The Effectiveness of Educational Technology: A Preliminary Study of Learners from Small and Large Power Distance Cultures

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Abstract. The cultural background of learners has been highlighted as crucial in determining the effectiveness of educational technology. This paper focuses on the influence of power distance in determining the effectiveness of educational technology. Utilizing a multiple case study, we examined the perception of learners from small and large power distance societies in terms of satisfaction with learning, self-efficacy with educational technology and perceived learning. Our findings show that the availability of educational technology enhances the learning outcomes of both cultures. The study suggests the notion that learning outcomes differ for learners from small and large power distance cultures.

Keywords: Educational Technology, Culture, Power Distance, Effectiveness.

1   Introduction

Many educational institutes and corporate organizations are utilizing educational technology as a tool for learning and training. The market for online higher education is forecast to reach US$69 billion by 2015 [1]. Similarly, worldwide corporate educational technology revenues are estimated to hit US$23.7 billion in 2006, up almost fourfold from US$6.6 billion in 2002 [2]. Correspondingly, cross-cultural collaborations among organizations and universities are growing. Online education also facilitates the expansion of distance education towards other countries. In addition, there is an increasing diversification of student and organizational populations. However, educational technology for one culture might not be as effective in another [3]. The cultural background of learners has been highlighted as crucial in determining the effectiveness of educational technology [4, 5].

Whereas culture can be examined from many perspectives, seminal research on culture by Hofstede [6] is considered pertinent to the examination of learning outcomes [7]. Hofstede's [6] taxonomy includes five cultural dimensions - power

distance, individualism/collectivism, masculinity/femininity, uncertainty avoidance and time-orientation. This paper focuses on the influence of power distance in determining the effectiveness of educational technology. Hofstede found that cultures differ in the level of power distance. Large power distance cultures tended to have a high regard for authority while small power distance cultures preferred to see others as equals. Research has found that power distance has a strong influence on learning outcomes [7, 8]. Students from large power distance cultures perceived a greater gap between themselves and instructors while students from small power distance societies regarded instructors as their peers. This has implications for the satisfaction, self-efficacy, perceived learning and academic achievement of learners [9]. Hence the effectiveness of educational technology would hinge on the degree of power distance.

The objectives of the paper are, to discover how educational technology affects learning outcomes, and to explore the role power distance plays in influencing the effectiveness of educational technology. The paper begins with a presentation of the research framework followed by the research methodology. It then focuses on the findings of the two case studies. Subsequently, the role of power distance is discussed before providing several suggestions for future research and practice in the conclusion.

2 Research Framework

We propose that power distance moderates the relationship between the availability of educational technology and learning outcomes. Figure 1 depicts the proposed relationships [9]. Furthermore, we stipulate that the effect of the availability of educational technology on learning outcomes, consisting of satisfaction with learning, self-efficacy with educational technology, perceived learning and academic achievement, will be greater on small power distance learners than on large power distance learners. The definitions of the constructs are presented in Table 1.
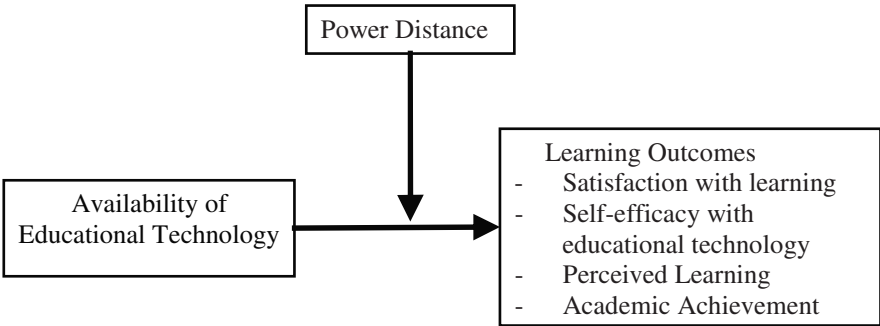

Fig. 1. Research Framework [9]

Table 1. Definitions of Constructs (adapted from [9])

Power Distance	The extent to which the less powerful people in society respond to inequality in power and consider it as normal [6]
Satisfaction with learning	The degree to which a learner feels a positive association with his or her own educational experience [10]
Self-efficacy with educational technology	The degree to which learners feel confident of learning from educational technology [5]
Perceived Learning	Changes in the learner's perceptions of skill and knowledge levels before and after the learning experience [11]
Academic Achievement	Actual cognitive development of learners; this concept is related to task performance and typically measured by project or course grades [5]

3   Research Methodology

Utilizing a multiple case study approach, we examined the perception of learners from small and large power distance societies. Data was collected from interviews, observation and documentation. We employed multiple techniques to analyze data such as data displays and pattern matching [12]. Our research framework served as a guide to the analysis. We investigated the perception of students from both cultures in terms of satisfaction with learning, self-efficacy with educational technology and perceived learning. Academic achievement was not captured owning to the lack of access to student's grades.

