Journal of Information Technology Management

ISSN #1042-1319

A Publication of the Association of Management

GLOBAL DIFFUSION OF INFORMATION TECHNOLOGY EDUCATION: A COMPARISON WITH DEVELOPING ECONOMIES

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ABSTRACT

Information technology (IT) course support plays an important role in modern classrooms. Developing nations have rather more at stake in the diffusion of IT support in the classrooms of higher education than do advanced nations, as this technology diffusion process is often the economic level upon which national competitive advantage will reside. This study compares perceptions of students in an American university information systems program with Jordanian students enrolled in similar programs, and determines that the expectations developed from over a decade of research on the nature of technology diffusion and educational support in the developing world do not necessarily support predictions about key differences between American and Jordanian IT students. Though this research is an initial exploratory foray into the nature of emerging economies and their use of IT support in technology education, important implications for future research are uncovered as part of the process.

Keywords: information technology education, classroom technology, student technology use, developing nations, courseware

INTRODUCTION

Technology is the lever on which many emerging economies are lifting themselves [40]. The idea of the knowledge society and the associated "information economy" became popular as a policy idea among developing nations in the passing days of the last decade, and less developed countries see the development of a knowledge society, via the development of associated information

technology, as the way toward economic prosperity [8]. We have long known that the development and diffusion of information and communication technologies (ICT) represents a means of national advantage in the developing world [24], though technology patterns vary across underdeveloped nations and eventual success depends heavily on an educated workforce [29].

As in the recent case of the Kingdom of Jordan and the technology diffusion initiative sponsored by its new King, governments of developing nations that are not otherwise rich in natural resources or possessed of geographical advantage often seek to develop technological workforces to increase standard of living and economic productivity [2]. Successful technology diffusion in such resource-poor developing countries requires the establishment of a corps of educated managers and technicians who can implement emerging technologies, which implies a critical role for technology education in the process of national economic improvement [16][17]. With fully one-half of the world represented by such developing nations (e.g., [35]), the significance of national technology initiatives in the developing world and the technology education programs that support them is considerable.

Online learning has become a global phenomenon, and the diffusion of educational technologies that leverage ICT and the Internet has provided an unprecedented opportunity for improving higher education around the world [15]. The integration of classroom technology and instructional technology into face-to-face courses tends to have a positive impact on student engagement and motivation, interactions with fellow students, learning performance, and perceptions of the course and the instructor [4][26][30]. For these reasons, technology education is becoming vastly more popular among developing nations which seek economic improvement, and, as a result, technology education is becoming internationalized at an increasing rate as firms recognize the need to prepare IT professionals for the global environment [28].

As part of this, the globalization of the learning process is paralleled by a dramatic increase in the utilization of the Internet as an educational support tool [44]. While there is no question that developing nations lag the Western world in the adoption of important information technology innovations [17], it seems equally unquestioned that the West can provide important guidance and support to the educational technology initiatives of the developing world, as part of assisting in the implementation of technology-based economic development models [45]. ICT is seen as critical to the development process upon which economic prosperity depends, but it is also an integral part of education systems, fundamentally changing the nature of the educational process [22]. For instance, ICT can be used to enhance student learning experience and interactivity and in distance education, leading to a new educational structure – interactive creation of knowledge [3][33].

This paper examines the role of Internet-based course support in the IT classroom, and makes comparisons between Western students and students from developing nations as regards the motivations for, usage of, and capabilities for learning from technology-supported education. It is our view that what we know about technological support of IT education in the West can inform the same process in developing nations; it may well be that through such comparisons, important distinctions between student response and performance at different levels of economic development will be noted, with attendant implications for educational policy and management in both developing and developed nations. Higher education is in the midst of a pedagogical paradigm shift, worldwide, and as we study the utilization of educational technologies, we do better to focus on the success characteristics of the students, themselves, in their various technological contexts and settings, as opposed to continuing in the comparative study of the technologies, themselves [10][14][15].

This is the purpose of this paper: to examine success factors for technology-supported technology education at two different levels of economic development in a global setting, with an eye toward determining likely success factors for implementations in developing countries, going forward. The paper is organized as follows: first, a brief overview of the use of technology in support of technological education is provided, after which specific aspects of a rising star of the developing world are discussed. Expectations for comparisons between developed and developing nation contexts are hypothesized and tested, following which results and implications are discussed.

