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Lifelong Learning Orientations of Freshman Engineering Students and Faculty Members

Birinci sınıf mühendislik öğrencileri ile öğretim görevlilerinin yaşam boyu öğrenme yönelimleri

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Özet

Bilimdeki hızlı gelişmeler ve mühendislik alanında bunları izleyen teknolojik değişiklikler, mühendislerin kendi beceri ve bilgilerini güncellemelerini gerektirmektedir. Bu da, mühendislik fakültelerinin yaşam boyu öğrenme (YBÖ) becerilerini müfredatlarına dâhil etmelerini ve öğrencilerinin YBÖ için hazır oluş düzeylerini belirlemelerini gerektirir. Bu amaç doğrultusunda bu çalışma, Abu Dabi'deki Petrol Enstitüsü'nde 2012-2013 akademik dönemi boyunca birinci sınıf mühendislik öğrencilerinin ve öğretim görevlilerinin YBÖ yönelimlerini tespit etmeyi hedeflemektedir. Çalışmaya, ortalama 19 yaşındaki 196 öğrenci ve ortalama 42 yaşındaki 31 öğretim üyesi katılmıştır. Çalışmaya katılan öğrencilerin yaklaşık %75.5'i yabancı ülkelerden gelen öğrencilerdir. Yaşam Boyu Öğrenim Eğilim Skalası kullanılarak toplanan veriler, cinsiyet ve etnik köken arasındaki kıyaslamalarla analiz edilmiştir. Öğrencilerin YBÖ yönelimleri ayrıca öğretim görevlilerinin yönelimleriyle de karşılaştırılmıştır. Veri analizi için SPSS istatistik yazılımı sürüm 18.0 (SPSS Inc., Chicago, IL, ABD) kullanılmıştır. Verileri yorumlamak için, sıklık ve yüzde gibi tanımlayıcı istatistikler kullanılmıştır. Grup karşılaştırmaları için Mann-Whitney U testi kullanılmıştır. Bulunan sonuçlar, sebat ve öz-düzenleme becerileri için nispeten düşük puanlarla birlikte öğrencilerin genel puanının ortalama olduğunu göstermiştir. Ancak öğretim görevlilerinin genel puanlarının yüksek olduğu ve merak becerileri için nispeten daha da yüksek puanlara sahip olduğu görülmüştür. Kız öğrencilerin puanlarının, öz-düzenleme ve merak konularında istatistiksel olarak anlamlı farklılıklarla birlikte daha yüksek olduğu görülmüştür. Ayrıca farklı ülkelerden gelen öğrencilerin tüm alt-beceri puanları, istatistiksel olarak anlamlı bir derecede daha yüksek bulunmuştur. Bu çalışmayla, mühendislik öğrencilerinin YBÖ becerileri konusunda farkındalıklarının artmasından fayda görecekleri ve mühendislik müfredatının, bu becerilerin öğretimini de bünyesine dâhil etmesi gerektiği sonucuna varılmıştır. Öğrencilerin yaşam boyu öğrenen özelliklerini üstlenmelerini sağlamak amacıyla bazı pratik öneriler sunulmuştur.

Anahtar sözcükler: Beceriler, cinsiyet, kültürler arası analiz, mühendislik eğitimi, yaşam boyu öğrenme.

Abstract

Rapid advances in science and subsequent technological changes in engineering require practicing engineers to update their skills and knowledge. This necessitates engineering faculties to include lifelong learning (LLL) skills in their curricula and determine their students' readiness for LLL. With this in mind, this study aimed to identify the LLL orientations of freshman engineering students and faculty members during the 2012 and 2013 academic year in the Petroleum Institute, Abu Dhabi. A total number of 196 students, with a mean age of 19, and 31 faculty members, with a mean age of 42, participated in the study. About 75.5% of the student participants were expatriates. The data, collected using the Lifelong Learning Tendency Scale, were analyzed through comparisons between genders and ethnic backgrounds. Students' LLL orientations were also compared to those of the faculty members. Data analysis was done using the SPSS statistical software version 18.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics such as frequencies and percentages were used to interpret the data. Mann-Whitney U test was used for group comparison. The findings indicated that the students' overall score was average, with comparatively lower scores for the perseverance and self-regulation skills. However, the faculty members' overall score was found to be high, with a comparatively higher score for curiosity skills. The female students' scores appeared to be higher with statistically significant differences in self-regulation and curiosity domains. Also, the expatriate students' scores for all sub-skills were found to be higher at a statistically significant level. It is concluded that engineering students will benefit from having their awareness raised about LLL skills, and engineering curricula need to incorporate explicit teaching of these skills. Some practical suggestions are provided to encourage students to assume the characteristics of lifelong learners.

