Assessing the impact of just-in-time methodology, in-lecture activities, and tutor-assisted post-lecture activities in the course experience of first year students in Economics at the University of Pretoria

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Assessing the impact of just-in-time methodology, in-lecture activities, and tutor-assisted post-lecture activities in the course experience of first year students in Economics at the University of Pretoria*

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Abstract

This paper focuses on the introduction of blended-learning as applied to lectures in a large first year economics course at the University of Pretoria. The blended learning methodology was aligned with the flipped-classroom approach where the traditional classroom is overturned via interactive student engagement activities. Lectures take place partially or fully outside the classroom via pre-lecture videos, reading assignments and/or podcasts. Lecture time is utilized to assist students in deep learning by doing exercises, peer evaluations and encouraging class discussions. Post-lecture activities consist of consolidation quizzes, assignments and peer networking through social media.

Blended-learning was introduced in the principles of economics course at the Department of Economics in the University of Pretoria in 2012; this paper reports the results for the second semester in 2013 and the first semester in 2014. It was found that students experienced the blended-learning methodology as beneficial in helping them understand basic concepts in economics.

Keywords: Blended-Learning; Just-In-Time-Teaching; Student Perceptions; Large Classroom

JEL codes: A22; I23

* *"Once you engage the students' minds, there's an eagerness to learn, to be right, to master."* Eric Mazur, Harvard University

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1 Introduction

The blended–learning methodology, which includes traditional face-to-face lectures mixed with online activities that are designed to accommodate a wide-variety of students has been transforming the way classes are being taught around the world (Picciano, 2009). With the use of technologies such as online instruction including videos and additional resources, students are now receiving a more active, engaging and interactive education. Despite the increased popularity of the implementation of blended learning at universities, limited academic research has been focused on reporting results obtained from implementing this methodology. Blended-learning still remains a topic better discussed in non-peer reviewed media such as newspaper articles and online blogs. This paper documents, for the first time, the benefits and positive perceptions of the blended-learning methodology as applied to a large economics classroom in South Africa.

For decades, the standard teaching approach in the higher education system around the world has focused on face-to-face lectures accompanied with tutors available for consultation after class and assigned readings from textbook chapters, solely focusing on external learning. Despite the internet revolution and new technologies available that could assist in making education simpler and more interactive by providing flexile access to online resource and course material, the traditional classroom still dictates that each week a number of hours are spent in formal lectures (Butt, 2014). Technologies and different media available in the twenty-first century place considerable pressure on lecturers to reinvent the traditional university teaching methods, where the lecturer focuses in transferring information in the classroom (Mazur, 2009). This wide variety of technologies, which includes television, social-media, presentation software and online podcasts, is believed to have the potential to assist in teaching and learning in a more effective way (Picciano, 2009).

The growing literature on teaching and learning suggests that due to the fact that students originate from different backgrounds, have different personalities, come from different generations, and display different learning styles; today's teaching needs to adapt and use different methodologies such as blended-learning (Picciano, 2009; Tinto, 2006).

With the traditional way of teaching, students are forced to deal with outside-class activities and materials on their own, with little help or guidance available from lecturers (Talbert, 2012). An alternative approach to this traditional methodology is known as Just-in-Time Teaching (JiTT), a teaching and learning strategy based on the flipped-classroom methodology, which is a type of blended-learning where *"... the events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa..."* (Lage, et al., 2000). The JiTT and flipped-classroom methodologies overturn the expectations of a traditional university classroom by including interactive engagement (Berret, 2012).

This paper focuses on evaluating the benefits of blended-learning where, amongst others, the JiTT methodology is applied to lectures in an undergrad-

uate first year economics course (principle of economics) at the University of Pretoria between the year 2012, when it was first implemented, and the first semester in 2014, traditionally taught in eight large-class groups annually every year. During this time, students were guided in the understanding of new concepts through different pre- and post-class online activities such as glossaries and online tests. An investigation into the first group of students will provide and insight into the students' perception of the new system; while the second wave will look more specifically at the performance of the students. It was posited that this blended learning approach would be beneficial to all learners and that it aims to provide students with new opportunities to improve their understanding.

The remainder of this paper is structured as follows. Section 2 will discuss the details of the specific methodologies as well as various applications of blended-learning in other institutions. Section 3 provides an overview of the scope and purpose of the intervention and it describes the data and methodology used. Sections 4 and 5 present the results of the intervention for 2013 and 2014 respectively. Lastly, the conclusions of our research will be presented in the final section of the paper.

2 Literature Review

2.1 *Why these methodologies?*

Recent studies suggest that the traditional-passive way of teaching at university level does not challenge students to think critically, develop writing skills and solve problems by applying theory (Arum & Roska, 2010; McLaughing et al., 2014). Due to the diversification of students in today's globalized world, which includes the usual recent high-school graduates, the older students, part-time students, and international students; today's classrooms are faced with many challenges. Lecturers need to align their teaching to different educational backgrounds, a multitude of perspectives and diverse interests in order to keep students motivated and aid them in succeeding in life after university (Novak et al, 1999). This has prompted the need for research and application of new teaching methodologies, such as blended-learning, which have been proven to engage a wide spectrum of learners (Lage et al, 2000). The JiTT and flipped-classroom approaches allow students to learn concepts on their own and see lecturers as a vehicle that scaffold active and own learning and challenges their way of thinking (McLaughing et al., 2014).