There were two cases in total – the first consists of students from the smaller power distance culture while the second comprises students from the larger power distance culture. The unit of analysis is at the individual level. Informants in Case A were selected from the student exchange program in a large university in Singapore (host University). Informants in Case B were chosen from the student population in the same university. Within case analysis and cross case analysis were performed.

4   Case A: Small Power Distance Learners

The small power distance learners hailed from Europe – 3 were from Finland and 2 from Germany. They were pursuing a master's degree that took 4.5 to 6 years to complete. They had been studying in the host University for 3 months on the exchange program when they were interviewed. Table 2 records the profile of the learners.

Table 2. Profile of Small Power Distance Learners

Informants	Year of Study	Age	Gender	Major, Faculty
S1	5	26	M	Computing, Computing
S2	5	25	M	Mechanical, Engineering
S3	5	24	M	Process, Engineering
S4	4	24	F	Southeast Asian Studies, Arts
S5	4	27	F	Southeast Asian Studies, Arts

4.1 Satisfaction

For small power distance learners, their satisfaction with educational technology is affected by the *ease of communication*, the *ease of searching for information*, and the *flexibility of studying anytime*. For instance, one student (S2) responded, "*It's easier with educational technology. You can share your knowledge, get materials, [even] extra materials and help for [the] difficulties [you encounter]. You don't have to read through books [to search for answers] for a little [problem]. You can ask things that are hard to find.*"

As noted in the literature, small power distance learners relish in using educational technology to connect with others [7]. Sharing information with each other is part and parcel of communicating with others and is satisfying to small power distance learners.

Another reason for their satisfaction is the ease of searching for information. They liked the integration of course information in the host University's virtual learning environment and the ability to search for course material online. The flexibility of studying anywhere and anytime was highlighted as another reason for their satisfaction. Students saved time by watching webcast lectures and sending email at their own convenience.

Thus, small power distance learners were clearly satisfied with the usage of educational technology. However, a possible reason for their enthusiasm was their limited experience in using educational technologies. These students did not have access to a similar virtual learning environment in their home university where learning materials, information about modules, assessments and interactive features were integrated into an information system.

4.2 Self-efficacy

Students were interviewed on their confidence in using educational technology. Most students expressed high self-efficacy. For example, in response to a question on how confident she would be to navigate a new website, S4 answered, "*I can do it on my own. Sometimes I do not really find every hidden detail or something but, I[will] click on this and that... it [may] take me 2 hours, but at least I find out where they are. I don't mind spending some time.*"

An exception was S3. S3 admitted that he "*can't figure out how to use IT*" and was "*not so good*" at using it. This lower self-efficacy can be attributed to his lack of experience with educational technology in his home university that did not make

much use of IT for instruction. However, S1 and S2 were also from the same home university and they were quite confident in using IT. A more likely reason could be due to the nature of his academic discipline. He was studying process engineering which would involve lesser use of educational technology as compared to a computing course. The IT and business disciplines generally make use of educational technology more than other fields [13]. Nevertheless, the data seems to suggest that the self-efficacy of small power distance learners was high with the availability of educational technology.

4.3   Perceived Learning

All informants agreed that educational technology helps in their learning. From the data, we identify 3 main causes. First, educational technology shortens the time needed to search for educational material which directs energy toward learning. It makes information much easier to find such as a portal storing all the course materials or a digital library for e-books and e-journals. The convenience afforded by these educational tools allows students to spend less time and energy gathering the materials and devote their time and energy to learn from these materials.

Second, educational technology enhances the knowledge of learners through social learning. Students noted the use of the electronic forums and email as a medium to learn from other learners and the instructors. "*It's a good way to share things. If somebody doesn't know something it's easy to ask classmates [in the forum]."(S3).*

Third, educational technology was perceived to increase learning when it was designed and utilized well. Educational technology could be developed by organizations or by individual instructors. S2 remarked that educational software helps in his learning if the software was designed appropriately by software companies. Students also found that instructors who made effective use of educational technology in their teaching facilitated their learning.