Keywords: Cross-cultural analysis, engineering education, gender, lifelong learning, skills.

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When we hear the word 'learning', schools and students may be the first words that come to mind. However, the criticism against the idea that learning mainly takes place in schools has led to the arguments of 'learning through life' and 'lifelong learning'. Although traces of the idea of lifelong learning can be found in *Republic* by Plato around 380 BC, a systematic approach to it was adopted in 1920s with the writings of John Dewey, Eduard Lindeman and Basil Yeaxle who suggested that education and learning could not be set apart from life itself (Ayhan, 2006, p. 2). UNESCO adopted this approach to learning and explained that the term lifelong learning (LLL) derives

> *… from the concept that education is not a once-for-all experience that is confined to an initial cycle of continuous education commenced in childhood, but a process that should continue throughout life. Life itself is a continuous learning process, but each person needs specific opportunities for continuing, purposive and sequential learning in order that he or she may keep abreast of technical and social change, may equip himself or herself for changes in his or her own …* (Titmus, 1979).

The interest in LLL has resulted in the need for the learning opportunities to be offered and organized in a way that everyone has access to them without limitation of time and place. Such an approach to learning gave way to the notion of learning societies, and the white book *'Teaching and Learning: towards the Learning Society'* was published in 1995 by the European Commission. Among its main objectives were to encourage individuals to take up learning activities and to fight exclusion. When these were accompanied by the discussions on so-called 'information age', learning was attributed new meanings. It is now suggested that the rapid changes in the kinds and amount of knowledge available to us as well as the continuous improvements in technology require individuals to revise their existing skills and knowledge and to acquire new ones. This can only be possible with people open to learning and willing to assume active roles in their own learning process as independent learners. This was also emphasized in the memorandum on LLL by the European Council in Lisbon in 2000.

Engineering Education and Lifelong Learning

Engineering is one of the fields directly affected by the changes in technology, and therefore engineers of the 21st century cannot be immune to lifelong learning. Otherwise, given the rat-race nature of the workplaces, they can easily be disposable. When the case of engineering students trained for skills that are likely to be obsolete by the time they graduate and start practical work in their field is considered, their aptitude for lifelong learning becomes even more critical. They cannot rely on knowledge and skills they acquired during their university studies. Markes (2006) states that engineers need to reflect on their skills and improve them accordingly if they wish to remain employable. This is only possible if they are willing to learn and have critical reflection on their learning, which appears to be a key skill that lifelong learners possess.

Therefore, the curricula of engineering departments need to cover non-technical skills that aim to equip students with the skills of creating and seizing learning opportunities throughout their lives, starting with their university years. This is also endorsed by the Accreditation Board for Engineering and Technology (ABET) engineering criteria adopted in 2000 and adjusted in 2011. According to the 3rd criterion, engineering students need to have 'recognition of the need for, and an ability to engage in life-long learning.' Therefore, institutions aiming to get ABET accreditation are bound to embed lifelong learning theme in their curriculum. Peat, Taylor and Franklin (2005) also suggest that for university graduates to be able to cope with the changing work environment, undergraduate science courses need to develop their life-skills rather than expecting separate courses to do it. Due to the nature of lifelong learning, engineering departments are required to adopt a multidisciplinary approach to learning and teaching. Love (2011) warns that curricular changes needed for this to happen may not be welcomed due to amount of time that needs to be invested. He also warns that faculty members in different engineering fields may have a different understanding of LLL, which would cause problems in reaching a consensus regarding what needs to be put in the curriculum. In order to ease the process, Love (2011, p. 158) offers a list of traits of skilled lifelong learners which he identified in collaboration of the faculty members, administrators and advisors at Illinois State University: A lifelong learner (a) takes responsibility for planning his professional career path, (b) understands the role of professional organizations in lifelong learning, (c) seeks certifications associated with his profession, (d) self-assesses, asks others to assess him, reflects and takes learning action based on assessment and reflection, (e) remains current in his field and takes responsibility for identification of knowledge deficiencies and learning opportunities, (f) knows criteria used to evaluate performance and professionalism, (g) has a multiyear professional development plan, and (h) has learning interests outside his profession and pursues those with vigour.