The JiTT and flipped-classroom approaches have been used in many disciplines such as physics, economics, biology and humanities, and have proven to be successful in encouraging critical analysis, positively motivating students and increasing learning gains (Brame, 2012; Lage et al., 2000; Mazur, 2009; Picciano, 2009). Most importantly, these methodologies fall into the category of student-centred approaches, where students are responsible for preparing for class in order to maximize their gains from class discussion and teachers should

facilitate the student's knowledge-building processes (McWilliam, 2006; Ylänne et al., 2006).

2.2 *How has it been done?*

Inverting the classroom has its roots in the case study approach traditionally used by business schools and the humanities disciplines around the globe. Electronic media communication and support is becoming increasingly important as a tool in supporting education and the way it is transferred. Web-based programs and communication tools are increasingly being used in supporting education worldwide. When applying the inverted classroom methodology, the use of online programs is key (Daniel, 2010).

As previously noted, blended learning has been adopted in many disciplines, especially in physics with the work of Prof. Mazur at Harvard University. Mazur (2009) focuses on the philosophy of teaching by questioning. His pioneering work in teaching introductory physics at Harvard University emphasizes on what he dubbed as 'peer-instruction', where students gain first-exposure to key concepts prior to class, then students are tested with in-class quizzes to ensure that these key concepts are understood and face-to-face classes are dedicated to discuss theoretical questions and develop models so students understand how science work (Crouch and Mazur, 2001). Mazur's approach focuses on moving from memorization towards interactive learning. Mazur's studies showed that learning gains from interactive learning notably improve students' traditional problem-solving skills.

Ann Arbor at the University of Michigan used the flipped-classroom model in the Mathematics Department for teaching introductory calculus. Students were encouraged to do the prescribed readings before class and spent in-class time by going through textbooks examples that were then worked-out by students on the blackboard (Berrett, 2012). This method proved to be successful and led to advances in students' understanding of mathematical problems (Berrett, 2012).

The flipped-classroom methodology was also implemented at the University of California (Irvine) in a biology class; at the University of Miami (Ohio) in a software engineering course and; at the Franklin College (Indiana) in a linear algebra course. These interventions suggest that the inverted-classroom methodology successfully leads towards an increase in average marks and improvements in acquiring technical skills (Talbert, 2012).

Looking at examples within the economic-specific literature, it has been reported that most economic departments around the world are using some form of flipped classroom approach where they use internet-based programs to upload videos and activities that are used to support teaching (Daniel, 2010). However, Watts and Becker (2008) report that only six percent of class time in the economics field is dedicated to some type of blended-learning. This argument is confirmed by Goffe and Kauper (2013) who reported that in the economics classroom only 30 percent of class time is used discussing and reinforcing key concepts.

To date, the research conducted by Lage, et al. (2000) remains at the forefront of flipping the economic classroom. The authors, found a mismatch between the traditional teaching style and the student's learning style. In order to engage a wide spectrum of learners, they inverted the classroom in an introductory economics course where students gained first exposure to key concepts outside class by reading important excerpts from textbooks chapters, watching online-videos, online interactive PowerPoint slides and listening to economics podcasts (Lage et al., 2000). To ensure that students were preparing for class, they were required to submit worksheets that were randomly collected and graded. Then, in-class time was spent in mini-lectures, economic experiments and different interactive activities that ensure key concepts and theories were learnt. At the end of the academic year, Lage et al. (2000) found that students taught under the flipped-classroom method were more motivated and obtained higher marks than those under the traditional format.

Other peer-reviewed literature reporting on blended learning and the flipped-classroom methodology within the economics fields includes Yamarik (2007); McGoldricik, et al. (2010) and Chen and Lin (2012). Yamarik (2007) found that students enrolled on a collaborative learning economic classroom scored higher marks than students enrolled in a traditional classroom. The author links this outcome to better lecturer-student interaction, which leads to an enhanced interest in economics. Research conducted by McGoldricik, et al. (2010) suggests that the inclusion of collaborative learning (i.e. blended-learning) in the economics classroom assists in attracting a more diverse group of students into the economics field. Chen and Lin (2012) evaluated the relationship between students' access to online resources in the form of recorded videos and exam performance on a microeconomics classroom. The authors found that students' who access online resources had an improvement on their exam performance of around 4 percent.

Regarding large economics classrooms, Salemi (2009), focused his research in how instructors of large-enrollment economics classroom can engage students by using '*classroom response system transmitters'* (clickers). The author reports on the use of clickers and its relationship with student's engagement in class. Clickers are used by students to respond, in class, to questions given by the lecturers. His results showed that students found the use of clickers as helpful in keeping them engage with the subject. In Salemi and Walstad (2010, 220), it is highlighted, that even though teaching in large-enrollment classrooms can be challenging, the effective use of interactive-learning can lead to a productive learning experience for students while increasing lecturer's satisfaction. Roach (2014) partially flipped a large microeconomics classroom by using online videos as part of the weekly activities conducted in the subject. These videos were compulsory to watch since quizzes and tests written during the semester included material that was only discussed on the different videos. The author focused in reporting students' perceptions toward flipped learning. Results showed, that in general, students perceived the methodology as positive and it helped them learning key concepts in economics.

2.3 *Drawbacks of the Flipped-Classroom Methodology*

As with every teaching methodology, the different blended-learning teaching strategies have their drawbacks. Firstly, preparing videos and quizzes to be uploaded online for students to watch and to respond to can be time consuming, especially to faculty members who are expected to focus on research and publishing academic papers (Talbert, 2012). Flipping the classroom can be labour intensive for faculty members who do not have teaching support, however, depending on availability of administrative staff, time constraints can be limited. In big classes where more than one lecturer teaches the burden can be shared. In the case of the principles of economics course at the University of Pretoria there was a course coordinator appointed (with no teaching responsibilities) whose main responsibility was to prepare the flipping activities and find the relevant videos to use, this eliminated the burden of preparing videos and questions on other lecturers.

