Different Tools & Techniques for Quality Improvement in Professional Education

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Abstract

The purpose of this paper is to determine the effectiveness of various teaching methods used for teaching students at graduate and post graduate levels. Two hundred technical students were interviewed about their perceptions of best and effective teaching methods and the reason for that. Most of the students rated lecture method as the best teaching method. Reasons included; teacher provides all knowledge related to topic, saving of time, students attentively listen to lectures and take notes, etc. Group discussion was rated as the second best method of teaching. The Project-based collaborative learning is an active, problem-centered approach to teaching and learning. As the name implies, it is a fusion of two related approaches- project-based learning and collaborative learning. Use of writing in engineering courses can help in achieving both technical depth and educational breadth in engineering programs. Engineering students can use words in describing concepts so that they will be encouraged to develop a linear, logical, and connected set of ideas in understanding them. Each student is thus forced to think carefully and in detail.

Introduction

Teaching and learning are the two sides of a coin. The literature on teaching is crammed full of well researched ways that teachers can present content and skills that will enhance the opportunities for students to learn. It is equally filled with suggestions of what not to do in the classroom. However, there is no rule book on which teaching methods match up best to which skills and/or content that is being taught. Students often have little expertise in knowing if the method selected by an individual instructor was the best teaching method or just "a method" or simply the method with which the teacher was most comfortable.

"Research indicates that students are the most qualified sources to report on the extent to which the learning experience was productive, informative, satisfying, or worthwhile. While opinions on these matters are not direct measures of instructor or course effectiveness, they are legitimate indicators of student satisfaction, and there is substantial research linking student satisfaction to effective teaching (Theall and Franklin)."

Keywords

Teaching Methods, Effective Teaching, Project-based collaborative learning

Most universities embrace a process by which students provide anonymous feedback at the end of each course they complete. These ratings of instructor effectiveness, these ratings have been a hot topic since they were first employed in mid 1920's and they create an enormous challenge for nearly every institution that uses them. Over the years student evaluation of instructors has changed significantly especially in the areas of the purpose and methodology. They have transformed from being primarily used to assist students in the selection of courses, to helping faculty members further develop and improve their teaching skills, to assisting administrators with respect to personnel decisions.

There is much debate within the higher education community on how teaching or teaching effectiveness may be defined (Braskamp, and Ory). For instance,

Centra, defines effective teaching as "that which produces beneficial and purposeful student learning through the use of appropriate procedures". Braskamp and Ory, include both, teaching and learning in their definition, defining effective teaching as the "creation of situations in which appropriate learning occurs; shaping those situations is what successful teachers have learned to do effectively".

Many researchers have focused on whether or not students are legitimate judges of teaching effectiveness. Theall, M. mentioned that the students can answer questions about the quality of lectures, the value of readings and assignments, the clarity of the instructor's explanations. Students are certainly qualified to express their satisfaction or dissatisfaction with the experience. They have a right to express their opinions in any case, and no one else can report the extent to which the experience was useful, productive, informative, satisfying, or worthwhile.

II. Various teaching methods

1. Lecture Method

- It creates new ideas.
- It is good for large class.
- Teacher is experienced and has mastery on subject, explain all points and can answer all questions raised by students.
- Students can ask if they need any clarification.
- Learn through listening
- Teacher explains all points.
- Students give their input
- Teacher discusses the whole topic in the class in easy language so students can easily understand the topic.
- Teacher provides all knowledge related to topic.
- Time saving as teacher is supposed to finish lecture in time.
- Students give their views at the end of lecture.
- Students attentively listen to lecture and take notes as the teacher ask questions at the end of lecture.
- Students know and understand basic concepts.
- Teacher knows all the students so he/she can use suitable strategies for the class to make them understand.
- Teacher share information with students so it creates interest in students.
- Students are more involved and participate when teacher ask question.

- Teacher provides notes.
- Students easily understand every point.
- Students share knowledge with teacher.
- Teacher is role model for students.

2. Group discussion:

- More participation of students.
- Students listen to other's opinion & express their opinion.
- Discuss with teachers the points that were missed during discussion.
- Students learn on their own & find out key points.
- Students exchange their ideas.
- Students get point of view of all and not only those who always speak.
- After discussion when students give their presentation, teacher corrects their mistakes.
- Students can make their own notes.
- The learning is more effective.
- Develops creativity among students.
- It evokes thinking among students.
- Students have time for preparation of topic.
- Students should have material and knowledge before discussion.
- Only those students participate who have confidence, rest do not participate.
- Concepts become clear after discussion.
- Every student gives his/ her opinion.