This list can be taken as a springboard by faculties. They also need to collaborate with other administrative departments as well as interested bodies in the field to compile a list mirroring necessary characteristics and skills in their particular fields.

Although it is the learners themselves who will eventually allow learning to take place, the role of the faculty of introducing lifelong learning desire in their students cannot be denied. If students have been exposed to traditional methods of teaching which encourage teachers to see themselves as the jug and stu-

dents as the empty glasses, the students cannot be expected to readily accept the idea of lifelong learning. They may need to have some guidance and training from the faculty, which is supposing that faculty members themselves have high aptitude for LLL. For this to happen, Mediano and Lord (2012) recommend that tailor-made workshops be offered to senior engineering students before they join work-life. These workshops would offer students LLL competencies and particular recommendations, and encourage them to demonstrate the lifelong learning skills they have gained throughout their studies at university.

It is also necessary to address different domains of LLL skills such as curiosity, motivation, perseverance and self-regulation, which are the main focus areas of this research as well. Curiosity can be aroused by using mind teasers at the beginning of classes (Mitchel in Schiefele, 2009) or employing humor about the content matter to come (Lomax and Moosavi, 2002), which would decrease students' concern about challenging or seemingly boring contents and tasks. It would also help to encourage students to ask questions that exhibit critical thinking skills. The type of questions they ask should allow them to see that what they learn in class has connections with what happens in practice outside of school. This will help them realize that learning is life-wide.

Motivation, fueled by curiosity, can be sustained through project work which requires students to find practical solutions to problems either they themselves or their community members face. In the case of engineering education, syllabus of a particular civil engineering course can require students to look into challenges faced by the handicapped children in the playground. Instead of imposing the project topics on them, allowing the students to choose topics they are interested in is more likely to increase motivation. However, instructors can offer choices to the students having difficulty identifying a topic. This will allow them to personalize the learning process and develop a sense of ownership (Scott, 2010).

Students' skills of perseverance, compared to the other three domains, need to be boosted in particular so that learning can become lifelong. The first stage for this might be getting to know students as individuals (Baxendell, 2007). Learning their interests, achievements and failures will help this. This necessitates instructors to see their students outside class in an unthreatening manner. In these one-on-one meetings, talking to students about the class content, going over their exam papers individually etc. will not suffice. Letting students know their instructors in person will increase trust, and both parties will feel respected and cared for, which will encourage learners to persist in the face of difficulties (Barseghian, 2013). Learners can also benefit from being given examples of people who failed but persisted, and therefore reached success.

Self-regulation, on the other hand, can be promoted by using the three-stage model identified by Luftenegger et al. (2012). The first stage requires learners to initiate and plan learning actions by identifying learning needs. Instructors need to encourage learners to self-assess their existing knowledge and skills related to course contents. Generally, instructors go into class with a set of preplanned course content which might undermine learners' readiness. This stage is also related to setting goals. Learners need to be encouraged to set themselves targets that are neither too challenging nor too easy in order to avoid boredom and failure. The second stage is where learners take actions. Instructors need to ensure that they learn their learners' dominant learning styles and vary their way of teaching so that they can address different learning styles. Learners also need to be encouraged to take learning actions outside class. For engineering students, it may be important to learn in cooperation with others since practicing engineers are often involved in team projects. When they reach the final stage where they assess their learning experience, multiple ways of assessment will be necessary. Although many learners expect to be evaluated by their instructors as course masters, this is not always the ideal since it results in dependence on the instructor. Students need to be encouraged to assess their own performance throughout the course. Although they will need to be provided with a set of rubrics against which they assess themselves, they should be encouraged to develop their own set of criteria. This will promote critical thinking skills necessary for LLL. It is also important to allow students to evaluate their peers, especially when they are engaged in team work. This will instill the feeling of interdependence in them. When these are accompanied with the instructor's assessment, the overall evaluation of the learning process will be more meaningful for both the instructor and the students, who will be better at self-regulation.