INFORMATION TECHNOLOGY EDUCATION

More and more schools are offering classes that actively mix lectures and technological support [43]. This approach of mixing Web-based resources with standard lectures [9][12] is popular with administrators and instructors, alike. Stafford and Simon [38] call this Web-based supplement to regular lectures "the high-tech adjunct," while more recent characterizations characterize the approach as "Web Enhanced Instruction," which denotes the enhancement of standard lecture formats with Internet-based course management technologies such as Black-

board [25]. It appears that, despite much initial attention to the concept of the totally online and completely asynchronous course, technology-supported live classes are more popular with students than the generic substitute of the all-technology delivery channel [11], probably because students come to realize that computers will never totally substitute for the learning experience they get from an instructor face-to-face [36].

Particularly in the field of Information Technology Education (ITE), the use of technology adjuncts in the form of Web-enhanced instruction is critical since technological content is not readily transferred to totally asynchronous Web-only channels [11]. Communications skills are also important in technological education, since technology learning is still impacted by the nature of the social relationship between the participants. Hence, instructors can more actively guide the learning process by mixing both synchronous and asynchronous methods [14].

ITE Success Factors

As student bodies diversify, it is important to study the differential impact technology supported education has on them [37]. In this process, it is the use of education technology in context that is important. The factors that enable or inhibit use of educational technologies must be understood, specifically the context of technology use and creation of knowledge [27]. As such, a critical factor in technology supported ITE is the technical competence of students as regards their ability to make use of the delivery technologies used to support classes [20].

Interestingly, in a world where it is often presumed that youngsters are more technologically advanced than their elders, age is one of the defining demographic differentiators that has been found to be useful in predicting student responses to the use of technology in the classroom [10][23], as well as student multicultural effectiveness in global contexts [28]. Other demographic variables such as gender and ethnicity may also be useful along this line [21]. Most undergraduates are moderate in their computer knowledge [41], and use their computers not only for education but also quite extensively for entertainment. This connotes a technology use motivation among students oriented more toward usage process motivations as compared to technology mediated content gratifications or motivations related to technology-mediated social support (e.g., [36]).

Older, non-traditional students tend to appreciate technology support in a course more than younger students, and these older students also tend to report feeling more comfortable with course support technology [32][37]. This is likely owing to dramatically differing scheduling constraints faced by non-traditional students [11][23], who often work and raise families while attending college. Among adult learners using Blackboard course support technology, it was found that technology-delivered course content was more desired than the communication and support tools provided by the course management system [25], in correspondence with Stafford's [36] finding that among graduate students the leading gratification for educational technology is the content it provides.

Oddly, business students with lower technical skills generally tend to overestimate their degree of computer competence, while students with decent skills estimate accurately [7], so competence might also be a critical success variable when benchmarked against other success factor variables.

It is critical to provide a sense of community among IT students today. Many work, and the increasing technological mediation of the workplace and school leaves their lives quite fragmented. This is particularly worrisome for IS students because life after school will continue to take this technologically fragmented path [6]. Most asynchronous educational support technologies do not support social aspects of learning in groups, which are considered important for the learning process [15]. Also, in large lecture sections, instructors have difficulties keeping students engaged with the information; ancillary support technologies provide a "third place" aside from home or work where students can engage with each other and with the course content [6]. This centrality of social processes in technology-supported learning mirrors Stafford's [36] finding that the strongest motivations for using online course support were course content, followed by social support.

ITE in Developing Nations

Effective IT utilization is hindered by the digital divide between the advanced nations and the less advantaged, which points to the need for more IT related research dealing with less developed countries in order to help redress the imbalance [1]. However, ICT diffusion patterns in the developing world tend to reinforce the digital divide rather than immediately ameliorating it, suggesting that simply implementing technology in a developing nation is not the entire solution [31]. Learners in disadvantaged areas struggle both with tight budgets for technology and with the cultural context to convert ICT use into something useful for them. As a result, global technology diffusion trends may be inadvertently and adversely impacting poorer nations. Even though ICT deployment provides stimulus for economic growth, this

outcome is dependent upon the role of the educational sector in producing an educated and technologically-trained workforce [29].

This education-based digital divide is doubly problematic, however, since the cost for technology-supported education systems development and training is a challenge for educational institutions in developing countries that want to be competitive in the global society [46], yet the ITE programs must be developed to boost national economic productivity in order to generate the economic well-being necessary to support technology diffusion in the wider population. Moreover, the adoption of educational technology in these developing nations does not always result in directly proportional increases in student learning outcomes, so it is important to understand the critical success factors in play, in order to optimize outcomes [31][46].

The diffusion of Internet use in developing economies is naturally dependent on telecommunications infrastructure, but it also depends heavily on the educational development [16]. Human development factors including higher education and technology availability explain almost all of the growth of the Internet sector in African nations [5]. In the Philippines, ICTs are also used to transform the educational system, but their use in that context is primarily for purposes of teaching computer literacy and software development [34].