Secondly, it demands that lecturers should be enthusiastic and knowledgeable in the field they are teaching, so they can answer questions from students during in-class meetings and to be able to guide them in processing information that might still be unclear (Berrett, 2012). The main concern with the inverted classroom technique is that students, who are used to the 'traditional' way of teaching, might feel that they are left alone to learn the important material of the course, hence the importance of lecturers actively engaging with students during the in-class meetings (Talbert, 2012). In the case of South Africa, not all students have access to fast Internet, which may affect their ability to take full advantage of the benefits of the blended-learning methodology in general and the JiTT methodology in particular.

Despite these possible pitfalls of the blended-learning methodology the application of this technique can bring great benefits into university classrooms. As the literature shows, more interactive classrooms are more effective in the transfer of knowledge where students are actively learning and applying new-knowledge to real issues (Mazur, 2009; Talbert, 2012). It is important to note that blended-learning, especially the JiTT, does not intend to eliminate face-to-face lectures. Therefore, this methodology should not be confused with distance learning. JiTT is simply a teaching and learning approach that mixes web-based study assignments with an active learner classroom; thus, most of the JiTT instruction occurs in a classroom with lecturers and students actively interacting (Berret, 2012; Novak et al., 1999)

3 Data and Methodology

This section aims to describe the movement from the traditional classroom towards blended learning in the Principles of Economics course at the University of Pretoria. It includes a description of the course pre blended-learning, the redesigning of the course and the JiTT format implemented.

3.1 *Just-in-Time Teaching Methodology Applied to Economics Students*

The current methodology applied in the course experience of first year students in the Department of Economics at the University of Pretoria aims to use the blended teaching and learning strategy. Students are guided in understanding new concepts and are helped through different pre- and post-class online activities such as glossaries and online tests to revise and apply core concepts and theories.

More specifically, the Department of Economics is implementing the JiTT technique, where via ClickUP (Blackboard web-based learning management system) first year students enrolled in the EKN110/120 Principles of Economics course respond to glossaries, online questions and tests before and after class, and they get immediate feedback to allow them to recognize and revise core concepts. The glossaries used in our methodology focused on definition of key concepts aimed to prepare students for the topic/chapter that was going to be discussed in class. Prior to class, students were given a sheet containing a table with key concepts that needed to be completed. The left column of the table included the name of the key concept and the right column was left blank for students to answer.

The JiTT methodology, as applied to the Principles of Economics course at the University of Pretoria, can be linked to the work of Meyes and De Freitas (2005), which suggests that teaching should be applied in a conceptualized cycle which is comprised of three stages. Firstly, the conceptualization stage, where the students are exposed to new concepts and ideas. Secondly, the construction stage, where students are given the opportunity to apply these concepts by doing practice assignments, glossaries, etc. Lastly, the dialogue stage also known as the learning stage, where concepts are discussed and revised in class.

While the traditional approach to teaching can be qualified as 'external learning' where knowledge is passed from a lecturer to students through face-to-face lectures and reading of textbooks chapters by focusing on the logical, rational, quantitative and theoretical aspects of the learning; the blended-learning methodology that is being applied at the Department of Economics represents a move towards 'interactive learning' where teaching is focused on discussions and hands-on activities, which include the completion of glossaries, watching of videos and class discussions; where the student can learn, discuss and have opportunities to get verbal feedback and encouragement from the lecturer. This current approach is more experimental and interpersonal where group discussions are promoted, that is, the sharing and expression of ideas and learning is more personal (De Boer et al., 2001).

3.2 *Course Redesign*

The redesigning of the Principles of Economics course was inspired by a need to adhere to the best educational international practices in order to enable our students to be prepared to work anywhere in the world. Additionally, this

was motivated by an aspiration to transform the educational experiences of the students and to meet their request for enhanced in-class active learning. In line with the research done by Lage et al. (2000), Novak et al. (1999) and McLaughlin et al. (2014), the main goals of the course redesign were to: 1) improve students learning experience and develop them as critical thinkers; 2) exploit the efficacy of each classroom session; 3) gain maximum learning benefits by using out-of-class activities; and 4) engage lecturers and students throughout the learning process aiming to create team spirit.

3.3 *Course Description*

The Principles of Economics EKN110/120 course is a compulsory module for all first year students who are enrolled in the Faculty of Economics and Management Sciences and the Faculty of Law at the University of Pretoria. It has approximately 2500 enrolments on average every year; students are divided into 8-10 groups leading to a large classroom of at least 250 students. The first semester module, EKN110, focuses on microeconomics; while the second semester module EKN120, focuses on macroeconomics.

In the years prior to the course redesign, the principle of economics module was presented using a traditional classroom approach. This approach consisted of three 50 minute lectures per week supported by the availability of tutors for consultation throughout the week. Consulting tutors was not compulsory and was left to the students' discretion. The assessment consisted of two semester tests that accounted for 50 percent of the final mark, and a final exam, which accounted for 50 percent of the final mark. To gain access to the final exam, students needed to have at least 40 percent in the semester mark.