Lifelong Learning Orientation of Learners

The above-mentioned lifelong skills and characteristics necessary to succeed in professional life are expected to improve through exposure to LLL experiences and training. However, it is important to start with where learners are. This has prompted several researchers to identify learners' LLL propensity in different contexts. However, studies carried out into LLL orientations of engineering students and teaching faculty will be mentioned here because this current study focuses on faculty members and engineering students.

Meerah at al. (2011) used the Lifelong Learning Scale by Kirby in their study to identify the LLL orientations of third year students at a Faculty of Education in the Malaysian context. They found that the participants had higher scores for application of knowledge and skills and locating information as skills necessary for a lifelong learner. However, they appeared

to have low orientation towards setting goals, adapting learning strategies and directing their own learning. These findings reveal that the teacher candidates in the given context had low aptitude for lifelong learning in general.

There appears to be a positive correlation between the number of years spent at university and LLL aptitude. One finding in support of this comes from a study conducted by Litzinger, Wise and Lee (2005) that employed the Self-directed Learning Readiness Scale (SDLRS) developed by Gugliemino in their study. They aimed to identify engineering students' level of readiness for LLL. They argue that SDLRS includes factors that contribute to one's ability to engage in lifelong learning. The findings of their study revealed that the participants tended to increase their SDLRS scores as they advanced their academic year of study. Similarly, Chen, McGaughey and Lord (2012), whose subjects were engineering students in America, used an instrument developed by Kirby, Lamon and Egnatoff (2010). They also found that the senior students tended to have higher scores for application of knowledge and skills.

Studies comparing female and male learners appear to have generated mixed results. Litzinger et al. (2005) did not find a statistically significant difference between the SDLRS scores of female and male students, whereas Meerah et al. (2010) found that the female students in their study had an overall higher tendency towards LLL. Similarly, the study by Chen, McGaughey and Lord (2012) revealed that male students had higher scores for abilities of locating information. Coşkun and Demirel (2012) also found that female university students had more aptitude for LLL than male students.

Lifelong Learning across Cultures

With the world becoming 'a global village' where learners from various cultural backgrounds interact with each other more than before, the need for cross-cultural understanding of learning appears to be of greater importance. This has resulted in some research comparing cultural beliefs of learning in general and LLL. One study that investigated this is by Chen et al. (2012) who found that Asian students had low scores for autonomous learning. Another study carried out by Artelt, Baumert, McElvany and Peschar (2003) investigated the literacy skills and mathematical literacy skills in relation to the learner characteristics in various countries. It was concluded that 22% of the weakest students came from Korea and Russian Federation compared to the total percentage of 17 in Austria, Belgium, Germany, Italy, the Netherlands and Sweden, and that they had not yet been able to acquire the necessary characteristics of LLL. The researchers underlined the need to foster self-regulation skills in particular for students to be persistent learners.

UNESCO carried out a Europe-wide survey on adult education participation in 29 countries between 2005-2006, which approached adult education from the LLL perspective. Global Report on Adult Learning and Education published in 2009 shows that Sweden had the highest participation rate (73.4%), and it notes that participation rates in LLL were positively correlated with the level of economic development countries have reached.

Purdue, John and Douglas (1996) compared Australian and Japanese students' perception of learning with a LLL orientation. They found that Japanese students tended to make more connections with what they learn at school and what happens in real life, suggesting that they were more life-oriented and therefore had more tendencies for LLL. Li (2002), on the other hand, studied Chinese orientations to learning and revealed that the Chinese have a strong desire for knowledge and a passion for LLL. Li notes that perseverance is a key skill that Chinese learners appear to possess. Their lifelong learning skills are enhanced by their attitude towards failure as something to be ashamed of; and therefore they need to endure hardship and concentrate on success. Li (2005) also reports the findings of her research into middle-class European American beliefs about learning. She states that European Americans tend to be more mind-oriented learners who value thinking greatly and question the known to discover the new. They also tend to be intrinsically motivated and eager to have expertise in their fields. Although success leads to pride, failure reduces their self-esteem more easily compared to the Chinese, which suggests that the Chinese have more perseverance skills.

