Evaluating Students' Acceptance of the Discussion Forum in the E-Learning Context

Kamla Ali Al-Busaidi, Sultan Qaboos University, Oman; E-mail: kamlaa@squ.edu.au

ABSTRACT

Recently, the popularity of e-learning systems has been growing in the academic and technical training world. Some academic and technical training organizations are adopting e-learning systems to support distance education, while others use these systems to supplement their traditional way of teaching. This pilot study evaluated the students' acceptance of the use of discussion forum in the context of using e-learning system as a supplementary tool, based on the technology acceptance model (TAM2). Data was collected through a questionnaire from undergraduate students in an academic institution in Oman. This study found that perceived usefulness is significantly determined by job relevance, image, result demonstrability and perceived ease of use of the system, but not by subjective norm and output quality. In addition, the use of the discussion forum in the e-learning context is determined by its perceived usefulness and perceived ease of use.

INTRODUCTION

Recently, the adoption of e-learning systems has been growing in the academic world. In 2004, the e-learning market was worth more than US $18 billion worldwide (Saady, 2005). In the Middle East, e-learning projects are expected to exceed a compound average growth rate of 32% by 2008, based on the Madar research group (Saady, 2005). Several international reports from the World Bank (2003) and the World Summit on the Information Society (2005) emphasized that the use of information communication technology (ICT), to build human resources is a vital prerequisite for the development of knowledge-based economy especially for developing country.

To be able to succeed on the deployment of e-learning systems, it is very essential to understand the determinants of this technology's acceptance. The technology's acceptance can be assessed at macro level (organizations or governments) or micro level (students and instructors). This study aimed to investigate this phenomenon from the students' perspective. Factors affecting information system usage are best investigated at the individual users' level (DeLone & McLean, 2002). Evaluating individual users' acceptance of the e-learning systems is a "basic marketing element" (Kelly & Bauer, 2004). Middle Eastern organizations are hesitant to adopt e-learning systems because of the limited Individual users' acceptance (Saady, 2005).

This study empirically examined factors that enhances students acceptance of e-learning initiative (specifically the use of discussion forum). Discussion forum is an online discussion group where people with similar interests engage in discussion, share and debate ideas. This study adopted Technology Acceptance Model (TAM2), which was proposed by Venkatesh and Davis (2000).

The next section provides a literature review of e-learning and technology acceptance models. The literature section is followed by sections on study framework, study methodology, data analysis, and discussion and conclusions.

LITERATURE REVIEW

E-Learning

E-learning is defined as "instruction delivered through purely digital technology using the Internet or private networks" (Laudon & Laudon, 2003, p. 268). It is the use of a web-based communication, collaboration, learning, knowledge transfer and training to add values to the learners and the businesses (Kelly & Bauer, 2004). Some academic and technical training institutions adopt the e-learning system to support distance learning, while others adopt this technology as a supplementary tool to their traditional way of teaching. E-learning provides several benefits for individuals and organizations. Such benefits are cost-effectiveness, consistency, timely content, flexible accessibility and customer value (Cantoni, Cellario & Porta, 2004; Kelly & Bauer, 2004). However, e-learning may cost a lot to develop, requires new skills on content producers and requires more responsibility and self-discipline from the learners (Cantoni et al, 2004); thus students might be intimidated to use the e-learning systems.

Thus, understanding the determinants of the learners' acceptance of the e-learning systems is vital to the promotion and exploitation of these systems. Limited studies investigated the e-learning acceptance such as those of Ashrafi, Al-Moharby and Salman (2005) and Abouchedid and Eid (2004). However, these studies assessed the instructors' acceptance of e-learning systems. Some Western studies empirically investigated the students' acceptance of e-learning. For instance, Roca and colleagues (2006) found that Information quality, ease of use, perceived usefulness, information quality, service quality and system quality determine the students' satisfaction and consequently their e-learning continuous intention. Gotthardt and colleagues (2006) indicated the success of e-learning strategy depends on content quality, system and content flexibility, system ease of use and others. Nevertheless, these two studies evaluated the individuals' acceptance of the entire e-learning system. However, an e-learning system incorporates various tools (such as online quizzes, files upload/download, chat rooms, discussion forums, instant messaging and email, quizzes, surveys etc.) that have diverse features. Thus, the determinants of these tools' acceptance may be different.