3.4 *JiTT Format*

The JiTT blended-learning approach used in this study started taking place in 2012. This analysis focused on two waves of students: Semester 2 2013 (July - November) and Semester 1 2014 (February - June).

Teaching times arrangements under the blended-learning format were kept as three 50 minute lectures presented per week. In the physical domain, lectures were designed to incorporate theoretical discussions, practical applications and exercises as well as inciting critical thinking through engaging activities during class. In the virtual domain, important information, offloaded material, online quizzes and announcements were communicated through ClickUP (Blackboard LMS), a web-based management system. Students could access ClickUP at any time on any computer or internet-enabled device. Students attended an orientation week before classes started. In this orientation session, students were informed of the educational approach that the course would be taking and the rationale behind this approach. A comprehensive study guide detailing the administrative procedures, assessment criteria and study outcome was distributed and offloaded to ClickUP.

As shown in Figure 1, the activities required by students to engage this course were sorted in three sessions: 1) pre-lecture; 2) during-lecture; and 3) after-lecture. Pre-lecture activities were designed to help students familiarize themselves with the chapter to be presented in the specific week. Students were advised to summarise and take notes of each chapter in advance; this allowed them to benefit fully when the topics were discussed in class. Students were not required to submit these summaries as it did not contribute towards the final mark; however, students were advised of the advantages they will get by completing them. Videos and relevant material related to the topic of the week were posted for the students in ClickUP. Two lecturers in the department created videos for two important concepts (opportunity cost and diminishing marginal utility); the rest of the videos used in the course were downloaded from available sources such as YouTube. The course is taught in both English and Afrikaans, however, due to time and labour constraints, videos were created only in English

Although prior knowledge in economics is not a requirement to enrol in the principles of economics course, a certain level of text comprehension and calculus is required. To make sure that each student was ready to start with the course, a section called "Getting Started" was designed as part of the pre-lecture activities. This section was created to evaluate their knowledge and ability to summarise and write notes. The "Getting-Started" activities consisted of:

1. Reading Task: this included instruction on how to take notes, based on that, students needed to submit their notes. This was the only way to check if students knew how to take notes.

2. Math Revision: for this part, a small quiz was created to help the students assess their capabilities on the material. Students were given a revision chart and they needed to answer and submit related questions.

The during-lecture activities focused on the face-to-face component of the course. On average, the lecturers presented one chapter as a thematic session across three lectures per week. For each chapter, a set of PowerPoint slides was posted in ClickUP. Students were advised to take notes during class and improve the ones from their preparation by consulting the presentation slides.

The after-lecture activities were designed to take form of on-going online assessment through ClickUP. These assessments helped the students in keeping up with the course and master material of the relevant study themes before progressing through to more complicated concepts. This online assessment took place after the completion of a chapter and covered topics from that chapter. This form of assessment contributed towards the semester mark. Additionally, students were provided with answers to selected end-of-chapter questions and the completed glossaries.

3.5 *Assessment Structure*

Re-structuring the assessment criteria was central to the implementation of the blended-learning methodology. The online pre- and after-lecture activities assisted students and lecturers in identifying areas that needed to be reinforced or revised during lectures. The semester mark for the course was calculated as follow: pre-lecture activities counted 5 percent towards the semester mark; after-lecture activities (online testing) 20 percent; semester test 1 (multiple choice questions) 30 percent, and semester test 2 (written and multiple choice questions) 45 percent. The final mark in the course was calculated as follows: semester mark 50 percent and final exam mark 50 percent, students needed a semester mark of at least 40 percent to gain entry into the final exam. A final weighted mark of 50 percent was needed to pass the course.

4 Course Outcomes: Second Semester 2013 (July – November)

In 2013, the blended-learning based EKN120 course was delivered to 2204 students. As indicated in Table 1, only 222 students (10%) were Economics or Econometrics students. Class attendance was recommended but not compulsory. Students were divided into 10 groups; the aim was to group students by degree and also by preferred language of instruction. In order to evaluate students' performance and perception of the blended-learning, we administered an extensive questionnaire at the end of the semester; participation in the pre- and post-lecture activities was compulsory, however, answering the questionnaire was voluntary and anonymous. 298 students out of the 2204 enrolled students answered the questionnaire.

The questionnaire was administered via ClickUP; it consisted of 85 multiple-choice questions which aimed to collect students' demographic information, perceptions of pre and after-lecture online activities and their preference for the blended-learning teaching approach. Since the questionnaire was answered anonymously, the demographic data could not be linked to the student's performance in the course.

4.1 *Description of the sample*

Table 2 presents the demographics of the sample, of those who answered the questionnaire; while Table 3 displays the specific education profile and characteristics of the students who answered the questionnaire.

Out of the 298 students who answered the questionnaire in 2013, it was shown that 81 were male, 130 were black, 124 were white, 64 spoke English as a first language, 231 were first-year students, 22 took economics as a subject at school and only 10 were repeating the subject.

In 2013, there were only a small percentage of students repeating EKN120 (only 13 percent); and most students did not take Economics as a school subject

(around 71 percent). Most students, around 77 percent, took EKN120 because it was a compulsory subject. It was noted that 60 percent of students took the 'new' National Senior Certificate (revised Matric certificate) and 26 percent the 'old' Matric certificate.

4.2 *Perceptions of the blended-learning approach*

Based on analyses of the detailed biographical information, the assumption was made that the data obtained from the group would be representative, reliable and valid. An analysis was then made of the perceptions on the pre- and post-lecture activities of the enrolled students on the blended-learning approach as applied in 2013.

