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ATTITUDES FOR IMPROVED LEARNING & KNOWLEDGE IN ARCHETYPAL ENGINEERING COURSES

Abstract:

It has been reflected during teaching ETHC303 "Ethical and Social Aspects of Computing" at Prince Sultan University, Riyadh that the students have a vague understanding about the subject at the beginning of the semester. They believe it as a second course and expecting higher grades in it, whereas the scenario is the other way around. The subject of this nature to be taught in final year class cannot be covered in the traditional way. As it is more towards practical practice rather than bookish approach.

There were three techniques used to analyse this problem in this case study including Individual Interviews, Literature Review Task (LRT) as a Flipped Class Room (FCR) approach and Field Trip (FT). In the end, Visual Clips were also used as an experiment for learning objectives delivery.

It is analysed that the literature review task as a flipped classroom approach could not produce satisfactory results for courses like ethics. Whereas field trips significantly produced satisfactory results for such a problem. It is also observed that visual clips are helpful for outline delivery within the subject of such typical nature.

It is concluded that field trips, visual clips and individual counselling are quite supportive and helpful to increase learning and knowledge in the subjects such as ETHC303 "Ethical and Social Aspects of Computing".

Keywords:

Flipped Class, Field Trip, Academia, Action Research

1. Introduction

A successful teacher is like a researcher that reflects upon his problems within the environment he is working in and come up with an approach that makes students learn the content and put their best in course. In result, the student feels motivated to study the course and can use the knowledge in future. It is an iterative process that includes a plan made for reflection on a problem, logging the outcomes and re-plan if required. The prolific outcome of the subject can be achieved through student-centred teaching approach and career orientated subject contents and activities can also contribute significantly in student interest and engagement level in any course.

Experiential learning during formal and informal field trips places students' interest, knowledge and motivation. The role of the teacher in planning, implementation and reflection often dictates the influence that field hours will have on students [1]. Schools in the United States have willingly spent the cost and interruption of excursions because they viewed these experiences as essential to their educational mission [2]. Field trips are a crucial activity for learning. During field trips, students should take notes, take pictures and pay attention to the teacher's instructions [3]. Multilevel management mechanisms have improved student learning outcomes [4]. The field visit as part of the educational experience is not new and the related issues have been explored in the literature from a number of perspectives. On-site visits and workplace internships add value to the student learning experience in many areas [5]. [6] Focuses on the use of videos to deepen understanding of key strategies of education in community studies. Implementing video examples of self-explanations, prompts, and comments can be an effective strategy for preparing students for training [7]. Researchers and teachers generally agree that video in the classroom can be a valuable tool [8].

Ethics and Social Aspects of Computing (Ethics) course is offered at CCIS College in Prince Sultan University (PSU). The course is theoretical type involving massive readings and discussions. Most of the times, students take this course as a grade improver. Such courses are challenging due to the involvement of reading cases studies, lack of local examples, lack of student interests in such a subject and their non-clarification about its future implications in their career. To address this challenge in such subjects, new teaching and learning approaches should be designed and applied to students[9]. A teacher can change viewpoint about the course by making students active learners, while a teacher role as a mentor should be giving a vision about future which can help them in choosing right tracks during studies instead of wasting useful time in career selection after graduation. The teacher should also enhance student inter-personal and research skills to help them in future. This can be achieved by using different teaching methods and approaches rather than traditional classroom lectures.

2. The significance of the Study

It is analysed that teaching new theory-based subjects which lack in reading material and learning guidelines fail in traditional classroom lectures. The students have a vague understanding of the subject at the beginning and treat it as a secondary course, requiring the least amount of efforts and still expecting higher grades in it. Whereas, the scenario is the other way around. Courses like Ethics are an important course for creating future experts in Information Technology as a developer, analyst or administrator. Such course was mostly considered as theoretical course thus making it more challenging to teach the subject in a way to achieve maximum learning objectives by increasing student knowledge and his learning capabilities. Field trips are often considered as a fun learning approach for mostly practical nature subjects like baking, engineering or medical and have been not used in a pure theoretical type of course. The results of this study will help teachers to introduce an alternative approach to increase student engagement and achieve a maximum number of learning outcomes.

