Cultural Issues That Affect Computer Programming: A Study of Vietnamese in Higher Education

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ABSTRACT— *Every society has its own cultural system which ultimately permeates and influences their educational system. Cultural attitudes impact the way students learn and participate in education. A few social practices or culture values may affect student engagement, learning process and learning experience in computer programming education. The purpose of this research was to investigate the impact of students' cultural attitudes on learning programming courses in Vietnam. To identify this, a questionnaire was designed and distributed to Vietnamese undergraduate IT students in order to measure the relationship between cultural attitudes and student engagement in learning. This study used Geert Hofstede's defined cultural dimensions of power distance, and collectivism versus individualism as combined factors that affect student participation and engagement. The survey results were analyzed by the correlation coefficient statistical method to examine the statistical relationships that exist between student's power dependency culture and participation in learning. The survey results confirmed that many students completed their secondary education in a teacher centered environment and students are hesitant to express their opinions to teachers, and prefer to use existing solutions to complete their work. Moreover, statistical results partially supported the conclusion that, student's high power distance culture may affect their engagement in learning programming courses though many students are interested in active learning environments.*

Keywords— Vietnamese educational system, Cultural dimensions, Problem based learning, Computer programming education.

1. INTRODUCTION

This paper analyses the cultural issues that affect students' learning abilities in learning computer programming. Culture is complex and is similar to tradition. The term culture refers to the religion, values, beliefs, attitudes, language, facial expressions, which are transmitted from one generation to the next. Culture is learned and can influence the person's learning skills, knowledge, and thinking, attitude(s) that reflects the value of society or distinguishes them from others. Moreover, people also use the word "our culture" to identify or define themselves. Cultural attitudes influence the way students take part in education. For example, Koreans follow collectivistic culture which emphasizes the family and the family's value [38]. Korean parents focus on their children's education and their East Asian Confucian culture stresses that the child's performance in the class affects his/her family status [28]. However, Americans have a more individualistic culture, i.e., the social status of the student will not have so much impact on his/her family [29]. Vietnamese follow collectivistic culture patterns and some cultural practices which exist at educational institutions in Vietnam encourage students to follow a shallow surface learning approach as opposed to an in-depth learning approach [31]. Also, many schools in Vietnam follow a traditional model of teaching in which a teacher transmits information to students with minimal interaction [25]. Furthermore, due to Vietnamese non- individualistic culture [10], students are struggling to interact with teachers and peers freely, hesitate to ask questions during lecture hours [16]. These cultural practices and attitudes result in greater difficulty in learning higher level thinking skills and concepts for advanced programming courses at higher education levels.

Computer programming courses are at the core of the computer science and IT education programs in higher education [12]. However, students find programming courses are generally difficult to learn and often experience problems in understanding the concepts and algorithms [2, 19]. Notably, it is identified that learning to program requires students to be motivated, be analytic, and able to share their own ideas with their teacher and peers [8]. However, it was observed that Vietnamese students are often hesitant to share their opinions in the programming class though they were

encouraged to participate. Taking this initial observation as our starting point, this study is designed and the research questions have been developed. The research questions are;

- Do cultural attitudes affect student participation and engagement, learning process, and learning experience in computer programming education?

- Do these behaviors affect student learning outcomes in computer programming?

2. LITERATURE REVIEW

2.1 Culture and Learning Behavior

Cultural attitudes impact the way students participate in education. There has been considerable research done on impact of cultural tendencies on student learning behavior. Student learning background can be identified based on their culture [34]. Moreover, student's learning style may vary based on his/her culture [17]. Manikutty et al. analyzed whether culture influence learning styles in higher education, and concluded that, power distance and collectivist culture tune the learning style to surface mode [17]. The surface learning style focuses on memorizing the information needed for assessments rather than focusing on deep learning where students apply new knowledge to unfamiliar problems. Moreover, students who follow a surface approach tend to take a narrower view and fail to distinguish principles from examples. This kind of learning approach negatively impacts students' learning outcomes.

