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Studies or Leisure? A Cross-cultural Comparison of Taiwanese and Norwegian Engineering Students' Preferences for University Life*

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An insight into students' preferences and expectations of life at university is useful when trying to understand drop-out percentages and design study programs, especially in the global competition for students. This study focuses on Taiwanese and Norwegian students' preferences for life and activities at university. Hofstede's model was used to predict culture-related differences. A pair-wise decision questionnaire was used to conduct measurements. A universal trend is that teamwork was considered most important, and teachers were considered to be less important. The most noticeable culture differences were that Taiwanese students preferred non-curricular values and Norwegian students preferred curricular values. The study discipline had little impact on students' preferences.

Keywords: culture differences; curriculum development; extracurricular activities; student recruitment; student motivation

1. INTRODUCTION

ENGINEERING EDUCATION is currently facing several global challenges. First, interest in engineering and technology is declining [1–3]. Second, students' basic skills in core subjects such as mathematics are weaker than before [4]; consequently, industry does not get enough new qualified engineering graduates [5]. Third, students are focusing less on their work as many hold part time jobs and procrastination is reported to be a problem [6]. Fourth, globalization and lower birth rates lead to a competition for students in the global marketplace when not enough qualified students can be recruited nationally. The decline in the number of students results in a reduced income for the university departments, financial uncertainty, redundancies and, at worst, programs must be shut down. Attempts to reverse this trend includes renewing the curriculum [7], adopting modern pedagogical strategies [8–10] and incorporating e-learning [11, 12].

More insight into the mechanisms that attract and make students stay in engineering education is needed [13]. This study focuses on students' preferences for life at university as little has been written on this important topic. The objective was to tap into the students' value systems related to curricular and extracurricular activities and study preferences. Moreover, the study addresses these issues in a cultural perspective as the cultural

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differences are believed to manifest themselves in the classroom [14, 15].

Two culturally dissimilar student populations are studied, namely Taiwanese and Norwegian students, as these are more or less representative of what is often stereotypically referred to as Eastern and Western students. Although not identical, Norwegian society is similar to most societies in northern Europe, while Taiwanese society is similar to most Confucian societies in South East Asia [16]. Moreover, a cultural comparison between Taiwan and Norway is particularly relevant as these countries have very similar GDPs with rankings of 23 and 24, respectively [17]. Moreover, Norway and Taiwan both have high human development indices of 0.968 and 0.932, respectively [18].

Although the issues raised in the study are general, and the questionnaire could have been used for any educational discipline, it is of particular interest to know the attitudes of engineering students. Insight into engineering students' preferences is a prerequisite for improving engineering education and reversing the negative student recruitment trends that in general are observed in engineering education. A non-engineering student group is included as a comparative reference.

2. BACKGROUND

Recently, several international studies have focused on the declining interest in studying science and technology [2] complementing large-scale, well known and general international studies such as TIMSS (Trends in International Mathematics and Science Study) [19] and PISA (Program for International Student Assessment) [20].

In general, students can be classified into students interested in studying science, students interested in other subjects and students not interested in studying [1]. Interest in technology has also been linked to whether students are 'nerds' or idealists [2]. The 'nerd' is interested in technology because the technology is interesting in its own right. The idealist has a humane goal of helping people and making the world a better place, and will invest the necessary effort to study the necessary science and technology to reach these goals.

Yurtseven [3] blames the declining interest in engineering subjects on the way that the general population views engineers. In an illustrative example he contrasts the image of contemporary engineers, represented by the cartoon character Dilbert, with the engineer of the past, represented by Leonardo Da Vinci. Leonardo Da Vinci was exciting, multitalented, had an impact on the world and is a role model to many. Dilbert is antisocial, boring, unimportant and clearly not a role model to which young individuals aspire.