3. Individual presentation

- Hamm (2008) quoted Rate; "A presentation involves motivating listeners to accept a new idea, alter an existing opinion, or act on a given premise."
- Students first thoroughly understand the topic before giving presentation i.e. mastery on topic.
- It increases confidence among students.
- Good way to learn for only one student who is presenting.
- Students search lot of books to collect material
- Teacher's supervision is important

4. Assignment

- It enhances the ability of research on any topic as the students search topic from different books, websites etc.

- ◆ Active learning

5. **Seminars**

- ◆ Give Chance to meet other people of same profession.
- ◆ Motivate and make student active in learning.
- ◆ Interested method.

6. **Workshops**

- ◆ Give Chance to meet other people of same profession.

7. **Conferences**

- ◆ Give Chance to meet other people of same profession.
- ◆ Networking with other institutions and professionals.

8. **Brain storming**

- ◆ More interesting
- ◆ More informative
- ◆ Gain knowledge
- ◆ Learning is effective
- ◆ More participation of students
- ◆ Students give their opinion
- ◆ Active learning
- ◆ Creative thinking is encouraged.
- ◆ Students think beyond their knowledge.
- ◆ Every one get chance to express their thoughts.
- ◆ Simple topics can be learnt through different angles.

9. **Role play**

- ◆ Interesting method
- ◆ Creative thinking is encouraged.
- ◆ Students think beyond their knowledge.
- ◆ Students enjoy the situation
- ◆ Active learning
- ◆ Easy to learn

10. **Case study**

- ◆ Active learning
- ◆ Creative thinking is encouraged.
- ◆ Students think beyond their knowledge.

11. **Project-based learning**

Project-based learning requires the student to engage in design, problem-solving, decision-making, and investigative activities, often resulting in an artifact or product ("Project-based learning," 2008). Collaborative learning involves joint intellectual effort by groups of students who are mutually searching for meanings, understanding, or solutions (Smith and McGregor). Both approaches require a central question or problem that serves to organize and drive activities, and encourage application, analysis, and synthesis of course material. The fusion of these two approaches can be characterized simply as people working together to create something, and to meet certain learning objectives throughout the process. This context yields an ideal yet complex territory for support with technology tools. Tools are currently available that can:

- ◆ facilitate real-time and asynchronous text, voice, and video communication;
- ◆ assist in basic project management activities, like task management, calendaring, workflow planning and routing, and time tracking;
- ◆ support co-creation by enabling groups to modify output in real-time or asynchronously;
- ◆ facilitate consensus building through group discussions and polling;
- ◆ simplify and streamline resource management in terms of basic file sharing, in addition to more advanced features like search, tagging, version tracking, privilege management, and so on;
- ◆ enable local and remote presentation, and allow for archiving of completed projects.

While the landscape of technology that can be used to support central activities of project-based collaborative learning is vast and varied, it is often lumped together under a single label: "collaboration tools." Educators and educational technologists can benefit from a more detailed and disaggregated view of what tools are available and how different types of tools can be used most effectively in support of specific teaching and learning goals.

Technology-Mediated Collaboration

An often-overlooked body of research on collaboration comes from the field of psychology. Finholt and Teasley note that cognitive, social, and organizational psychologists have examined work in groups for more than 20 years, and have been able to identify some of the relative strengths and weaknesses of relying on technology in the context of group collaboration. For example, psychology research has demonstrated that computer-mediated groups are better at generating a range of ideas, while face-to-face groups perform better at tasks that require problem-solving or reaching consensus on group preferences. Furthermore, participation in computer-mediated groups tends to be more equally distributed, whereas face-to-face groups are more easily dominated by a single or few individuals (Finholt and Teasley). Group decision support systems

(GDSS) are a relatively heavily investigated category of collaboration technology. They combine "communication, computing, and decision support technologies to facilitate formulation and solution of unstructured problems by a group of people" (Desanctis and Gallupe). Research has shown that these systems increase the quality of decisions, facilitate more equal participation, and encourage groups to stay focused on tasks. However, groups using GDSS take longer to reach a decision, achieve less overall consensus, and less satisfaction with the decision-making process and outcomes (Finholt and Teasley). Computer mediated groups outperform face-to-face groups in brainstorming tasks due to reduced production blocking (the tendency for one individual to inhibit contributions from other people during a group discussion). Along the same line, physically dispersed participants outperform physically proximate participants when using the same decision support system while brainstorming.

Example of Tools & Technologies

The range of tools available creates many interesting opportunities for collaboration and instruction, but decisions about which tools to use (and how) should be shaped by the objectives of the assignment.