Although educational technology was seen to enhance learning, students also cautioned the replacement of traditional face to face modes of teaching with educational technology. "*If I [attend] lectures I can learn more. I cannot concentrate [as well] with webcasts. But maybe someone [else] can." (S1).* Students found it harder to concentrate on educational technology as they could be easily distracted by other leisure activities online. They seemed to prefer educational technology to supplement and not replace traditional face to face teaching.

In sum, the availability of educational technology on small power distance learners raised their satisfaction, self-efficacy and perceived learning. The paper now proceeds to describe the second case of large power distance learners.

5   Case B: Large Power Distance Learners

The large power distance learners originated from Singapore, Malaysia and China. All of them were studying full-time in the host University. Most were undergraduates in 3 or 4 year Bachelor degree programs. A total of 9 students were interviewed. The profiles of the informants are shown in Table 3.

Table 3. Profile of Large Power Distance Learners

Informants	Year of Study	Age	Gender	Major, Faculty
L1	4	24	M	English Language, Arts
L2	4	24	M	Lifescience, Science
L3	4	22	F	Civil, Engineering
L4	3	23	M	Finance, Business
L5	3	30	F	Bioengineering, Engineering
L6	1	19	F	Statistics, Science
L7	1	19	F	Arts
L8	1	19	F	Chemistry, Science
L9	1	21	M	Mechanical, Engineering

5.1 Satisfaction

Large power distance learners were satisfied with educational technology due to the *ease of communication and knowledge sharing*. Many highlighted the specific educational tool such as the virtual community feature in the virtual learning environment that enabled them to share knowledge with other learners.

> *Ya a lot of times I'm satisfied. Sometimes when we are doing something together, we need to share our information. Sometimes we cannot find a lot of time to meet together, so in this way [using educational technology] it is easier for us to share our information,[and] update one another. (L5).*

In general, large power distance learners had positive attitudes towards educational technology and were satisfied with the availability of educational technology.

5.2 Self-efficacy

Many students believed that they could handle educational technology relatively well. They had no difficulty in navigating through the virtual learning environment of the host University. One even went so far as to claim that the system was *"idiot-proof" (L9)*. Many had been using IT in their earlier years of education and felt quite capable of using it. Hence, the data reveals that the *past experience* of students in using IT affects their degree of self-efficacy with the availability of educational technology.

Although they seemed to be confident in using educational technology, students were reluctant to admit they were IT experts but only acknowledged that they were average users – 7 out of 9 students claimed they were average users. This is so even though almost all informants accessed educational technology typically once a day. Their self-efficacy towards using educational technology is less than their self-efficacy towards other educational means such as textbooks and their instructors.

5.3 Perceived Learning

Perceived learning seemed to be higher with the availability of educational technology than without. First, students highlighted how educational technology *supplements face to face learning* methods. Educational technology is "*a way to let you learn and teach you about the lesson. [It is] a way I can learn [by] myself besides [through the] lecture. It is helpful.*" *(L6)*. Students placed the spotlight on the additional knowledge they can gain from educational technology.

Second, students were able to *share knowledge* and learn from others over the online medium. Essentially, this is social learning at work. Educational technology gives more opportunities for students to communicate with each other. L2 spoke of how he contributed to the learning of his classmates, "*I will read through [the discussion forum] to see the topics that actually make sense. When I feel that [the posting] is a good contribution then I'll post something. I usually post when I have something substantive. Sometimes I will reply to other people's discussions.*" Hence, the availability of educational technology enhances the learning outcome of large power distance learners.

6 Role of Power Distance

6.1 Satisfaction

The analysis of small power distance learners showed that they were clearly satisfied with the availability of educational technology. They were effusive of their praise for educational technology. In contrast, large power distance learners were milder in their affection for educational technology. It seems that these students took for granted the ease of searching for information and the flexibility of studying anytime via educational technology.

Moreover, we believe that large power distance learners were not as satisfied with the sharing of information as small power distance learners. Some large power distance learners did not appreciate the ability to use the online discussion forum to interact and participate in the online class. "*I usually don't go [into the forum] unless it's required. You know some modules they require forum participation. Too much time is required…*" *(L2)*. L2 found it time-consuming to participate in the online forum and would only post when it was a requirement of the course. It seems then that large power distance learners do not see a need to learn and share with others in the online discussion forum whereas learners from small power distance cultures enjoyed using educational technology to connect with others.

