

## THE EFFECTS OF THE FLIPPED CLASSROOM APPROACH SHOWN IN THE EXAMPLE OF A MASTER COURSE ON MANAGEMENT INFORMATION SYSTEMS

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**Abstract:** Technology also has the ability to change the dynamics of time and space in higher education institutions. Education technology is increasingly important in light of the changed learning needs and styles of today's students. Today's students are growing up in a digital world and are masters of technology. The flipped classroom is a pedagogical method in which the typical lecture and homework elements of a course are reversed. The value of a flipped class is in using class time as a workshop environment where students can inquire about lecture content, interact with one another in hands on activities, and test their skills in applying knowledge. In this study the effects of the flipped classroom were analyzed to measure the impact of the flipped approach on student achievement. A master course on MIS was redesigned by using flipped classroom methods, combining short video lectures and in class activities like tutorials and workshops. Rubrics were created and applied for analyzing students' performance. The results of the study revealed that exam performance did not change in a significant manner, but the overall semester performance, measured in terms of paper, presentation, case studies and projects, improved significantly for the students attending this master course.

**Keywords:** Flipped classroom, student performance, student engagement, rubric.

### INTRODUCTION

Student achievement is an increasingly important topic in education today, the goal for any instructor is to improve the ability level and prepare students for their future responsibilities in business world. Defining student achievement and factors that impact progress is critical to becoming a successful instructor. Student achievement measures the amount of academic content a student learns in a determined amount of time. Successful instruction of standards results in student achievement. Classroom instruction is the most important factor that impacts student achievement. Instructors influence the quality of instruction, set expectations for learning, and measure the level of understanding. They use strategies to gain student attention and to support the learning process. One of these innovative approaches is the flipped classroom model, which is a pedagogical approach in which direct instruction moves from the group learning space to the individual one. Instructional courseware, digital content and other electronic learning resources can help meet intermediary goals that can lead to improved student achievement, making technology an essential tool in teaching and learning in the 21st century. Quality electronic learning resources can provide many educational benefits, such as Engaging students through multi-media, interactive content; Strengthening understanding and thinking skills through exploration, collaboration and creation; Adapting to support differentiated or personalized learning for students who have a specific learning style, pace or needs; Keeping knowledge current and information accurate; Enhancing accessibility for physical or learning disabled students through assistive technologies and presentation of content in alternative modalities; and

Integrating testing and classroom management tools, thus allowing realtime tracking of student performance to inform instruction and provide accountability (Angelini and Garcia-Carbonell, 2015 and Grinager 2006).

### **LITERATURE REVIEW**

Technology brings rich and diverse materials into the classroom and has the ability to change the dynamics of time and space in schools. By helping students work more independently, technology gives instructors more time to work one-on-one or with small groups of students. Assessment technologies also help instructors more efficiently identify students' strengths and weaknesses to better target instruction. With digital record keeping, phones in the classroom, and access to local networks to communicate with students, administrators and colleagues, instructors can spend more time teaching and less on paperwork. In addition, students can extend their learning if they can connect from home to their school's network and to other courses and resources (Bergman, 2014 and New Media Consortium, 2014 and Wallace, 2014, and Grinager 2006).

Technology has allowed students increased opportunities for individualizing, customizing and providing access to education through virtual or distance learning. When used effectively, technology applications can support higher-order thinking by engaging students in authentic, complex tasks within collaborative learning contexts. These important "learning skills" enable people to acquire new knowledge and skills, connect new information to existing knowledge, analyze, develop habits of learning and work with others to use information. Education technology is increasingly important in light of the changed learning needs and styles of today's students. Today's students are growing up in a digital world and are masters of technology. They seamlessly integrate multiple technology tools and digital resources into their daily lives (Grinager 2006).

The flipped classroom is a pedagogical model in which typical lecture and homework sections of a course are reversed, offering the benefit that it rearranges face-to-face instructions, attempting to create a more efficient and enriched use of class time. The flipped classroom model is part of a larger pedagogical model that overlaps with blended learning, enquiry-based learning, and other instructional approaches and tools that are meant to be flexible, active, and more engaging for students. The main benefit of flipped learning is the restructuring of class time, which is more of a pedagogical solution than a technological solution. Nevertheless, in-class benefits are dependent upon the utilization of technology tools, like content creation tools, tablet software, document-camera based solutions and distribution tools. Students had to watch lecture videos outside the classroom (no traditional in class teaching) and focused in class on group work activities, assessments and other online focused activities (Basal, 2015 and Helgevold, 2015 and Turan and Göktas, 2015, and Koon, 1995).

