FLIPPED LEARNING ENABLER PLATFORM : FOR UNIVERSITI TEKNOLOGI PETRONAS (UTP) ENVIRONMENT

BY

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BACHELOR OF TECHNOLOGY (HONS) BUSINESS INFORMATION SYSTEM

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this paper, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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NUR AQILAH BT MUHAMMAD NUR AZAM

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Abstract

The Flipped Learning offers a great use of technology - especially if it can divert lecture out of the classrooms and into the hands and control of the learners in this projects' context, the students of UTP. The Flipped Learning videos have a place in the models and cycles of learning proposed by educational psychologists and instructional designers. Providing educators with a full framework of how the Flipped Learning can be used in their educational settings will increase its validity for educators and their administrators. Hence, this project will look into the feasibility of developing a framework for implementing flipped learning in UTP and tackle the challenges associated with that. The subject-focussed of this project are the lecturers and course instructors of UTP who will be the executor of flipped learning in UTP. Aiming at providing a cost free solution with ease of access and straightforward user interface, this project looks into developing a platform with guidance in implementing constructed flipped learning for lecturers and instructors of UTP. This user-guiding platform will model and enable the flipped learning method into the education system of UTP. This project paper outlines the development of Flipped Learning enabler platform that guides lecturers and instructors in implementing flipped learning wholesomely in UTP.

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Chapter 1

1. Introduction

1.1. Project Background

In traditional learning environments in higher education, lecturers have limited class hours to fully deliver new topics and concepts. Due to time constraint, students and lecturers engagement in discussing the new topics or concepts is restricted. Within the limited class hours, lecturers could not attend to all students personally to establish good understanding towards the given subjects. These constraints limit the teaching-learning process. Hence, the flipped learning has emerged as a new teaching-learning methodology to address the issues mentioned above.

Flipped learning as per outlined by Flipped Learning Network (FLN)(2014), is a pedagogical approach that shift teaching-learning focus from group oriented to individual oriented learning zone, whereby flexibility of student-centered, self-paced and multimodal approach to learning are made possible. It is also followed by an in-class dynamic and interactive group learning environment guided by the instructor as students apply the concepts and engage creatively in the subject matter. Flipped learning are not to be confused with flipped classroom whereby flipped classroom may be implemented by simply instructing students to read text outside of class, watch supplemental videos, or solve additional problems (FLN, 2014). Flipped learning involves a holistic approach in integrating important grounds as a foundation for an effective flipped learning implementation which will be discuss further in this paper.

A typical flipped learning implementation involves the students learning the topic by themselves through video lessons prepared by lecturers according to their own pace and time outside class. With no pressure of competing with their peers and the ability to repeat the lessons up to their understanding certainly boost student's participation in active learning activities with the aim to deepen their understanding of the topic and lecturers. Class time is dedicated for discussion and constructed activities to test student's understanding and ability to apply the knowledge learned. This teaching-

learning methodology promotes student-centered learning and collaboration through in-class engagement in projects and assignments. Unlike traditional classroom models, flipped learning gives the flexibility and freedom of access to video lectures for student to refer to at any time they want. Thus, providing an effective learning experience for students.

Flipped learning has been successfully implemented in many institutions worldwide, extending from high schools to higher education institutes (FLN, 2014). Though, flipped learning is a fairly new concept in Malaysia, higher education institutes like Universiti Malaysia Terengganu (UMT), Universiti Pendidikan Sultan Idris (UPSI), Universiti Kebangsaan Malaysia (UKM), Universiti Malaysia Sabah (UMS), and International Medical University (IMU) have started employing this method in their education structure (Embi, 2014). In this paper, we will look into enabling flipped learning approach into the teaching-learning structure in Universiti Teknologi PETRONAS (UTP). Consistent with UTP's mission whereby to expand the frontiers of technology and education, flipped learning will persistently integrate technology into education and vice versa if embedded into its education system.

This project focuses on implementing flipped learning in UTP and tackles the challenges associated with that. The subject-focussed of this project are the lecturers and course instructors of UTP who will be the executor of flipped learning in UTP. Aiming at providing a cost free solution with ease of access and straightforward user interface, this project looks into developing a platform with guidance in implementing constructed flipped learning for lecturers and instructors of UTP. This user-guiding platform will model and enable the flipped learning method into the education system of UTP. FLN (2014) suggested several platforms in making lectures videos such as Explain Everything and Microsoft Movie Maker. However, this platform focuses on video making and editing. Our aim is to provide a platform that guides lecturers and instructors in implementing flipped learning wholesomely in UTP, as per mentioned before it is extended beyond just having students watching video outside class.

Flipped learning itself is already a very established research area. Hence, this project will focus more on adaptation of flipped learning in UTP environment alongside with development of Flipped Learning Enabler Platform to assist and guide lecturers and course instructors in pursuing flipped learning approach in their teaching method.