Meanwhile, Internet usage is the lowest in the Middle East compared to all other regions in the world except Africa [1], yet in Africa ICT diffusion is a function of the degree to which it is used in education [42]. Hence, the use of IT for education in the Middle East must be critical, indeed (e.g., [19]). Arabs feel there is a difference between their culture and that of the West, and that these cultural differences inhibit technology transfer to their region. Given the importance of understanding educational technology use in context [27][31], exploring the circumstances of ITE in developing nations of the Middle East can be a useful endeavor.

Of the Middle East, the Kingdom of Jordan is a shining example of technology diffusion [2]. The young King, H.M. Abdulla, has made technology diffusion in general, and the Internet specifically, articles of faith among the population, and inroads are being made in adapting technology to the purposes of economic development in Jordan. In this study of the use of Web-enhanced ITE, we are specifically interested in differences and similarities between Western students using technology as part of the IT curriculum and Jordanian students doing the same. On the principle that technology diffusion in the business of IT education is part and parcel of the process leading to technology-based national enrichment (e.g., [16]), we wish to know how students in an important emerging technology economy compare to students in a mature technology economy. Such a comparison can provide valuable insights both for purposes of enhancing and optimizing developing nation ITE programs, but also for purposes of checking on the progress and quality of advanced nation ITE initiatives.

RESEARCH HYPOTHESES

It has been determined that, as a generality in the advanced nations, non-traditional students respond better to information technology support in courses than do younger students [37]. This is generally attributed to the diversity of older working students, as compared to traditional college student demographics. However, our focuses here are the students' cultural differences. To ensure that the differences were due to culture rather than age, a separate analysis was used on each of the two independent variables as well as a two-factor ANOVA was preformed to ensure separation of the effects of the two variables. In as much as there is a strong degree of cultural homogeneity within most Middle Eastern nations [40], it might be reasonable to expect that Jordanian college students will be less diverse as a group than their American counterparts, and on the face of it, less likely to respond to technology as a part of class in the way that the nontraditional student might, faced, as they are, with numerous time constraints and extracurricular pressures which technological support tends to ameliorate through the additional support and course functionality it provides to a time-starved student. In Web-enhanced learning environments, student satisfaction is believed to relate to satisfaction with the instructor, perceived ease of use of the course technology, and satisfaction with the course [18].

Certainly, it may be that Middle Eastern students appreciate technology in the classroom in entirely different ways, but this can only be discovered in testing that assumption, hence:

H1: Students in Jordanian Universities will exhibit significantly less satisfaction than American college students for IT class courseware implementations in support of class learning goals.

An aspect of the Uses and Gratifications approach (U&G) to understanding course technology motivations among students is the well established notion that inexperienced users are quite a bit more likely to be interested in actual use of the technology, as opposed to the specific content the technology might deliver them, on the theory that they are motivated to learn and master the technology, and that the best route to that objective is practice [36]. It is already known that Internet usage is

quite low in the Middle East, compared other regions in the world except Africa [1], hence Jordanian users might be expected to be less experienced with Internet technology than American users. In that sense, since experienced technology users in courseware-supported classes are most likely to seek and appreciate course content, as opposed to wishing to experience the course technology for the experiential process of mastering it (e.g., [25][36]), we expect to find:

H2: Jordanian students using courseware in support of ITE will be significantly more motivated by usage process gratifications than American students.

H3: American students using courseware in support of ITE will be significantly more motivated by technology content gratifications than Jordanian students.

Middle Eastern nations are generally more homogeneous, demographically speaking, than are western nations [40]. It has been found that demographically diverse nontraditional student groups in Western studies, such as those represented by students of nontraditional age, are more likely to find educational support technologies to be flexible in support of meeting educational goals [37]. Though it is a strong generalization, the homogeneity of Jordanian society in comparison with the more extensively diverse American society augurs for the expectation of a similar effect in tests for differences between student populations from each nation, with regards the appreciation of the flexibility component of educational courseware support for ITE:

H4: American students will find technological course support to be significantly more flexible in support of learning goals than Jordanian students.

Certainly, it is noted that the digital divide between developed and less developed nations implies that technology diffusion into the classroom will proceed at a slower pace, regardless of the essential nature of such diffusion initiatives in terms of economic development. As such, it should be expected that:

H5: American students will report higher levels of technical mastery in regard to course support technology than Jordanian students.

METHOD

Measurements and Variables

Hypothesis one specifies that Jordanian university students will be less satisfied with course learning goals than American college students, as regards ITE courseware implementations. Learning goals is operationalized in a measure that was used by Stafford and Lindsey [37] to assess the overall perceptions on the part of students of the learning effectiveness of a distance education offering. The question is worded, "As to the learning goals with regard to this technology, were they met or not, in your opinion?" The associated seven point semantic differential was anchored by Met and Unmet. Scale mean for the sample was 5.65. ($\sigma = 1.092$).