As shown in Figure 2, 29 percent of surveyed students reported spending between 21 and 40 minutes doing before-lecture activities. Only 10 percent of students reported that they spent more than 40 minutes doing before-lecture activities. Figure 3 shows, that 27,85 percent of surveyed students spent between 21 and 40 minutes participating in post-lecture activities, while only 7.38 percent of students spent more than 40 minutes. In accordance to the literature (Lage et al., 2000; McLaughlin et al., 2014), these types of answers are indication that students are used to the traditional classroom but are adapting to the blended-learning approach.

Table 4 below, shows that around 31 percent of respondents answered that the pre-lecture activities were helpful and assisted them in understanding the basic economic concepts that were studied in the course. Also, more than 35 percent of students believed that the post-lecture activities helped them with other modules and were useful in better understanding the course. Overall, students showed positive attitude towards the blended-learning teaching approach.

Qualitatively speaking, these results demonstrate a positive perception of the blended-learning teaching approach. Out of the 298 students who answered the questionnaire, more than 30 percent found the pre-lecture activities to be helpful in allowing them to better understand the module and the lectures while only 3 percent of respondents found that the post-lecture activities were a waste of time. Students indicated that the JiTT methodology could be perceived as a positive approach to the university classroom since it provides a good mixed between face-to-face lectures and individual-learning. As expected, students favoured a balance between active classroom activities and the traditional classroom. As suggested by the literature (Butt, 2014), we believe that the inclusion of online pre-lecture activities alongside face-to-face lectures further encourages the completion of after-lecture activities and serves as a good tool for student engagement.

5 Course Outcomes: First Semester 2014 (February – June)

As shown in Table 1, in 2014, EKN110 was delivered to 2441 students. Of the total enrolled students only 231 were Economics or Econometrics students; and 608 students chose Afrikaans as their language of instruction. As in 2013, class attendance was recommended but not compulsory and students were divided in 10 groups according to their degree and preferred language of instruction.

In 2014, the same blended-learning structure that was implemented for EKN120 in 2013 continued. At this stage, we decided not to administer a questionnaire but rather track students' performance by evaluating the progress on their marks; this was achieved by checking their access to ClickUP and their participation in online activities. The reason for that was that we wanted to investigate the performance of the students in relation to the new methodology and not only their perceptions. Therefore, we took a performance approach rather than a perception one to evaluate the success of the JiTT methodology in 2014. It is important to note that this second wave of students were new to the university and did not have previous experience with the blended-learning methodology. Also, the same textbook was used, 80 percent of the staff was the same as before and students were given the same semester test and exams opportunities. The only change made in the teaching methodology was the introduction of extra pre- and post- learning activities compare to when the methodology was first introduced in 2011

5.1 *Progress mark reports*

In 2014, students received two different progress marks reports during the semester. These reports aim to: 1) congratulate and encourage students that had above average marks to continue working hard on the course; 2) to warn students who had below average marks that they needed to work harder the rest of the semester; and 3) to encourage students that were at risk of failing the course to study harder and seek assistance from their lecturers and tutors.

The first progress mark report was sent in April 2014, after the first semester test marks were available. As shown in Table 5, by the time the first progress mark report was sent, the average mark on the course was 60 percent. There were 239 students with marks below 35 percent; 315 students at risk of failing the subject; and 1917 students that were on the right track to pass the subject with marks mostly above average. After the first progress mark was sent to students, the quality of videos and other pre-lecture activities was improved in order to assist students in improving their study skills and better their marks.

The second progress mark report was sent in May 2014, after the marks for the second semester test were available. As shown in Table 5, the average mark for the course increased to 65 percent. Overall, there were fewer students at risk of failing the subject and more students on the right track to pass the subject with above average marks.

Overall, as shown in Table 5, there was an improvement in marks between progress mark 1 and progress mark 2. As seen in figures 4 and 5, after receiving the reports on their marks, students started accessing ClickUP more. Additionally, more students were consulting the tutors and lecturers after class. This indicates that the blended-learning methodology was successfully helping students.

It can be concluded from Table 6 below that, overall, the improvement of the progress mark report was positive. Around 65 percent of students enrolled in EKN110 increased their marks after the first progress mark report.

5.2 *Relationship between access to ClickUP and marks*

As mentioned above, to evaluate the effectiveness of the blended-learning methodology and the use of pre- and post-lecture activities, we tracked students' performances and their access to online activities on ClickUP. As expected, the more students participated in pre- and post-lecture activities and utilize the online resources available, the higher the marks they obtained. This relationship is clearly shown in Figures 4 and 5, where ClickUP access (the times that students access the online facility) is plotted against students marks for both progress mark 1 and progress mark 2 respectively.

As mentioned above, the students analysed in this second wave were new students that have never experienced the blended-learning methodology and online ClickUP system before. It can also be argued, that by the time students received the second progress mark they had a better understanding of the system and the methodology and this might have contributed to the improvement of their online participation and marks.

6 Conclusion

This paper studied the introduction of blended-learning in the form of Just-in-Time Teaching in the principles of economics course at the Department of Economics in the University of Pretoria for the second semester in 2013 and the first semester in 2014. In 2013, students were surveyed at the end of the semester to obtain their views and perception on lectures in general and the blended-learning structure. Overall, students viewed the blended-learning methodology as positive and beneficial in helping them understand basic concepts in economics. Around 35 percent of those students who answered the questionnaire showed a positive attitude towards the blended-learning methodology. In 2014, students' participation in prescribed-online activities was monitored and it was found, as expected, that the more students participated in pre-class activities and utilize the online resource, the higher the marks they obtained. Only 3 percent of students believed that blended-learning was a waste of their time.

