the environment			√			
House et al.'s Nine Cultural Dimensions (2004)						
1. Power Distance	√					
2. Assertiveness		√				
3. Gender Egalitarianism		√				
4. Uncertainty Avoidance			√			
5. Institutional Collectivism				√		
6. In-group Collectivism				√		
7. Future-Orientation					√	
8. Humane Orientation		√				
9. Performance Orientation		√				
Minkov's Three Cultural Dimensions (2007)						
1. Exclusionism vs. Universalism				√		
2. Monumentalism vs. Flexumility					√	
3. Indulgence vs. Restraint						√

Table 2 – Influence of Hofstede's six cultural dimensions on other studies

√ - Definitional / conceptual similarities √ - Derived from √ - Inspired by √ - Correlation

Although the terminology used in these four models differs (Table 2), there are overlaps among the factors with Hofstede's model. Among these four models, Hofstede's work was a pioneering attempt to study national cultures (Minkov, 2007; Ma, 2010). Hampden-Turner and Trompenaars published seven cultural dimensions in 1993. As demonstrated by Krumbholz and Maiden (2001), there are commonalities between Hofstede's and Trompenaars' cultural dimensions and their definitions are similar. As shown in Table 3.2, black ticks show the shared definitions. Each dimension overlaps with at least one other, showing considerable similarity between Hofstede and Trompenaars.

House et al. identified nine cultural dimensions through their GLOBE research project in 2004. This GLOBE project expanded the five Hofstede dimensions to nine for conceptual reasons (House et al., 2004). For example, the first six cultural dimensions of the GLOBE project were derived from the four identified by Hofstede. This relationship is shown by green ticks in Table 2. House et al. identified that future orientation is conceptually similar to the dimension Hofstede called long-term versus short-term orientation. This is shown by black ticks in Table 2. Hofstede argued that the other two dimensions of the GLOBE project (i.e., humane orientation and performance orientation) are also inspired by his masculinity-femininity dimensions. This relationship is shown by red ticks in Table 2.

Based on the World Value Survey (WVS) Minkov introduced his three cultural dimensions in 2007. Then Minkov became one of the authors of Hofstede's third edition of Culture and organizations: Software of the mind and integrated his research results with those of Hofstede. Of the three Minkov dimensions, two dimensions are strongly correlated (in statistics, the degree of common variation of two sets of numbers) with two of Hofstede's dimensions as shown by pink ticks in Table 2. Subsequently, one of Minkov's cultural dimensions, indulgence versus restraint, was added to Hofstede's third edition and expanded his formerly five-dimensional model of cultures to six.

Hofstede's culture model has been the most frequently replicated, tested and validated (Oliver, 2011; Kirkman, Lowe, and Gibson, 2006). According to the Social Science Citation Index (SSCI), Hofstede's work is more widely cited than other culture studies. Moreover, Hofstede's cultural dimensions have been widely used in many fields and have been used in studies on implementing or introducing e-learning in specific cultures. For example, Ma (2010) conducted deductive research to find out the driving factors and barriers to e-learning implementation in traditional universities in China and Sweden and how these factors are influenced by national culture. For this purpose, Ma collected primary data through questionnaires from teachers in two Chinese universities and one Swedish university. Hofstede's culture dimension model was used to analyze the difference between Chinese and Swedish e-learning education. Ma found that as China is a high-power distance society, its teachers were experiencing barriers such as lack of e-learning strategy or leadership and lack of support compared to Swedish teachers in their low power distance society. Teachers in China therefore expect universities to lead and support their e-learning initiatives by funding them and recognizing and rewarding individual factors. Similarly, Ma found that national culture is a significant factor that affects e-learning implementation in higher educational institutions.

Olaniran (2007) discussed challenges to implement e-learning in lesser-developed countries based on a review of the literature and used Hofstede's cultural dimensions to explore significant challenges created by learning preferences and adoption of innovation. Olaniran found that different implications for e-learning are required for different cultures.

For instance, e-learning in collectivistic cultures needs to integrate more interpersonal interactions where students and instructors get to explain ideas to one another while self-paced independence-focused e-learning is suited to individualistic cultures.