Hypothesis two suggests that Jordanian students using courseware in support of ITE will display higher usage process gratifications than American students. This was operationalized by Stafford's [36] Usage Process scale for assessing Uses and Gratifications for Internet use in the classroom. The uses and gratifications theoretical perspective was developed in the communications theory literature as a method for profiling audience motivations for media use, and has been successfully adapted for use in measuring Internet usage motivations in both general usage (e.g., [39]) and education-specific usage contexts (e.g., [36]).

Respondents were directed to consider how various characteristics of the Internet seemed to them, and were asked to indicate their opinion using seven point semantic differential scales anchored by Very Important and Very Unimportant. As shown in the Appendix, characteristics of the Usage Process gratification are: Resources, Search Engines, Searching, Surfing, Technology, and Web Sites. The scale exhibited a reliability coefficient of .78, and a summed-score value was input to analysis of variance. Scale mean for the sample was 36.73 ($\sigma = 3.36$).

Hypothesis three predicts that American students using courseware in support of ITE will display higher technology content gratifications than Jordanian students. This was assessed by using the sum score from Stafford's Content Gratifications scale [36], which includes the characteristics of Education, Information, Knowledge, Learning, and Research. Sample mean for the sum score was 30.92 ($\sigma = 2.88$).

Hypothesis four specifies that American students will find technological course support to provide more flexibility in the learning process than will Jordanian students. This was assessed using Parnell and Carraher's [32] technical flexibility subscale of the Management Education by Internet Readiness Scale, as adapted by Stafford and Lindsey [37]. This consisted of three seven-point Likert items, worded: 1) Taking a course supported by the Internet would allow me to arrange my work schedule more effectively, 2) Taking a course supported by the Internet could allow me to finish my degree more quickly, 3) Taking a course supported by the Internet could allow me to take a class I would not otherwise be able to take. Summed-score scale mean on technical flexibility for the sample was 16.42 ($\sigma = 3.22$).

Hypothesis five suggests that American students will report higher levels of technical mastery over ITE support technology than will Jordanian students. This was assessed using a technical mastery measure from Parnell and Carraher's [32] Management Education by Internet Readiness study, as adapted by Stafford and Lindsey [37]. This was a single item seven point Likert measure, reading "I easily get frustrated with technology," for which the sample mean was 2.87 ($\sigma = 1.61$). Scale characteristics are summarized in Table 1.

Sample

Data for purposes of testing these hypotheses were collected from students in introductory ITE courses at a prominent business school located in the Southeastern United States and at a leading Jordanian business school. Two hundred forty-six completed questionnaires were collected between the two locations, with 93 American students responding and 153 Jordanians. Across the sample, there were an essentially even number of men (119) and women (127), and the vast majority of respondents were of traditional college age (213 respondents were in the 18-24 age group, with 27 in the 25-34 group, and only a few in any higher age grouping). As shown in Table 2, the sample is evenly balanced between nationalities at the 25-34 age grouping, but there were roughly twice as many Jordanians as Americans in the 18-24 grouping – a fact accounted for by the relatively larger overall sample response from the Jordanian side. The average Jordanian respondent was more likely to be female, which is a trend that is beginning to surface in American schools, as well, and the average respondent across the entire sample was likely to be under 25 years of age. Data from this sample were subjected to Analysis of Variance in SPSS 15 for purposes of hypothesis testing.

Table 1: Scale Characteristics

Item	Mean	s.d.	alpha
Learning Goals	5.65	1.092	Single Indicator
Process U&G	36.73	3.36	.77
Content U&G	30.92	2.88	.86
Technical Flexibility	16.42	3.22	.78
Technical Mastery	2.87	1.61	Single Indicator

Table 2: Sample Characteristics

		Age					Gender		Total
		18-24	25-34	35-44	45-54	55+	Female	Male	
Nationality	American	73	14	4	1	1	41	52	93
	Jordanian	140	13	0	0	0	86	67	153
Total		213	27	4	1	1	127	119	246

RESULTS

Testing for Hypothesis one examined the idea that American university students would be more satisfied with course learning goals in a class supported by ITE courseware, than would Jordanian university students. This is largely based on previous research demonstrating that non-traditional student groupings would appreciate courseware support more than students from traditional demographics, in the consideration that more homogenous and traditional student groupings could be expected in Middle Eastern nations. The analysis indicated that while there was a significant difference between the student ages and nationality there was a significant relationship between nationality and learning. The ANOVA analysis yielded a value of $F_{1, 490} = 1177.354$ ($p = 2.2E\text{-}132$). Means analysis indicated that, for agreement that learning goals had been met by ITE courseware, Jordanians actually had a higher mean score (5.72 on a scale of 7) than did Americans (5.53).

