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Are Industrial Organizations Really Hiring Fresh Graduates with Lifelong Learning Skills?

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Is the industry hiring fresh graduates with life-long learning competency?

Introduction

The engineering profession is undergoing major changes at an incredible pace. Newer challenges are emerging and newer technologies and solutions are developed to scale them. Engineering graduates need to learn something different from college curriculum – within a few years of graduation. They will have to acquire a great deal of new knowledge and wisdom through independent learning. That mandates development of the life-long learning competency of engineering students. Therefore, all the leading accreditation systems of engineering education have included life-long learning as one of the graduate attributes (competency). This competency connotes that learning must occur beyond the formal structure of educational institutions and throughout one's lifetime. Employers expect that the life-long learning competency be developed in the formative days of engineers i.e. during their educational phase. Therefore, the education system requires measuring and developing the competency.

It is worthwhile to examine if the employers evaluate the competency during the campus hiring process and students' performance, therein. This paper investigates correlation between lifelong learning competency and result of hiring process. We carried out the study at one of the best engineering colleges in a small town in India. It had about 600 senior (final year) students and a large corporate house had selected 46 out of them. We measured life-long learning using the form developed by Kirby et al.. [1] We received responses from 373 students out of which the large corporate house had selected 33. We found statistically significant difference between placed and unplaced students in six of the fourteen characteristics of the life-long learning competency. This analysis is the major contribution of the paper. Literature uses the term autonomous learning for life-long learning and refers to life-long learning as skill, attribute, characteristics, and competency. We primarily use the term life-long learning competency unless we refer to a specific study that has used a different term. After this introductory section, we present research design followed by concluding remarks.

Research Design

The criticality of the life-long learning competency in engineering is known for long. [2] This competency is indeed very important from the industry perspective. ASEE (American Society of Engineering Education) had invited thirty-four industry representatives to discuss their requirements of fresh engineering graduates in the 21st century. They listed life-long learning competency as one of the 15 requirements. [3] Shuman et al.[4] have reviewed work done in the area in terms of developing different models and assessment instruments. However, we have not come across a study that checks if the industry is assessing the life-long learning competency while hiring fresh graduates. Our study attempts to fill the gap by analyzing the correlation between life-long learning competency and the result of hiring process of final year students using the research design outlined in Figure 1.

Objective, Scope, and Type

Lander [5] states that in a world of rapid scientific and technological advancement, the half-life of an engineer's vocation-specific knowledge is steadily decreasing. That necessitates the development of life-long learning competency in engineering education. While the education systems have started working on it, we wanted to check how much the industry values the competency in their hiring processes.

Our research is descriptive, diagnostic, cross-sectional, and field-setting. Descriptive research describes characteristics of a population being studied and does not explore the reasons for those characteristics. Diagnostic research determines the frequency with which something occurs or its association with something else. We did not study the event over time but at a particular cross section, making the study cross-sectional. Our research covers real-life situations and, therefore, is a field-setting study.

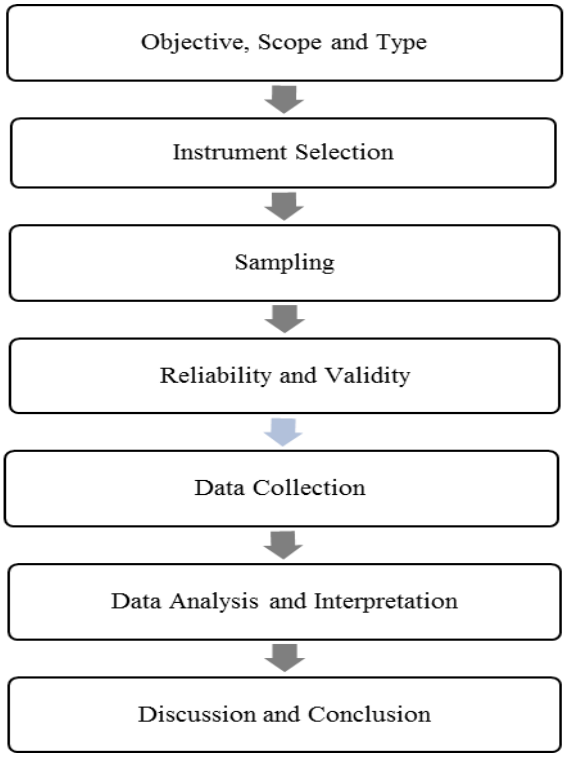

Figure 1 Research design

Instrument Selection

A few instruments are in use to measure life-long learning [1, 6-8]. Lord et al. have compared life-long learning of Chinese and the US students. [9] Chen et al. have compared the attribute (competency) across different ethnic groups, the gender, and the year of study. [10] Macaskill and Denovan assessed psychological character strengths and based on that designed psycho-