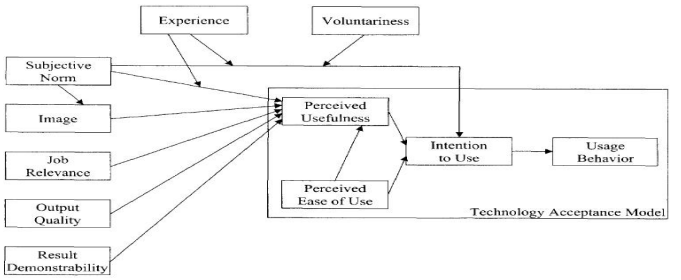
Technology Acceptance

User acceptance is a multidimensional attitude affected by various technical and social factors (Bailey & Pearson, 1983; DeLone & McLean, 2002). Technology acceptance has been assessed in the literature based on perceived usefulness, user's satisfaction, intention to use, and actual usage of the technology. Various frameworks, such as those of Bailey and Pearson (1983), Davis et al. (1989), Doll and Torkzadeh (1998), DeLone and McLean (2002), investigate the determinants of this individuals' acceptance. Baily and Pearson' and Delone and McLean's models focus mostly on the effects of information system's technical characteristics on IS effectiveness. However, discussion forum is a knowledge exchange tool. Knowledge management (KM) is a social and technical process (Scholl, Konig, Meyer & Heisig, 2004). Thus, investigating the social factors is as important as the technical factors. Venkatesh and Davis's TAM2 model (2000) is more suitable because it focuses on social and technical factors to measure the user's acceptance of information technology. *Figure 1* illustrates this model.

TAM was originally developed in 1989 based on the theory of reasoned action (TRA) in psychology, and was extended in 2000 (Venkatesh & Davis, 2000). Based on TAM2, user acceptance is determined by two factors: perceived usefulness (the extent to which a person perceives that using the system will improve his or her work performance), and perceived ease of use (the degree to which a person believes that using the system will be effortless). According to TAM, the effects of external variables on the intention to use are mediated by perceived usefulness and perceived ease of use; perceived ease of use also directly affects the perceived usefulness. TAM2 extends the external variables to include social influences (subjective norm, voluntaries and image) and cognitive influences (job

Copyright © 2007, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

Figure 1. TAM2 (Source: Venkatesh & Davis (2000))



relevance, output quality, result demonstrability and perceived ease of use). The study framework section below provides more discussion on TAM2 model.

STUDY FRAMEWORK

This study examined the factors that determine the students' acceptance of the discussion forum use in the e-learning system based on TAM2. *Figure 2* illustrates the study framework. This study did not measure voluntariness because the use of the system in the participating sample is discretionary not mandatory. Experience was also excluded because to test the moderation effect of experience, a larger sample size is needed.

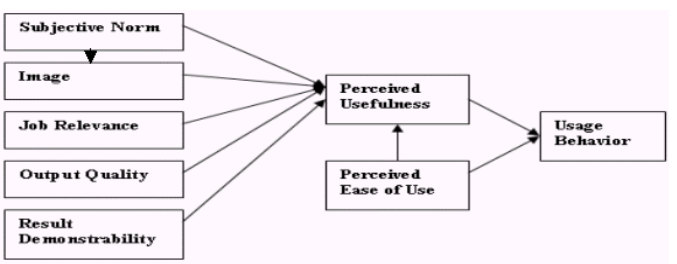
Based on TAM2, there are several factors that may contribute to the perceived usefulness of an information system (Venkatesh & Davis, 2000). These factors are subjective norm, image, job relevance, and output quality and result demonstrability.

Subjective norm and image are two social influences that may affect the perceived usefulness of a system. *Subjective norm* is defined as the individual's perception that most people who are important to him think he or she should or should not do a specific behavior (Fishbein and Ajzen, 1975). The rationale behind this effect is that a person tends to conduct a behavior just because other important contacts (superiors or colleagues) believe s/he should do it even s/he is not favoring doing it. Very limited studies investigated the influence of subjective norm on IS acceptance; one of these studies that found a significant relationship is Taylor and Todd (1995). *Image* is another social factor that affect perceived usefulness. Image is the degree to which an individual believe the use of an innovation will improve one's position in one's social system (Moore & Benbasat, 1991). Thus, an individual may perceive that the use of a specific system is useful because its usage enhances his image. TAM2 also theorizes that subjective norm affect image because if important figures in one's social network believe s/he should conduct a behavior, then conducting it will enhance his/her standing in the social group. Thus, the study hypothesized:

Hypothesis 1: Subjective norm improves perceived usefulness of the discussion forum in the e-learning context.