Hypothesis two suggested that Jordanian students would be significantly more motivated by Internet Usage Process Gratifications, on the principle that less experienced Internet users would prefer the experience of using the technology as a primary motivating factor to the informational content that experienced users would generally prefer (e.g., [36][39]). In testing, for the sum score

Usage Process Gratification scale, $F_{1, 244} = 1.197$ ($p = .275$). Means for Americans (37 out of a possible 42) and Jordanians (36.55) were essentially the same. Both groups of students were rather highly process motivated.

Hypothesis three specified American students, putatively more experienced with Internet technology, would be more Internet content motivated than Jordanian students. In testing, $F_{1, 244} = 67.116$ ($p < .001$). Means for Americans (32.63 out of a possible 35) were significantly higher than the Jordanian sample (29.876). The hypothesis is confirmed.

Hypothesis four predicted that American students would find ITE course support to be significantly more flexible than would Jordanian students, on the principle that a more diverse student group would have greater and wider needs for technological support than would be the typically homogenous student groupings found in the Middle East. In testing, $F_{1, 244} = 64.685$ ($p < .001$), and, in fact, as seen in the means, Jordanians had a much higher mean score (17.57 out of possible 21) than did Americans (14.53). The hypothesis is disconfirmed in favor of its converse.

Hypothesis five suggested that American students would report a significantly higher level of technical mastery related to ITE courseware support technologies than would Jordanian students, on the principle that IT diffusion in the Middle East is proceeding at a generally slower pace than in the western world, resulting differential technology experience levels. This was assessed in line with Parnell and Carraher's [32] technical mastery question assessing the degree of frustration experienced with technology use. The ANOVA analysis yielded a value of $F_{1, 244} = 36.14$ ($p < .001$). Means for the nationality groupings indicated that Jordanians actually disagreed more with the statement about difficulty using technology (2.42 out of a possible 7), as compared with American students, who – while disagreeing with the statement about experiencing frustration with technology use – were much closer to a neutral value on the seven point scale (3.61). The ANOVA statistics for hypothesis testing are displayed in tabular format in Table 3.

Table 3: ANOVA Results

Hypothesis	F Statistic	P value	Means
H1 – Americans more satisfied with learning goals	1.79	.182	5.53, American 5.72, Jordanian
H2 – Jordanians more motivated by Process Gratifications	1.197	.275	37, American 36.55, Jordanian
H3 – Americans more motivated by Content Gratifications	67.116	<.001	32.63, American 29.876, Jordanian
H4 – Americans find ITE more flexible	64.685	<.001	14.53, American 17.57, Jordanian
H5 – Americans will indicate higher disagreement to a technical difficulty question	36.14	<.001	3.61, American 2.42, Jordanian

DISCUSSION AND IMPLICATIONS

While most hypotheses were not confirmed, the one that was confirmed as well as the ones directly rejected in favor of their converse provide very interesting points for discussion regarding the differences between American and Jordanian college students in terms of their uses for and perceptions of Information Technology Education courseware support. Conventional expectations, based on current literature, suggest Middle Eastern college students will be less experienced with ICT than will American college students, and the range of hypothesis generated for testing here were based on that presumption. To the degree that hypotheses were not confirmed, conventional presumptions about technology use and educational technology in the Middle East could be revised, particularly with regards to the unique case of the Kingdom of Jordan.

Learning Goals and ITE in Developing Nations

Hypothesis one suggested that American college students would be more satisfied that the learning goals of their course were being met through the use of ITE courseware, and this was not confirmed. In fact, while the differences were not statistically significant, the Jordanian students were more satisfied with the support of their ITE courseware; they had the higher mean score. And, cer-

tainly, they were no less satisfied than the American students, as the hypothesis would have predicted.

The implications of this outcome are interesting. There is a recent trend in the developing world toward IT diffusion in support of national economic development [24], and it has been known for several years that the Kingdom of Jordan has very visibly committed to ICT investment and diffusion throughout its society as an economic lever [2]. Naturally, the first place that a developing nation's technology buildout would best manifest itself would be in the educational sector, as the nation's future technology executives and political leaders were prepared for the evolving business and governmental sectors [16][29]. Hence, we'd expect to see early and significant impact of IT diffusion's effects in the educational sectors of developing nations engaged in technology initiatives. For this reason, the strong technology usage process motivations reported by Jordanian students in our sample may well simply represent the top-of-mind awareness and immediate daily contact these individuals have with the technology in their educational settings.