2.1 Cultural dimensions

A widely cited framework for assessing cultures is Hofstede's five dimensions of culture [21, 22]. This framework is supported by a solid body of data collected across several decades, a subset of which is depicted in Fig. 1 [22]. The graphs show

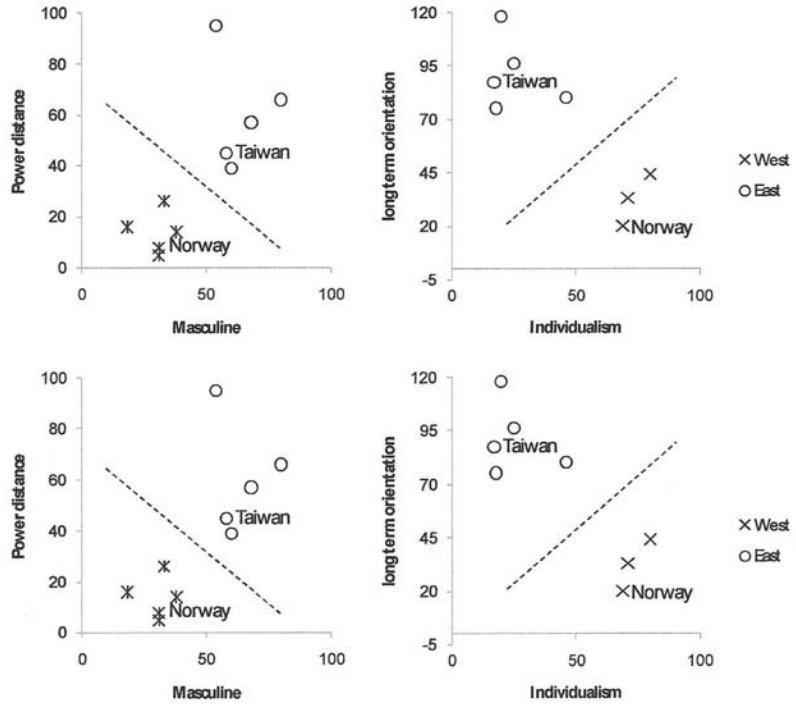

Fig. 1. A plot of Hofstede's cultural dimensions for north European countries (Norway, Sweden, Denmark, Finland and the Netherlands) and Confucian countries in South East Asia (Taiwan, China, Hong Kong, Japan and South Korea). The left plot shows the Masculine–Power distance plane and the Individuality–Long term orientation plane. Note that uncertainty avoidance is not plotted and that long term orientation data for Finland and Denmark were unavailable.

four of Hofstede's five indices for a selection of culturally related Eastern and Western countries represented by Taiwan, Hong Kong, China, South Korea and Japan, and Norway, Sweden, Denmark, Finland and the Netherlands, respectively.

Power distance addresses how a society accepts unequal distribution of power. In a society with a low power distance people are more equal than in societies with a large power distance. Figure 1 shows that the power distance in Taiwan is larger than in Norway. For example student representative organizations have more influence in Norway than Taiwan. Norwegian student representative organizations even have seats on university steering committees. Several studies describe power distance in the classroom [14, 15].

The second index, individuality, addresses whether the individuals of a society act individually or collectively as a group. In an individualistic society individuals focus on themselves. Figure 1 shows that Norwegian society is individualistic, while Taiwanese society is collectivist. In Taiwan important decisions including study matters are often taken collectively. In Norway students have more influence over their decisions. Talents and interests often influence the direction of study. Motivation has also been connected to individualism as students with intrinsic motivation, i.e., personal interest in mathematics score higher than students with extrinsic interest, such as family-driven motivation [23, 24].

The third index addresses masculinity versus femininity. A masculine society is competitive while a feminine society places emphasis on relationships and quality of life. Figure 1 shows that Taiwanese society is masculine while Norwegian society is feminine. The Taiwanese education system is very competitive. Students sit university entrance exams where the results are used to rank the students nationally. Student must score high on this ranking list in order to be admitted to the prestigious universities. In Norway, students are free to choose their university and everyone has a reasonable chance of studying at a top-100 university. Only a few specialized subjects, such as medicine and medical-related areas, are highly competitive. In general, connections have been found between masculinity and technology, and between human and health oriented subjects. For instance, females have been found to be less interested in physics [25] and computer science [26] than males. Instead, females have been found to be more interested in biology than males [27]. The values of idealists [2] can also be viewed as feminine.