2.2 Vietnamese Values and Educational System

The Vietnamese value system has four main elements. They are allegiance to the family, reputation, lover of learning, and respect for others [4]. According to the Vietnamese value system Vietnamese are expected to respect people by their age, status, and position. So, it is obvious that educators, scholars, and writers are well respected by the public in Vietnam. Vietnamese always give importance to learning. They respect the people who are very well-educated more than the non-educated rich man [21]. Vietnam is Eastern country and Vietnamese follow group oriented culture and ideology. So, Vietnamese culture also plays a vital role in the Vietnamese educational system, which is based on Eastern education. In Eastern educational systems, classrooms are teacher-centered [21]. Learners strongly believe that the teacher is the complete source of knowledge. Students have been taught to keep quiet in the classroom as the way to show their respect (attitude) to their teacher. Moreover, they do not interrupt the lecture even if they do not understand the topic at all. The students who studied at those schools are trained to be attentive in the class, and are good in memorizing the facts and concepts (skills). It was also identified that, the "Spoon feeding" style of teaching and learning is followed in many educational institutions of Vietnam [34].

2.3 Cultural Attitudes versus Student performance

Student performance levels are an indicator that the student has achieved his/her academic goals. Many researchers have attempted to identify the factors that affect student performance [3, 6, 14, 15]. Notably, Ota conducted a study on cultural factors and Chinese ESL students in USA, and concluded that, students' cultural characteristics play an important role in their learning preferences and performance [23]. For example, students from collectivistic culture prefer rote memorization as one of their learning methods and give more importance to getting high grades and certificates than acquiring competence. So, similar cultural attitudes may hinder Vietnamese students' learning performance as they also follow collectivistic culture.

2.4 Geert Hofstede's Cultural Dimensions – Vietnam

Hofstede et al. conducted a study on national culture and derived six cultural dimensions such as power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance, long term orientation, and indulgence [10]. Based on Hofstede et al. research publication, the cultural dimensions data of Vietnam collected and the Figure 1 was reproduced with permission from them [10]. According to Hofstede et al. findings (refer Figure 1), Vietnam has a high score on the power distance index of 70, which means that challenges to leadership are not well-received [10]. This power-dependency relationship can be connected to teacher and student behaviors as well. On the other hand, the uncertainty avoidance dimension score is very low, i.e. 30 – This dimension score can be related to students from low certainty avoidance countries that see mistake is an opportunity to learn something new and part of the learning process. Similarly, the individualism score of 20 reflects that Vietnam is a collectivistic society.
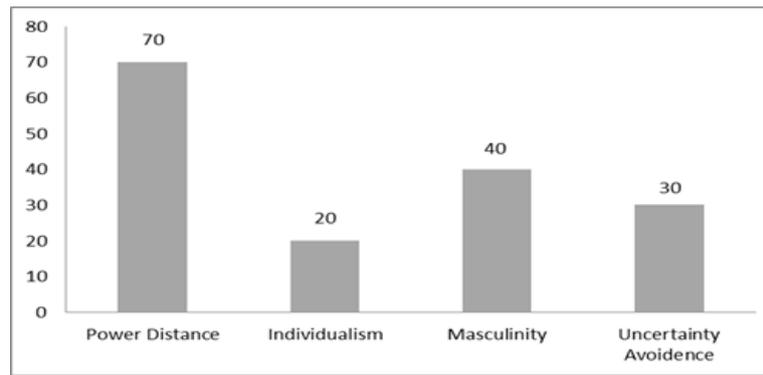
Figure 1: Hofstede's Cultural Dimensions of Vietnam

2.5 Vygotsky's Social Development Theory and Student participation

According to Vygotsky' social development theory, social interaction (participation) will help students to cognitively enhance their learning so they can move on to the next level of performance [35]. For example, Cooperative Learning (CL) helps students to interact with each other and improve student learning outcomes. Thanh analyzed the Vietnamese teachers and students perceptions toward cooperative learning, and reported that, CL helps students to review what has been taught but to seek knowledge [31]. In addition, it is noted that Vietnamese students do not keep direct eye contact with their teachers as that behavior is considered disrespectful to their teachers. Moreover, students were rarely motivated to ask questions during lecture hours or they hesitate to interact with teachers in the classrooms [16]. This kind of cultural behavior may prevent Vietnamese students from actively participating in their learning [36]. Moreover, Vietnam is a collectivistic society (refer figure 1), individual students will speak only when they called personally by the teacher [10, 24]. These kinds of attitudes hamper student teacher interaction in learning programming courses.