Collaboration Suites

Several companies have developed families of applications that meet a range of collaborative needs. These tools might be used individually, but they are often designed to work together or integrate for optimal usefulness. These systems might include traditional desktop applications for word processing, spreadsheets, communication, or calendaring, but often extend beyond basic functionality by virtue of the ability for these artifacts to be accessed and edited by multiple members. Collaboration suites also might include an additional "aggregator" application that allows pieces from each of the other applications to be pulled together into a common work space.

Course Management Systems

Most course management systems give instructors the ability to make group work spaces for their students. Tools available in group spaces might include discussion boards or other group communication fools, file sharing, and peer evaluation tools. While these tools are not ideal for supporting complex collaborative efforts, in many cases these tools are readily available to instructors and can be easily activated.

Project Management Tools

Project management solutions are multifunctional systems that often deal with logistical issues, like scheduling, time tracking, task management, resource allocation, collaborative writing or editing, communication, file sharing, and process documentation. These tools might be particularly useful for semester-long projects where the instructor hopes to monitor group interactions and evaluate students' work processes and communications.

Wikis

A wiki is a page or collection of web pages that allows anyone with proper privileges to modify, add, or delete content. A wiki also often has the functionality of maintaining a document history, which allows users to track and view changes over rime. Wikis are most effective for collaborative writing or collaborative creation of text-based documents. However, the ability to incorporate other media types (audio, video, images) is often considered useful in encouraging rich communication.

Real-Time Communications

Products in this category include web-based presentation tools, screen sharing applications, web or audio conferencing tools, and VoIP (Voice over Internet Protocol) or internet-based telecommunications. These tools are especially useful for project teams that are not co-located, or who do a significant portion of their work at a distance. They allow teams to share work in progress, discuss concepts with the help of rich media, and exchange information and ideas in a manner that more closely approximates the face-to-face experience than traditional text-only communications.

And so on

Web-based tools are also available to support collaborative concept mapping, collaborative writing, stand-alone list or task management, software development and issue tracking, creative or design collaboration, slide sharing, market research, contact management, and on and on.

12. Writing

Writing is a uniquely valuable learning process. Writing is vital in any educational setting. Janet Emig has argued writing is unique mode of learning- that, in her opinion, "writing is not merely valuable, not merely special, but unique." Her arguments provide a valuable basis for using writing as a learning tool in any discipline. Writing is a process of discovery. The act of writing is not a simple one. Several steps can be identified. The learning, organizing, and clarifying experienced by the writer when preparing to write is very valuable and unavailable elsewhere. As stated concisely by James Britton. One of the steps the writers must do in preparing to write is to explain to themselves what they intend to write. Understanding is further reinforced during writing, rewriting, and editing. When finished, the serious writer has a much firmer grasp and command of the material than would have been possible without writing. This process of discovery is important to students because they experience and understand the material in a direct and personal way. This process is similar to the one experienced by the professor when preparing a lecture.

Through writing assignments, individual engineering courses can become more flexible, more topical, and more exciting for the student. Writing assignments might involve some important topic from the past or some interesting recent development. In an undergraduate controls course, a writing assignment tracing the history of feedback could be very beneficial. For example, an

assignment on wavelets in a linear systems class would allow the student to investigate a relatively recent development. After having written about a subject many students will have, to some degree, made the topic their own and developed an outlook of their own. Writing assignments are an effective way to introduce informed discussions on current or historical topics into the classroom and are currently used by many engineering educators. For instance, in a civil engineering class, advances in LIDAR technology could provide a basis for a discussion of metrology. Whatever the form, these assignments serve to enhance class discussion because they ensure that the class has thought in detail about a topic before discussion. Alternately, writing assignments could be used to introduce the students to consideration of topics outside the formal course subject matter. As an example of this, a writing assignment on hydroelectric power generation could include aspects of the political difficulties that can result from such projects. If these tools were consistently and creatively employed throughout the curriculum, they would the engineering student without necessitating the elimination of engineering courses in the major curriculum.

III. Conclusions

Teachers need to educate students in effective ways of giving precise feedback that addresses specific aspects of their learning experience. Teachers need to continually assure students throughout the semester that the ratings will be used for productive changes in teaching/ learning process and that there will be no chance of retribution to the students. To evaluate teaching effectiveness different methods can be used including: peer review, self-evaluation, teaching portfolios, student achievement and students ratings of teaching methods used by their teachers. This paper is also intended to give instructors a basic understanding of project-based

collaborative learning, and the types of tools that are currently available to support project-based collaborative learning activities. Writing provides a uniquely valuable mode of learning, and if we ignore this tool, as is presently done in many engineering courses, our students will be deprived of a central intellectual experience. For many of our students, this process of knowledge discovery during writing may be among the most important skills gained during their entire collegiate career.

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