A possible reason for the difference in satisfaction of large and small power distance learners is the degree of instructor support. A large power distance user commented that the reason she does not actively use the forum is the lack of feedback from instructors. "*I use it [the online forum] occasionally only because not many people use it to post questions online. And there are no answers from the lecturer or tutors. So I use it only occasionally.*"*(L8).*

Indeed, this is reflective of learners from the large power distance society which views the teacher as the knowledge source. Learners in large power distance societies focus their attention on absorbing knowledge from the instructor. Hence, in online

forums where the instructor has minimum participation, students do not believe they can gain much knowledge from the social interaction and are less inclined to participate. From these analyses, we suggest that the effect of the availability of educational technology on satisfaction will be greater on small power distance learners than large power distance learners.

6.2 Self-efficacy

Four out of the five informants from the small power distance culture regarded themselves as having a high level of self-efficacy with educational technology. This is a higher number compared to large power distance learners. Two out of nine large power distance learners felt they were able to use educational technology very well while the rest preferred to admit that they were average users. This difference is detected despite the fact that all of them use educational technology almost daily.

The above observation is conceivably due to large power distance learners' higher dependency on the instructor. They are then less comfortable in independent learning with educational technology and have less self-efficacy than low power distance learners. Students see instructors as knowledge fountains and are extremely reliant on their teachers [6]. "*I usually would rather go straight to the lecturer or tutor. They should know what they are talking about."(L2).* Large power distance learners prefer to go directly to the instructor rather than search for the answer themselves via educational technology.

Small power distance learners on the other hand, have a low dependency on instructors and are familiar with an active mode of learning. "*If there is a problem with my computer I won't go to someone and ask them for help but I will study how to do it and do it myself."(S2).* Small power distance learners seem more confident on learning on their own. Educational technology facilitates this independence and their self-efficacy of learning with it will increase. Thus, the availability of educational technology will lead to greater self-efficacy for small power distance learners compared to large power distance learners.

6.3 Perceived Learning

In terms of perceived learning, the data suggests that learners from both small and large power distance cultures can learn equally well with educational technology. There does not seem to be any difference in perceived learning among the cultures. There were students from both cultures who gained knowledge and skills from educational technology.

Some researchers observe that students from high power distance cultures are constrained by the public nature of the discussions [7]. However, we find that students were not inhibited by the online medium but were more willing to participate using educational technology than in the face to face classrooms. "*I prefer online over face to face as I will self censor when it's face to face. Online I will not restrict myself - things I thought are stupid, I'll be able to say them online. I feel more relaxed. I feel embarrassed to ask people in the lecture or tutorial too. Also, there is no chance for interaction in the lecture or tutorial." (L7). A*s noted by other researchers [14],

educational technology enables large power distance learners to communicate and gain knowledge more effectively.

In sum, we find that the availability of educational technology has a similar effect on the perceived learning of small and large power distance learners. Students from both cultures are equally comfortable in learning with educational technology.

7 Conclusion

This case study has served to illuminate antecedents for our research framework. It seems that the ability to share knowledge and interact with other learners and instructors is a critical part of educational technology for learners from both large and small power distance cultures. We believe that these two antecedents deserve further study. Moreover, these preliminary findings serve to advance our understanding of the role of power distance in influencing the effectiveness of educational technology. This research framework could be further tested using a quantitative approach. Our next step involves a sample survey.

An important message of this study is that power distance is a key moderating influence on the link between the availability of educational technology and learning outcomes. Therefore, educators, instructional designers and researchers need to consider its influence in teaching and learning situations. Specifically, further research should examine issues related to the design and structure of educational technology to enhance the satisfaction and self-efficacy of large power distance learners.

Educators can help to increase the satisfaction and self-efficacy of large power distance learners by actively participating and giving feedback using online media such as electronic discussion forums. Larger power distance learners see their instructors as knowledge sources and have a high respect for this figure of authority. Online discussions by the instructor will then enhance the knowledge gained for students. We caution that instructors should encourage the participation of all learners in the electronic forum by challenging the students rather than spoon-feeding them with answers. Next, the design of educational technology must enhance the ease of knowledge sharing. As this has been highlighted by both cultures, it should be made easily available in educational technology.

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