2.6 Teaching Programming Courses

There has been much research done on teaching programming courses to students in interesting and more effective ways. However, many of those studies accepted that teaching programming is a difficult task [11]. Also, many students admitted that understanding terminology and syntax of the programming language is like learning a new language with unfamiliar grammar [1]. Interestingly, different pedagogical approaches were suggested by these studies in order to teach programming courses especially to novice students though none were identified as a best approach to follow. Some examples are, conceptual model for learning to program [2], conducting online tests and one-to-one teaching [18], Facile Programming [5], Game based teaching and learning computer science courses [37], and using visualization tools for individual and collaborative learning [26, 27] are a few of those. There were few other suggestions like collaborative learning and or pair programming where two or more students learn together, which may benefit them to share their views, knowledge to learn how to program better [30]. Collaborative learning changes the traditional learning environment into an interactive learning environment. However, public schools in Vietnam have not fully implemented the interactive learning environment yet [16]. Problem Based Learning (PBL) is another novel approach in learning and teaching where the students are presented with a problem for group discussion and to come up with possible solution to solve it. PBL fosters positive development in students' critical thinking [32]. However, O'Grady et al. found that, the existence of PBL into the average computing curricula is not deep [22]. In addition, Thanh researched Vietnamese teachers and students' perceptions toward Cooperative Learning (CL), and concluded that, the benefit of the CL approach was heavily hindered by cultural and institutional barriers, such that teachers and students failed to understand the functions of CL [31]. Tran conducted a study on effects of cooperative learning on the academic achievement on Vietnamese students, and concluded that, Vietnamese students are willing to accept a western style of learning and their learning styles are not culturally based though they were accustomed to a teacher-centered learning [33]. Although, all those studies attempted to provide various types of teaching techniques to solve students understanding problems none of these suggestions were targeted to programming students that have cultural issues.

2.7 Hypothesis development

Based on the foregoing literature review on impact of cultural attitudes on student participation and performance, programming courses and, given the data available for this study the following hypotheses were developed to answer our research questions. This study examines the Vietnamese undergraduate IT students' cultural attitudes towards learning

and identifying the relationship between their cultural attitudes and their learning skills on acquisition of computer programming education. It is expected that, students who studied in eastern educational system based schools, and from high power distance culture will struggle to participate in active learning. Based on the foregoing literature review on Vietnamese values and their educational literature, our observation on those students' cultural attitudes, the following hypotheses were developed to answer our research questions

Hypothesis 1: *High power distance culture will affect student engagement in the programming courses.*
Hypothesis 2: *High power distance culture will affect student learning skills in the programming courses.*
Hypothesis 3: *High power distance culture will affect student to participate in active learning*.
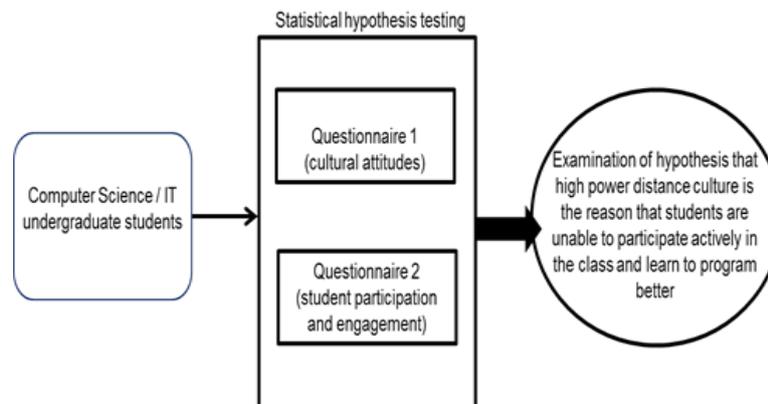
3. RESEARCH METHOD

Figure 2: Process Model of the data collection and analysis

This study used Google Forms to develop a questionnaire, and conducted the anonymous electronic survey to investigate the research questions in order to measure the results against defined hypotheses. The data were collected and analyzed with *statistical hypothesis testing* of the correlation coefficient technique to find out whether or not cultural attitudes prevent students from learning programming courses. Figure 2 shows the process of model of data collection and analysis.

3.1 Participants and Survey questionnaire

Fifty Vietnamese undergraduate students of computer science and IT streams were chosen at random to participate in the survey as voluntary participants. However, only 48 students confirmed their willingness, and submitted the completed survey questions with their email ids that were shared with them by Google Forms. Two sets of questionnaires were prepared to measure the Power Distance culture dimension (PD) and Student's Participation and Engagement (SPD). The survey questions of this research were derived from Handelsman et al. [9] and Kasuya's research work [13]. The survey questions were prepared in English. The questionnaire contained closed response questions and was prepared for 5 point Likert scales ranging from 0 to 4 for students to respond. The first set of questionnaire was prepared to measure the participants' PD. Similarly, the second set of questionnaire was prepared to measure the SPD. Set one of questionnaire contained 19 questions and set two contained 20 questions for participants to response. Each question was provided with five options: "strongly agree," "agree," "neither agree nor disagree," "disagree," and "strongly disagree". Respondent is allowed to choose one of the options as his/her response for each question.