Hypothesis 2: Image improves perceived usefulness of the discussion forum in the e-learning context.

Figure 2. Study framework



Hypothesis 3: Subjective norm improves image.

TAM2 also theorizes that four "cognitive instrumental" factors determine perceived usefulness; they are job relevance, result demonstrability, output quality and perceived ease of use. Based on TAM2, people perceive the system's usefulness by cognitively comparing system's capabilities with what they need to get done in their job. Job relevance means that the use of a system is relevant to an individual job. Based on task-technology fit research, job relevance is an important influence on the acceptance of a technology (Goodhue, 1995). *Output Quality*, which is the perception of how well the system performs its tasks, affects the perceived usefulness. This effect has been empirically tested and confirmed in the literature (Venkatesh & Davis, 2000). *Result Demonstrability* is the "tangibility of the results of using the innovation" (Moore & Benbasat, 1991). An individual perceives the usefulness of the system if "the covariation between usage and positive results is readily discernable" (Venkatesh & Davis, 2000). *Perceived ease of use* means that the system is simple and effortless for the end user to use. Researchers indicate that perceived ease of use affects usage directly and indirectly through perceived usefulness (Bailey & Pearson, 1983, Venkatesh & Davis, 2000). In the e-learning context, research indicates that ease of use positively affect the system use (Gotthardt et al., 2006), and perceived usefulness (Pituch and Lee, 2006). Thus, the study hypothesized the followings:

Hypothesis 4: Job relevance improves perceived usefulness of the discussion forum in the e-learning context.

Hypothesis 5: Output quality improves perceived usefulness of the discussion forum in the e-learning context.

Hypothesis 6: Result demonstrability improves perceived usefulness of the discussion forum in the e-learning context.

Hypothesis 7: Perceived ease of use improves perceived usefulness of the discussion forum in the e-learning context.

Hypothesis 8: Perceived ease of use improves the discussion forum use in the e-learning context.

Using the system's intention-to-use or actual use to measure the IS acceptance has been debated in the literature (DeLone & McLean, 2002). The intention-to-use is useful in the context where the system use is mandatory. The investigated system use in this study is voluntarily. Thus, measuring the system actual use is more appropriate. In The e-learning context, Pituch and Lee fount that perceived usefulness positively affect the use of e-learning system (2006). Thus, the study hypothesized:

Hypothesis 9: Perceived usefulness improves the discussion forum use in the e-learning context.

STUDY METHODOLOGY

Investigated System and Sample

The study questionnaire was distributed to students in a public academic institution in Oman. The institution is one of the largest universities in the country. The medium of instruction is English in all science fields including commerce where the sample was selected. The university is currently deploying Moodle and WebCT e-learning systems. Instructors may voluntarily use these systems and incorporate them in their teaching. The e-learning systems are used as supplementary tool to support the traditional learning system enrich the learning experience. Some Instructors mandates the students to use the system; others leave its use voluntarily. The study sample is selected from the volunteer use context. One of tool that is utilized by instructors in the e-learning system is the discussion forum. Discussion forums are online discussion groups where people with similar interests engage in discussions, share and debate ideas. Instructors regularly post topics (questions) related to the course subject, and students are allowed to reply, share their ideas and debate others' ideas.

The questionnaire was distributed to about 136 students, but only 92 responded. The sample included about 49% male students and 51% female students. About

Copyright © 2007, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

54% of student described their English level as average and 36% of them above that. 63% of the students were first and second year student and 37% were major students. About 41% of the students described their computer skills as average, and 40% of them described as above average. All participants had an experience before with the e-learning system. About 32% of students had 1 semester of e-learning experience, 36% had two semesters experience, 23% had three semesters experience and 9% had at least four semesters experience. 24% of the students had used only WebCT e-learning system and 48% of them used only Moodle e-learning system and 28% used both WebCT and Moodle.

