Expectations of Student Engaged in Tertiary Education on Engineering Courses from Their Teachers of Choice

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Abstract

Although several learning theories ranging from behaviourism to cognitive to humanistic education have been proposed to choose the appropriate effective teaching models, none can be applied across the board to all learners in all situations; nevertheless some commonalities emerge. A combination of pedagogical and andragogical, "middle of the road" approaches meet the need of a larger segment of the audience. Our experiences and many surveys confirmed that the theory of behaviourism may be well suitable to first and second year students and the cognitive approach may be well fit to third and fourth year students. Only for supervising final year project work, based on the theory of teachers and students working together, humanistic may be adoptable. The survey was conducted among the students enrolled for engineering courses in Curtin University, Sarawak to assess the grade of importance on twelve basic aspects of knowledge, communication skill and planning potentials expected from the teachers. This paper describes the analysis of the action survey results and summaries of the recommendations for effective teaching. The survey concludes that each well defined lecture arranged in right sequences should be orally presented in a simple constructive language with the consistent flow speed optimum suitable to majority of the audience for better learning outcomes. Language proficiency and fluency are not the barriers for successful teaching to multicultural classroom in tertiary education. It concludes that "Teachers of student choice" are not born but they are trained by acquiring the required relevant knowledge and sincere practice of delivering the lectures in an optimum suitable way to the audience for effective learning.

Keywords: Learning theories, Teaching, Tertiary education, Learning, Oral presentation

1. Introduction

Teaching offers a bright and rewarding career for those can meet the intellectual and social challenges of the job (Richard, 1996). Gage (1984) describes the art of teaching as an instrumental or practical art, not a fine art aimed at creating beauty for its own sake. As an instrumental art, teaching is something that departs from recipes, formulas or algorithms. It requires improvisation, spontaneity, handling of hosts of considerations of form, style, pace, rhythm and appropriateness. Like most human endeavours, teaching has aspects that cannot be codified or guided by scientific knowledge alone but instead depend on a complex set of individual judgments based on personal experiences.

A teacher's work can be conceptualized around three main functions: the executive, the interactive and the organizational. Berliner (1982) suggested that teacher's executive roles are similar to those of leaders who work in other type of organizations. Joyce, Weil and Showers (1992) identified and described 20 major models or approaches to teaching. It is more realistic that at least six very essential models that have been selected and learned well, can meet the needs of most teachers. These are: presentation using advance organizers, concept teaching, direct instruction, cooperative teaching, discovery teaching and discussion.

Effective teachers have diverse repertories and are not restricted to a few pet practices (Weil and Showers, 1992). This is in contrast to some arguments from earlier eras intended to prove the superiority of one approach over another; for example, inductive versus deductive teaching or the lecture versus discussion method. The result of all this debate was futile and misdirected because no one approach was found to be consistently superior to any other. Instead, many teaching approaches were found to be appropriate and the selection of a particular model depended on the teacher's goals and the characteristics of a specific group of learners.

The role of the teacher is a complex one that has been shaped by historical and contemporary forces. Increasingly teachers are expected to have advanced preparation and to demonstrate their knowledge of both subject matter and pedagogy. Effective teachers are those who understand the knowledge base for teaching, can execute a repertoire of best practice, have attitudes and skills necessary for reflection and problem solving and consider learning to teach a lifelong process.

2. Learning Theories

Although several learning theories ranging from behaviourism to cognitive to humanistic education have been proposed, none can be applied across the broader spectrum to all learners in all situations; nevertheless some commonalities emerge. Davenport et al, (1985) recommended a combination of pedagogical (teacher-directed) and andragogical (learner-directed) methods in adult education because this "middle of the road" approach meets the need of a larger segment of the audience. From the observations and experience of my own teaching at Curtin University, Miri Campus, this approach is very much appropriate to achieving best performance and comparable results with students from the main Campus at Perth, Western Australia. Even though our students are adults, most of them have adolescent characteristics as far as learning is concerned. Many of them do not fully understand the value of the resources and time spent on their education. The reports from "Evaluation" survey conducted in every year and the past exam results are confirming that teaching approaches based on the theory of behaviorism may be well suitable to first and second year students. Since third and fourth year students are adult learners as compared to first and second year students, the cognitive approach may be well fit to them for active learning. Only for supervising final year project work, the theory of teachers and students work together, humanistic approach may be adoptable.

