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WHAT DO THEY THINK OF "CHEMISTRY-ENVIRO"?

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ABSTRACT

Recently, a large number of researchers examines students' misconceptions, students' understanding on chemistry concepts and not to forget teaching methods that are appropriate to the students in order to enhance meaningful learning, thus improve students' achievement. Somehow they forgot to appreciate the powerful impact of emotions or feelings that students would face in the process of learning. By considering this factor, we have decided to find out what Engineering students think of "chemistry enviro". Meaning, the chemistry subject itself and the lecturers' teaching style. In this study, we try to elicit the Engineering students (N=62) feeling about chemistry. What is the most difficult topic in CHM 140 syllabus? Why do they think the subject is difficult? Do they like their lecturers' teaching style? Anecdote of the findings, transition metal is the most difficult topic, followed by quantum mechanics, electrochemistry and acid-base. Most students found the topics difficult because they involved too many calculations and memorization. From this survey we also found that 43.2% of the lecturers applied two-way interaction and created learning-active environment during their classes. The study also revealed that more than 80% of the students enjoyed their chemistry classes.

Keywords: "Chemistry-enviro", educational needs and teaching styles.

INRODUCTION

Most lecturers are very concerned on finishing their syllabi. Are they able to vomit out the contents of the syllabi to the students' before the final exam? Do the students need extra classes? Very few lecturers are concerned on how they teach their students. How do they teach? Good? Bad? Can they be good teachers? How to make the students better? How should they teach to make them understand? These very few questions actually are the important questions to ponder by academician.

Whether you are a senior or a fresh lecturer you should be able or try to tackle your students' educational needs in the "chemistry-enviro". "Chemistry-enviro" here is actually how the students and the lecturers live together in a chemistry class (Diagram 1).

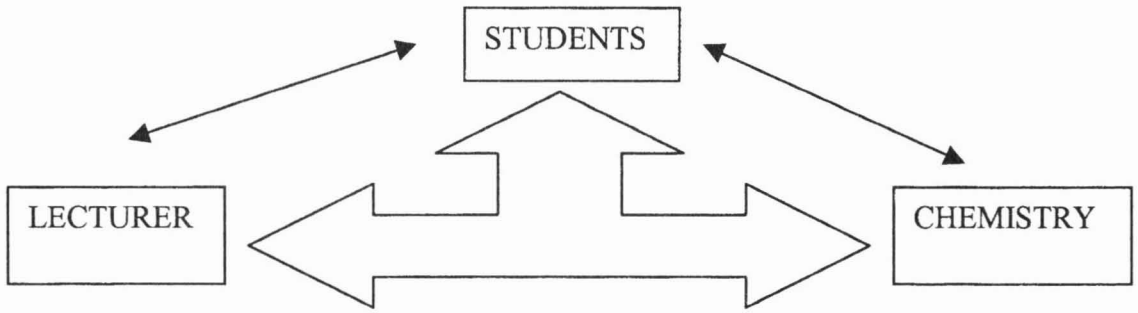

Diagram 1: "Chemistry-enviro"

This kind of interaction is very important in order to create "acceptable situation". This means that the students can accept the lecturers, the lecturers can tolerate with the students, students can tolerate among themselves and they can adapt themselves with the chemistry lesson.

In order to ignite this situation, we as lecturers need to foresee our student's views on chemistry lesson and us, their lecturers. This is an important factor, which will help us to create the so-called "acceptable situation". Consequently, make the "chemistry-enviro" alive.

Successful "chemistry-enviro" will finally arouse students' interests, enhance students' performances, build up meaningful learning environment and make the teaching and learning process full of enthusiasm. This is one of the good ideas mentioned by Hanson and Wolfskill (1998) during their workshop titled "How to improve the teaching/learning process in chemistry".

In this study, we are providing a way in which students can honestly declare their difficulties and needs. This information is valuable for us to improve ourselves and at the same time guide the students to be successful in their education especially in chemistry.

METHODOLOGY

Questionnaires Development

The survey comprised of three parts; A,B and C. Part A consisted of four questions. The first question in this part asked the students to rank the topics taught in the code, from the most difficult to the least difficult (1 to 15 respectively). Continuing from this, the students were to choose the reasons listed in questions 2, why they ranked the topics as such in question 1. The third and fourth questions asked the students for their opinions on the chemistry subject as a whole and the importance of the subject to them.