The fourth index, uncertainty avoidance, summarizes how members of a society manage uncertainty, i.e., whether uncertainty is avoided through rules and religion, or whether uncertainty is accepted. Taiwan is somewhat more uncertainty-avoiding than Norway, but this is not the case for all the countries included in Fig. 1 and this dimension is therefore not plotted. For instance, student participation and in-class discussions are encouraged in Norway. In Taiwan the teacher predominantly assumes responsibility for proceedings. When a lecture is well structured, and the teacher is in control, uncertain situations are avoided. On the other hand, student participation may provoke unpredictable situations [28].

The fifth index, long term orientation, describes the degree to which societies are oriented towards future rewards involving characteristics such as thrift and perseverance. The opposite, short term orientation, is characterized by an emphasis on the past and the present. Taiwan is long term oriented and Norway short term oriented. Note that long term data for Finland and Denmark were not available. It is considered important to study hard in Taiwan as one may reap the benefits of your efforts in the future through a good career. In Norway, students are more likely to study a topic they are interested in irrespective of future job prospects.

2.2 Research questions

It was hypothesized that Taiwanese and Norwegian students would indicate different preferences for university life and activities at university due to their respective cultural backgrounds. Taiwanese students were expected to indicate preferences characterized by larger power distance, collectivism, masculinity and long term orientation, while Norwegian students were expected to prefer life and activity preferences characterized by a small power distance, individualism, femininity and short term orientation.

Aspects of university life were identified as being taught by good teachers, obtaining good grades, being in control of one's situation, i.e., not falling behind in courses and generally coping, indulging in extracurricular activities, experiencing a good student environment and becoming an adult. It was predicted that the Taiwanese students would indicate a preference for sitting exams and extracurricular activities. Obtaining good grades is a long term oriented goal as the student will someday be able to reap the benefits of the hard work that went into studying for these grades. Extracurricular activities involving friends is a collectivist activity.

Moreover, it was predicted that the Norwegian students would indicate a preference for the student environment and being in control. Concern for the student environment is a feminine trait. To be in control is an issue especially relevant from an individualistic viewpoint where one has to look after oneself, compared with the collectivist viewpoint where one is taken care of by the group. Becoming an adult and experiencing good teachers were viewed as culturally neutral and equally relevant to students from both cultures.

Key activities at university were identified as spending time with friends, attending lectures, self-study, collaboration and teamwork, practical

Table 1. Predicted culture related differences

Preferences	Taiwan	Neutral	Norway
University life	Extracurricular activities Good grades	Becoming an adult Good teachers	Student environment Being in control
Activities	Spending time with friends Teamwork Exams	Attending lectures	Practical coursework Self-study

coursework and sitting exams. It was predicted that the Taiwanese students would indicate a preference for spending time with friends, teamwork and exams. Spending time with friends and teamwork are both collectivist activities as opposed to spending time by oneself or individual study. Exams are a form of competition and hence a trait of masculinity, and Chinese students' emphasis on exams is echoed in the literature [29].

Moreover, it was predicted that the Norwegian students would indicate preferences for self-study and practical coursework. Self-study has the trait of individuality as opposed to teamwork which is collectivist. Practical coursework has feminine traits as it is pragmatic. All the predicted preferences are summarized in Table 1.

3. METHOD

3.1 Material

A questionnaire based on pair-wise comparisons for ranking of issues was developed for this study (see Fig. 2). Unlike Likert-based questionnaires, where an issue is measured through a handful of questions with multiple subjective alternatives, a pair-wise instrument will employ more questions for each issue, but each question offers only two distinct alternatives. Consequently, reliable measurements can be obtained with fewer respondents than for Likert-style questionnaires [30].