3. Assets and liabilities of the adult learners

Adult learners are having few general assets and liabilities as compared to adolescent learners. The learning environment must be physically and psychologically comfortable for adult learners; long lectures, periods of interminable sitting and the absence of practice opportunities rate high on the irritation scale. Adults have something real to lose in a classroom situation. Self-esteem and ego are on the line when they are asked to risk trying a new behaviour in front of peers and cohorts. Bad experiences in traditional education, feelings on authority and the preoccupation with events outside the classroom affect in-class experience. Adults have expectations, and it is critical to take time early in the program to clarify and articulate all expectations before getting into content. The instructor can assume responsibility only for his or her own expectations, not for those of students. Adults bring a great deal of life experience into the classroom, an invaluable asset to be acknowledged, tapped and used. Adults can learn well and much from dialogue with respected peers. For adult learners new knowledge has to be integrated with previous knowledge; students must actively participate in the learning experience. The learner is dependent on the instructor for confirming feedback on skill practice; the instructor is dependent on the learner for feedback about curriculum and in-class performance.

The instructors who have a tendency to hold forth rather than facilitate can hold that tendency in check or compensate for it by concentrating on the use of open-ended questions to draw out relevant student knowledge and experience. The key to the instructor role is control. The instructor must balance the presentation of new material, debate and discussion, sharing of relevant student experiences, and the clock. Ironically, it seems that instructors are best able to establish control when they risk giving it up. When they shelve egos and stifle the tendency to be threatened by challenges to plans and methods, they gain the kind of facilitative control needed to affect adult learning. The instructor has to protect minority opinion, keep disagreements civil and unheated, make connections between various opinions and ideas, and keep reminding the group of the variety of potential solutions to the problem.

4. Action Research Survey

Educational researchers use several methods such as observations, listening, obtaining feedback by student evaluation report, microteaching and action surveys to study problems related to teaching and learning. The critical differences between the various approaches include the ways researchers design their studies and the way they collect information and the means they use to interpret their results. To do Action Research successfully requires careful attention to several aspects of the process. In general, there is a set of steps for initiating and completing an Action Research project. The three important parts of the process include 1) deciding on problems to study and framing questions, 2) collecting valid information and 3) interpreting and using this information effectively for the purpose of improving one's teaching.

Kemmis and McTaggart (1981) explained the concept of action research as Plan → Act → Observe → Reflect and repeat the cycle for further improvement. Lyman (1986), who has helped many teacher candidates and beginning teachers launch and successfully complete action projects, prefers a step-by-step approach. Beginning teachers are confronted with literally hundreds of problems and questions that could be topics for action research. The most difficult part of an action research project, however, is identifying a specific problem for study and defining carefully the variables involved. David Hopkins (1985) has identified five principles to use in deciding on a problem for study. When teachers want information about the attitudes or options of their students toward

some aspects of their teaching or classroom, the easiest and most economical way to gather type of information is by giving students a questionnaire to fill out. To achieve the effective result, remember to write questions or statements which are simple and straightforward and make sure the response categories are consistent.