4. DATA ANALYSIS AND RESULTS

The collected data were imported (as excel file) from Google Forms into SPSS software for data pre-processing and statistical analysis. All participant responses were converted into numerical values based on Likert scales defined for this study (refer Appendix) to calculate the total and average scores for further analysis. For example, Figure 3 shows a participant response for set 1 questionnaire – PD (sample).

Respondent	Question 1	Question 2	Question 3	Question ..	Total	Average in %
1	Disagree	Disagree	Neither agree or disagree	……		51.32
Likert Scale	3	1	2	……	39	

Figure 3: Set 1 – Power distance culture dimension student's answer, Likert scale value, total and average

Each respondent answer was converted into corresponding numerical value defined in the scale 1 or scale 2 based on the type of questions defined in the questionnaire. For example, as shown in the Figure 3, numerical value for question 1 of set 1's answer was assigned based on scale 1. However, numerical value for question 2's answer of the same set was assigned based on scale 2 (see Appendix for more details). Similar process was implemented on set 2 questionnaire responses to find total and the average scores for statistical analysis. Notably, three students' responses were eliminated due to incomplete survey responses, and the remaining 45 students' responses were used for analysis. Figure 4 shows the calculated mean score of each respondent-sample for data normality test to proceed further.

Serial No	Timestamp	Set 1 - Total (out of 76)	Set 1 - Power distance average in %	Set 2 - Total (out of 80)	Set 2 - Student engagement (average in %)
1	7.1.2015 4:30	43	56.58	50	62.5
2	7.6.2015 11:28	47	61.84	39	48.75
3	7.6.2015 13:24	32	42.11	47	58.75
4	7.6.2015 17:42	39	51.32	42	52.5
5	7.6.2015 20:02	37	48.68	54	67.5
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Figure 4: Total, and average scores of PD and SPD

The Shapiro-Wilk test was conducted to check if data were normally distributed to apply an appropriate type of statistical techniques and to avoid statistical errors [7]. It was identified that the p-value of the test was greater than the alpha level. I.e. the collected data mean-scores are normally distributed. As the data were normally distributed, we used Pearson correlation coefficient technique to measure the statistical dependence between the average scores of power distance and student engagement dimensions.

Figure 5 reflects the Vietnamese programming students' average scores of both factors PD and SPD in percentage (%).
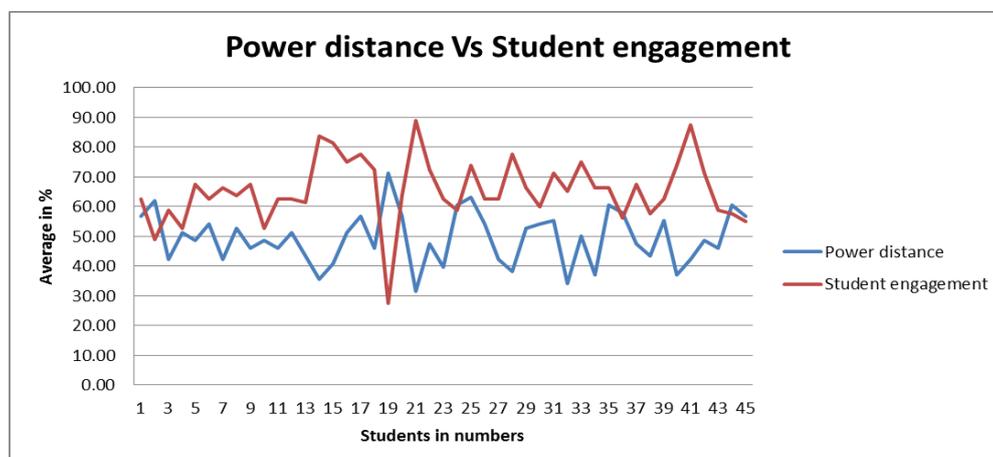

Figure 5: Relationship between PD and SPD average scores

Analysis 1: *To identify the relationship between both variables- correlation coefficient*

The Pearson correlation Coefficient method was used to assess the dependency or relatedness between the categorical data mean scores. The test result was -0.5549. Since the result is a negative number (<0), there is inverse relationship between PD and SPD. The critical value of correlation coefficient was calculated to generalize our findings to the larger population. Table 1 reflects the statistical inference of our findings.