1.2. Problem Statement

In traditional learning culture within the context of higher education, lecturers and course instructors control the learning environment including the pace of teaching and how classes are being carried out. Traditional learning culture is not student-centered and student's engagement in class is almost unneeded. It lacks individualized learning, guidance and hands on activities, as well as having low academic expectations and academic supports (Bromley et. el, 2009). Bromley et. el(2009) further discussed the failure of traditional teaching method in education, based on their studies of American's educational system, is that most secondary education systems offers a one-size-fits-all educational methodology. In the current systems, students are expected to pass and meet a predetermined academic achievement instead of emphasizing towards expectations for growth and learning (Bromley et. el). The same assumptions are relevant in UTP. Although having multiple approaches in teaching-learning method within the institution, many courses in UTP are still using traditional learning culture. Flipped learning gives numerous potential in improving the learning culture in UTP. Hence, we will look into how flipped learning will resolve issues of student participation in class and promotes effective learning to enhance performance of students in class.

Flipped learning utilizes technology to deliver the lectures and other learning materials prior to the actual class (FLN, 2014). Focussing on video-based constructed flipped learning context, making and editing videos can be a tedious process for lecturers and are prone to add workload to lecturers. With abundance of video editing software in the market, which would be the most suitable to be used in enabling flipped learning? And would it be cost effective to purchase this software? However, that would actually be the least of the concern in ensuring effective implementation of flipped learning. This is because, taking into consideration that not all lecturers are

tech-savvy, usability of the software can be an issue. In addition, most of this software has plenty of added features that might not be of use to making flipped learning lecture videos. We are looking into a cost free, highly accessible platform with intuitive user interface and features that fits to flipped learning approach in assisting UTP's lecturers in realizing flipped learning into their teaching method.

Furthermore, flipped learning is not just about instructional videos on their own, but their integration into the overall approach which makes the differences in teaching-learning environment (Tucker, 2012). Making the lectures videos is only one part of it; lecturers need to be guided on how to properly deliver the videos to the students. Not only that, the question of what happened next after watching the videos need to be addressed by the lecturers in providing a constructed flipped learning to students. A manual to facilitate lecturers on preparing activities and in class discussions would be beneficial to ensure a structured implantation of flipped learning.

1.3. Objectives

1. To determine the area of flipped learning suitable to be adapted in Universiti Teknologi PETRONAS (UTP) environment.

   This paper will look into the concept of flipped learning and its various methods to identify methods that are suitable in higher education framework and the approach that best fit UTP environment. The pros and cons of flipped learning implementation in UTP will also be analysed. This is to maximise the potential of flipped learning in UTP as well as tackling the downsides and challenges that comes with it.

2. To build flipped learning enabler platform that can assist instructor to implement flipped learning in their courses.

   Focusing on developing a platform directed to lecturers and instructors to be guided in implementation of flipped learning in their courses, this project aim to produce flipped learning platform with features such as simple yet intuitive user interface, ease of access and use alongside with providing guidance and information with regards to the subject area. The hardware and software requirements and the development process will be identify and described in this paper.

3. To test the usability of the Flipped Learning Enabler Platform.

   This project will also look into the evaluation of the Flipped Learning Enabler Platform whether it satisfies the specified requirements or not. System Testing and Acceptance Testing is done to assess the usability of the Flipped Learning Enabler Platform for UTP environment.

1.4. Scope of Study

In this project, we will focus on the constructed video-based learning method of flipped learning whereby lecturers record and narrate screencasts of the topic and/or videos of themselves teaching the topic. The fundamental is that the video is made and deliver by the lecturers themselves and not from secondary sources such as videos from online learning academy.

A full implementation of flipped learning model is intended for UTP whereby each structure of flipped learning methodology is followed and implement into the UTP teaching-learning environment. However, in testing the impact of flipped learning in UTP environment, we will limit the implementation to six to seven courses involving one lecturer and a class of students per courses. In addition, flipped learning approach will not be implemented throughout the whole course; instead, this project will focuses on implementation in two to three topics of the course which can be best taught through flipped learning. Extended implementation to all other courses in UTP, covering majority of the topics within the courses will be recommended for future research.

Although the study of flipped learning effectiveness in UTP focuses on how student responded to the flipped learning experience and how lecturers perceived the process of carrying out flipped learning lessons, the platform development are lecturers/instructors centered. Hence, the main focus is to deliver a flipped learning guidance platform that is easy to understand which enable video editing function that focuses solely on teaching purposes. With that outline, the functionality of its video editing features will be limited and not too extensive.

Limitations of time and focussed development along with the aim to provide a cost free platform will impact the project by having limited capabilities and a very straight forward and simple platform delivery. The research area is focussing on flipped learning in UTP environment; hence the discussions and results will reflect with the radius of this paradigm.