5. Methodology

Based on our vast teaching experience, close observations of class students and careful discussions with other academics, the questionnaire as shown in the Appendix was prepared and distributed to the students of Curtin University, Sarawak Campus, enrolled in Engineering Courses for the period of semester-1, 2009. The students were asked to fill out their perspectives on the importance for the 11 aspects of teaching effectiveness expected from their teachers engaged in engineering units. The relevant 11 aspects of content knowledge, planning, scheduling, skill of presentations and abilities of classroom managements required to fulfil executive and interactive functions of teachers were carefully prepared. The aspects of "revise the critical part of prerequisite knowledge required for the effective learning of the current enrolled unit" and "well defined and carefully reviewed assignments based on students work load distributions and regular feedbacks" were introduced in the questionnaire to get the expectations of the students particularly engaged in engineering studies. As a 12^{th} aspect, an open ended option was given to express any other expectations apart from the prescribed 11 aspects in the questionnaire. The analysis and summary of the action research with the data received from 66 respondents, is discussed in the following section.

6. Analysis and Summary

The weighted average of each aspect was calculated by giving the weightage of 3 for "Very essential", 2 for "Essential", 1 for "May be essential" and none for "Not essential". The weighted percentage was computed based on the maximum weighted average of 198 (66x3) to each aspects from the total respondents of 66. The calculated weighted percentage for each aspect is plotted and shown in Figure 1.

The analysis from the survey data shows that more than 80% of the students recorded their views as very essential for aspects 2(Curriculum knowledge with particular grasp of the materials and program that serve as 'tools of the trade' for teachers), 6(Teaching with simple constructive language, delivered with moderate frequency suites to the majority of the classroom), 7(Well defined teaching plan, sequence and consistent scheduling for the entire semester), 8(Class room time management in teaching the concepts, illustrations and tutorials to draw the best attention and effective learning with suitable break in long hour classes) and 11(Well defined and carefully reviewed assessments based on students work load distribution and regular feedbacks). The details are plotted and shown in Figure 2.

The action survey results show that more than 50% but less than 80% of the students expressed their views as very essential for the aspects 1(Content knowledge or knowledge of the particular subjects to be taught), 9(Revise the critical part of prerequisite knowledge required for the current enrolment and fix the misconceptions if any) and 10(Providing well defined and confined study materials with source references for further studies). The details are plotted and shown in Figure 3.

Most of the students considered the aspects 3(General pedagogical knowledge, with special reference to those board principles and strategies of class room management), 4(Strong research background and publications in the areas taught) and 5(Very strong proficiency and fluency in the instructional language) are not very essential requirement from their teachers handling engineering units for the under graduate courses. The summary of the analysis are plotted and shown in Figure 4. Among the respondents to the survey, 94% of them recorded their perception as 'very essential' for the aspect 6(Teaching with simple constructive language, delivered with moderate frequency suites to the majority of the classroom) whereas only 7.5% of the respondents only recorded their perception as 'very essential' for the aspect 5(Very strong proficiency and fluency in the instructional language).

For the 12^{th} open ended aspect the total 66 respondents expressed their expected optional aspect as 40% for discussing the past exam papers, 17% for encouraging the students initiatives, ideas and their experiences, 14% for arranging field visits and technical film shows, 9% for arranging film shows on site safety regulations and 20% for none. The results are shown in Figure 5.

There are some aspects of teaching that can be learned in college classroom and can be learned by studying what researchers and experienced teachers have to say about the topic of interest. However, many of the most important features the art of professional practice can be learned only though experience. Effective teachers should have a learning agenda for lifelong growth coupled with careful analysis and reflection that produces the growth with experiential learning. Johnson and Johnson (1975) described the cyclical nature of experimental

learning, shown in Figure 6. One of the very successful teaching practices developed from experiential learning and action research is described in the following section.

7. Recommended and Practicing Teaching Style

From my 20 years of teaching experience and knowledge gained with academic and real world experience, I have set my personal style of teaching based on the following principles for the successful standards of learning outcomes.

Teaching plan and schedule: Set clear and realistic weekly programs to cover the entire syllabus outlined along with assignments release date, submission dates and feedback dates for the unit. Provide materials hard copy/soft copy well in advance before the start date. Make sure there are no deviations in the teaching schedule. This clear scheduling facilitates students to set their own program of attendance by identifying the critical classes that could not be missed for their own interest.