The Aims of the Research

The impetus for this study comes from our observations of the freshman engineering students' limited knowledge and skills as lifelong learners at the Petroleum Institute (PI), Abu Dhabi the UAE. This appears to result in lack of interest in learning as a 'life-wide' endeavor. This is despite the fact that the PI has recently been accredited by ABET. This prompted us to determine the level of the PI students' and faculty members' tendencies for lifelong learning. With this general aim in mind, this research aimed to answer the following questions:

- What is the PI freshman students' level of lifelong learning tendency?
- Does the students' level of lifelong learning tendency change according to gender?
- Does the students' level of lifelong learning tendency change according to nationality?
- What is the PI faculty members' level of lifelong learning tendency? And how does it compare to that of the students?

Methods

The Respondents

A total number of 196 freshmen engineering students at the Petroleum Institute participated in the study. Their ages varied from 17 to 22, with a mean age of 19. Out of the total number of participants, 107 (54.6%) of them were female and 89 (45.4%) of them were male. In terms of nationality, 148 (75.5%) of the participants were of Emirati origins. On the other hand, 48 (24.5%) of them were expatriates: 17 Jordanian, 12 Egyptian, 10 Palestinian and 9 Syrian students.

The student participants were majoring in 6 different engineering fields, the summary of which can be seen in Table 1.

Out of the total number of 31 faculty members teaching at the PI who participated in the study, 22% was female and 78% was male. Their ages ranged between 33 and 65, with a mean age of 42.

Data Collection and Analyses

The data were collected using the English version of the Lifelong Learning Tendency Scale (LLTS), originally developed in Turkish by Coşkun and Demirel (2012). Lifelong Learning Tendency Scale is a six-point Likert scale instrument with four subsections motivation (6 items), perseverance (6 items), self-regulation (6 items) and curiosity (9 items).

Coşkun and Demirel tested the validity and reliability of the original instrument. The Cronbach's alpha internal consistency coefficient of the scale was calculated to be 0.89.

The Turkish instrument was translated into English, and three English native speakers proofread it. In cases of discrepancy between any items, further assistance was sought from one other expert who spoke Turkish and English fluently. The translated version was translated back into Turkish to make sure that none of the items lost their original meanings. The translated data-gathering instrument was applied to a total number of 10 students chosen randomly at the PI to make sure that it was both reliable and valid.

A second English version of the instrument was used to gather data from the faculty. In this adopted version, special care was taken to reflect faculty members' thoughts and experiences.

Maximum and average points were determined to decide the participants' levels of LLL orientation, and standard deviation was calculated for each score. In the six-point scale, 3.5 would be average. The minimum score would be 27x1=27, while the maximum score would be 27x6=162. The medium score would be 27x3.5= 94.5. Since the scale includes both positive and negative statements, a score around the medium would mean the person does not have a fixed orientation.

Table 1. Number of student participants according to departments

Departments	n	%
Mechanical Engineering	63	32.1
Chemical Engineering	49	25.0
Petroleum Engineering	45	23
Electrical Engineering	22	11.2
Geo-science	10	5.1
Petroleum Geosciences	7	3.6
Total	196	100

In order to have the respondents' thoughts about their perceptions of LLL, semi-structured interviews were adopted as a second type of data collection instrument. Britten (1995) states that semi-structured interviews tend to cover a few issues identified to collect greater details about them, and based on the interviewees' responses, the researcher can ask further clarification and probing questions for details. These advantages promoted the researcher of this study to hold semi-structured interviews with a sample of participants who gave their informed consent after being assured that their names would not be identifiable in any subsequent report. Due to time constraints, the number of interviews was limited to 10 students and 3 faculty members, who were chosen among those volunteered. This was not seen an issue since the purpose of the research normally determines the sampling strategy (Al-Busaidi, 2008), and therefore statistical representativeness is not necessarily an issue in qualitative research (Britten, 1995).

The interviews were conducted at the interviewees' convenience and recorded with their permission. The recorded interviews were transcribed by the researcher, and another independent researcher was asked to verify the accuracy of the transcriptions. The coding technique was adopted to analyze the qualitative data, and the emerging LLL themes were identified by the researcher himself, and verified by a second independent researcher. Mays and Pope (1995) point out that the assessment of transcriptions and the coding scheme by an additional researcher is expected to increase the analysis of the qualitative data.