Downey et al. (2005) conducted a study to investigate possible relationships between national culture and the usability of an e-learning system. They used two theoretical frameworks to guide their study: Hofstede's cultural dimensions and Nielsen's usability attributes. By collecting quantitative data from 24 attendees who represented 14 different countries from Africa, Asia, Europe, and North America, they found that participants from high uncertainty avoidance cultures find use of an e-learning system frustrating because they make more errors in navigating the e-learning system and therefore, they are least likely to accept risk. In addition, in Hofstede's book Culture and organizations, he categorized key differences of each dimension in different societies, for example, the differences in families, schools or educational systems, workplaces or organizations. Hofstede's cultural dimensions therefore provide a useful guide for understanding cultural influences on the introduction of e-learning in tertiary-level IM education in Sri Lanka.

However, there have been criticisms of Hofstede's work on cultures and nations. For example, McSweeney (2002) argued that Hofstede's cultural model was based on five false assumptions: i) national, organizational, and occupational levels of culture are discrete, ii) the national is identifiable in the micro-local (IBM samples), iii) national culture creates questionnaire response (response differences between the classifications/stratifications), iv) national culture can be identified by response difference analysis, and v) Hofstede's analysis of national culture is not situation-specific. Baskerville (2003) argued that nations are not the best units for studying cultures, because cultures are not countries and there are generally multiple cultures in one country at any one time. For example, there are 98 different cultures recognized in 48 countries in Africa and 81 cultures identified in 32 countries in Western Europe. In addition, Fang (2003), based on his indigenous knowledge of Chinese culture and philosophy, argues that Hofstede's fifth national cultural dimension, i.e., long-term vs. short-term orientation is philosophically flawed in interpreting Chinese culture. In Chinese culture protecting your face (yao mianzi) and having a sense of shame (Zhi chi) are not different concepts but share a common Confucian moral base, i.e., face-caring or face-need. Fang therefore argued that (as one example) it is inappropriate to operationalize 'having a sense of shame' and 'protecting your face' as two separate and opposing values in Hofstede's fifth dimension. Sondergaard (2002) has followed the debate on Hofstede's culture model from 1986 and summarized the criticisms into five points: i) surveys are inappropriate instruments to measure culture, ii) nations are not the best unit for studying culture, iii) participants from one company (IBM) cannot represent entire national cultures, iv) the IBM data is old and obsolete, and v) four dimensions cannot tell the whole story.

Hofstede has responded to these criticisms. For instance, Hofstede (2003) addressed Baskerville's (2003) criticism, i.e., nations are not the best units for studying cultures and said "True, but they (nations) are usually the only kind of units available for comparison and better than nothing" (Hofstede, 2003, p. 812). Then he noted the validity of his study on two levels, i.e., micro-level and macro-level. For example, Hofstede found over 400 micro-level significant correlations, i.e., country-culture dimension scores against data from a wide variety of other sources. Hofstede maintained that, at the macro level, a number of researchers and authors have used and have continued to use his work for understanding the problems they address. In fact, Hofstede has also responded to criticism through his new edition of Cultures and organizations: Software of the mind (2010). Hofstede argued that, even though regional, ethnic, and religious cultures account for differences within countries, they are learned from birth onward, and therefore can be described under the same terms as national cultures. Therefore, he argued that the same dimensions that were identified as differentiating national cultures can also be applied to identifying differences within countries. In addition, with regard to criticisms of Hofstede's fifth national culture dimension, Hofstede integrated Minkov's (2007) analysis of World Values Survey (WVS) data in his third edition and showed that Minkov's research results significantly correlated with his fifth dimension. For example, Minkov's third dimension of monumentalism versus flexhumility is conceptually similar to the long-term orientation and correlates significantly with long-term orientation.

Despite the limitations identified by other researchers, as noted in Table 2, large cross-cultural studies have been published since Hofstede's work that have sustained and reinforced Hofstede's conclusions rather than contradicting them. By reviewing empirical research that incorporated Hofstede's cultural values framework and was published in top-tier journals, Kirkman, Lowe, and Gibson (2006) show that researchers preferred Hofstede's cultural dimensions due to their clarity, parsimony, rigor, and relative accuracy. They suggested that Hofstede's values are relevant for studies in which culture is an important facet of the research context. Therefore, Hofstede, Hofstede, and Minkov's (2010) cultural dimensions can be used to understand cultural factors that have an impact on the introduction of e-learning in tertiary-level IM education.