Chapter 2

2. Literature Review

2.1. What is Flipped Learning?

In the recent years, Flipped Learning has emerged to tackle the issues of limited class hours that restrict the teaching-learning process between the teachers and the students (Jiugen et. el, 2014). While there are many methods of classroom management strategies to promote active learning such as in-class activities and group discussions, however, these methods applied on its own would not be suffice (Carroll et. el, 2008). Hence, we're looking into a more holistic approach in enhancing the teaching-learning performance.

Before we delve into the flipped learning paradigm, it is best to understand the theory behind blended learning as flipped learning is a branch of blended learning. As described by Garisson and Kanuka (2014), blended learning is simple yet complex because the integration of classroom face-to-face learning experiences with online learning experiences held the simple structure of blended learning, however, its implementation pose a challenge of virtually limitless design possibilities and applicability resulting it to be complex in nature. The essence of blended learning approach can be understood through figure 1 below. Based on Garrison & Vaughan(2006) and Neals(2010), blended learning can be describes as a student-centered, self-paced, flexible and multimodal approach to learning.
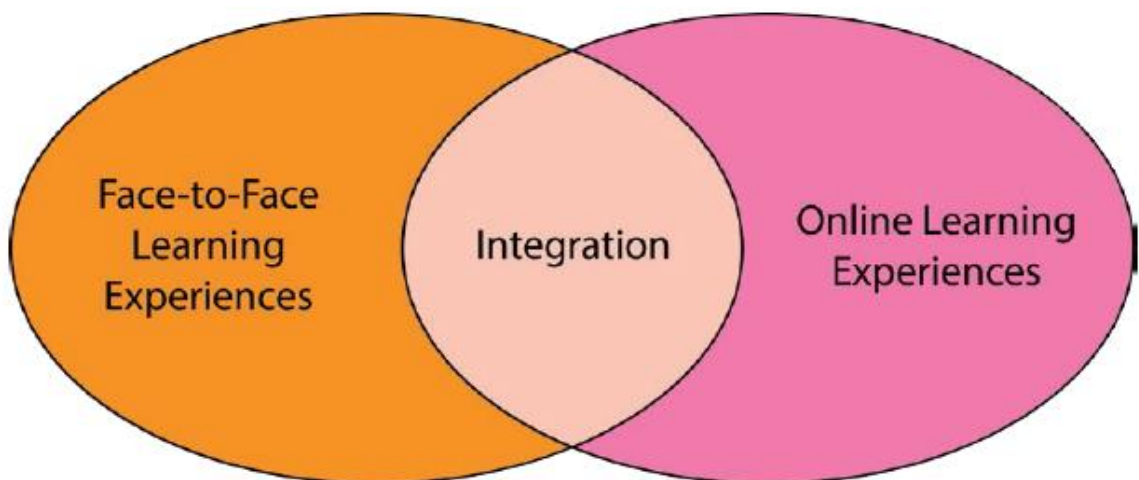
Figure 1: Campus-Based Blended Learning Approach (based on Joutsenvirta & Myyry, 2010)

As a branch of blended learning, flipped learning follows the same principle. Similar to blended learning, flipped learning relies on digital sources too such as videos and online notes; however, how it is structured into teaching-learning process varies. Flipped learning consists of two parts: in-class interactive group learning activities, and direct computer-based individual instruction outside classroom (Bishop & Verleger, 2013). Flipped learning is highly distinguishable from blended learning (FLN, 2014). This is because blended learning can be any form of combination of normal teaching practice with additional outside class materials, usually from the internet technology (Garisson & Kanuka, 2014).

Although it is a branch of blended learning, Chen & Chen (2014) described that flipped learning is different by the notion of flipping the learning methodology to come out with a new approach to learning. This can be as simple as interchanging the learning lessons to be at home and doing homework to be in class (Embi, 2014). As per outlined by FLN (2013), flipped learning is a learning model where teachers switch the learning focus from a large group learning space to a more individual learning space in which students learn content at home by watching online video lectures, followed by homework done in class with teachers and students discussing and solving questions. In flipped learning model, teacher's interaction with students is more of giving guidance instead of lecturing and it is also more personalized (Chen & Chen).

2.1.1. Why Flip?

In a traditional lecture setting, students are expected to concentrate in class and capture what is being taught in front of the class (EDUCAUSE, 2012). Not only that, students are not able to stop during lessons and process what is being taught and they are prone to miss significant points when they are trying to take note on the lectures (EDUCAUSE). To defy the ineffectiveness of traditional teaching-learning method, flipped learning. Because of this, educators are continually challenged to find new strategies in engaging students in the classroom in order to increase the effectiveness of the learning process (Findlay-Thompson & Mombourquette, 2014).