Part B of the survey focused on the lecturers' teaching method and approach during classes. Students were asked to list the teaching aids and methods adopted by their lecturers. An open-ended question was also included in this part for the students to suggest to their lecturers the effective teaching method, which could increase their understanding on the subject.

Finally, the students were asked for their education background in the last part of the questionnaire. However, data on this part of the survey were not highlighted since this paper did not discuss any correlations.

Background of the chemistry subject, CHM 140

This subject is a must for all first semester engineering students in UiTM. They are required to attain at least 'C' (pass) for their overall performances in this code. Students who obtained 'C-' are considered to have failed the course and have to repeat the subject. They are allowed only three attempts on the paper (inclusive of the first semester's). Infact, this is the only chemistry code that the students have to face throughout their diplomas in UiTM.

Sample

The convenient sample consisted of 62 first semester engineering students.

Procedure

The survey was administered at the end of the semester, right after the last topic (first series of transition metal) of the course.

RESULTS AND DISCUSSION

Part A of the survey;

Question 1

Table 1A: Topics covered in the syllabus.

Topics in CHM 140	Ranking	Percentage (%)
Mole and Avogadro number	15	51.6
Empirical and molecular formula	14	46.8
Concentration and molarity	13	41.9
Chemical equations	12	38.7
Quantum mechanics	1	19.4
Electron configurations	10,11	14.5
Periodic table	9	21.0
Ionic and covalent bonding	8	21.0
Molecular Geometry	7	14.5
Crystal structure	5,6	12.9
Thermochemistry	3,4	12.9
Redox reaction	3,6	12.9
Electrochemistry	1	17.7
Acid and base	1	16.1
Transition metal (first series)	1	22.6

Note: 1 (most difficult) → 15 (least difficult)

Table 1B: Ranking of the chemistry topics.

Ranking	Chemistry Topics (CHM 140)
1	Transition metal (first series)
2	Quantum mechanics
3	Electrochemistry
4	Acid and base
5 &6	Thermochemistry
	Redox reaction
7	Crystal structure
8	Molecular Geometry
9	Ionic and covalent bonding
10	Periodic table
11	Electron configurations
12	Chemical equations
13	Concentration and molarity
14	Empirical and molecular formula
15	Mole and Avogadro number

The data collected from our sample showed that 51.6% perceived that topic mole and Avogadro number as the easiest topic in CHM 140 while the five most difficult topics are transition metal (first series), quantum mechanics, electrochemistry, acid and base, thermochemistry and redox reaction (in sequence of percentages).

We observed that our findings were different from the studies done by Kennedy (1996), who found that the most difficult topic perceived by the students in her sample was bonding and molarity/stoichiometry. However, redox and types of reaction still remained as among the difficult topics in chemistry.

Question 2

Question 2 of the questionnaire asked the students to sequence the reasons provided following their answers in question 1. The students' feedback revealed that they perceived the chosen topic as difficult because it involved too much memorization and calculations.

Questions 3

Question: What do you think of chemistry subject?

Table 2: Students' overall opinions on chemistry subject?

Students' feedback	Percentage (%)
1. Easily scored if did lots of exercises	27.4
2. Interesting and fun to learn	24.2
3. Difficult and complicated	17.7
4. Really need to understand the concept	17.7
5. Moderate	8.1
6. Too much memorization and imagination	4.8

Chemistry was interesting and fun to learn for 24.2% of the students. 27.4% of the students admitted that they could easily score for the subject if they did lots of exercises. Only 4.8% said that chemistry required too much memorization and imagination. Our findings were quite similar to Kennedy's (1996) whereby 28% of her sample admitted that chemistry is an interesting and enjoyable subject.

Questions 4

Questions: Do you think chemistry is important? Why?

From the survey, 88.8% of the students agreed that chemistry is important while 6.4% thought otherwise.

Table 3: Importance of chemistry to the students.