2.2 Hofstede's cultural dimensions (1980, 1991, 2001, 2005, 2010)

Hofstede's first culture-related study was carried out (with IBM) from 1967-1969 and repeated from 1971-1973. The study received 117,000 questionnaires from over 88,000 IBM employees in over 66 countries. Based on the surveys' results, he explored four dimensions of culture in his first edition of Culture's consequences: International differences in work related values in 1980, while the first edition of Cultures and organizations: Software of the mind was published in 1991. From the second edition of Culture and organizations

(2005), Gert Jan Hofstede (Hofstede's son) joined as a co-author. For Hofstede's third edition of Culture and organizations (2010), Minkov also joined as co-author and Hofstede integrated his research results with Minkov's exploration of the World Values Survey (WVS). Consequently, Hofstede explores six dimensions of culture (Table 3) and these dimensions are used in this study as the latest expansion of Hofstede's model. (The evolution of Hofstede's cultural dimensions (from 1980 to 2010) is visualized in Appendix 3).

Dimension	Definition
Power Distance (PDI)	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally (p. 61)
Individualism and Collectivism (IND)	Individualism means a society in which the ties between individuals are loose: everyone is expected to look after himself/herself and her/his immediate family only. Collectivism means a society in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty (p. 92).
Masculinity and Femininity (MAS)	Masculinity indicates a society in which social gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life. Femininity indicates a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life (p. 140).
Uncertainty Avoidance (UAI)	The extent to which the members of a culture feel threatened by ambiguous or unknown situations (p. 191)
Long-Term versus Short-Term Orientation (LTO)	Long-term orientation entails the fostering of virtues oriented toward future rewards – in particular, perseverance and thrift. Short-term orientation entails the fostering of virtues related to the past and present – in particular, respect for tradition, preservation of 'face', and fulfilling social obligations (p. 239).
Indulgence versus Restraint (IVR)	Indulgence involves a tendency to allow relatively free gratification of basic and natural human desires related to enjoying life and having fun. Restraint reflects a conviction that such gratification needs to be curbed and regulated by strict social norms (p. 281).

Table 3 - Hofstede's six cultural dimensions Source: Hofstede, G.H, Hofstede, G.J., and Minkov (2010)

An analysis of the Sri Lankan culture was added to Hofstede's official web site in 2012. Table 4 shows national culture dimension scores for Sri Lanka compared to Morocco, China, India, Sweden, Canada, Brazil and New Zealand. For this study, I have included the rankings of the other countries for comparison purposes. They are randomly selected according to the continent i.e., Africa, Asia, Europe, North America, South America, and Oceania. However, three countries are selected under Asia (including Sri Lanka) since this study represents the Asian context.

Continent	Country	PDI	IDV	MAS	UAI	LTO	IVR
Africa	Morocco	70	46	53	68	14	25
Asia	China	80	20	66	30	87	24
	India	77	48	56	40	51	26
	Sri Lanka	72	28	35	53	49	64
Europe	Sweden	31	71	05	29	53	78
North America	Canada	39	80	52	48	36	68
South America	Brazil	69	38	49	76	44	59
Oceania	New Zealand	22	79	58	49	33	75

Table 4 - Hofstede's values of Asian countries (score out of 100)

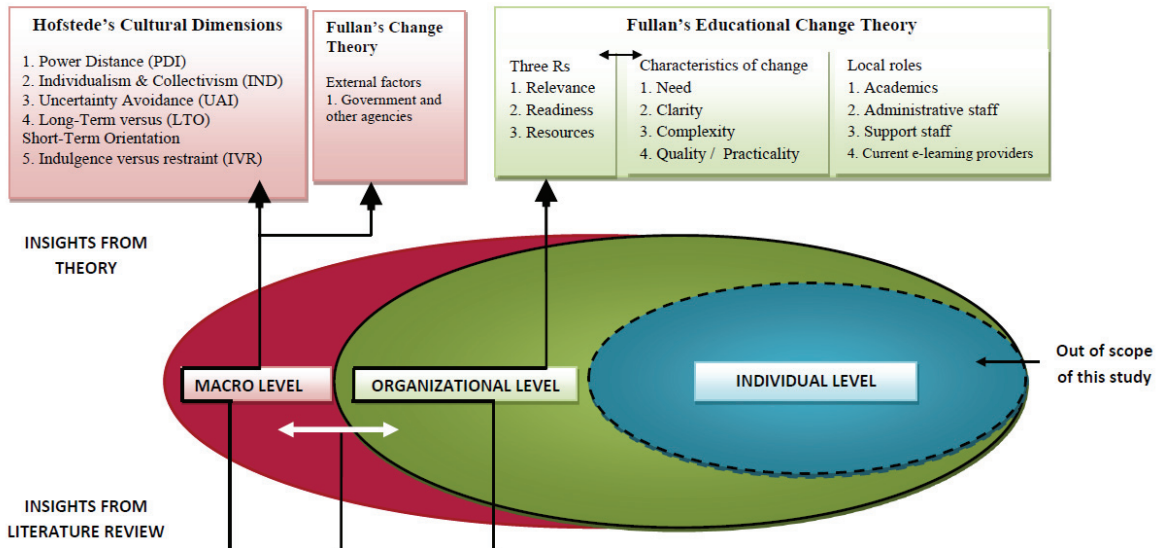
Source: Hofstede Web Site http://www.geerthofstede.nl/dimension-data-matrix