The first part of the questionnaire was designed to sample demographic information including sex, age, and level of study and discipline of study.

Then, the respondents were asked to rank the importance of the following issues related to attending university, namely (1) having good teachers, (2) obtaining good grades, (3) being in control of the studies, i.e., not falling behind, (4) extracurricular activities and fun, (5) good student environment, and (6) becoming an adult.

Finally, the respondents were asked to rank what activities they viewed as the most important, including: (1) spending time with friends, (2) attending lectures, (3) studying by themselves, (4) collaborating with classmates through teamwork, (5) doing practical coursework and (6) sitting exams.

Each part listed all pair combinations with each pair on a separate line where the respondent had to choose between one of the two choices, or tick both if the respondent viewed these as equally important. The pairs were shuffled into random order and the item pairs were organized such that they appeared approximately the same number of times on the left and the right side.

The initial questionnaire was designed in English and then translated into Norwegian by the Norwegian author and into Traditional Chinese by a

We wish to hear your opinion on what aspects of university that is the most important to you. Therefore, for each pair of items below, please tick the aspect that is the most important to you at university.

□	Good teachers	or	□	Good student environment
□	Becoming an adult	or	□	Good teachers
□	Being in control of the studies (not falling behind)	or	□	Good student environment
□	Being in control of the studies (not falling behind)	or	□	Becoming an adult
□	Extracurricular activities and fun	or	□	Good student environment
□	Becoming an adult	or	□	Extracurricular activities and fun
□	Good student environment	or	□	Becoming an adult
□	Good grades	or	□	Being in control of the studies (not falling behind)
□	Good grades	or	□	Extracurricular activities and fun
□	Good student environment	or	□	Good grades
□	Good teachers	or	□	Extracurricular activities and fun
□	Becoming an adult	or	□	Good grades
□	Being in control of the studies (not falling behind)	or	□	Extracurricular activities and fun
□	Good teachers	or	□	Good grades
□	Good teachers	or	□	Being in control of the studies (not falling behind)

Fig. 2. An example of pair-wise ranking from the questionnaire.

teaching assistant, and checked by the other Taiwanese authors. Moreover, a small pilot was run that uncovered minor problems that were eliminated before the questionnaire was deployed.

Cronbach's alpha was 0.93 and 0.90 for the two blocks of pair-wise questions, respectively, which suggest that the internal consistency reliability of the questionnaire is high. The high alpha values reflect the redundancies caused by the large number of transitively related pair-wise comparisons.

3.2 Respondents

A total of 221 university students responded to the questionnaire of which 33 responses were discarded. The respondents comprised 30.3% females and 69.7% males. Of these, 123 students (*East*) were Taiwanese students studying at National Cheng Kung University, Tatung University and National Taipei University of Technology, respectively. Moreover, 65 students were Norwegian students enrolled at Oslo University College (*West*). The Taiwanese students comprised 75 computing engineering students from all three universities (*East-tech*), and 48 humanities students from National Cheng Kung University majoring in various English-language-related subjects (*East-nontech*). The Taiwanese students included 82 undergraduates and 41 graduate students, while the Norwegian sample was made up of only undergraduate students. The mean age for all students were 22.2 years (SD = 4.7). The Norwegian group comprised 41 computing engineering students (*West-tech*) and 24 students studying the social aspects of computing (*West-nontech*). The demographic details for the respondents are listed in Table 2.

3.3 Procedure

The questionnaire was distributed in class to ensure a high return rate from March to May during the spring of 2008. The students were given 30 minutes to complete the questionnaire and on average the students completed the questionnaire in 20 minutes. All the students returned the questionnaire (100%) but only 85.1% of these were used during the analysis.