educational interventions. They found that the interventions resulted in higher confidence in the first-year university students for life-long (autonomous) learning [11]. Al-Masoud [12] used a method to assess life-long learning competency that consisted of two performance indicators. One checked the ability of students to recognize the attributes of a life-long learner using a survey instrument. The other checked the ability to do in-depth analysis, produce quality work, pursue knowledge, and use various resources to learn new material independently. This indicator was assessed using technical report grading rubrics.

We used the instrument developed by Kirby, et al. to map the research problem to a mathematical domain [1]. The instrument is a generic life-long-learning scale that relies on self-reporting learning approaches in terms of characteristics identified by Knapper and Cropley, i.e. goal-setting, application of knowledge and skills, self-direction and self-evaluation, locating information, and learning strategy adaptation. Each characteristic has a varying number of questions as shown in Table 1.The instrument uses reverse coding for some of the questions i.e. the higher rating for the question means lower life-long learning competency. This helps increase validity of the responses. Further, each question seeks rating on ordinal scale i.e. strongly disagree, disagree, neural, agree and strongly agree. They are mapped into quantitative ratings of, -2,-1, 0, 1, and 2, respectively.

Characteristic	**Number of Questions**
Goal setting	5
Application of knowledge and skills	3
Self-direction and evaluation	2
Locating information	1
Adaptable learning strategies	3

Table 1: The Characteristic and the respective number of questions in the Kirby instrument.

We also considered the instrument developed by Crick, et al. which is called 'Effective Lifelong Learning Inventory' [7- 8]. The instrument has 72-items making it laborious to complete. Further, some questions are vague and open for multiple interpretations [1]. The Macaskill and Denovan instrument that measures two subscales – independence of learning and study habits, appeared to be less comprehensive [6]

Sampling

Our sample consisted of 373 undergraduate senior students of a college from a smaller town in India. Out of 373, a large IT (Information Technology) services organization had selected 33 students.

While most of the students were admitted to the four-year undergraduate engineering program after 12 years of schooling, a few of them had lateral entries in the second year of the program after ten years of schooling followed by three years of engineering diploma. The college students are securing most of the top ranks in the university with which it is affiliated, indicating superior performance of the college. It attracts bright students but has a noticeable variation in performance in their engineering entrance examination and earlier engineering courses.

The company that hired the students is one of the largest Information Technology (IT) service providers in India. Their placement process consisted of shortlisting students based on their academic performance followed by four knockout rounds. The first round consisted of an online aptitude test of ninety minutes. It has ten minutes of email test that asks students to write emails based on a given situation and eighty minutes of numerical and logical ability test. The company exempts top five rankers of the college from the logical and arithmetic part of the round. In the next round, the company conducts technical interview to ascertain their basic technical knowledge in their streams and performance in projects and seminars. In the third round, the company interviews students, with the help of case studies, to assess their situation comprehension, decision making and work attitude skills. The fourth round informs students of their selection and apprises them of the company culture, policy, and rules.

Reliability and Validity

Kirby et al. [1] found internal consistency (Cronbach alpha) to be 0.71 and claim their instrument to be reliable. They argue that this moderate level of reliability is reasonable for a construct such as life-long learning, which has multiple aspects. We found Cronbach alpha for our data to be 0.72, which makes the instrument reliable as per Nunally [13].

Data Collection, Analysis and Interpretation

We explained the background of our study to students and administered the Kirby form. The following table (Table 2) provides questions along with their reverse or normal coding, average and standard deviation of unplaced and placed students and p value of two-tailed and two-sample equal variance (homoscedastic) T test using Minitab version 17. We also used two-sample unequal variance (heteroscedastic) for questions with notable differences in standard deviations (questions 1, 5 and 6) and did not find large enough changes in p values to impact the statistical significance. We have underlined the questions that have significantly different response between placed and unplaced students.