3. Research Methodology

Initially, the students were given literature review assignments. One paper per week was given to students to read it and submit a summary of the paper. The time duration for this task was one month. Meaning that each student has to submit the summary of 4 papers, one each week.

In the second phase, individual interviews were given by the students to explore the reason for the failure of the first task. New approaches were identified from interviews to be applied in the next phase.

In the third phase, field trips were organized for the students. In this regard, A trip was organized to ITC (Information Technology Centre), PSU. Meanwhile, visual clips were also posted on LMS to help the students understanding the learning objectives.

4. Results & Discussion

In the first phase, the students were given literature review task to enhance their knowledge in particular content of the subject. The task started successfully for the first week and then steady decline was observed in the responses from the students because of a few possible reasons as;

- They feel it as an extra burden
- They feel it as a hard task
- They feel it as a vague approach
- They get frustrated

Figure. 1. Assignment Submission Rate
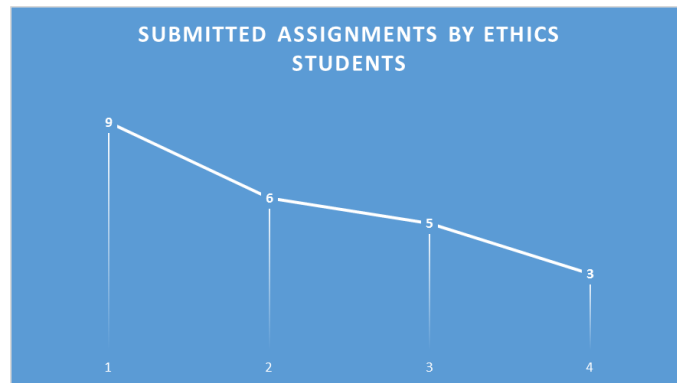
Source: Data based on students assignments

Figure 1 shows the decline of submission of assignment by the student for the select course and it is clearly a major decline. It was a point of serious concern after getting such responses and feedback about the subject from the students. A brainstorming session was made on this serious problem. Meanwhile, discussions were arranged with senior colleagues, chairman and especially with the tutors who taught this subject quite a couple of times. It was interesting to see different feedback and even various definitions of this subject. In the later stage, individual interviews were arranged with the students of this course and a random number of student sample was selected for this task. Interestingly, the results of the individual interviews were quite shocking. Most of the students feel that it is a high scoring subject without making much effort. Few other reasons are as follows which were analysed during the interview phase. The students believe that;

- No implication in future
- Will not help in job hunting
- Will not help in career advancement
- Will not groom our professional skills

After analysing the results of individual interviews, it was decided to use the alternative method and approach to solve this problem in such theory-based subjects. It was decided to organize field trips and show students different visual clips for different topics of this subject. A small survey was conducted to get the feedback of the students about the outcomes of a field trip supporting this subject. Table 1shows the results of feedback from students that were participating in a field trip.

Table. 1. Student Feedback for Field Trips

Questions	Response number							
	1	2	3	4	5	6	7	8
Do you think field trips are valuable ?	yes	yes	yes	yes	yes	yes	yes	yes
Do you think it will develop your personality?	no	yes	yes	yes	yes	no	no	yes
Do you think it will promote cooperation?	yes	yes	yes	yes	yes	yes	yes	yes
Do you think it will promote discipline?	yes	no	yes	yes	yes	no	no	yes
Do you think it will provide self-confidence?	no	yes	yes	no	yes	no	no	yes
Do you think it will promote socialization?	yes	yes	yes	no	yes	yes	yes	yes
Do you think it will get better in studies?	no	yes	no	no	yes	yes	yes	no
Do you think it will assesst in job selection?	yes	yes	yes	yes	yes	yes	yes	yes
Do you think it will find up need about carrer?	yes	yes	yes	yes	yes	no	no	yes
Do you think it will give me practical insights?	yes	yes	no	yes	yes	yes	yes	yes
Do you think it will increase my knowledge?	yes	yes	yes	yes	yes	yes	yes	yes
Have you prepated questions?	yes	yes	no	no	yes	yes	yes	no