Table 1: Correlation coefficient results

Sample size (n)	Correlation coefficient value (r)	Degrees of freedom (n-2)	Critical value (0.05)	Critical value (0.01)
45	-0.5549	43	abs(r)>0.294	abs(r)>0.38

Analysis 2: *measuring power distance culture dimension against number of students*

To understand further the impact of cultural attitudes in programming courses in order to classify them we counted the number of students based on their power distance culture and student engagement mean scores against the average bands 0-25, 25-50, 50-75 and 75-100 for further analysis (Refer Appendix for more details). Figures 6 and 7 reflect the students' overall type of PD and SPD based on the range given in percentage (%). Refer to scale details given in Appendix.
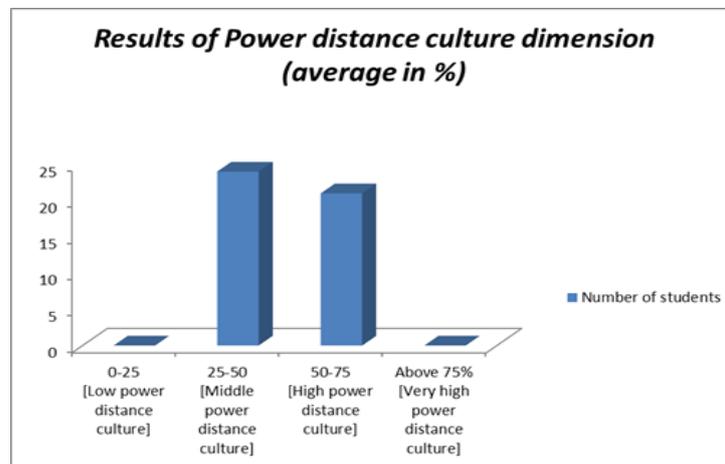

Figure 6: Results of PD average band

Analysis 3: *measuring student engagement level against number of students*
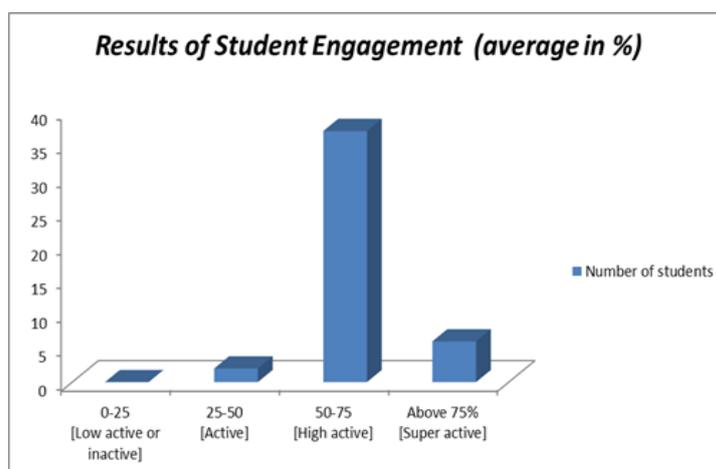

Figure 7: Results of SPD average band

The summary of responses generated and displayed in pie charts with percentages by Google forms were analyzed and chosen the questions that yielded significant results (Strongly agree + Agree = 50% or more) in relation with PD and SPD in programming courses for further analysis. Table 2 shows the extract of Google forms summary of responses in %.

Table 2. Students' responses in percentage (%)

Survey questions identified *	Responses in %
I did my secondary education where the teacher(s) were more authoritative or the educational process is teacher centered.	64.44%
I prefer to accept my teacher's comments on my work though I do not agree with some of his/her comments.	62.22%
I would like to receive feedback about my performance from my teacher as much as possible though I do not ask.	93.33%
I prefer to implement existing solution for the questions to complete the work.	75.6%
I prefer to debate with my staff during group work discussions.	75.6%
I am very active and more interested in group activities.	57.8%
I prefer to complete lab/tutorial work alone though it can be done with friends.	51.1%
I ask questions during lecture hours if I don't understand.	73.3%
I am bit hesitant to express my disagreement about the feedback to my teacher on my work.	64.44%

5. DISCUSSION

The primary purpose of this research was to explore the impact of power distance culture on Vietnamese students in higher education. Figure 6 confirms that, nearly 46.66% of students (21 students) fall in "High power distance culture" type although none of the students were identified as either "Low power" or "very high power" type. However, Figure 7 data reflects that only, 13.33% of the students (6 students) were of "Super active" type of student engagement or engagement learning environment. The resulting correlation coefficient is negative, which reflects that students from the high power distance culture will certainly struggle with engaged learning or low active participation. Table 3 − statistical inference of correlation coefficient is, r > 0.294 (0.05) and r >0.38 (0.01). The two variables were strongly correlated, $r(43) = -0.56$, $p < .01$. These findings can be extrapolated to Vietnamese IT students' population although the r value did not yield a strong negative relationship between student's cultural attitude and engagement in learning. The results moderately (partially) support hypothesis1: high power distance culture will affect student engagement in the programming courses.