The data gathered using LLTS were analyzed using SPSS Version 18.0 (SPSS Inc., Chicago, IL, USA). The participants' characteristics were summarized using mean. Numerical data were first tested for normality and then analyzed using Student's t-test for parametric data. The Mann-Whitney U test was used for variables for non-parametric data for group comparisons. A p-value less than 0.05 was considered statistically significant.

Results and Discussion

Lifelong Learning Orientations

Table 2 shows that the student participants' overall scores varied between 62 and 154, with a mean of 110, which suggests that their overall LLL orientation level was slightly above the average score of the scale (94.5). When their scores for each subsection are considered, it is seen that curiosity and motivation received higher average scores ($\bar{X}$=30.71 and $\bar{X}$=29.86 respectively). The averages of the subscales perseverance ($\bar{X}$=25.1) and self-regulation ($\bar{X}$=24.34) appear to have received similar scores. This variation in the interest level was also apparent in the data collected through the interviews conducted with some of the learners. Those who seemed less keen mentioned their boredom of studying, short-term goals and seemingly secure future professional life as contributing factors. One student stated:

"I've been studying since I started primary school, and I'd like to stop worrying about learning new things when I graduate from university."

Another student said:

"I do what I am required to do. But I am not really worried about finding a job after graduation."

These quotes appear to show lack of motivation by some students. Despite this, those who were identified to have more tendencies for LLL gave examples of how they could regulate their learning later in life and their need for mental stimulation. In the words of one of the participants:

"I know how I can learn more efficiently and I'd like to keep this after university too."

A female student said:

"I enjoy learning about other scientists' lives. When I hear an important name in class, I try to read more about him/her and I go online to do some search after class."

Taken together, these data suggest that although the student participants developed some aptitude for lifelong learning they do not seem to have strong inclination for it. The wide spectrum of scores could also show some evidence of some learners' comparatively less interest in lifelong learning, while the occurrence of certain number of higher scores is an indication of the existence of learners with more enthusiasm for learning throughout life.

The higher scores for curiosity and motivation but lower scores for self-regulation and perseverance can be interpreted as indications of the students' readiness to assume active roles in becoming LLL learners. If curiosity and motivation are regarded as the driving forces for any kind of learning, the learners' relative enthusiasm for LLL can be noticed. However, their comparatively lower scores of self-regulation indicate that their skills of evaluating own level of knowledge, organizing learning, locating and using information of sources may not be as strong. In terms of perseverance skills, they might not be strong in preserving their interest in learning when faced with difficulties with time and budget. Their determination for learning may be easily disturbed when challenged intellectually. This suggests that curiosity and motivation will not suffice for learning to last long. The varying degrees of scores in the sub-skills that emerged in this study have also been noted by other researchers. Both Meerah et al. (2010) and Chen et al. (2012), for instance, found that the participants in their study were more skilled in application of knowledge and skills. In our study, however, the participants appeared to be less equipped with this skill. This difference is suspected to be due to the number of years the students had spent in their current institutions. That is, the participants in our research were freshmen students while the ones in the abovementioned studies were senior students. This may suggest that students tend to become more skilled in higher levels of LLL skills as the time they spend studying at university increases, which is also suggested by Litzinger et al (2005) and Coşkun and Demirel (2012).

Table 2. The level of the students' lifelong learning tendency

Subsections	N	Min	Max	Mean	SD
Motivation	196	11	36	29.86	3.940
Perseverance	196	6	36	25.18	5.235
Self-regulation	196	9	39	24.34	6.357
Curiosity	196	10	54	30.71	8.890
Total score	196	62	154	110	18.164

Gender and Lifelong Learning Orientations

The second research question asked whether or not gender had a role in determining the student participants' LLL aptitude level. The result of the analysis done with this aim can be seen in Table 3.

According to Table 3, both genders' scores for the whole scale were above the average determined by the scale (94.5). However, on the average female learners were found to have scored higher than the male ones ($\bar{X}$=114.29 and $\bar{X}$=104.84 respectively). The difference between these scores was found to be statistically significant (p=0.001).