3.4 Analysis

The questionnaire responses were analyzed using a set of custom made spreadsheet tools. The ranking lists were computed based on the normalized ranking scores according to the procedure outlined in [30], which can be summarized as follows. If issue A is selected then issue A is given a score of one, and B zero. Or, if issue B is selected then issue B is given a score of one and issue A zero. If both A and B are selected, then both issues are given a score of 0.5. To rank n issues $n(n–1)/2$ pair-wise comparisons are needed. Based on the scores assigned to the issue pairs, the preference weights w_i for the issues are computed as follows:

$$w_i = \frac{\sum_{j=1}^{n} a_{i,j}}{\sum_{i=1}^{n}\sum_{j=1}^{n} a_{i,j}}, \tag{1}$$

where $a_{i,j}$ is an element in a square matrix that represents the number of times issue i was preferred to, or found to be equally preferred to, issue j for k participants. Next, agreement U was computed as follows:

$$U = 8\left[\frac{\sum_{i,j} a_{i,j}^2 - k\sum_{i,j} a_{i,j}}{k(k-1)\cdot n(n-1)}\right] + 1 \tag{2}$$

Only elements above or below the diagonal are summed. The measure of agreement U falls in the range –1.0 to 1.0, where a value of 1.0 indicates complete agreement among the subjects, and a value of –1.0 indicates total disagreement. A value close to 0.0 indicates that the responses are random. A χ^2-test was used to assess the null hypothesis $H0$ that the measurements are random ($U = 0.0$) against the hypothesis $H1$ that they are not random ($U \neq 0$) using Equation (3).

$$\chi^2 = n(n-1)\frac{1 + U(k-1)}{2} \tag{3}$$

There are $n(n$ –1)/2 degrees of freedom. These values were compared with critical values of the χ^2 distribution. Furthermore, a normalized Kendall Tau rank distance measure was used to compute the difference between rankings in order to make quantitative comparisons [31].

4. RESULTS

Table 3 lists students' ranking of aspects related to life at university. The results show that there is a

Table 2. Respondent demographics

	Taiwan		Norway	
	Engineering	**Non-tech**	**Engineering**	**Non-tech**
Total	75	48	41	24
Females (%)	10.7	75.0	12.2	34.8
Age mean	21.4	21.6	22.9	23.7
Age SD	5.5	4.7	4.5	4.6
Undergrads (%)	60.0	64.6	100.0	100.0

Table 3. Ranking of aspects related to life at university

	Taiwan				Norway			
	Engineering		Non-technology		Engineering		Non-technology	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Good teachers (w_1)	0.17	(3)	0.17	(3)	0.22	(2)	0.22	(3)
Good grades (w_2)	0.13	(6)	0.13	(6)	0.24	(1)	0.23	(2)
Being in control (w_3)	0.14	(5)	0.13	(5)	0.19	(3)	0.24	(1)
Extracurricular activities (w_4)	0.17	(4)	0.14	(4)	0.10	(5)	0.10	(5)
Student environment (w_5)	0.21	(1)	0.20	(2)	0.17	(4)	0.12	(4)
Becoming an adult (w_6)	0.18	(2)	0.23	(1)	0.08	(6)	0.09	(6)
Agreement	0.1		0.1		0.2		0.3	
χ^2(df = 15)	47.4		66.8		145.0		99.8	
p	<0.001		<0.001		<0.001		<0.001	
Kendall Tau Distance								
Norway/Non-technology	0.73		0.80		0.13			
Norway/Engineering	0.73		0.80					
Taiwan/Non-technology	0.07							

large distance between the preferences across the two cultures (τ(*East*, *West*) = 0.73–0.80), and that the rankings are quite similar within each culture (τ(*West-tech*, *West-nontech*) = 0.13 and τ(*East-tech*, *East-nontech*) = 0.07).