Literature shows that the blended-learning methodology has proven to be successful in changing the perception and somehow the performance of students. This methodology provides incentives for students to prepare for class,

allow lecturers to assess student understanding on an on-going basis and focus on exploiting their cognitive activities. While using the available technologies in today's world such as internet, videos and online-blogs; blended-learning teaching is reinventing the traditional passive teaching methodologies where lecturers are simply transferring information to students via in-class lecturing towards interactive-learning where teaching focus on reinforcing knowledge and encouraging students to construct their own understandings. This approach does not involve sacrifice of course coverage relative to the traditional classroom.

The Principles of Economics course at the University of Pretoria continues to improve throughout the years by introducing other aspects of the blended learning approach (self-assessment systems for the students to engage before and after the learning in class) as well as more interactive communication with the students outside class in the form of continuous (weekly) course and understanding evaluation surveys. However, taking into account the descriptive approach of this paper, we acknowledge that in the years to come, we should focus on having a more detailed study and interpretation of the student's participation in pre- and post-lecture activities in order to better understand the role of blended-learning on their marks and understanding of the material that is being taught. We also acknowledge, that before blended-learning can be adopted as the mainstream teaching methodology in economics, more research quantifying its success needs to be done.

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Table 1: Statistics for EKN120 2011-2013 and EKN110 2014

Year	Total Students Enrolled	Gender: Female	Gender: Male	Language of Instruction: English	Language of Instruction: Afrikaans	Economics and Econometrics Students	Non-Economics Students
2011	2512	1432	1089	1757	755	156	2356
2012	2322	1225	1097	1716	606	206	2116
2013	2204	1202	1002	1664	540	222	1982
2014	2441	1387	1054	1895	546	348	2093

Table 2: Demographic characteristics of students (who answered the questionnaire) that completed the EKN120 Principles of Economics course in 2013 at the University of Pretoria

Demographic Characteristic	*2013 (n=298)*
Gender	
Male	27.18%
Female	71.14%
Unanswered	1.68%
Race	
Black	43.62%
Coloured	3.02%
White	41.61%
Indian	6.04%
Unanswered	5.71%
Home Language	
English	21.48%
Afrikaans	28.19%
Zulu	7.72%
Xhosa	2.69%
Tswana	4.70%
Other Official South African Language	18.12%
Other European (German, French, Italian, Greek, etc.)	2.69%
Other Asian (Chinese, Japanese, Korean, etc.)	0.33%
Other	5.03%
Unanswered	9.06%

Table 3: General education information of students that completed the EKN120 Principles of Economics course in 2013 at the University of Pretoria

General Education and EKN110/EKN120 Related Questions	*2013 (n=298)*
Repeat EKN120	
No	90.23%
Yes	3.36%
School Certificate	
Matric	26.51%
National Senior Certificate	60.07%
Abitur (13 years)	0.00%
Combi - Abitur (12 Year NSC/Abitur Combination)	0.67%
HIGCSE	0.34%
A-Level	3.69%
Other	1.01%
Unanswered	7.72%
First year at university	
Yes	77.52%
No	13.09%
Unanswered	9.40%
Chosen medium of instruction	
English	67.11%
Afrikaans	22.82%
Unanswered	10.07%
I studied EKN110 because…	
It is a compulsory module for my degree (other than Economics)	80.20%
I am enrolled on a degree in Economics	5.37%
I was interested in the subject	3.69%
Unanswered	10.74%
At school	
I took Economics as a school subject	7.38%
I took Economics as a school subject but it did not help at university	2.69%
I took Economics as a school subject but it helped me a lot at university	7.38%
I did not take Economics as a school subject	71.48%
Unanswered	11.07%
After studying EKN110	
I continued with EKN120 only because I must	76.85%
I am now more interested in Economics than in the first semester	10.07%
I am now considering switching to a degree in Economics	1.68%
Unanswered	11.41%

Table 4: Blended-learning perceptions and the "getting-started" activities

Blended Learning Related Questions	***2013 (n=298)***
Doing the ClickUP pre-lecture exercises: Getting started in EKN110	
The pre-lectures exercises helped me a lot to identify the main issues in the lecture and follow the lecturer better	15.44%
The pre-lecture exercises helped me a lot to follow the lecturer better	16.44%
I completed the pre-lecture exercises but was not quite sure of the purpose	17.79%
Pre-lecture tasks and assignments are not a great help to make me understand the lecturers better	11.07%
I did not have time to do the pre-lecture exercises - I am just surviving	10.74%
I took EKN120 before 2013, when there were not pre-lecture activities	1.01%
Unanswered	27.52%
The post-lecture exercises helped me consolidate the chapter and understand it better	
The idea of post-lecture work as a strategy has helped me with my other modules as well	9.40%
Doing the post-lecture exercises helped me look back and understand issues better	25.84%
I will do post lecture exercises, just in case I need them for the examination	18.79%
I did do the exercises because I must	13.42%
Post-lecture exercises are a waste of time	3.02%
Unanswered	29.53%