First week of teaching: Most of the engineering units demand mandatory prerequisite knowledge for effective learning. While we are introducing course outline overview, context, expected outcomes and assessment criteria, make sure all the students understand the importance and criticality of the prerequisite knowledge required for effective learning. In the first week before starting the course, provide all the important text references and refresh the critical areas of prerequisite courses. If we failed to identify their level of knowledge on the key element of prerequisite and fix the misconceptions if any, we may not achieve the expected learning outcome even at very high effort shown through teaching.

Classroom and Time management: The learning environment must be physically and psychologically comfortable; long lectures, periods of interminable sitting and the absence of practice opportunities rate high on the irritation scale. The key to the instructor role is control and to draw the effective attention of the students for maximum duration of the class. The instructor must balance the presentation of new material, debate and discussion, sharing of relevant student experiences, and the clock. For 3 hours long classes, rather than giving two short breaks, giving one mid break of 15 or 20 minutes will be more appropriate in maintaining the tempo and attention in teaching and learning. Teachers should remain in the class during the break time to encourage the students to return back to the class after the break in time. If teachers need a break, it may be available while students are engaged in tutorial task or in group discussions.

Assessment tasks and feedback: One of the most important key elements in successful learning and teaching are assessment tasks and feedback. Number of assessments and volume of work involved in each assignment should be very carefully reviewed based on students work load distribution. Teachers must also respect that students have other interests and engage in time-consuming activities outside the classroom. For equitable work load, Curtin, Australia proposed 2 summative assessments followed by one formative final exam for 12.5 credit units and 3 or 4 summative tasks followed by a formative task for 25 credit units. Ideally, set one assessment task early and make sure the students have feedback within the first four weeks of the semester. The all assessment tasks should be spaced throughout the semester.

8. Conclusion

The overall survey results indicate that most of the students enrolled in tertiary education in engineering courses are expecting from their teachers very essentially the effective executive functions such as providing motivation, planning and allocating scarce resources. They are also expecting the effective interactive functions refer to methods and processes teachers employ in day-by-day instruction to students. The survey concludes that each well defined lecture arranged in right sequences should be orally presented in a simple constructive language with the consistent flow speed best suitable to majority of the audience for the better learning outcomes. Language proficiency and fluency are not the barriers for successful teaching to multicultural classes in tertiary education. This paper concludes that “Teachers of student choice” are not born and they are trained by acquiring required relevant knowledge and sincere practice of delivering the lectures in an optimum suitable way to the audience for successful learning.

References

Berliner, D. C. (1982). *The executive functions of teaching.* Paper presented at Wingspread Conference on Relating Reading Research to Classroom Instruction, Racine, Wisc.

Davenport, J and Davenport, J. H. (1985). *Andragogical-pedagogical orientations of adult learners*, Research results and practice recommendations, Lifelong Learning, 9(1): 6-9.

Gage, N. L. (1984). *An update of the scientific basis of the art of teaching.* (Mimeographed) Palo Alto, Calif.: Stanford University.

Hopkins, D. (1985). *A teacher's guide to classroom research.* Philadelphia: Open University Press.

Johnson, D. W., and Johnson, F. P. (1975). *Joining together: Group theory and group skill.* Englewood Cliffs, N.J: Prentice-Hall.

Joyce, B., Weil, M., and Showers, B. (1992). *Models of teaching (4th ed).* Englewood Cliffs, N.J: Prentice-Hall.

Kemmis, S., and McTaggart, R. (1981). *The action research planner.* Victoria, Australia: Deakin University Press.

Lyman, F. (1986). *Procedures for using the question/response cues.* (Mimeographed) College Park, Maryland: University of Maryland.

