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A COMPARATIVE ANALYSIS FOR ADOPTING AN INNOVATIVE PEDAGOGICAL APPROACH OF FLIPPED TEACHING FOR ACTIVE CLASSROOM LEARNING

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Abstract

Active learning is a way of education that imparts the responsibility of learning on learners. Active learning pedagogies ranging from simple lectures to structured pedagogies can be applied to online or face-to-face environments or in a combination of both. Multiple studies have shown that active learning can be done by flipped teaching which improves students understanding and retention of information. The flipped classroom approach, with its prime focus on active learning, attempts to address the concerns of academic staff and helps to meet the expectations of students for practical exposure. On contrary to the traditional pattern of teaching using conventional classrooms and other e-learning methods, the flipped classrooms is a form of blended learning in which students first learn the content online by watching video lectures, usually at home, and do the homework in a class by discussing it with their teachers and colleagues. This approach allows having the most personalized interaction of the teacher with students. Flipped classrooms have started to become common on many university campuses. Despite the growing number of flipped courses, however, quantitative information on their effectiveness remains sparse because of very less number of researchers on it. This paper, therefore, investigates the various major aspects of flipped technology to explore the effectiveness of a flipped classroom model on student's performance and ease of use. The paper also presents a research of comparing traditional class that engages students in some learning to a flipped classroom that creates more time for active learning using PAPRIKA technique of multi-criteria decision-making (MCDM). A group of students and teachers undergone through the different approaches to teaching have been evaluated for various attributes to determine the overall utility of Flipped teaching.

Keyword: flipped classroom, PAPRIKA method, comparative analysis.

Introduction

Active learning strategies can help guide students toward professional practice and encourage higher order thinking reflected in graduate attributes. Previous studies show that active learning or flipped learning improves learner's understanding and can be very effective in developing cognitive skills such as critical thinking and problem-solving and also helps retention

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of information. One of the methods of doing this is by using flipped classroom methodology. Flipping the class is a prospect of thinking about an innovative pedagogical way to engage students, encourage ownership of learning, and promote deeper learning and to equip students for professional practice. The method of the flipped classroom learning is to shift from passive to active learning where the learning process is more visible, reflexive, collaborative and engages students in critical thinking.

Quantitative and precise qualitative data on Flipped Learning is limited, but there is a great deal of research that supports the key elements of the model with respect to directive strategies for engaging students in their learning. All the research on Flipped classroom available commonly consists of teacher reports on student achievement after adopting the model (based on course and/or state test scores), descriptions of flipped classrooms, course completion rates, disciplinary actions, and surveys measuring an array of outcomes, such as teacher, student and parent mindset changes

This paper first addresses the flipped learning concept and its comparison with other conventional approaches to teaching. It then explores the results of our research using PAPRIKA "Potentially All Pairwise Rankings of All Possible Alternatives" method under MCDM to determine how its effectiveness has been proven at a graduate and undergraduate level for active learning. All this will allow the teachers to conclude if it is a concept worth implementing in their own classroom as well as how to implement it properly.

Flipped classroom methodology

A flipped classroom is one that inverts the typical cycle of content acquisition and application. Flipped classroom is a form of intermingling learning in which students learn necessary content first by themselves either by reading or watching video lectures, usually at home, and the assignments and homework are done in class with teachers and students discussing and solving questions. Teacher interaction with students is more personalised - guidance instead of lecturing. In other words, this means that students or learners gain first exposure to new information outside of class, generally via reading or video lectures, and then do the harder work of assimilating that knowledge in class time, perhaps through discussion, problem-solving, or debates in front of their teachers and instructor.

The traditional pattern of teaching has been to give students the task of reading textbooks and work on problem sets outside the school while listening to lectures and taking tests in class. In such cases, many times the classroom a lecture has been criticised despised and even made fun of. The teacher keeps on asking if "Anyone" can answer or raise a query, and gets a negligible response because of one-way interaction. Students often try to capture what is being said at the instant the teacher says it. Various times the problem with face-to-face teaching is often a matter of pacing. Therefore, some students may have trouble understanding their lecture and get the information rapidly or they may lack the previous information they need to understand the concepts presented. After the lecture, teachers often assign homework, which leads to confusing for many students. (Hamre & Pianta, 2005; Greenberg, Medlock, & Stephens, 2011).