Data Collection

Data was collected by a questionnaire. Instructors personally handed the questionnaires to the students. Students were asked to return their completed questionnaires to instructors' mailboxes. The cover letter asked the students to fill out the questionnaire for their use of discussion forum in a specific course. The letter identified the e-learning systems used by the university and the definition of the discussion forum. The questionnaire included some demographic questions and the questions related to the measurements of the study constructs. The measurement scale of constructs was based on 5-point Likert scale: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. The questionnaire uses 4 items for usage behavior, 3 for Perceived usefulness, 3 for perceived ease of use, 2 for subjective norm, 2 for Image, 2 for Study-relevance, 2 for Output-quality, and 2 for result demonstrability. The measurements were developed based on Venkatesh and Davis (2000), and adjusted for the use of discussion forum in the e-learning context. For instance, one of the image indicator was "People in my organization who use the system have a high profile" in Venkatesh and Davis (2000). For this study, it is adjusted to "Students who use the discussion forum have a high profile". Two self-reported frequency measurements were also used to measure usage behavior: minutes per week and posts per week.

DATA ANALYSIS

Analysis Methodology

The data was analyzed using the partial least square (PLS) methodology, a structural equation modeling (SEM) based methodology. The study used PLS-Graph Version 3.0 software. With PLS, the rule of thumb suggests that the sample size is to be 5-10 times the larger of the following: (1) the scale with the largest number of formative (i.e., causal) indicators (note that scales for constructs designated with reflective indicators can be ignored), or (2) the largest number of structural paths directed at a particular construct in the structural model (Chin & Newsted, 1999). Reflective indicators are developed based on the assumption that they all measure the same underlying phenomena or construct, hence they all covary. Formative indicators are considered to be uncorrelated; indicators are assumed to be causing rather than being caused by the latent variable. This study investigated the model in reflective mode because it's the most applicable. Thus, a sample size of 30 to 60 is needed to evaluate the investigated model.

Measurement Reliability

The Model in PLS is evaluated based on several statistics. The R-square for dependent latent variables illustrates the predictive relevance of the model. The r-square of perceived usefulness and usage were 0.44 and 0.32 respectively. In PLS, the measurement internal reliability is measured by the composite reliability; the recommended acceptable level is 0.70 (Braclay, Higgins & Thompson, 1995; Hair, Anderson, Tatham & Black, 1998). The construct validity is measured by "Average variance extracted" (AVE) (Braclay et al., 1995). AVE refers to the amount of variance that a latent variable component captures from its indicators; the acceptable level is at least 0.50. *Table 1* shows that all the investigated factors satisfied the reliability and validity standards. PLS also provides the loading of each indicator on their factor, but because of the limited space they are not included here. The correlations among the investigated determinants of perceived usefulness were below 0.50.

Hypotheses Testing

The hypotheses testing were conducted by examining the path coefficients of the independent latent variables and their significance. The path coefficients are used to measure the relationship's importance and the direction of an independent variable and a dependent variable (Hair et al., 1998). *Table 1* shows the t-test results of constructs based on 95% confidence. To test the significance of the PLS estimates, bootstrapping technique was utilized with a re-sampling of 200 as suggested in the PLS-Graph user's guide. The statistical significance of the hypothesized paths was measured by t-values. As indicated in *Table 1*, the significant determinants of perceived usefulness are in order of their b*etas* are Job relevance (0.32), image (0.22), result demonstrability (0.21) and perceived ease of use (0.16). Subjective norm (0.10) and output quality (0.06) are not significant determinants of perceived usefulness. However, subjective norm is a significant determinant on image (0.21). Perceived usefulness (0.48) and perceived ease of use (0.20) have significant effects on the usage of discussion forum. Thus, hypotheses 2, 3, 4, 6, 7, 8 and 9 are supported, while hypotheses 1 and 5 are not supported.

DISCUSSION & CONCLUSION

Review of Findings

The popularity of e-learning systems has been growing in the last few years. The e-learning system offers several tools that can be incorporated to improve the teaching quality and efficiency in academic institutions. One of these tools is the electronic discussion forum. This study aimed to measure the students' acceptance of the discussion forum use in the e-learning system. The study adopted TAM2 model for this evaluation. Based on TAM2, the user acceptance of an information system is measured by perceived usefulness and usage. Perceived usefulness is determined by subjective norm, image, job relevance, output quality, result demonstrability and perceived ease of use. Usage is determined by perceived usefulness and perceived ease of use. However, this study found that perceived usefulness is significantly determined in order of their b*etas* by Job relevance