As shown in Table 4, Sri Lanka has a high degree of power distance (72). Unlike countries in Europe, North America, and Oceania, countries in Asia (including Sri Lanka), Africa, and South America are more collectivist. According to Table 3.4, Sri Lanka has a considerably lower degree of masculinity than other countries except Sweden. Sri Lanka has a slightly higher value for uncertainty avoidance and a mid-level value for long-term versus short-term orientation compared to other Asian countries. Interestingly, Sri Lanka has a considerably higher degree of indulgence (especially since after the civil war) than other Asian, African, and South American countries.

Five out of Hofstede's six cultural dimensions were selected for Socio-Technological Innovation Studies in the Field of Information Management in Sri Lanka. They are power distance, individualism and collectivism, uncertainty avoidance, long- versus short-term orientation, and indulgence versus restraint. The other dimension, masculinity versus femininity, was not selected for this study for the following reason.

Strother (2003), Downey et al. (2005), and Ma (2010), who used Hofstede's cultural dimensions for their studies, found that the masculinity or femininity of cultures is not important for e-learning implementation. For example, Strother (2003) pointed out that e-learning delivery modes are, by their very nature, more gender independent. Also, Ma (2010) did not identify gender as a driving factor or a barrier for implementing e-learning in traditional universities in China and Sweden. Similarly, Downey et al. (2005) found that there was no significant relationship between femininity/masculinity and the usability of an e-learning system. Further, there is no research that indicates gender as a critical factor that influences the success or failure of e-learning. Therefore, this dimension was not selected Socio-Technological Innovation Studies in the Field of Information Management in Sri Lanka.

After carefully looking at the two theories, i.e., Fullan's educational change theory and Hofstede's cultural dimensions, the conceptual model was developed by combining relevant elements from each theory and depicted in Figure 3.



[Not discussed in this paper]

Figure 3 – Part of the Conceptual model of factors that might have an impact on the introduction of e-learning in tertiary-level IM education in Sri Lanka

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Appendix 1

Selected relevant studies that have cited Fullan's educational change theory

Source	About the study	Methodology	Context of the use of Fullan's work
Do, Van Hung (2015)	The aim of this study was to identify contextual factors affecting the development of digital library education in Vietnam	Qualitative research approach was employed and conducted 18 interviews and 11 focus group involving 70 participants and also used documentary evidence	Used Fullan's educational change theory as one of the sources to develop an initial conceptual model of factors affecting digital library education
Ismail, S.A. (2014)	The aim of this study was to identify factors affecting the implementation of information literacy education in Malaysian primary schools	Qualitative research approach was employed i.e., focusing on cases and used semi-structured interviews and documentary analysis	Used Fullan's educational change theory as one of the sources to develop a preliminary model to explore potential factors internal and external to the school ecology
Beeharry-Konglar, M. (2013)	The aim of this study was to understand the use of ICT in secondary visual arts classrooms in Mauritius. Three key issues were examined, - Use of ICT tools in teaching visual arts - How ICT tools are used in the in teaching visual arts - Scope and barriers using ICT in the teaching of visual arts	A mixed method was employed i.e., questionnaire, focused group discussion, and classroom observation - Questionnaires were administrated among 70 visual arts teachers in public and private schools. - 40 classroom observations (observed teachers) were carried out in both lower and upper secondary school visual arts classes. - A focus group discussion was held with 15 visual arts teachers to understand their beliefs and attitudes	Based on a review of the literature, a conceptual framework for the study was developed. Fullan's study (including other literature) used to identify factors that influence teacher's decision to use ICT in the classroom. For example, teachers resistance to change. Teacher's values, beliefs, and attitudes are therefore identified as significant contributors to their preparedness to use e-learning. This was also confirmed by study findings.
Neumann, J.W. (2013)	The goal of this study was to examine critical pedagogy problem with changing teachers' dispositions towards critical teaching	Reviewed literature on successful change	Based on review of the literature, this study identified four changes critical educators must make in their approach towards teachers if criticalists hope to influence more teachers' dispositions towards critical teaching. They are;