The Taiwanese engineering students placed the most emphasis on the student environment (w_5 = 0.21, rank = 1/6) and the Taiwanese non-technology students preferred the aspect of becoming an adult (w_6 = 0.23, rank = 1/6). Furthermore, both Taiwanese groups ranked good grades as the least important (w_2 = 0.13, rank = 6/6). The Norwegian engineering students preferred good grades (w_2 = 0.24, rank = 1/6) and the Norwegian non-technology students preferred to be in control (w_3 = 0.24, rank = 1/6). One universal trend was that all groups placed medium-high importance on having good teachers (w_1 = 0.17–0.22, rank = 2–3/6). Taiwanese students ranked extracurricular activities slightly higher (w_4 = 0.14–0.17, rank = 4/6) than Norwegian students (w_4 = 0.10, rank = 5/6).

Table 4 lists students' preferences for activities at university. Large differences were observed between the cultures (τ(*East*, *West*) > 0.54) and smaller differences within each culture (τ(*tech*, *nontech*) < 0.14).

In general, students ranked collaboration and teamwork as the most important (w_4 = 0.21–0.20–25, rank = 1–2/6). Moreover, Norwegian students preferred to attend lectures (w_2 = 0.19–0.21, rank = 1–2/6), while the Taiwanese students ranked lectures as the second least important activity (w_2 = 0.13–0.15, rank = 5/6). Next, Norwegian students ranked spending time with friends as the least important (w_1 = 0.8–0.13, rank = 6/6) while Taiwanese student ranked spending time with friends of medium–high importance (w_1 = 0.18–0.21, rank = 2–3/6). Another trend is that the Taiwanese ranked exams as the least important activity (w_6 = 0.4–0.5, rank = 6/6) and Norwegian students ranked exams of medium importance (w_6 = 0.18, rank = 3/6). Finally, Norwegians ranked self-study in second last place (w_3 = 0.13–0.15, rank = 5/6), while Taiwanese students were more

Table 4. Students' ranking of university activities

	Taiwan				Norway			
	Engineering		Non-technology		Engineering		Non-technology	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Spending time with friends (w_1)	0.21	(2)	0.18	(3)	0.13	(6)	0.08	(6)
Attending lectures (w_2)	0.13	(5)	0.15	(5)	0.19	(2)	0.21	(1)
Self-study (w_3)	0.18	(4)	0.21	(2)	0.13	(5)	0.15	(5)
Collaboration and teamwork (w_4)	0.25	(1)	0.25	(1)	0.21	(1)	0.20	(2)
Practical coursework (w_5)	0.19	(3)	0.17	(4)	0.17	(4)	0.17	(4)
Exams (w_6)	0.05	(6)	0.04	(6)	0.18	(3)	0.18	(3)
Agreement	0.3		0.3		0.1		0.1	
χ^2(df = 15)	312.8		203.5		52.2		45.9	
p	<0.001		<0.001		<0.001		<0.001	
Kendall Tau Distance								
Norway/Non-technology	0.60		0.60		0.07			
Norway/Engineering	0.53		0.53					
Taiwan/Non-technology	0.13							

divided as the Taiwanese non-technology students ranked self-study as second most important activity ($w_3 = 0.21$, rank = 2/6).

5. DISCUSSION

The results confirm the predictions that the Taiwanese students prefer extracurricular activities, that Norwegian students prefer to be in control and that access to good teachers is a culturally neutral preference. The students' universal medium ranking of the teacher suggests that teachers are not in the centre of students' frame of reference, as many teachers may assume. The low ranking of teachers is consistent with other studies [28, 32].

Next, the results refute the predictions that Taiwanese students prefer good grades and that Norwegian students would prefer a good student environment. In fact the Taiwanese students ranked good grades as least important and the student environment as highly important. The Norwegian students ranked good grades as highly important and the student environment as being of medium–low importance. The two issues preferred by the Taiwanese students, namely extracurricular activities and student environment are both not directly related to the curriculum. On the other hand, the two issues preferred by the Norwegian students are very curriculum-centric, namely obtaining good grades and being in control of one's studies.