Jiugen et. el (2014) emphasized that online resources such as videos and supplementary materials has been utilized in traditional teaching method for some time with regards to the development of education information infrastructure. The rise of flipped learning not only promote the usage of online resources but when combined with face-to-face teaching, student adaptation and understanding of new knowledge will be improved as flipped learning boost active learning, peer-to-peer learning and student-centered learning (Jiugen et. el; Graham, 2004). The use of videos and pre-recorded media puts learning at student's own pace whereby they can watch, fast forward or rewind as needed apart from being able to watch multiple times if they don't understand, this is especially beneficial to students who are non-English speakers or slow learners (EDUCAUSE, 2012). This notions is supported by Phillips and Trainor(2014), adding that flipped learning are more time efficient as time in class can be utilized for much useful activities such as application of concepts, collaborative projects and topic discussions. Through this in class activities, apart from enabling collaborative learning among students, error of thinking can be detected and student understanding of the given topic can be tested (EDUCAUSE). Lecturers and instructors will then only have to provide extra clarification and correct misunderstanding of the concept during class time instead of having to explain everything from scratch (Garrison & Kanuka, 2004). Hence, make teaching and learning become more focus.

Based on Literature Review done by Flipped Learning Network (2013), many primary and secondary educations in United States has benefited from this approach. FLN summarizes success stories from schools in United States which have shown significant increase in passing major subjects such as algebra, calculus and grammar of more than 20% apart from the increment of homework completion rate among students after the implementation of Flipped Learning. Not only that, higher education institutes in Canada (University of British Columbia) and United States (University of Memphis, University of North Carolina, Texas A&M University, Capital University, Georgia Institute of Technology and Harvey Mudd College) have implemented flipped learning across multiple disciplines and based on student evaluations, the students of these universities performed better and are more satisfy with the new teaching and learning approach (FLN, 2013).

FLN (2013) suggested eleven (11) top motivations for higher education to flip their courses which can be the underlying base for Universiti Teknologi PETRONAS (UTP) to start implementing Flipped Learning in its courses. The top motivations are outlines as below including its scale of importance:-

Goal	Importance
Improve students' critical thinking/creative problem solving/higher-order thinking/21st century/professional skills	1
Increase student participation, engagement, and motivation	2
Improve students' team-based skills and peer-to-peer interaction	3
Customize/differentiate learning	4
Make students the center of learning/encourage student ownership of learning	5
Better faculty to student interaction	6
Increase faculty freedom/enjoyment	6
Improve learning outcomes	6
Dealing with absences	7
Encourage faculty collaboration	7
Compensate for limited classroom space	7

Table 1: Top Motivations for Higher Education to Flip Their Courses (based on FLN, 2013)

2.1.2. Flipped Learning Model

To make an impact on student learning through flipped learning, it is not just about having the students to watch instructional videos on its own, rather it is the integration of these videos into the overall approach that makes a difference (Tucker, 2012). Hence we will look into the framework in enabling flipped learning into classroom teaching for adaptation that is suitable in Universiti Teknologi PETRONAS (UTP).

Before we delve further into the framework of flipped learning, it is important to understand that there is no one rigid model of flipped learning implementation been established by flipped educators and researchers (EDUCAUSE, 2012; Alsagoff et. el, 2014). However, there are several recommended flipped learning models that we can assess among which will best fit in higher education context. These models share

common instructional approach that aim to empower students in engaging deeper in the learning process and the ability to apply what they have learnt (Alsagoff et. el).

The basic approach to flipped learning that is common among most flipped learning models would include two parts (FLN, 2013; EDUCAUSE, 2012; Tucker, 2012; Jiugen, 2014; Embi, 2014):-