				1. Advocacy for critical teaching must begin by appreciating the knowledge that teachers already have 2. Critical educators should begin their work 'small' 3. Critical educators should work with teachers in ways that are practical 4. Educational change should be approached with sustainability in mind Third and fourth areas were identified based on Fullan's study.
Huan, N.B. (2013)	The aim of this study was to understand the beliefs about the support needed for teacher change in English for Specific Purposes (ESP) classes within a university context in Vietnam. In particular, this study aimed to examine how ESP lecturers conceptualised and managed change to include more interactive teaching to enhance active learning.	Qualitative action research approach was utilised i.e., interviews, planning meetings, and participants observations. - Two lecturers with similar levels of seniority, academic knowledge, English proficiency, and research experience were selected as participants for this study.	This study confirmed the findings of Fullan's study of educational change i.e., benefit of collaboration with others to improve the teaching situations, importance of policy makers and education administrators support to ensure that change occurs and becomes part of teachers' personal and professional growth.
Tondeur, J., Devos, G., Houtte, M.V., Braak, J.V., and Valcke, M. (2009)	The goal of this study was to explore both structural school characteristics (i.e., infrastructure, planning and support) and cultural school characteristics (i.e., leadership, goal orientedness and innovativeness) and how they contribute to ICT integration in the classroom.	A survey was done among 527 (428 were female) teachers in 68 primary schools in Flanders, Belgium.	Fullan (2001) stated that educational improvement or innovation efforts should consider to a large extent – the 'power of site or place'. Therefore, this study centred on the hypothesis that school characteristics affect the integration of ICT at classroom level. The study findings re-emphasised how important and influential school-related characteristics are to establish educational change. This study also confirmed that structural and cultural school characteristics are relevant vehicles to promote educational change in general and ICT integration in particular.
Wong, E.M.L., Li, S.S.C., Choi, T-H., and Lee, T. (2008)	The study aimed to identify contextual factors that impact on the teaching and learning and how these factors interact with each other, in	A qualitative case study approach was adopted i.e., lesson observations, interviews, and focus-group interviews.	Followed by Fullan's (1991) view, innovation cannot be assimilated unless its meaning is shared, this study used

	particular the relationship between technological innovations and pedagogical innovations.	- Study sample was eight schools in Hong Kong and Singapore - Lesson observations of English, Chinese, general studies, and mathematics at primary level while English, geography, physics, and mathematics at secondary level - Semi-structured interviews were conducted with teachers and heads of department - 30 minute focus group interview was conducted with six students (three active participants vs three passive participants)	comparative case study with a view to understanding the processes of change in different education system, and how technological innovations can be successful.
Williams, M.D. and Williams, J. (2007)	This study aimed to understand the change management aspects of ICT investments	A single case study method was employed – i.e., public sector organization in UK, and received its funding (indirectly) from the UK central government. - Observation, semi-structured and informal interviews with 6 departmental heads, 17 administrative staff, and 7 technicians and document analysis (ranging from minutes of meetings to individual memos and emails) were used to gather data.	Based on a review of the literature relating to ICT evaluation and to the concept of change, a conceptual framework for the study was developed. For this purpose, they used Fullan's educational change theory i.e., initiation, implementation, and institutionalisation as a part of their change-based evaluative framework. Moreover, Fullan's three Rs of relevance, readiness, and resources were also used to show management team, and the user-base commitment toward the innovation.
Hargreaves, A. (2005)	This study examined the relationship of the emotions of teaching to teachers' age career stages based on experiences of educational change	50 interviews were conducted among elementary, middle, and high school teachers of varying ages, different grades and a variety of subjects across 15 schools in Ontario, Canada.	Used Fullan's educational change theory to ground some of the findings of the current study i.e., importance of identifying personality types of teacher whether they are early or late adopters of change, provides leaders with tools to improve the improvement process.

Appendix 2

Evolution of Fullan's Educational Change theory

Adapted from New Meaning of Educational change, Fullan (1982, 1991, 2001, 2007)

Appendix 3

Evolution of Hofstede's Cultural Dimensions

Hofstede's culture related study was first carried out (with IBM – at the time identified as HERMES) around 1967 – 1969 and repeated around 1971 -1973. The study comprised 117,000 questionnaires with over 88,000 different respondents from over 66 countries. Based on this survey results, Hofstede published;