Flipping allows the teacher to target those who need the most help rather than the most confident. In addition to that, devoting class time to discussing and application of concepts might give teachers a better opportunity to detect errors in thinking, and allows them to work with individuals or groups of students throughout the session. At the same time, students learn by doing and asking questions. Students can also help each other, a process that benefits both the advanced

and less advanced learners. (Beesley & Apthorp, 2010; Bergmann & Sams, 2012; Hattie, 2008; Schwerdt & Wuppermann, 2010).

The PAPRIKA method

The PAPRIKA method allows the decision-maker to find the most advantageous method by answering a series of simple questions. Each question requires us to choose between two hypothetical alternatives described according to the criteria's we set to find the optimum. The method begins by identifying all such pairs of hypothetical alternatives. Each pair is presented sequentially to us to pairwise rank, based on our expert knowledge and subjective judgment. Such simple pairwise-ranking questions are repeated with different pairs of hypothetical alternatives, all involving trade-offs between different combinations of the criteria, two at a time, until enough information about your preferences has been collected to accurately rank the alternatives we are considering.

From our answers, preference values representing the relative importance, or ‘weights’, of the criteria are obtained via linear programming model. These preference values are used to rank the alternatives available. The major advantage of this method is the pairwise ranking (choosing one alternative from two) which is a natural type of decision activity that can be easily obtained from the subjective analysis that everyone has experience of in their daily lives. In contrast, most alternative methods of MCDM are based on ‘scaling’ or ‘ratio’ measurements of decision-makers’ preferences.

Our research by flipping the paradigm

To obtain a direct scientific research to establish whether flipped classrooms increase student achievement, I adopted the flipped classroom approach and inverted the entire paradigm of teaching away from a traditional model of teaching. I executed a thorough qualitative survey in different separate classes. One classroom was a course taught with a traditional classroom model, the second classroom was a course taught with E-learning methods while another section of the same course was taught with the flipped classroom model. The same content was covered in all sections and the same assessments were used. The analysis is done using the PAPRIKA method in ‘1000Minds’.

The flipped classroom students were provided with online access to a series of short video lessons that may be completed at their convenience. Each video concluded with a short online quiz, consisting of two to four questions designed to record student participation and learning knowledge. Students were supposed to answer 80% correctly before moving on to the next video. The object of the quizzes is to get immediate feedback, not grading. The class time is dedicated to active learning sessions, which allow direct interaction with the instructors as students apply their learning for solving graded assignments, team case studies and exams.

Initially, students found the format and design of the class to be somewhat uneven and were initially reluctant. In addition, students were unfamiliar with this kind of access to the instructor. However, once the students began to view the teacher as a facilitator rather than the instructor, the students eventually became comfortable with asking questions for further understanding. Table 1 illustrates the various evaluation criteria's and sub- criteria's used to rank the available teaching methodologies. For every teaching method, a normalized weight is obtained using PAPRIKA technique for all the criteria's based on their usage and relevance in the teaching methods.

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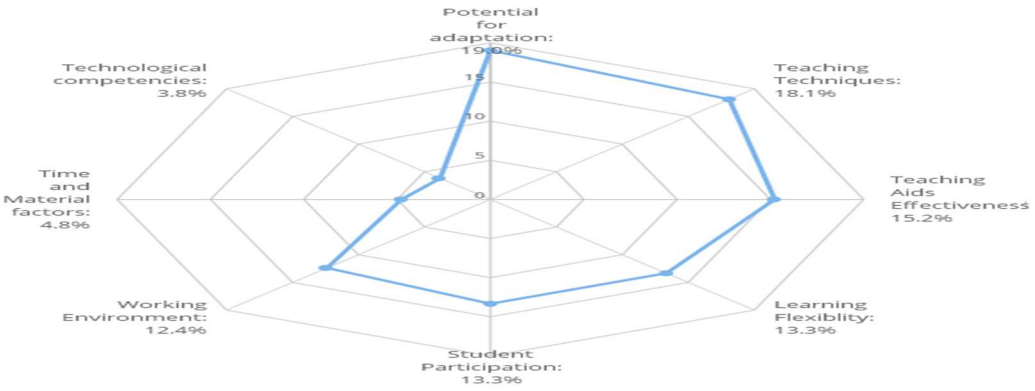
Table 1. The evaluation attributes/criteria with their utility values