  i.   Students to watch pre-recorded videos with interactive lessons and instructions at home, in advance of class.
  ii. Students to engage in collaborative learning through in-class activities such as group discussions, problem solving, case studies and others that involve applying the knowledge learnt with the facilitation of the lecturer or instructors.
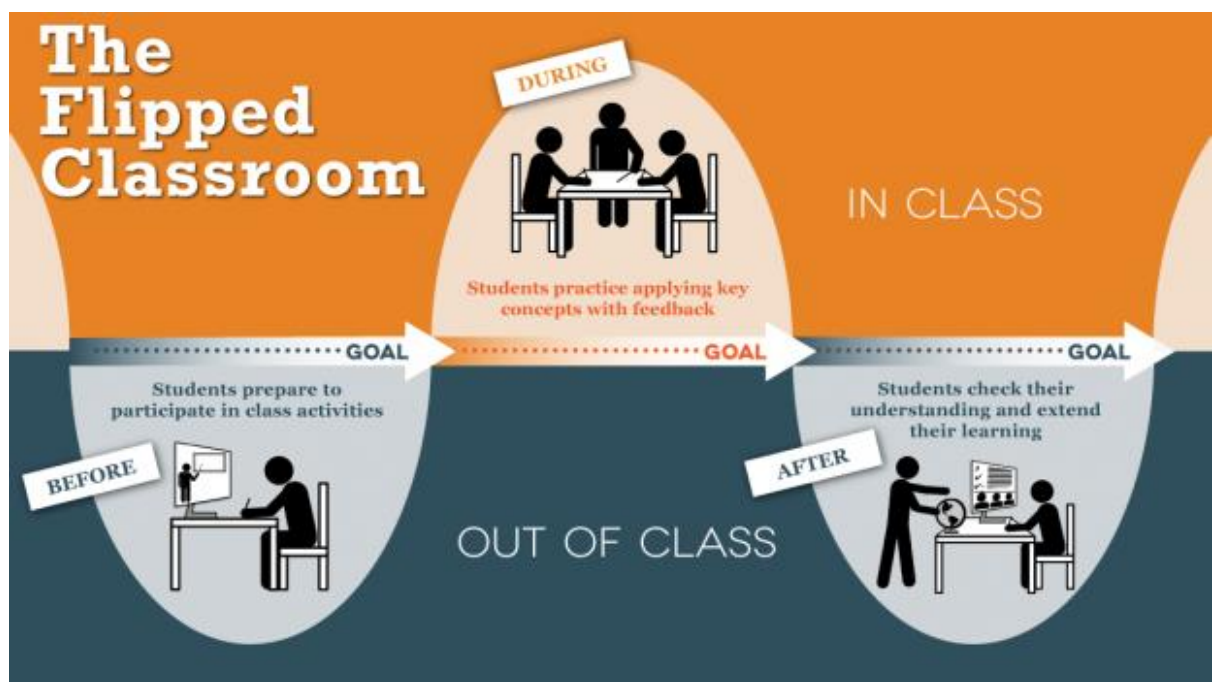
Figure 2: Flipped Learning Flow Model (by UTexas, 2014)

Though as simple as it may sound, research has noted that for flipped learning to be successful, the right blend and approach of the two above need to be formulated (Aspden & Helm, 2004). There is no singular silver bullet approach to make it work, but what they all have in common is the drive to design flipped learning environments that empower students to engage deeper in what they are learning, and

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be able to apply what they have learnt (Alsagoff et. al, 2014). EDUCAUSE(2012) noted that flipped learning teachers almost universally agree that it's not the instructional videos on their own, but how they are integrated into an overall approach, that makes the difference. The video lectures is often seen as the key ingredient in the flipped approach, such lectures being either created by the instructor or posted online or selected from an online repository (Embi, 2014).

Academicians from the Flipped Learning Network together with Pearson's School Achievement Services (2013) established four key premises regarding this approach (Hamdan et al, 2013):

F – Flexible environment
L – Learning culture
I – Intentional content
P – Professional educators

These four key premises ensure that every flipped classroom is unique and requires thorough planning to ensure learners gained the maximum learning benefit through this approach (FLN, 2013). FLN (2013) further explained the four foundation of effective flipped learning as below:-

- *Flexible Environment*

While allowing various learning modes; educators often physically rearrange their learning spaces to accommodate a lesson or unit, to support either group work or independent study, flipped learning creates flexible spaces in which students choose when and where they learn.

- *Learning Culture*

Flipped Learning model deliberately shifts instruction to a learner-centered approach, where in-class time is dedicated to exploring topics in greater depth and creating rich learning opportunities. As a result, students are actively involved in knowledge construction as they participate in and evaluate their learning in a manner that is personally meaningful.

- *Intentional Content*

Flipped Learning Educators continually think about how they can use the Flipped Learning model to help students develop conceptual understanding, as well as procedural fluency. They determine what they need to teach and what materials students should explore on their own.

- *Professional Educators*

The role of a Professional Educator is even more important, and often more demanding, in a Flipped Classroom than in a traditional one. During class time, they continually observe their students, providing them with feedback relevant in the moment, and assessing their work. While Professional Educators take on less visibly prominent roles in a flipped classroom, they remain the essential ingredient that enables Flipped Learning to occur.

Models Adopted in Flipped Learning

The first consideration to choosing a flipped learning model would be the suitability and applicability of the model to courses taught by the lecturers or instructors because it may not be for every form of teaching and learning process and for every type of courses (Garrison & Kanuka, 2004). Hence, the model and approaches explained in this study is chosen to best fit science, technology, engineering, and mathematics (STEM) disciplines as per recommended by Flipped Learning Network and Flipped Educators. This aligns with the major academic disciplines in Universiti Teknologi PETRONAS (UTP).