Richard, I. A. (1996). *Learning to Teach (3rd ed)* McGraw-Hill, USA

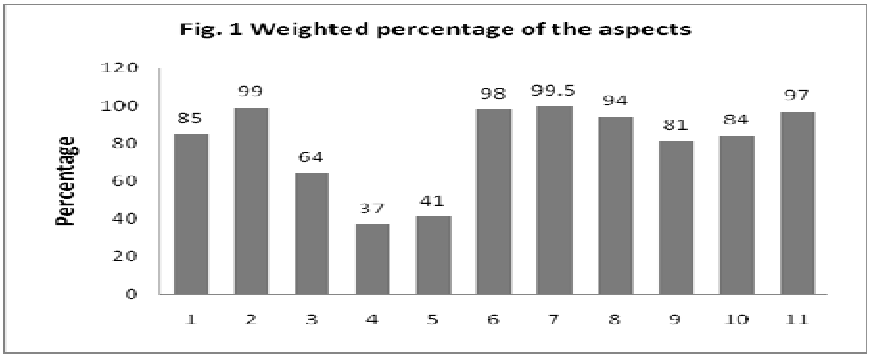

Figure 1. weighted percentage of the aspects

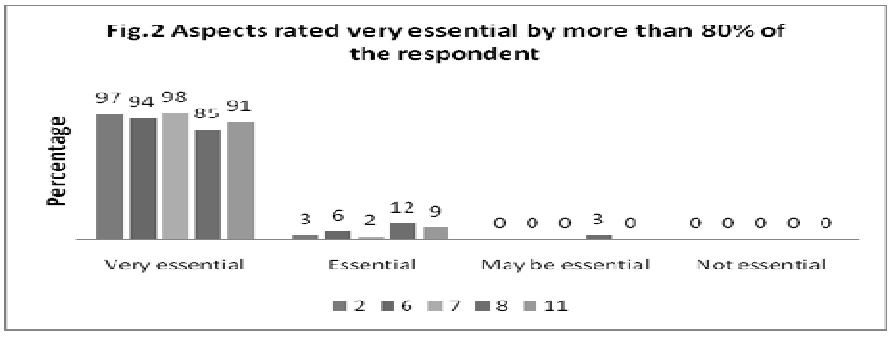

Figure 2. Aspects rated very essential by more than 80% of the respondent

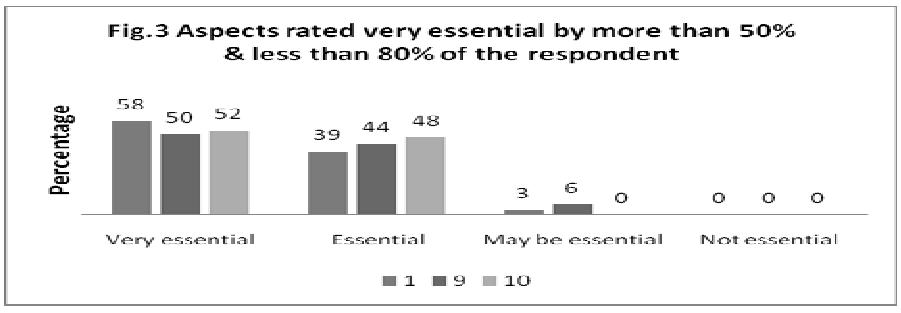

Figure 3. Aspects rated very essential by more than 50% & less than 80% of the respondents