Reasons given	Percentage (%)
A lot of things can be learned through chemistry -related to living things/everyday life	41.9
No comment	14.5
Core subject	11.3
Correlate with other subjects	6.4
Related to engineering	6.4
Basic Science	4.8
Help to develop thinking skills	3.5

Students (41.9%) believed that chemistry was indeed related to daily life. Their lecturers had successfully emphasized the fact that chemistry is very much linked to human as well as the environment. This finding was parallel to Frazer and Shotts (1987) that children would doubtless, become more interested and enthusiastic about chemistry if everyday's applications were given greater emphasis in school.

It is most important to highlight however, that though many students thought chemistry was important for their future studies, few of them gave very encouraging reason. 3.5% of the students admitted that studying chemistry had helped them to develop thinking skills. This is a very positive achievement to the students for it showed that they were capable of understanding lecturers and solving problems with minimum guidance from their lecturers. Being able to think indicated that the students understood the concept in the chemistry topics taught to them. It also showed us that these students were not simply memorizing their notes without understanding them.

Part B of the survey

Types of learning tools used.

Some people felt that learning tools were not important especially when dealing with adult learners. Actually learning tools are the essential features; more so when it involves abstract conceptual. From the survey, 55.0% of the lecturers used geometric model in their teaching, 7.8% used charts and 29.4% demonstration.

Teaching styles and approach used by lecturers in teaching chemistry

Question c.

Table 4A: Lecturers' teaching method and approach.

Teaching method and approach	Percentage (%)
Two-way interactions	43.2
Active learning	39.2
One-way interaction	9.4
Cooperative learning	4.1
Concept map	4.1

Question d

Table 4B: Students' opinions on their lecturers' teaching methods.

Range	Percentage (%)
Very good	37.8
Good	49.2
Satisfied	8.2
Moderate	4.9

Teaching method and approach used by lecturers is important since it influences learners. Suitable styles and approaches could create meaningful learning and arouse students' interest. Our findings showed that 43.2% of the students said that theirs lecturers used two-way interactions and 39.2% said that they were involved in active learning. This method helped to increase students' retention during lectures.

The application of cooperative learning and concept mapping should be enhanced in future since a lot of studies found that these methods are effective in retaining students attention and able to increase students' performances (Hanson and Wolfskill, Fathiah, 1998; Sha. Ruzaina, 1999; Sha.Ruzaina, 2000).

Although our findings showed that more than half of the student praised their lecturers' teaching style it however, cannot be generalized since this was a convenient sample and the size of the sample was quite small compared to the enrolled number of students. Further studies with refined items would be conducted again in the near future.

Question f
Question: What do you think is the most efficient technique or suitable environment that may help you to increase your performance in learning chemistry subject?

Table 5: Students' preferences on effective teaching methods.

Students' feedback	Percentage (%)
Give lots of examples and exercises	34.6
Two-way interactions	12.8
Cooperative learning	14.1
Lively learning environment	9.0
Active learning	5.1
Summarized and condensed notes	5.1
Use learning tools	3.8
Use concept mapping	3.8
Concentrate on slow learners	2.5
No respond	9.0

Students (34.6%) agreed that lecturers could enrich them by giving more examples and exercises. Almost 13% preferred the two-way interactions while about 14% believed that cooperative learning would help them to improve their performances. 2.5% students suggested that lecturers should give extra coaching and motivation to slow learners. Some novice learners came to class with full of enthusiasm, but the way lecturers treated them, would demotivate their morale. Eventually their interest in chemistry would decline and this could definitely affect their performances.

Our findings somehow agreed with Kennedy's (1996) that more practice of exam questions should be emphasized. Her findings also suggested that we should have different levels of chemistry for different groups of students and should spend more time on difficult topics.

CONCLUSION AND SUGGESTION

This preliminary study need to be refined further in terms of the format of the questions and some of the items need to be modified in order to strengthen the survey questions. Some correlation studies can be done in future to make it more interesting, for example is there any correlation between previous educations and their CGPA, influence of previous education to attitude towards chemistry and others. A lot of studies can be done not just for the sake of presenting but also for researchers and educators to help the younger generations to survive in education especially in science education.

Last but not least, considering and taking into account our students' educational needs would help to ignite the liveliness of the "chemistry-enviro". In chemistry education the students are the clienteles and as such their views should be valued (Kennedy, 1996). Understanding students' difficulties would also help them to solve their difficulties.

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