Another consideration as per suggested by Steed (2012) and Roscorla (2014) would be to start small and moving away from traditional lectures to a more active-learning methods such as flipped learning by one lesson at a time. Selection of one topic in a course to be flipped instead of the whole course for the entire semester is a great starting point for beginner's flipped educators (Steed, 2012; FLN, 2014). Once this is decided and established, lecturers and instructors can start to model their flipped learning implementation based on models suggested by flipped researchers.
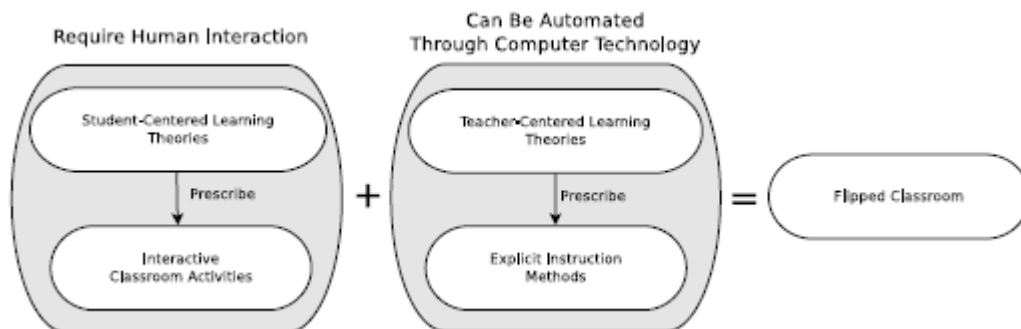
Figure 3: The Flipped Classroom Model (based on Bishop & Verleger, 2013)

In this study, we support the model proposed by Bishop and Verleger (2013) that defines the flipped classroom as an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom as per Figure 3. This model excludes flipped learning designs that do not employ videos as an outside of the classroom activity as per what is pursued in this study (Bishop and Verleger, 2013).

There are several flows of the flipped learning implementation that is proposed by flipped researches, though, timeframe is independent in this context. Hence, in this study, timeframe of implementation will be proposed with regards to Universiti Teknologi PETRONAS (UTP) semester structure and weekly class arrangement as per each courses involved in this project. Nevertheless, we will look into comparison of proposed video deliverance procedure based on several studies done by flipped researchers to support the timeframe decided for UTP implementation of flipped learning. The comparison made is as below:-

Flipped Learning Studies & its Proposed Procedure	Flipped Learning Network (FLN)*	Philip & Trainor (2014)	Chen & Chen (2014)	Thompson & Mombourquette (2014)	Lavelle et. al (2013)	Bradford et. al (2014)
Research Title	Not Applicable	Millennial Students And The Flipped Classroom	Design and Evaluation of a Flipped Course Adopting the Holistic Flipped Classroom Approach	Evaluation Of A Flipped Classroom In An Undergraduate Business Course	Flipped Out Engineering Economy: Converting a Traditional Class to an Inverted Model	An Analysis of Flip-Classroom Pedagogy in First Year Undergraduate Mathematics for Computing
Flipped Learners Background(s)	School and Higher Education Institutes	Higher Education Institutes	Higher Education Institutes	Higher Education Institutes	Higher Education Institutes	Higher Education Institutes
Course(s) Flipped	Variety	Variety	Computer Network	Business and Accounting	Engineering Economy	Mathematics for Computing

Video Lectures Duration	4 to 20 Mins	20 Mins or less	Not Specified	Not Specified	45 to 65Mins	15 Mins or less
Days Given For Student To Watch Videos Prior To Class	2 to 7 Days	Not Specified	1 to 7 Days	1 to 3 Days	Videos Available All Semester	4 Days
Checking Mechanism If Student Have Watch The Video	Yes; Quizzes and questions to be answered in class placed in the video	Yes; Pre-class assignments and online quizzes	Yes; Cyber-Face to Face (C-F2F) Strategy	No	Yes; Attempt homework problem before class	Yes; Questions to be answered as pre-requisite to watch the next video.

Table 2: Proposed video lectures deliverance procedure based on studies as stated above.

*Note: Studies done by Flipped Learning Network (FLN) are based on general practices by flipped learning educators of FLN, hence, no year specified.

Although major emphasize has been given to the basis of delivering the online content; for this study, the pre-recorded video lectures, it is only one part of the whole pedagogical approach to flipped learning implementation. The process flow of lipped learning extend beyond ensuring videos are watched by students prior to class (FLN, 2013). The flipped learning process flow proposed by Philip & Trainor (2014) as per figure 4 which emphasizes on active learning, student engagement, in class coaching, and problem solving approach of learning will be the based for flipped learning flow for this study.
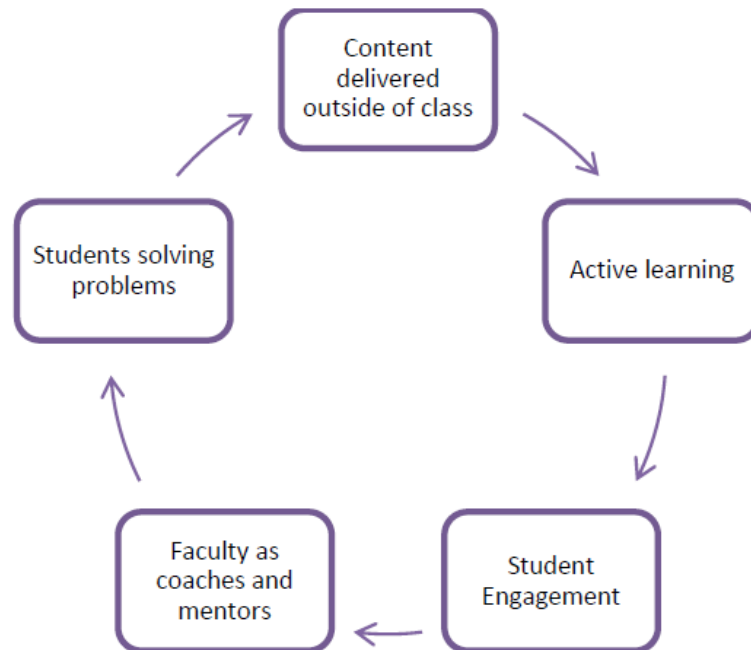