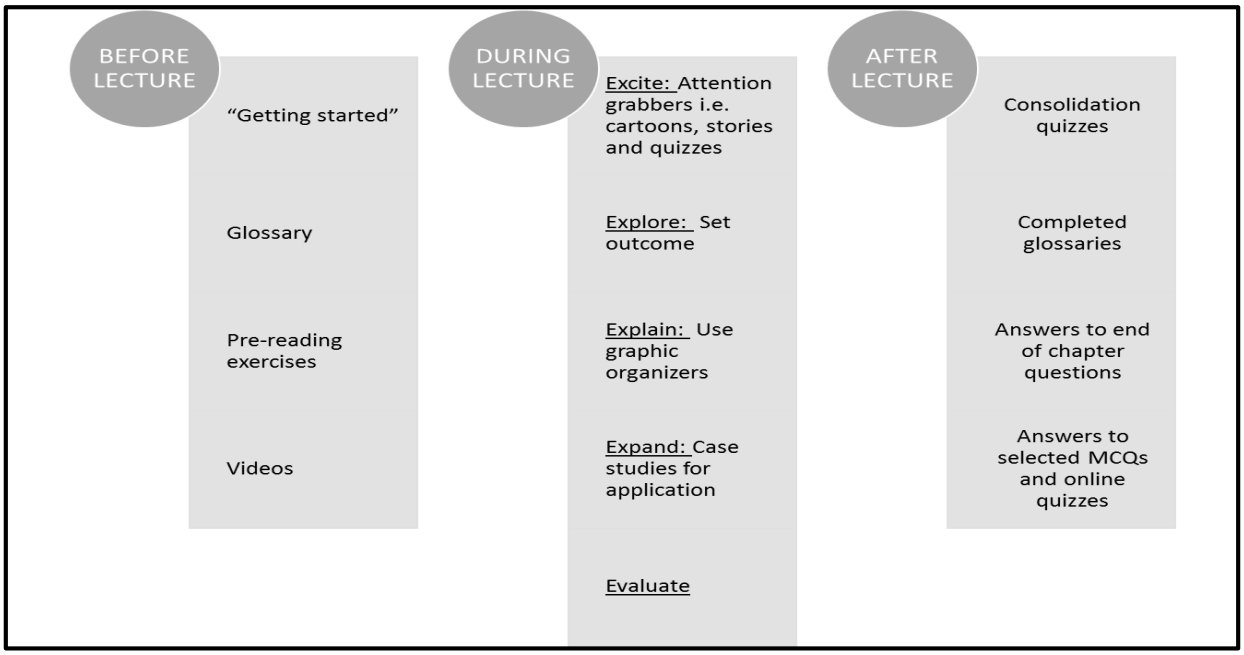
Table 5: Progress Mark Report

	Progress Mark 1 (April 2014)	**Progress Mark 2 (May 2014)**
Average	60%	65%
Min	0	0
Max	99%	97%
0-35%	239	130
36-49%	315	108
50-74%	1324	1534
75-100%	593	713

Table 6: Differences between Progress Mark Report 1 and 2

Number of students that increased their progress mark	1612 out of 2479	65%
Number of students with average progress 1 mark from 10-49% that are out of risk now	325 out of 450	72%
Number of students that decreased their progress mark	820 out of 2479	33%
Number of students that fell in risk in progress mark 2	4 out of 1977	0.20%

Figure 1: Just-in-Time Teaching format for Principles of Economics (EKN110/120)



Source: Adapted from Eisenkraft (2003)