Table 3 also shows that the female students scored higher in all subsections of the LLL scale. Statistically significant differences were detected between male and female's students' scores for self-regulation (p=0.020) as well as curiosity (p=0.001). There were indications of these findings in data collected from some female learners during the interviews. One participant remarked that she would not be able to compete

Table 3. Lifelong learning orientations and gender

Subsections	Females n=107			Males n=89			t	p
	Min-Max	Mean	SD	Min-Max	Mean	SD		
Motivation	19-36	30.33	3.058	11-16	29.30	4.749	-1.078	0.281
Perseverance	13-35	25.73	4.492	6-36	24.53	5.968	-1.383	0.167
Self-regulation	11-39	25.32	5.909	9-36	23.17	6.704	-2.318	0.020
Curiosity	10-50	32.92	8.348	11-54	28.07	8.844	-4.337	0.001
Total score	77-154	114.29	16.675	62-151	104.84	18.625	3.744	0.001

against her male engineers colleagues unless she had to keep improving her knowledge and skills in her future career as an engineer. A similar comment made by another student:

"I'll be the first female engineer in my family, and I want to prove that I can be a successful engineer just like men. The only way to do is to keep learning."

These two comments suggest that female learners tend to value LLL more than their male counterparts since they expect it to help them survive in a male dominated profession.

The finding of this study regarding female learners' stronger propensity towards LLL appears to be consistent with some of the previous research in the literature (Meerah et al., 2010; Coşkun and Demirel, 2012). In the context of our research, we tend to attribute this to the evolving position of women in the society, with the particular developments of women's position in engineering. The data from the interviews held with the female students revealed that they tended to feel disadvantaged when compared with their male counterparts since engineering is traditionally regarded as a male-dominant field of work. In order to be on par with male engineers, the female participants in this study tended to have high levels of motivation to seek further knowledge and improve their skills both while studying at university and after graduation. Hewlett and Rashid (2010) state that the number of women wishing to study at university is on the increase in the UAE now, and women account for 65% of college graduates. They also report their finding on the motivation level of the Emirate female students at university: 92% of educated females see themselves to be very ambitious and more than 80% of them wish to have a top position in their jobs. This seems to show some reasons why the female participants in this study appeared to search for LLL opportunities.

Nationality and Lifelong Learning Orientations

The third research question asked if the participants' lifelong learning aptitude changed according to their nationality. Table 4 presents the results of statistical data analysis carried out with this aim.

It is clear from Table 4 that expatriate students' overall average score was higher scores ($\bar{X}$=117) than those of the local Emirati students ($\bar{X}$=107.73). This difference was found to be statistically significant at p=0.002 level of significance. The expatriate students' scores for motivation ($\bar{X}$=31.33), perseverance ($\bar{X}$=25.48), self-regulation ($\bar{X}$=26.44) and curiosity subsections ($\bar{X}$=33.75) were found to be higher. Differences were detected between the expatriate students' and local students' scores for motivation (p=0.003), self-regulation (p=0.010) and curiosity (p=0.004). These findings suggest that the students who were ethnically different from the UAE nationals had relatively stronger aptitude for lifelong learning.

In an attempt to find some possible reasons for this difference, the interviewees were asked to comment on their perceptions' of LLL. Among similar responses given by some expatriate students were:

Table 4. Lifelong learning orientations and nationality

Subsections	Expatriate n=48			Emirati n=148			t	p
	Min-Max	Mean	SD	Min-Max	Mean	SD		
Motivation	24-36	31.33	3.224	11-36	29.39	4.041	-2.957	0.003
Perseverance	11-35	25.48	5.450	6-36	25.09	5.178	-0.728	0.467
Self-regulation	12-34	26.44	5.379	9-36	23.66	6.516	-2.592	0.010
Curiosity	10-54	33.75	9.330	11-50	29.73	8.546	-2.878	0.004
Total Score	77-151	117	18.592	62-154	107.73	17.492	3.142	0.002

"I was born in the UAE, and would like to live here rest of my life. For this, I need good education and find a good job after university. This will only be possible if I improve myself all the time."

"I do not really want to go back to Syria, at least not in the near future. So I must guarantee myself a good job. I can do this by improving myself."

"If I am a good learner, I can move to any part of the world."

These examples seem to suggest that the expatriate students tended to see LLL as a means of securing their future in the UAE or becoming more mobile.

Faculty Members' Lifelong Learning Orientations

The last research question aimed to identify the faculty members' LLL orientation level and compare it to that of the students. Table 5 summarizes the data analyzed to answer this question.