Based on research findings of Manikutty et al. power distance culture certainly affects classroom communication, and students from high power distance culture are more hesitant to participate in group work and discussions [17]. The pair programming method needs students to interact with each other in order to share their views to solve the given programming exercises and related questions [20]. It seems that a power distance culture still exists in the Vietnamese educational system. The data from students' responses shows that (see Table 2), nearly 65% students did their secondary education where the teachers are more authoritative and the educational process is purely teacher -centered. Another statistical result derived from student responses (see Table 2) also claims that, Vietnamese students are a bit more hesitant to express their opinions or views to their teachers directly. In addition, 62.22% of students responded that they prefer to accept the teacher's comments on their work though that practice has some issues in itself. These kinds of cultural attitudes typically support Hofstede's statement "Power Index: challenges to the leadership is not well-received or Fear of disagreement of leaders or Respect of authority" [10]. Thus, cultures which have high power distance dimension will negatively impact on student's learning skills and our statistical data also partially supports this assertion in hypothesis 2 i.e. "High power distance culture will affect student's learning skills in the programming courses".

Although, the results of our data analysis supporting our hypotheses 1 and 2, there were a few other results calculated from students' responses pointing out that, Vietnamese students prefer engaged learning or active learning environment, which did not support our hypothesis 3 fully. 64% of students responded positively to questions about "taking leading roles in group activities", "ask questions during class hours if don't understand", "active and interest in group activities", and "helping other students during lab hours". Moreover, these parts of the study findings are similar to Tran's research findings [33]. However, 75.6% of students stated that they prefer to implement existing solutions to the questions to complete the work instead of making own solutions.

6. CONCLUSION AND LIMITATIONS OF THE STUDY

It is important for computer science and IT students to acquire computer programming skills. However, it is understood that, cultural attitudes of students play a vital role in learning. In this analytical paper, we used survey responses to examine the Vietnamese students' cultural attitudes that affect learning in programming courses. In a quantitative analysis we found that, there is a negative relationship between power distance culture and student

engagement which affects student participation in learning in computer programming courses. However, our research did not focus on Geert Hofstede's other dimensions such as masculinity versus femininity, uncertainty avoidance, long term orientation, and indulgence related to learning computer programming courses.

Like all research, this study has several limitations and it is not free from its weakness. First, the sample size of this study is not adequate enough to generalize our findings. Second, the subjects in this study were 45 Vietnamese undergraduate IT students from HoChiMinh city in Vietnam. Consequently, it is hard to generalize the findings from this study to all the IT students of Vietnam even though our findings are statistically bit significant. Third, it is unknown whether or not the participants respond to the questionnaires honestly. The responses to the questionnaires are beyond the researcher's control. Finally, the participants of this study were volunteers who may not represent the full range of views of all students.

7. ACKNOWLEDGEMENT

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9. APPENDIX

9.1 Measurement unit of Survey questionnaires

Scale 1:					Scale 2:				
Value	Definition	Points / scores	Power distance culture questions	Student participation questions	Value	Definition	Points / scores	Power distance culture questions	Student participation questions
5	Strongly agree	4	1, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 19	1, 2, 6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18, 19	5	Strongly agree	0	2, 4, 11, 16, 17, 18	3, 4, 5, 11, 13, 20
4	agree	3			4	Agree	1		
3	Neither Agree nor Disagree	2			3	Neither Agree nor Disagree	2		
2	Disagree	1			2	Disagree	3		
1	Strongly Disagree	0			1	Strongly Disagree	4		

9.2 Power distance (PD)-average scale:

Student engagement points average band (in %)	Number of students	Student engagement level
0-25	0	Low active or inactive
25-50	2	Active
50-75	37	High active
Above 75%	6	Super active

9.3 Student participation and engagement (SPD)-average scale

Student engagement points average band (in %)	Number of students	Student engagement level
0-25	0	Low active or inactive
25-50	2	Active
50-75	37	High active
Above 75%	6	Super active