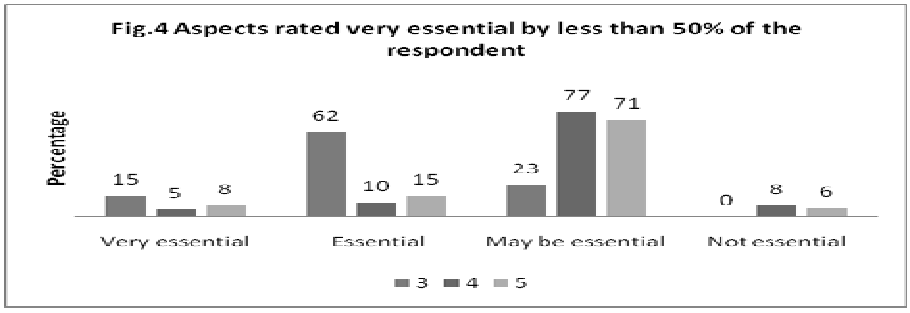

Figure 4. Aspects rated very essential by less than 50% of the respondent

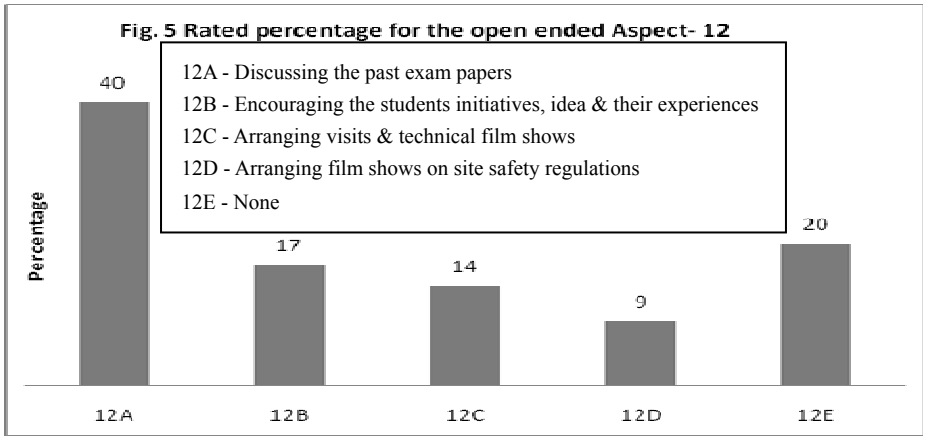

Figure 5. Rated percentage for the open ended Aspect-12

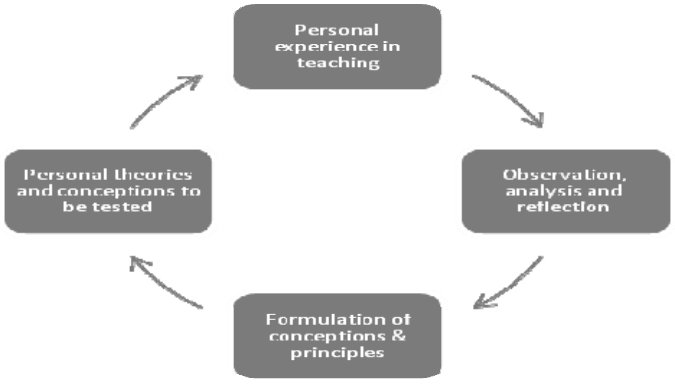

Figure 6. Cyclical nature of experiential learning

Appendix

Table 1. Survey for the Teachers of Student Choice

Please indicate your views / opinions on the requirements of the following aspects for the teachers of your best choice.

No.	Details of requirements	Very Essential	Essential	May be Essential	Not Essential
1	Content knowledge or knowledge of the particular subjects to be taught				
2	Curriculum knowledge with particular grasp of the materials and program that serve as “tools of the trade” for teachers				
3	General pedagogical knowledge, with special reference to those board principles and strategies of class room management				
4	Strong research background and publications in the areas taught				
5	Very strong proficiency and fluency in the instructional language				
6	Teaching with simple constructive language, delivered with moderate frequency suites to the majority of the classroom				
7	Well defined teaching plan, sequence and consistent scheduling for the entire semester				
8	Class room time management in teaching the concepts, illustrations and tutorials to draw the best attention and effective learning with suitable break in long hour classes.				
9	Revise the critical part of prerequisite knowledge required for the current enrolment and fix the misconceptions if any,				
10	Providing well defined and confined study materials with source references for further studies				
11	Well defined and carefully reviewed assessments based on students work load distribution and regular feedbacks				
12	Any other aspects				