Figure 4: Flipped Learning model process flow as proposed by Philip & Trainor (2014)

The next important element in the flipped learning model it to take advantage of the scheduled class meeting time to implement active, collaborative, and integrated learning strategies that promoted higher student engagement and learning (Lavelle et. al, 2013). As depicted through the proposed process flow of flipped learning model, the effectiveness of flipped learning lies in the completion of activities following the videos that involves active learning and student engagement. Class time should be devoted purely to active and collaborative assignments (Philip & Trainor, 2014). Lecturer and instructors might lead in-class discussions or turn the classroom into a studio where students create, collaborate, and put into practice what they learned from the lectures they view outside class. Shift in role from educators to facilitators, the lecturers suggest various approaches, clarify content, and monitor progress. Organizing students into an ad hoc workgroup to solve a problem that several are struggling to understand is a good in class activities to ensure wholesome learning and understanding of the subject matter (EDUCAUSE, 2012). Flipped learning makes deep learning out of class by means of the communication of lecturerss and students, guiding teaching and learning to a deeper lever (Bishop & Verleger, 2013).

The aims of the post-lecture videos lesson would be to achieve several student-centered learning theories and methods as depicted by Bishop & Verleger (2013) in Figure 3 in a single class time. All this theories and methods are the key factors of successful implementation of flipped learning which involves the holistic pedagogical approach of integrating pre-recorded lectures videos into effective in-class activities (Bishop & Verleger, 2013; Jiugen, 2014).
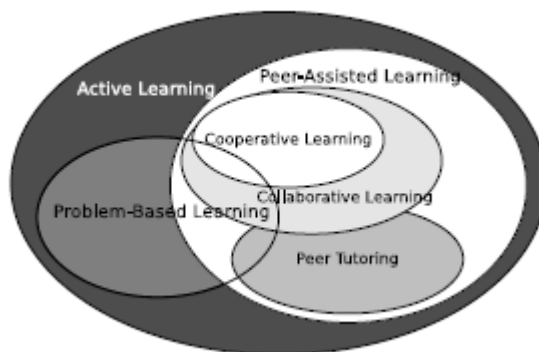

Figure 5: Venn diagram of several student-centered learning theories and methods. (based on Bishop & Verleger, 2013)

Role of Teacher

The role of a teacher in flipped learning teaching is similar to the role teachers have always played in the face-to-face classroom teaching. Teacher is expected to facilitate learning to the best of the teacher's ability. Chitravelu et al., (1995) emphasizes two factors that change the way a teacher operationalizes this role today. One factor is the concept of what actually facilitates learning. In the traditional instruction, teaching was thought to bring about the best in learning. However, with the modern instruction, the opportunities for learning are given the central importance (Embi et. al, 2014). The absent of the teachers in the learning environment will contribute to student stress where students will experience trouble in using technology, lack of necessary motivation due to self-managed learning and feel isolated (Embi et. al, 2014)

Role of Student

Flipped learning is believed to provide many benefits to the students. In order to experience full advantages of the educational opportunities available using flipped learning approach, the students have to become less of passive and more active participants in the learning process (Stansfield, McLellan & Connolly, 2004). Moreover, flipped leaning offers excellent possibilities for placing students at the centre of learning. Students are being encouraged to take part in discussion forums and make valuable contributions to the learning process. The central importance is given to learning and the students. The methodology used in flipped learning environment requires that learners take an active part in the learning process and participate by posting up their ideas, responding to colleagues and sharing their thoughts and views.

2.1.3. Flipped Learning Vs. Traditional Learning

In a traditional learning setting at most colleges and universities, the lectures are still the main centrepiece of instructions, where students passively absorb pre-processed information in class (McCarthy and Anderson, 2000). The lecturers teaching in class

and assigning homework has always been the common teaching and learning method used in education system (Jiugen et. el, 2014). But, to what extend is this methodology are effective to maximise students' learning experience? In this section we will compare flipped learning with traditional learning based on a few aspects.