No	Question	Group	Coding	Average-Unplaced	Std Dev-Unplaced	Average - Placed	Std Dev-Placed	p-Value
1	I prefer to have others plan my learning	Goal Setting	Reverse	0.45	0.99	-0.03	1.24	0.01
2	I prefer problems for which there is only one solution	Adaptable learning strategies	Reverse	0.23	1.06	-0.48	1.09	0.00
3	I can deal with the unexpected and solve problems as they arise	Adaptable learning strategies	Normal	1.02	0.75	1.03	0.73	0.94
4	I feel uncomfortable under conditions of uncertainty	Adaptable learning strategies	Reverse	0.32	1.05	-0.12	1.02	0.02
5	I am able to impose meaning upon what others see as disorder	Application of knowledge and skills	Normal	0.56	0.81	0.48	1.06	0.60
6	I seldom think about my own learning and how to improve it	Goal Setting	Reverse	1.04	0.84	1.00	1.03	0.82
7	I feel I am a self-directed learner	Goal Setting	Normal	0.91	0.87	0.97	0.95	0.73
8	I feel others are in a better position than I am to evaluate my success as a student	Self-direction and evaluation	Reverse	0.46	1.08	-0.30	1.26	0.00
9	I love learning for its own sake	Goal Setting	Normal	0.84	0.84	0.76	0.94	0.57
10	I try to relate academic learning to practical issues	Application of knowledge and skills	Normal	1.12	0.83	1.30	0.73	0.23
11	I often find it difficult to locate information when I need it	Locating information	Reverse	0.46	0.93	-0.03	1.05	0.00
12	When I approach new material, I try to relate it to what I already know	Application of knowledge and skills	Normal	0.98	0.77	1.24	0.66	0.06
13	It is my responsibility to make sense of what I learn at school	Self-direction and evaluation	Normal	1.24	0.67	1.15	0.62	0.44
14	When I learn something new I try to focus on the details rather than on the ‘big picture’	Goal Setting	Reverse	1.18	0.76	0.97	0.77	0.13

Table 2: Life-long learning questions along with reverse or normal coding, average and standard deviation of unplaced and placed students and p-value of two-tailed and two-sample equal variance (homoscedastic) T test using Minitab version 17

We can see statistical difference in responses to the following six questions between placed and unplaced students. Since the reverse coding makes it difficult to interpret the results, we have described interpretations in the last column.

Question	**Group**	**Interpretation of Results (What Placed Students do)**
I prefer to have others plan my learning	Goal Setting	Prefer to plan their own learning
I prefer problems for which there is only one solution	Adaptable Learning Strategies	Prefer problems with multiple solutions
I feel uncomfortable under conditions of uncertainty	Adaptable Learning Strategies	Feel comfortable under conditions of uncertainty
I feel others are in a better position than I am to evaluate my success as a student	Self-direction and evaluation	Feel themselves in a better position to evaluate success as a student
I often find it difficult to locate information when I need it	Locating information	Find it easy to locate information when need it
When I approach new material, I try to relate it to what I already know	Application of knowledge and skills	When approaching new material, try to relate it to what they already know

Table 3: Six questions that had statistically significant different responses between placed and unplaced students and their interpretations

Discussion and Conclusion

Continuous learning has been a vital part of learning process. Over the last century, the breathtaking pace of all-round changes has made the learning more critical and difficult. It has become imperative that individuals – especially future engineers - develop this habit of life-long learning in their college days. Therefore, the engineering education accreditation systems have included life-long learning in the list of graduate attributes (competencies). The industry needs to accord due importance to the competency in its hiring process. We attempted to validate whether that is happening or not by correlating life-long learning between placed and unplaced students. We found that six out of the fourteen characteristics have better rating in the selected (placed) students.

While the sample size for the experiment was large enough, the fact remains that it covered only one college and one company. We need to repeat the experiment with more colleges and companies in the same locale to validate the findings. After that, we plan to repeat the

experiment at different geographical locations to assess the global validity. As more life-long learning instruments become available, we plan to study them and explore possibility of their usage in our experiments.

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