Table 5 reveals that the faculty members' total score ($\bar{X}$=131.97) was considerably higher than that of the students ($\bar{X}$=110). This difference was found to be statistically significant (p=0.001). The statistical analysis between the data sets for the sub-sections motivation, perseverance, self-regulation and curiosity revealed significant differences (p=0.025, p=0.014, p=0.001, p=0.001 respectively). However, the biggest difference appears to be for the curiosity data set, which showed a marked difference of almost 30%. If curiosity is considered to be the driving force behind motivation for learning and acquisition of new knowledge and skills, then the 30-percent difference may be expected to have a determining effect on the overall level of one's LLL orientation. Lowewenstein in Reio (2004) states that people's perceived lack of information has the potential to encourage them to seek ways of compensating for it, which in turn sets the foundations of LLL.

The student participants interviewed were asked for their opinions on their instructors' effect on their motivation for lifelong learning. One student said:

"Obviously, he knows a lot about the topics in our classes. But he also seems to be interested in other things too. I truly admire him and would like to be like him."

"The tasks we are required to do help me learn how to think. I owe this to my instructor." said another learner.

These responses may be seen examples of how some students are influenced by their instructors' wealth of experience in learning and aim to improve different aspects of LLL. Therefore, our finding that the faculty members' curiosity level is markedly higher than that of the students can be seen as a stimulus for students. Metcalf and Game (2006) note that when instructors themselves are passionate about learning their learners will be more energized and display more willingness for learning.

The following quotes from the interviews with some of the instructors give evidence of the differences between the attitudes of faculty members and students toward LLL:

"Some of my students do the minimum, expecting me to tell them what they need to and how they need to do it."

"They don't have the need to learn. That's probably because their job is guaranteed when they graduate."

These suggest that the instructors see the lack of motivation and self-directed learning skills as factors that inhibit LLL.

Conclusions and Recommendations

This research mainly concerned the lifelong learning (LLL) orientations of freshman engineering students. With this general aim in mind, the effects of gender and nationality on learners' orientation are investigated, and a comparison is made between the learners' and faculty members' LLL orientation.

The student participants were found to have an average level of LLL, with a wide range of scores from low to high. They scored higher for curiosity and motivation subsections. The female learners, on the other hand, were found to have more aptitude for LLL. Similarly, non-Emirati students had higher scores of LLL. The comparison between the students' and faculty members showed that the faculty members' scores were much higher than the students', as expected.

Taken together, the findings of this research suggest that the student participants did not have a strong tendency for

Table 5. Comparison of the faculty members' and the students' Lifelong learning orientations

	Faculty members N=31			Students N=196				
Subsections	Min-Max	Mean	SD	Min-Max	Mean	SD	t	p
Motivation	26-35	31.55	2.567	11-36	29.86	3.940	-2.249	0.025
Perseverance	18-36	27.87	4.703	6-36	25.18	5.235	-2.449	0.014
Self-regulation	18-37	29.71	4.221	9-39	24.34	6.357	-4.317	0.001
Curiosity	22-57	42.84	6.953	10-54	30.71	8.890	-6.495	0.001
Total Score	91-154	131.97	13.627	62-154	110	18.164	-5.948	0.001

LLL, but still had the potential. Considering the traditional educational background of these students where they were generally exposed to rote-learning, their comparatively lower propensity for sustained LLL may not be surprising. Should the fact that many of students at university in the UEA are the first-generation university students be considered, the need for assisting them to become lifelong learners becomes clearer. It would be wrong to assume that learners take up LLL skills spontaneously. Therefore, faculty members cannot expect to teach content matter per se. They need to undertake the role of mentors who guide learners towards LLL skills.

Considering the finding that expatriate students tended to have higher LLL scores, it may help to have students from different backgrounds work in pairs or teams. This is because learners can sometimes pick up skills from each other easier than from their instructors.

This research focused on the lifelong learning tendencies of freshman engineering students with an emphasis on four domains of skills. Further research can investigate the relationships between these four domains and determine the possible correlations between them. Also, the university in which this study was conducted was segregated by gender, which we suspect may have a determining effect on the overall results of the inventory. Future researchers can consider replicating this study with a group of students in unsegregated education contexts.

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