Table 1: Potential benefits of the flipped classroom model

Potential benefits	
Improved student-instructor interaction	Instructors do not talk ‘at’ students, they circulate and talk ‘with’ students
Opportunities for real time feedback	Instructors spend more one-to-one time with students, compared to the traditional classroom concept
Self-paced learning	Students are able to pace their own learning according to their needs.
More meaningful homework	Flipped classrooms alter the nature of homework, by having students practice and apply their learning in the classroom

### THE STUDY

Studies that isolate a particular technology to study its effect on some measure of student achievement find that well-implemented technology use can lead to improved student achievement.

In this study the term ‘flipped classroom’ stands for an inversion of traditional in class learning; all activities traditionally done in class are situated outside classroom; with an in class focus on those activities, traditionally allocated outside the classroom.’ The typical flipped classroom achieves knowledge transfer of fundamental conceptual material via reading assignments and video lectures which students are responsible for before attending the in-person lecture. This lecture then becomes a setting for questions, joint problem solving, and targeted discussion of topics that require more in-depth treatment as well as short, interactive learning experiences that provide individual and group practice along with immediate feedback.’ (Redekopp & Ragusa, 2013).

The instructor has given a master course on management information systems following a traditional instructional approach in 2013 and 2014. In 2015 this master course on management information systems (MIS) was chosen to be re-designed, including flipped classroom elements. The study focuses on the course results in 2013, 2014 and 2015 focusing on the research questions, mentioned below.

Table 2: Section & student structure

Section	Students	Lecture style	Student demographics
1/2013	30	Regular lecture style methodology	Master students business, engineering, IT 2. year
2/2014	42	Regular lecture style methodology	
3/2015	36	Flipped classroom methodology	
Students were given the same course outline in each section including assignments, quizzes, and exams with identically weightings for each activity			

### **Research Questions**

The following research questions were defined for this study: (1) What are students perceptions of the effectiveness of the flipped classroom model related techniques installed for the course? (2) How is student perception of the flipped classroom model aligned with student performance?

Students perception on the effectiveness of the ‘flipped MIS’ course and the relationship between perception and student performance should have been analyzed, to measure the impact of the flipped classroom methods on students achievements.

### **Design and Implementation of a “Flipped MIS” course**

The MIS course selected for re-design, included coverage of fundamental management information systems related topics, focusing on information, data, communication, systems concepts, organizational structures, management basics, planning, decision making, elements of control, performance measurement, information and communication technologies for business and management, applications of ICT in MIS and MIS application.

While conceptual understanding of system related components, management requirements and organizational thinking, decision making and control management could be covered with the traditional lecture based course structure, the application of ICT in MIS and MIS applications in different business areas were a challenge for students in course sections organized in a traditional manner, since there was no practical part in the course to focus on these applications. In the traditional lecture based course structure MIS applications such as decision support systems, executives information systems, expert systems and other tactical and strategic MIS applications were theoretically ‘offline’ introduced.

Students had difficulties to apply their knowledge on MIS applications in their term projects. Students proficiency with tools and MIS applications, as well as their ability to evaluate this kind of systems, comparing, evaluating and choosing alternatives, were often underdeveloped.

One key for successful learning is an aligned curriculum. To re-design the curriculum the following adjustments were done: (a) definition of clear learning outcomes, (b) definition of learning experiences, which should help students achieve the learning outcomes defined, (c) creation of assessment tasks which allow students to demonstrate their achievement of those learning outcomes.

The following assessment tasks were included: short form tests (partly online), short answer tests, essay, performance test, written report, project, presentation, journal.

The course was designed for 14 weeks. Every week 1-2 videos, students watched outside classroom. In class activities: (1) tutorials, (2) case study analysis, (3) group work, (4) assessments, (5) role plays, and (6) practical sessions (Oberer 2015).