Source: Responses from student's questionnaire surveys

After receiving positive feedback about field trips, it was decided to arrange a field trip for the students of this subject. All necessary arrangements were made for the students to visit ITC lab, PSU. The trip was arranged during the class hours after taking the prior appointment from Director ITC, System Admin ITC and Developer in ITC. A prior email was sent with an agenda to be covered to the ITC members. Introductory orientation was given by Director ITC and System Administrator who presented about the ITC, its services and its departments. Then work ethics were discussed about the staff. A student asks questions regarding what to choose if they want to the analyst, administrator and developer. In the last session, student and staff rights were discussed with the ITC member in light of theories studied in class and student gained a major understanding of the topic studied. Post-trip collective conversation from students showed very positive results and another individual survey was conducted to collect the feedback of the students after the trip. Following pie charts are showing the results;

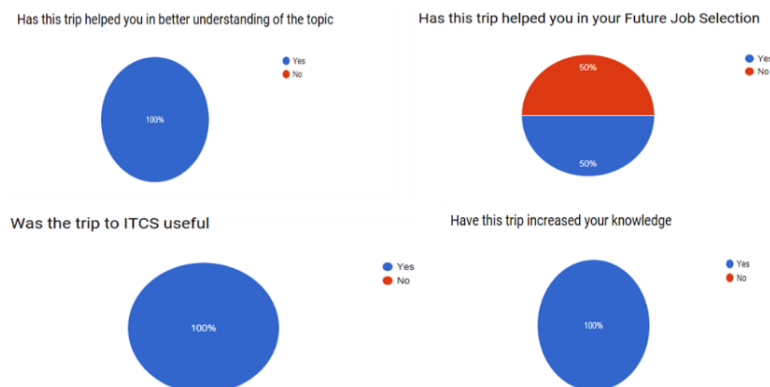## Figure. 2. Showing the student responses after the Field Trip

Figure 2 shows the responses of students as in order to see whether these trips were helpful or not and it is evidence as student liked the visit as well as it gave them a clear picture in mind about career selection as they can see the outcome of their studies. All of the students were of the view that it increases their knowledge.

Table 2 shows the detailed responses by each participant and it is seen that student became aware of different job titles and their roles. Students also preferred to take another topic in a similar way but it is seen that as most of the students were from software engineering discipline so they preferred to go into the development and suggested the ITC to start a wing for their in-house tool development.

Table. 2. Post Trip Feedback

Questions	Response number							
	1	2	3	4	5	6	7	8
Was the trip to ITCS useful	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Has this trip helped you in your Future Job Selection	No	Yes	Yes	No	Yes	Yes	No	No
Has this trip helped you in better understanding of the topic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Have this trip increased your knowledge	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Have improved your concepts about Work Ethics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Have improved your concepts about Administrator Ethics	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Have improved your concepts about Professional Ethics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
It has helped you to think out of the box	yes	yes	NO	yes	yes	yes	yes	yes
It has helped in increasing awareness about the roles and responsibilities of Administrator, Director, and support staff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do you want to be in area of ITCS	Yes	No	No	No	No	No	No	No
Are you willing to work as Student-Knights in improving ITCS Infrastructure and problems	Yes	Yes	Yes	Yes	No	No	No	Yes
Is this mode of study, (that means Field Trips) helps in better delivery of subject contents	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do you want some other course topics to be covered in the field trip way.	Yes	Yes	Yes	Yes	Yes	No	No	Yes

Source: Data from student's questionnaire surveys

Meanwhile, it was also encouraged and guided the students to see the visual clips posted on the Learning Management System (LMS) to give an idea about the learning objectives of the different contents of the course. The following figure shows the visuals on LMS;

It was observed that visual clips and video lectures received quite better feedback from students as they believed that instead of studying a research paper, watching a video may help in getting the knowledge is an easier way. The students believed that learning objectives were clear and created interest in a topic which is quite better than the old traditional teaching method. In this regard, a final survey was conducted to get the students to feedback on the visual approach. Table 3 shows the student feedback results.