Table 1. Measurements and t-test statistics

Construct	Total indicators	Reliability	AVE	Beta	t-value	Significance
Usage	4	0.76	0.50	NA	N/A	
Perceived usefulness (H9)	3	0.91	0.78	0.48	6.22	0.005
Perceived ease of use (H7, H8)	3	0.85	0.658	0.16 0.20	1.31 1.90	0.10 0.10
Subjective norm (H1, H3)	2	0.90	0.81	0.10 0.21	1.02 1.79	NS 0.05
Image (H2)	2	0.90	0.82	0.22	2.61	0.01
Job relevance (H4)	2	0.87	0.80	0.32	3.10	0.005
Output quality (H5)	2	0.71	0.59	0.06	0.38	NS
Result demonstrability (H6)	2	0.81	0.68	0.21	1.95	0.05

Copyright © 2007, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

(0.32), image (0.22), result demonstrability (0.21) and perceived ease of use (0.16). Subjective norm and output quality were not significant on perceived usefulness. Another study on e-learning context also found insignificant relationship between interpersonal influences (subjective norm) on user satisfaction (Roca et al., 2006). However, subjective norm as hypothesized was a significant determinant of image. The insignificance of output quality on perceived usefulness may be traced to the fact that it has a significant correlation with job relevance (0.334) and result demonstrability (0.326). Thus, subjective norm and output quality have indirect effect on perceived usefulness. The perceived usefulness (0.48) and perceived ease of use (0.20) of the discussion forum were significant predictors of discussion forum usage.

Study Limitations and Implications

There are some limitations of the study. First, the sample was selected based on accessibility. A random selection would increase the strength of external validity. Second, this study did not investigate the moderation effect of experience and voluntariness. Future research may test that effect and include more indicators to investigate the study construct, and explore other factors that might be significant to the acceptance of e-learning systems and the benefits of this usage. Third, this study examined only the use of the discussion forum. Other tools in the e-learning system might be also investigated in future studies. Finally, future studies may also have a closer look to the effects of other system characteristics such as reliability, and speed on perceived usefulness.

The study offered useful implications for practice and research. This study provided empirical quantitative evidence of the significance of TAM2 in the e-learning context which is a very limited in the IS research. The study also provided useful insights for the practitioners (Instructors and academic institutions). Instructors should ensure in their course design that the use of e-learning tools should be relevant to the students' studying tasks. They also should constantly encourage the students to use the e-learning system. Developers should ensure that the system provides tangible results that are useful. Some recent research in Oman indicates that one of the challenges of the instructors' adoption of the several tools in the e-learning system in their courses because of the student's attitudes toward this technology and their low acceptance (Ashrafi et al., 2004). This study added initial insights and on the factors that might affect the students' acceptance of this technology specifically in academic institutions in Oman. Because of the growing adoption of the e-learning systems, the findings of this study could assist organizations to have more successful and effective deployment of these systems. Successful deployment of these systems will encourage training organizations to not only use the e-learning systems as a supplementary tool but also use it them to support distance learning. Consequently, this will increase the capacity of these organizations in building human resources.

REFERENCES

Abouchedid,K. & Eid,G. (2004). E-learning Challenges in the Arab World: Revelations from a case study profile. *Quality Assurance in Education, 12(1),* 15-27.

Ashrafi,R., Al-Moharby,D., & Salman, R. (2005). E-Learning Challenges in an Institute of Higher Education in Oman. *International Conference on Higher Education and Emerging Trends in Information Technology*, Mazoon College, Muscat. Oman 29-30.

Bailey, J., & Pearson, S.(1983). Development of a tool for Measuring and Analyzing Computer User Satisfaction. *Management Science, 29(5),* 530-545.

Barclay,D., Higgins,C., & Thompson,R. (1995). The Partial Least Squares (PLS) Approach to Casual Modeling: Personal computer adoption and use as an illustration (with commentaries). *Technology Studies,2,* 285-323.

Cantoni,V., Cellario,M, & Porta, M. (2004). Perspectives and Challenges in e-learning: towards natural interaction paradigms. *Journal of Visual Languages and Computing, 15*, 333-345.

Chin,W., & Newsted, P.(1999). Structural Equation Modeling analysis with Small Samples Using Partial Least Squares. In Rick Hoyle (Ed.), *Statistical Strategies for Small Sample Research*, Sage Publications, 307-341.

Davis,F.D.(1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13,* 319-339.