Another possibility is that undergraduate college students not only use their computers for learning but also quite a bit for entertainment [41]. The usage process gratification of ICT is related to both the motivation to learn through experience, but also the enjoyment of the usage experience, best characterized in the "surfing" metaphor (e.g., [36]). Hence, it may simply be the case that students in introductory IT classes simply enjoy playing with the technology, regardless of their national origin. Studies (e.g., [13]) have shown that increases in enjoyment positively relate to student learning performance.

But, in the main, it would seem, based on the degree of satisfaction expressed by Jordanian students with their ITE courseware and related educational technology, that the Jordanian technology diffusion/economic development initiative is having the effect intended by the Jordanian leadership. Whether this is a novelty effect or not is up to question and further research, but the fact remains that the Jordanian students are considerably more impressed with courseware support in the classroom than might be expected on the face of hypothetical expectations derived from our review of literature on technology trends in the general Middle Eastern region.

The real question to be drawn from the unexpected finding with regard to hypothesis one, apart from why Jordanians are so satisfied with how they are learning in classes supported by technology, is why Americans are not. This would be an issue for future ITE research focused on Western nations, certainly. As the project currently under discussion is a comparative study aimed at clarifying the state of ITE in the developing world, a subsidiary question of interest is the degree to which Jordan, among the Arab nations, is either representative or distinct in terms of its seeming technological evolution, as assessed in the higher education sector. We suspect, based on the differences between Jordan and other nations in the region, that in terms of both resources and geographical location, relative to the degree to which the government has committed to technology as a national initiative, Jordan may be unique in comparison to the richer oil-producing nations in the regions. In short, perhaps technology in education is a matter of national success rather than simply a convenience for the Jordanian people.

ITE Technology Usage Motivations

Hypothesis two predicted higher usage process gratifications for Jordanian students as compared to American students, but the results indicated that both nationalities were statistically the same as regards their degree of process gratifications for use of Internet course support technology. Each group evidenced a strong and statistically similar usage process motivation score, suggesting that college students, American and Jordanian, alike, are quite gratified by using Internet course support technology and related technological tools. This runs counter to the present literature, to the extent that theoretical indications are accurate about Middle Eastern technology users being less experienced [1], and, hence, might be highly motivated to gain additional experience through technology use (the basis of process-based motivations). The outcome of this hypothesis test suggests that, perhaps, Jordanian students have more technology experience than might be the norm in the region, since the expectation about content versus usage gratifications for more and less experienced users, respectively, are generally borne out in examining differences in Western samples (e.g., [36]).

Another potential interpretation is that the rapid diffusion of the Internet in the developing world is matched by a rapid buildout of the educational system, characteristic of the synergies of globalization, technology diffusion and education, combined [44]. Although undergraduates of all types are generally moderate in their computer knowledge, they use their computers not only for education but also quite extensively for entertainment [41]. This connotes a technology use motivation among students towards more frequent technology use, and a focus on the enjoyment of the sheer process of technology usage, as opposed to a focus on the educational content carried by the technology (e.g., [36]).

Hypothesis three predicted American students would be more technology content motivated, and this did prove to be the case. This outcome is interesting, as it

would have typically been the converse finding of the expectations expressed in Hypothesis two, with the more technically experienced group expressing content motivations and the less technically experienced expressing process motivations. However, the degree to which educational technology has diffused in the American higher education system is probably the explanatory factor. While it seems clear that Jordanians embrace, appreciate, and enjoy their educational technology as part of the higher education process, it is equally clear that such technology is at an earlier stage of diffusion in that society than it is in the American higher education system. Not to suggest that ITE courseware support has become mundane in American institutions, but it certainly appears to be much more routine and normal in its regular use (cf., [9][12][25][43]). Students on the American side of the equation have likely become quite accustomed to accessing their syllabi, course lectures, and associated course content from technological channels, and, as such, would naturally display high technology content gratifications. They have been socialized to expect this gratification from ITE courseware support

This is not to say Jordanians are not motivated by the content carried by ITE course support technologies. The potential response range on the sum-scored scale varies from 5 to 35, with mid-level response on the group of 5 seven point scales occurring at 20. Both sub samples were above the middle point; the Jordanians, by 9 points and the Americans by 12.

Mastery and Flexibility

Hypothesis four predicted American students, typically comprised of higher degrees of nontraditional demographics, would find ITE course support more flexible. In fact, the Jordanian students found ITE courseware to be more flexible for them, and this has interesting implications for education support in Jordan. With a score range from 3 to 21, and a neutral point at 12, the Jordanian mean of 17.57 is distinct in contrast to the 14.53 mean for American students. This is a matter for further research specific to the Jordanian education system; it may be that societal factors that distinguish between the two samples are at the foundation of this interesting result. It is sheer speculation, but the nations in the Middle East face quite a bit more societal volatility in comparison to the United States; students might find it superbly more flexible to leverage technology for learning support, since it has been suggested that technological education support serves to moderate the effect of fragmented lifestyles [6].