Moreover, the prediction that becoming an adult would be a culturally neutral aspect of university life had to be rejected as the Taiwanese students ranked this as highly important while the Norwegian students ranked this as least important. Perhaps one explanation for this observation is that many Taiwanese students experience a strict upbringing with strong parental control. Once they leave home to attend university their sense of exploring individual life becomes stronger than for Norwegian students who might have had a more liberal upbringing.

Next, only one of the predicted preferences related to activities at university was confirmed, namely that Taiwanese students preferred to spend time with friends. In fact friends were ranked as the second and third most important activity at university while Norwegian students ranked this the least important activity.

The prediction that Taiwanese students would indicate a preference for exams was refuted by the results as the Taiwanese students ranked this as the least important while the Norwegian students ranked exams as being of medium importance. Chinese Heritage Students are known to have well-developed exam sitting skills. Perhaps their confidence in their exam sitting skills and their exam sitting experience make this student group view this as a trivial and unimportant issue, while Norwegian students have less developed exam sitting techniques and hence must focus harder on these milestones.

Moreover, the prediction that Norwegian students would prefer self-study had to be rejected as the Taiwanese showed a stronger preference for self-study than the Norwegians who ranked this as second least important. The act of self-study is individualist while the goal is collectivist. Moreover, one may reach a different depth of concentration with self-study from when working in teams, and the act of self-study can therefore also be viewed as being long term oriented, where one can reap the harvest of the invested effort in the future.

Next, the views on attending lectures were not culturally neutral as Norwegian students indicated a stronger preference for attending lectures than the Taiwanese students. One explanation for this could be that Taiwanese students must attend lectures while Norwegian students can choose whether they want to attend lectures or not. Perhaps, the freedom means that the attitude to lectures is more positive as Norwegian students are intrinsically motivated compared with the Taiwanese students who probably are more extrinsically motivated to attend lectures.

Perhaps the most important observation is that the preference for teamwork is culturally neutral and is ranked as the most important. This suggests that the students feel they benefit from such activities irrespective of cultural background.

Moreover, the preference for practical coursework was also found to be culturally neutral and not a Western preference as predicted. However, this was ranked as being of medium–low importance.

In conclusion, Western students are motivated by good grades at university while Eastern students may be attracted to a pleasant student environment and the organization of extracurricular activities. The appreciation of teamwork is universal and it supports pedagogical strategies involving group projects [8, 9].

6. LIMITATIONS

The study of culture differences is a complex endeavor and it may be misleading to generalize or put too much reliance on the results obtained from such a small sample, although the sample is highly representative. Moreover, the trends observed reflect that of the group as a whole and not that of individuals as individual variations can be huge. Next, the gender factor was omitted in this study because of the gender imbalance in the observed groups. It is probable that gender may be an influential factor. Finally, this study addresses only a small aspect of extracurricular activities and more research into this topic is needed, especially qualitative studies.

7. CONCLUSIONS

This study has addressed engineering students' perceptions of their educational environments. An unexpected, but potentially important, finding in this study is that Eastern students place emphasis on the university environment and the process of becoming an adult, while Western students are seeking good grades. A universal trend is that all groups play down the importance of the teacher. In terms of activities at university all groups emphasize the importance of teamwork. Western students rank attending lectures as important while ranking spending time with friends as unimportant, while Eastern students value spending time with friends and rate lectures as unimportant. Western students also are more positive towards exams.

Implications of the findings are that educational institutions involved in engineering education should emphasize practical project work in groups to reflect the engineering profession that awaits the students. Next, in order to stimulate and maintain recruitment into engineering programs western institutions should facilitate extracurricular activities for inbound Eastern students. Eastern engineering educators should be cautious about expecting inbound Western students to be independent and self-sufficient. Moreover, the results confirm the teacher as a facilitator of learning rather than the provider of knowledge. Although one should be cautious about making bold claims about results that generalize, it is expected that the results represent a rough universal trend.

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