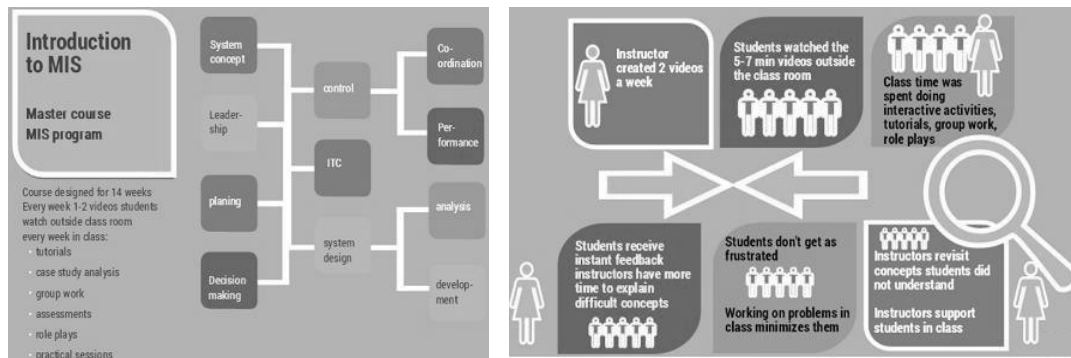


Figure 1: Course design

*Flipped classroom activities:*

**ONLINE LECTURE ASSESSMENT:** Whenever a video-based lecture was assigned, a brief, online, auto-scored, multiple-choice assessment (using Blackboard in our case) was provided to assess students' understanding of the concepts. >> *Students* know their mastery on the topic; >> *Instructors* know what to focus on more detailed in class; >> *Both* can address specific questions of the test in class

**JOURNALS:** Using Blackboard's online Journal feature, students were obligated to provide feedback (for at least one out of every two video lectures) after watching online lectures. Aimed at jumpstarting the students meta-cognitive processes, they were asked to list questions they had, what they found interesting, and what topics warranted more review. Before coming to lecture, the instructor sampled the questions posed in these journal entries and used them to start each lecture with a discussion of the questions and their answers.

*In class activities:*

**IN CLASS PROJECT WORK:** By moving content to video, more in-class face-to-face instructional time was available for projects and other group efforts. Students were often asked to perform pieces of their homework or projects in class where an instructor could roam the classroom monitoring progress, answering questions or addressing issues synchronously rather than hours if not days after students encountered them.

**IN CLASS GROUP ACTIVITIES:** reflecting the topics covered by the two videos each week, students discussed relevant topics in class, and analysed their group findings with their classmates.

**CASE STUDIES:** focus on (1) technologies, (2) companies, (3) innovations

*Out of classroom activities:*

**WRITTEN ASSIGNMENTS:** 2 questions, 1 week time to hand in, instructor feedback, multiple hand in possible.

**WRITTEN REPORTS:** every week students hand in a report containing a summary what they learned the previous week. Reports include a list of open questions, which the instructor should address the week after in class

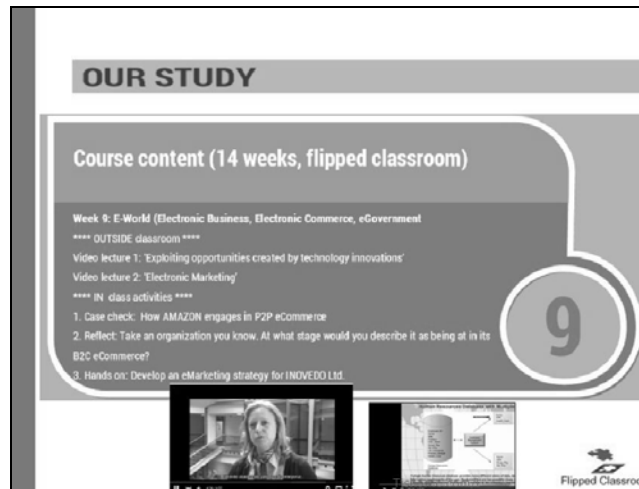


Figure 2: Course content shown for a sample week

### Evaluation method

Students performance was evaluated by defining analytic rubrics. To develop rubrics, (1) learning objects were defined, (2) concepts or skills students need to demonstrate were identified, (3) levels of performance and their point values were defined, (4) criteria for each level of performance were identified and (5) a rubrics framework was developed. The following rubrics were developed: (a) group activity rubrics, (b) written report rubrics, (c) written assignment rubrics, (d) group project rubrics, (e) peer assessment rubrics.

Table 3: Rubrics framework developed to structure evaluation rubrics

Rubrics framework			
Level of performance / criteria for each level	Level 1	Level 2	Level n
Criteria 1			
Criteria 2			
Criteria 3			
Criteria n			