This outcome may simply be an effect related to the considerations discussed above, as regards the relative novelty of newly diffused technology among the Jordanian students versus the "business as usual" mature adopter perspective likely to be characteristic of American students, most of whom have known little else but routine and plentiful technological support in their short time in higher education. In any case, the role of technology in supporting educational flexibility among Jordanian students is a finding that implies the need for further investigation, as it will certainly serve as one of the critical success factors for this developing region that prior research has exhorted us to identify [15][27].

Hypothesis five predicts Americans will have a higher reported degree of technical mastery for IT courseware than would Jordanians, and this, too, proved to be exactly the opposite as predicted. For a measure that expressed degree of frustration with technology use, the American students had a higher score, indicating more agreement with the statement, while the significantly lower score for the Jordanian students indicated they strongly disagreed about being frustrated with course technology. This is not to suggest that there is an issue with courseware technology use in the ITE classroom; the overall sample mean for this measure was 2.87 on a scale of 7, well below the neutral point of 4. However, the American students disagreed quite a bit less than did the Jordanian students about the level of frustration they experienced in using technology (3.61 vs. 2.42).

This, too, might be fertile ground for future work with the Jordanian education system. One possibility is that a technology initiative mandated by the King is too visible and too important, societally, to speak ill of. In other words, perhaps this is a subtle case of "yea-saying." Future work can seek to determine the level of social desirability present in the perceptions of Jordanian students in regard to the technology implementations made by the government to support higher education.

On the other hand, the American students were using a newer and more recently implemented version of the courseware that the Jordanian students were using. They were also paying an appreciable technology support fee as part of the provision of such service. A tempting alternative explanation might be that customer satisfaction issues were at play in regard to implementation of a new system, as compared to the supposition that Americans are more easily frustrated by technology than are the Jordanians. In either case, this outcome is potent fuel for future work, as we seek to focus more clearly on the role and nature of ITE technology support in Middle Eastern contexts.

CONCLUSION

This research examined the use of Information Technology Education technology support across a broad context of Western and Middle Eastern users in higher education. Technology diffusion initiatives in developing nations rely heavily upon the success with which educational implementation proceed, so knowledge of critical success factors provides the basis for advancing technology diffusion, in general, in the developing world, and specifically in the case of resource poor developing nations in the Middle East which cannot rely upon mineral wealth as an economic base.

Contrary to theoretically-derived expectations, Jordanians seem more interested in and gratified by educational technology support. This suggests the time may have come to reformulate our understanding of differences between the mature adoption scenarios in the advanced nations of the world and the early adopter perspectives of new technology users in the college classrooms of the developing world. Future research can seek to better explain why classroom technology is so much more enthusiastically supported in Jordanian rather than American educational institutions, for even if the differences found were small, in some cases they were in directions not expected and this provides the basis for new and innovative views of the role that technology in the classroom plays in improving the economic lot of the developing nations of the world.

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APPENDIX: SURVEY INSTRUMENT

Instructions: This is a questionnaire to assess your impressions of distance education technology. The following questions assess your opinions of the importance of certain characteristics of distance education using the Internet. All you have to do is indicate with the scale how feel; the closer you mark on the scale to one side or the other indicates the strength of your opinion in that direction. There are no right or wrong answers; your true opinion is all that counts!

I generally have no problems downloading files and software via the Internet.
Agree ___:___:___:___:___:___:___ Disagree

I consider my computer ability to be better than average.
Agree ___:___:___:___:___:___:___ Disagree

I get frustrated easily with technology.
Agree ___:___:___:___:___:___:___ Disagree

Taking an Internet course would allow me to arrange my work schedule more effectively.
Agree ___:___:___:___:___:___:___ Disagree

Taking an Internet course could allow me to finish my degree more quickly.
Agree ___:___:___:___:___:___:___ Disagree

Taking an Internet course could allow me to take a class I would not otherwise be able to take.
Agree ___:___:___:___:___:___:___ Disagree

I would probably lean more from my fellow students in an Internet course than I would in a face-to-face course.
Agree ___:___:___:___:___:___:___ Disagree

I would probably not learn as much in an Internet course as I would in a face-to-face course.
Agree ___:___:___:___:___:___:___ Disagree

I learn more effectively when I interact with people in a face-to-face setting.
Agree ___:___:___:___:___:___:___ Disagree

I consider myself to be well-organized.
Agree ___:___:___:___:___:___:___ Disagree

I am more self-disciplined than most of my colleagues.
Agree ___:___:___:___:___:___:___ Disagree

I tend to manage my time well.
Agree ___:___:___:___:___:___:___ Disagree

Instructions: Please answer the questions below as accurately as you can, keeping in mind that the question may be phrased in a way that presents distance education as a technology (in the event that the wording seems strange to you). There are no right or wrong answers; your true opinion is all that counts! Thanks for your participation!