DeLone,W., & McLean,E.(2002), Information systems success revisited. Proceedings of the 35th Hawaii International Conference on System Sciences.

Doll & Torkzadeh,G. 1988. The Measurement of End User Computing Satisfaction. *MIS Quarterly, 12(2),*259-274.

Fishbein,M., & Ajzen, I. (1975). Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Addison-Wesley, Reading, MA.

Goodhue,D. (1995). Understanding the Linkage between user evaluations of systems and the underlying systems. Management Science, 41, 1827-1844

Gotthardt,M. et al.(2006). How to Successfully Implement E-learning for both Students and Teachers. *Medical Student Application, 13*, 379-390

Hair,J., Anderson, R., Tatham, R., & Black, W.(1998). *Multivariate Data Analysis,* Upper Saddle River, NJ: Prentice Hall.

Kelly,T. & Bauer,D.(2004). Managing Intellectual Capital-via E-learning-at Cisco. In C. Holsapple (Ed.), *Handbook on Knowledge Management 2:Knowledge directions* (pp. 511-532).Berlin, Germany: Springer

Laudon,K. & Laudon,J.(2003). *Essentials of Management Information Systems (5th Ed*). Prentice-Hall USA.

Moore,G. & Benbasat,I.(1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research, 2,* 192-222

Pituch,K. & Lee,Y.(2006). The Influence of System Characteristics on e-learning Use. *Computers & Education, 47,* 222-244.

Roca, J., Chiu,C. & Martinez,F. (2006). Understanding e-learning Continuous Intention: An extension of the technology acceptance model. *Int. J. Human-Computer Studies*.

Saady,A. (2005). E-Learning Curve. ITP Technology. www.ITP.net

Scholl, W., Konig, C., Meyer, B., & Heisig, p. (2004). The Future of Knowledge Management: An international Delphi study. *Journal of Knowledge Management, 8(2),* 19-35.

Taylor,S. & Todd,A. (1995). Understanding Information Technology Usage. A test of competing models. *Information Systems Research.*

Venkatesh,V., & Davis,F. (2000). A Theoretical Extension of the Technology Acceptance Model: Four longitudinal. *Management Science, 46(2),* pp. 186-204.

World Bank: Technical Cooperation Program Brief on GCC. (2003). http://web.worldbank.org/wbsite/external/countries/menaext/bahrainextn/0,,menupk:312668~pagepk:141132~pipk:141107~thesitepk:312658,00.html

Copyright © 2007, Idea Group Inc. Copying or distributing in print or electronic forms without written permission of Idea Group Inc. is prohibited.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/proceeding-paper/evaluating-students-acceptance-discussion-forum/33123

Related Content

PageRank-Enhanced Deep Graph Network for Green Logistics Impact Assessment
Pinmeng Li (2025). *International Journal of Information Technologies and Systems Approach (pp. 1-20).*
www.irma-international.org/article/pagerank-enhanced-deep-graph-network-for-green-logistics-impact-assessment/372060

Intelligent Assessment and Dynamic Optimization Model of Carbon Emission Measurement in the Whole Life Cycle of Power Grid Construction
Yue Chu, Meng Meng, Gaoyan Jiang, Yu Zheng, Yuhao Caiand Shoubin Yang (2026). *International Journal of Information Technologies and Systems Approach (pp. 1-18).*
www.irma-international.org/article/intelligent-assessment-and-dynamic-optimization-model-of-carbon-emission-measurement-in-the-whole-life-cycle-of-power-grid-construction/409976

Parental Mediation of Adolescent Technology Use
J. Mitchell Vaterlaus (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 7097-7105).*
www.irma-international.org/chapter/parental-mediation-of-adolescent-technology-use/184406

A Pedagogical Model of Distance Training for the Continuous Training of Magistrates
Joana Caldeiraand Neuza Pedro (2019). *Educational and Social Dimensions of Digital Transformation in Organizations (pp. 194-217).*
www.irma-international.org/chapter/a-pedagogical-model-of-distance-training-for-the-continuous-training-of-magistrates/215143

An Efficient Server Minimization Algorithm for Internet Distributed Systems
Swati Mishraand Sanjaya Kumar Panda (2017). *International Journal of Rough Sets and Data Analysis (pp. 17-30).*
www.irma-international.org/article/an-efficient-server-minimization-algorithm-for-internet-distributed-systems/186856