S. No	Criteria	Normalized Weights
1	Teaching Aids Effectiveness (Visual aids, Sound aids and Multimedia)	**0.152**
2	Working Environment (Lecture, Group Discussion and Simulation)	**0.124**
3	Teaching Techniques (Lecturing, Mentoring and Apprenticeship)	**0.181**
4	Learning Flexibility (Pacing, Possibility to select between topics and Time of study)	**0.133**
5	Student Participation (Ease of use, Problem-solving and critical thinking ability and Student achievement, Student achievement)	**0.133**
6	Potential for adaptation (Burden, Resource needed and Available information)	**0.191**
7	Time and Material factors (Time for preparation and Financial resources)	**0.048**
8	Technological competencies (Infrastructure and Skilled teachers)	**0.038**

Figure 1(a). Radar Chart of Normalized weights of all criteria



(a)

(b) Relative importance of attributes

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	Potential for adaptation	Teaching Techniques	Teaching Aids Effectiveness	Student Participation	Learning Flexibility	Working Environment	Time and Material factors	Technological competencies
Potential for adaptation		1.1	1.3	1.4	1.4	1.5	4.0	5.0
Teaching Techniques	1.0		1.2	1.4	1.4	1.5	3.8	4.8
Teaching Aids Effectiveness	0.8	0.8		1.1	1.1	1.2	3.2	4.0
Student Participation	0.7	0.7	0.9		1.0	1.1	2.8	3.5
Learning Flexiblity	0.7	0.7	0.9	1.0		1.1	2.8	3.5
Working Environment	0.7	0.7	0.8	0.9	0.9		2.6	3.3
Time and Material factors	0.3	0.3	0.3	0.4	0.4	0.4		1.3
Technological competencies	0.2	0.2	0.3	0.3	0.3	0.3	0.8	

(b)

Figure 1(a) shows the normalised weights of all the criteria in form of radar chart and figure 1(b) shows the 'Marginal rate of substitution' (ratio) of the column attribute for the row attribute. When Figure 1 is analysed, it can be observed that in all the categories of evaluation, the factors potential for adaptation and teaching techniques played an important role. Technological competencies and time & material factors are identified as the least affecting criteria when choosing a teaching methodology. After the criteria weights are determined, the ranking of the teaching methodologies based on PAPRIKA is obtained with total utility factor is as shown in Table 2.

Table 2. Ranking of the teaching methodology

Concept	Rank	Total utility
Flipped learning	1st	80.95%
E-learning	2nd	58.10%
Traditional Classroom learning	3rd	8.57%

According to Table 2, the Flipped learning methodology is determined as the first alternative with around 80% utility factor. With E-learning method, it comes out with 58% and the traditional classroom method got around 8% which is the least. All our results illustrate that if a student undergone through Flipped teaching will demonstrate consistent improvements in their performance. The E-learning and traditional classroom methodologies, which impart knowledge on static and resource-restricted environments are arguably less predictive of real-world success because they do not mirror the actual requirements of the working world. In the qualitative terms, it can be observed that the lower-level dependent learners will note that the use of flipped teaching helped them in

understanding the material more practically.

Conclusion

After reviewing our results, it can be concluded that the use of flipped learning imparts positive effects on the student's performance. Flipped learning can provide the students with an opportunity to learn in a more differentiated fashion rather than linear and intellectual. Flipped learning empowered students through more active learning. Students studying using flipped approach will stand higher in their achievement and have better attitudes toward learning and school. Not only this, the flipped classroom approach, with its inherent focus on active learning attempts to address the concerns of academic staff and helps meet expectations around graduates and their preparation for professional practice.

Although the idea is straightforward, an effective flip requires careful preparation. Recording lectures require effort and time on the part of faculty, and out-of-class and in-class elements must be carefully integrated for students to understand the model and be motivated to prepare for class. As a result, introducing a flip can mean additional work and may require new skills for the instructor. However, with the span of time, new tools may emerge to support the out-of-class portion of the curriculum. As of this instance, our initial research suggests that the Flipped teaching methodology has good potential and deserve further inquiry.

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