My interaction with the distance education class is clear and understandable
Agree ___:___:___:___:___:___:___ Disagree

Interacting with the distance education class does not require a lot of my mental efforts
Agree ___:___:___:___:___:___:___ Disagree

I find the distance education class easy to use
Agree ___:___:___:___:___:___:___ Disagree

I find it easy to get the distance education class to do what I want it to do.
Agree ___:___:___:___:___:___:___ Disagree

Using the distance education class would improve my performance
Agree ___:___:___:___:___:___:___ Disagree

Using the distance education class would increase my productivity
Agree ___:___:___:___:___:___:___ Disagree

Using the distance education class would enhance my effectiveness
Agree ___:___:___:___:___:___:___ Disagree

I find the distance education class would be useful
Agree ___:___:___:___:___:___:___ Disagree

Assuming I had access to the distance education class, I intend to use (or, continue to use) it.
Agree ___:___:___:___:___:___:___ Disagree

Given that I had access to the distance education class, I predict that I would use (or continue using) it.
Agree ___:___:___:___:___:___:___ Disagree

Instructions: The following questions assess your opinions of the importance of certain characteristics of Internet use. All you have to do is indicate with the scale how much you feel that a particular aspect of using the Internet is important to you. The closer you mark on the scale to one side or the other indicates the strength of your opinion in that direction. There are no right or wrong answers; your true opinion is all that counts!

Chatting
Very Important ___:___:___:___:___:___:___ Very Unimportant

Friends
Very Important ___:___:___:___:___:___:___ Very Unimportant

Interaction
Very Important ___:___:___:___:___:___:___ Very Unimportant

People
Very Important ___:___:___:___:___:___:___ Very Unimportant

Resources
Very Important ___:___:___:___:___:___:___ Very Unimportant

Search Engines
Very Important ___:___:___:___:___:___:___ Very Unimportant

Searching
Very Important ___:___:___:___:___:___:___ Very Unimportant

Surfing
Very Important ___:___:___:___:___:___:___ Very Unimportant

Technology
Very Important ___:___:___:___:___:___:___ Very Unimportant

Web Sites
Very Important ___:___:___:___:___:___:___ Very Unimportant

Education
Very Important ___:___:___:___:___:___:___ Very Unimportant

Information
Very Important ___:___:___:___:___:___:___:___ Very Unimportant

Knowledge
Very Important ___:___:___:___:___:___:___:___ Very Unimportant

Learning
Very Important ___:___:___:___:___:___:___:___ Very Unimportant

Research
Very Important ___:___:___:___:___:___:___:___ Very Unimportant

Instructions: If you would, please tell us how much you use the Internet and certain utilities using the scales below. There are no right or wrong answers; your true opinion is all that counts!

Please answer a few questions about your technology use:

I consider that my usage rate for Internet services is:
High___:___:___:___:___:___:___:___Low

I use the Internet:
Frequently___:___:___:___:___:___:___:___Infrequently

Research shows that, on average, the amount of time spent online is 50 minutes, daily. Average, in this case, only means the total number of minutes of overall online time divided by number of total users logging on. Remembering that there is no right or wrong answer to this question, if you had to choose, would you say that you

___ spend more time online than the average?
___ spend less time online than the average?

I consider that my E-mail usage rate is:
High ___:___:___:___:___:___:___:___ Low

I use E-mail
Frequently ___:___:___:___:___:___:___:___ Infrequently

Research shows that the average household sends 8.2 email messages per day. Remembering that there is no right or wrong answer to this question, if you had to choose, would you say that you:

___ use e-mail more than average?
___ use e-mail less than average?

Please answer a few basic questions about yourself; the answers will be anonymous and will only be reported in aggregate form (like average age of the sample, etc.):

Your age:
___ 18-24
___ 25-34
___ 35-44
___ 45-54
___ 55+

Your gender:
___ Female
___ Male

The following questions are intended to assess your perceptions of videoconference delivery of courses.

How satisfied were you with the videoconference session
Satisfied___:___:___:___:___:___:___Unsatisfied

What were your perceptions of the video quality?
Satisfactory___:___:___:___:___:___:___Unsatisfactory

What were your perceptions of the audio quality?
Satisfactory___:___:___:___:___:___:___Unsatisfactory

As to the learning goals with regard to this technology, were the met or not, in your opinion?
Met___:___:___:___:___:___:___Unmet