Table. 3. Post Activity Feedback

Questions	Response number							
	1	2	3	4	5	6	7	8
Do you feel watching video before lecture about topic can give a better idea of outline instead of using a single power point agenda	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DO you feel reading a research paper is hard and watcning vidoeo and making notes is easier and make us well prepared before the lecture	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do you feel lots of questions can be generated that will be answered in lecture later make lectuer more interesting	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3 shows the results obtained from students about their perception after watching the videos. It is seen that videos are much more appreciated by students instead of going through slides especially current students tend to use mobile phones. They suggested using mobisodes instead of large lectures in order to get the key point and easier to manage and not get diverted. The research suggests that field trips and video before lectures make the learning easier for students and they tend to work less hard and spend more time in thinking at the right track. It is also evident that these kinds of fun activities have a long-time influence and the concepts tend to remain for a long time in mind. It was also seen that grades of students are also elevated as they tend to like the lecture and take more interest. But in order to do these kinds of activities, first the activity should be;

- Timely managed according to topic
- Agenda should be decided with the visited company in order to stay on track
- Pre-questionnaire and post questionnaire should be made properly in order to avoid confusion
- These activities should cover more than one topic (like a set of topics must be covered)

It is also suggested not to use it for all the course topics as it is very hard to make a field trip especially in terms of managing a common time for all students and visited company. Managing the transport, food, approval from management for the trip is also a tedious job and require a lot of efforts. But the benefits of using such an approach are a lot and can be adapted once to twice a term for a set of topics.

5. Conclusion & Suggestions

It is concluded that field trips and visual clips are quite supportive and helpful to increase learning and knowledge in the subjects such as ETHC303 "Ethical and Social Aspects of Computing". It is observed that reading assignments create a feeling in student about more load and they also fear losing grades. Moreover, if the assignments are not prepared and reviewed properly, the instructor has to summarise the readings before going to the next topic resulting in lesser student engagement. Hence, visual clips and video lectures can

play an additive role in gaining the objective as analysed in results which are a significant increase in student understandability and interest in the topic. There are few problems in using visual clips and video lectures are observed which are, the instructor has to spend numerous hours to look for the right kind of videos, whose content is also appropriate. The tutor needs editing skills to remove the non-relevant, offensive, cultural or religious content. It is suggested to just provide the student with downloaded videos instead of links as due to YouTube links student might ponder around other videos making the task more difficult and complex.

Field trips are a valuable element to increase student engagement and their perception of the theoretical course. It is also observed that after field trips students are highly motivated. In the case study for this paper, a couple of students deciding a career track while gaining 70 to 80% better learning objectives than traditional teaching approach. There are few challenges in arranging field trips for all contents, company, timing and venue. Therefore, it is strongly recommended to provide field trip agenda to companies in advance else it may not grab better outcomes.

Teaching theoretical subjects in computer science discipline has been a challenge for tutors to teach the students and achieve sufficient satisfactory learning outcome. Traditional teaching methods lack in transferring the skill to students in such subjects. Therefore, new teaching techniques and tools can be introduced in order to increase student engagement and enhancing learning by making theoretical subject to some kind of experiential learning (like field trips). In order to provide the student with a feeling that they belong to subject techniques like constant motivation and technological use (like WhatsApp, blogs and forums) can be used. In order to enhance student engagement in lectures and problems of delayed contents delivery, small video clips and lectures can be used. The mentioned approaches are followed in the current semester and these strive to innovate new methods to make the subject interesting and having a long lasting effect of student learning and professional life.

6. Acknowledgements

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