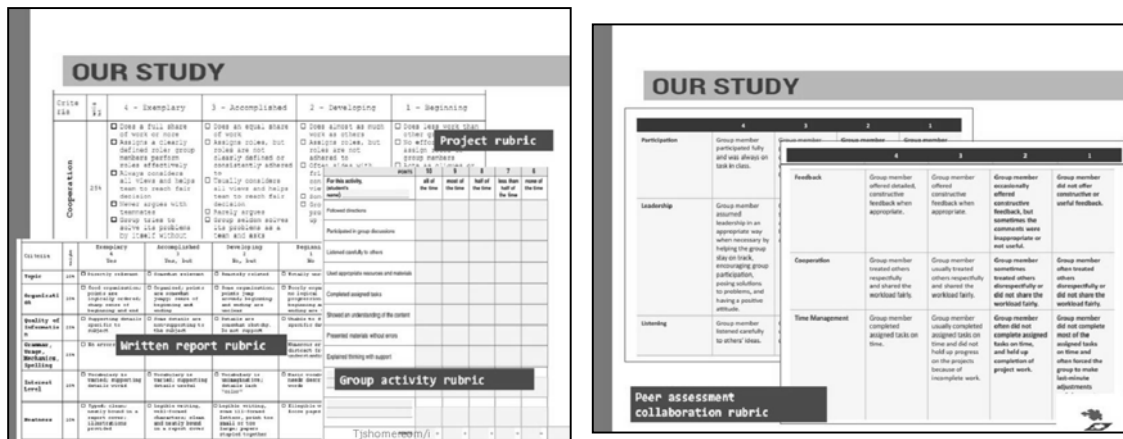


Figure 2: Rubrics developed for evaluating student performance

## RESULTS

There was an expectation that grades would be higher in the flipped classroom based on the literature review findings. The primary findings from this study were that there were grade differences when comparing the flipped class with the two traditional-lecture style classes. Grades for students attending the flipped MIS course were higher than the results of students attending courses with traditional lecture style.

The results of the study revealed that exam results did not differ significantly. Average exam grades were 10.58 (traditional teaching, section 1), 10.48 (traditional teaching, section 2), and 10.86 for the flipped classroom section. This equals an increase of 3.15% on average. Results of quizzes conducted in the classroom increased by 74% from 3.12 to 5.58. The performance on presentations increased from 10.32 to 13.45 which equals an increase of 30.33%. Students achievements on case studies they worked on increased by 22% to 12.99 while project performance increased significantly from 11.56 to 14.99, which equals an increase of 29.67%.

The final grades increased from an average of 68.40 for section 1 to 79.79, which equal an increase of 16.65%.

Table 4: Comparison on course results (overview)

Section	Exam1	Exam2	Exam3	Quizzes	presentations	Case Studies	Projects	Final Grade
(1) non flipped	10.43	10.65	10.67	4.12	10.32	10.65	11.56	68.40
(2) non flipped	10.45	10.33	10.65	3.12	10.99	11.66	11.88	69.08
(3) flipped	10.89	10.67	11.02	5.78	13.45	12.99	14.99	79.79

Table 5: Exam performance

Section	Exam1	Exam2	Exam3	AVG	AVG % increase
(1) non flipped	10.43	10.65	10.67	10.58	+ 3.15%
(2) non flipped	10.45	10.33	10.65	10.48	
(3) flipped	10.89	10.67	11.02	10.86	

Table 6: Performance on Quizzes and Case Studies

Section	Quizzes	AVG % increase	Case Studies	AVG % increase
(1) non flipped	4.12	+ 74%	10.65	+ 22%
(2) non flipped	3.12		11.66	
(3) flipped	5.78		12.99	

Table 7: Presentations and Projects performance

Section	presentations	AVG % increase	Projects	AVG % increase
(1) non flipped	10.32	+ 30.33%	11.56	+ 27.67%
(2) non flipped	10.99		11.88	
(3) flipped	13.45		14.99	

Table 8: Performance Delta table

Section	Exams AVG % increase	Quizzes AVG % increase	Presentations AVG % increase	Case Studies AVG % increase	Projects AVG % increase	Final Grade AVG % increase
(1) non flipped	+ 3.15%	+ 74%	+ 30.33%	+ 22%	+ 27.67%	+ 16.65%
(2) non flipped						
(3) flipped						



### Lessons learned

1	Student understanding of the purpose of the flipped classroom must be properly communicated and students given the opportunity to express concerns about their responsibilities to this new style of learning.
2	Student buy-in must be gained so they will be committed to the learning process.
3	The instructor must be willing to let go of traditional teaching practices and be fully trained in how to effectively implement a flipped classroom as it is not as simple as recording a video and letting students do homework in the class.
4	The instructor must be willing to let go of traditional teaching practices and be fully trained in how to effectively implement a flipped classroom as it is not as simple as recording a video and letting students do homework in the class.
5	It is the intention of the authors to conduct further flipped
6	Classroom experiments once formal procedures for communicating the process to students were defined.

### CONCLUSION

Technology that is carefully deployed in learning can engage and motivate students; it can assist with aspects of professional development that ultimately can lead to better teaching and is an effective tool to improve productivity and efficiency.

Applying the flipped classroom model of instruction, students watch recorded lectures for homework and complete their assignments, labs, and tests in class. Flipped classroom is not a synonym for online videos. The main focus of this models lies on the interaction between instructor and students and the learning activities applied in a face-to-face manner in class.

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