Figure 2: Average time spent in before-lecture activities

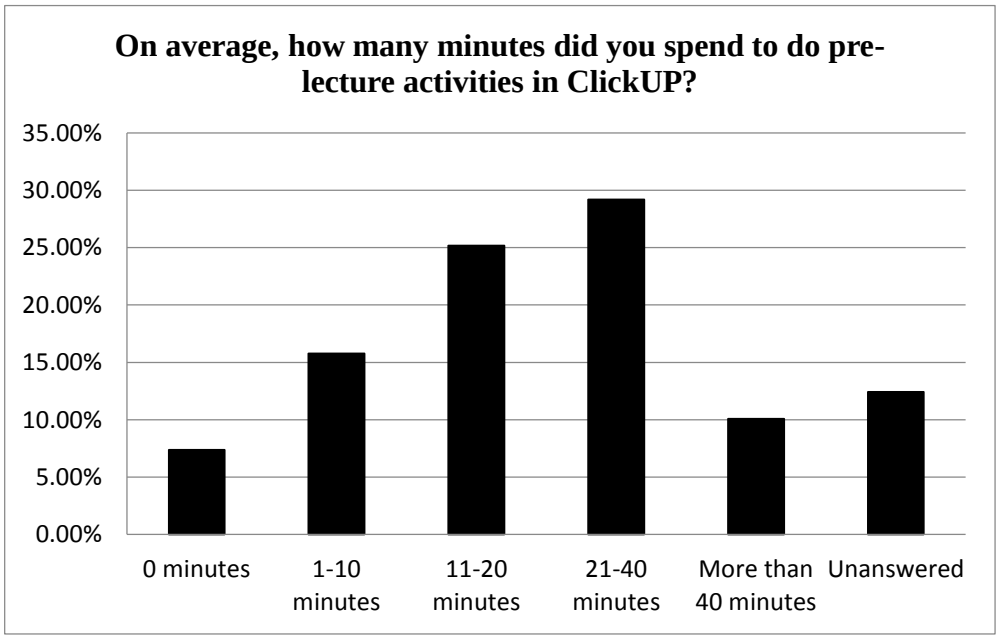


Figure 3: Average time spent in post-lecture activities

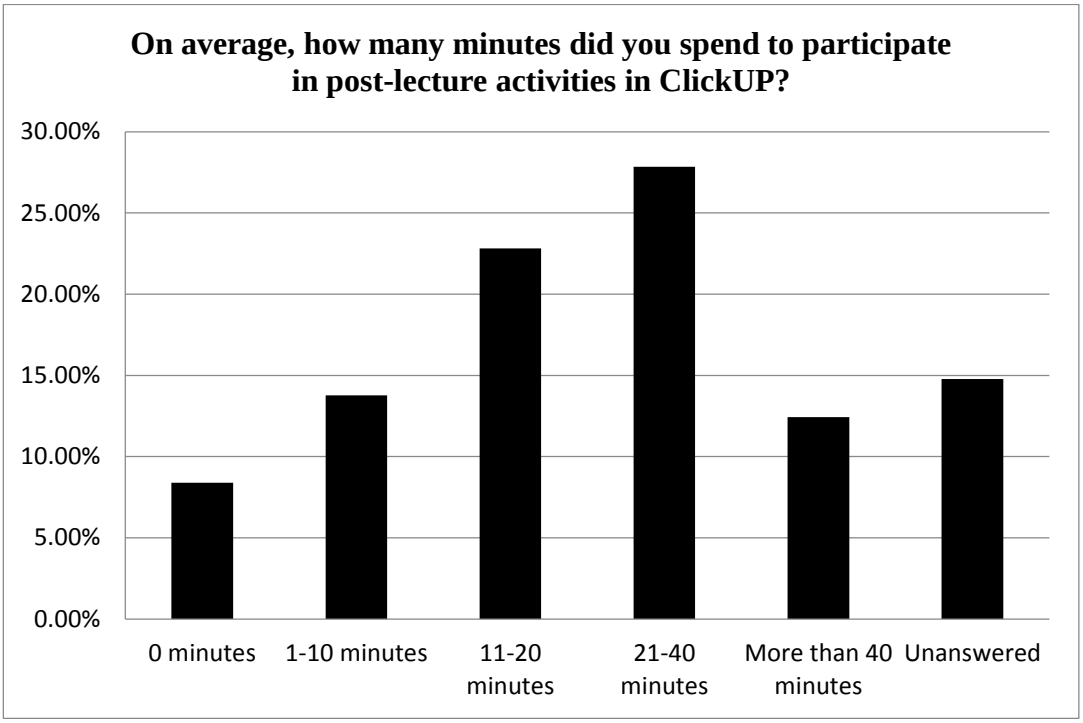


Figure 4: EKN110 2014 course analytics, first progress mark

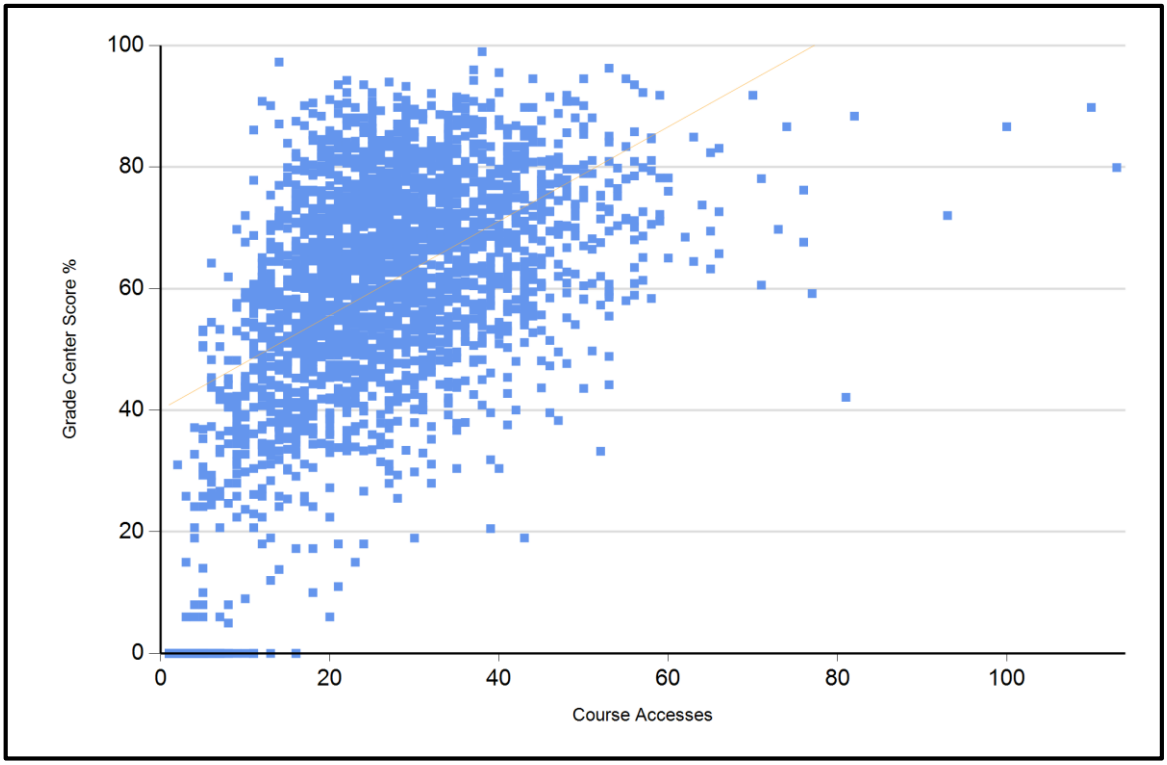


Figure 5: EKN110 2014 course analytics, second progress mark