	Traditional Learning	*Flipped Learning*
Teacher's Role	Knowledge spreader, classroom manager	Learning guider and facilitator
Student's Role	Passive receiver	Active researcher
Teaching Form	Teaching + assigning homework	Learning before class + researching in class
Learning Mode	Passive learning	Active learning
Class Content	Knowledge presenting	Question exploring
Technology Application	Content Presenting	Autonomous learning, reflecting, implement of discussion
Evaluation Mode	The paper test	Multi angle, multi method

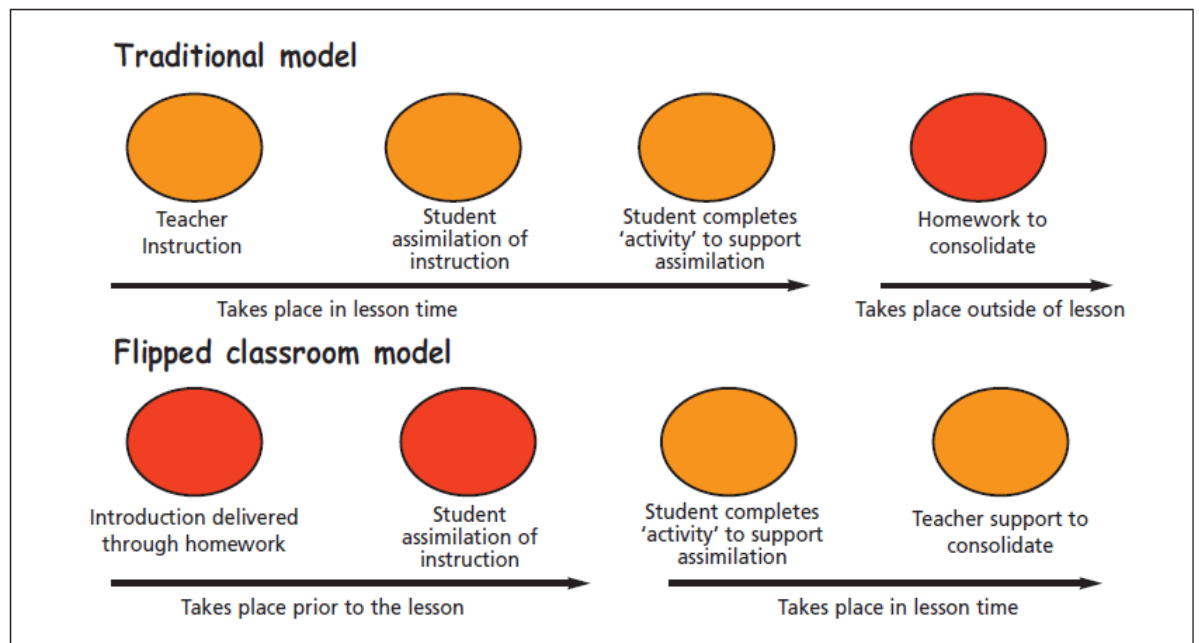*Table 3: Traditional Learning Vs. Flipped Learning comparison, adapted from Jiugen et. el (2014)*

Figure 6: The 'traditional' model vs the 'flipped' classroom model (based on Steed, 2012)

2.2. The Pros and Cons of Flipped Learning

The Pros of Flipped Learning

- *Flexibility*

Flexibility is a key advantage as students can access course material when they are ready to learn, no matter the time of day (Lavelle et. al, 2013). If a student misses a key point in a lecture, or misses a week of classes due to illness he or she can log on and learn at their convenience (Lavelle et. al, 2013; EDUCAUSE, 2012; Embi et. al, 2014). Not only that, lecture videos can be viewed as often as needed to understand a topic, and are more time efficient (Frydenberg, 2012).

- *Better learning outcomes*

Literature have noted a positive view of implementing flipped learning as researches have noted an improvement in learning experience (Khine & Lourdusamy, 2003; Motteram, 2006; Aspden & Helm, 2004). In a traditional classroom space, the students are always trying to record what is being taught immediately without actively reflecting on it. Many important points are missed out and those that were recorded are not completely understood by the students because he has not been given practical, real-life-based problems to apply the concept (Lavelle et. al, 2013).

- *Students have more control*

In a flipped classroom, it is possible for students to have increased input and control over their own learning. By providing short lectures at home, students are given the freedom to learn at their own pace. Students may pause or rewind the lectures, write down questions they may have, and discuss them with their teachers and peers in class (Philip & Trainor, 2014; Lavelle et. al, 2013).

- *Promotes Collaboration*

Flipped classrooms allows class time be used to master skills through collaborative projects and discussions. This encourages students to teach and learn concepts from each other with the guidance of their teachers. By allowing students to partake in their own learning, they are able to own the knowledge they achieve, which in turn builds confidence. Furthermore, teachers are given the ability to identify errors in thinking or concept application, and are more available for one-on-one interaction (Jiugen, 2014).

- *Inexpensive to implement*

Flipped learning model is cost-effective for institutions to implement than purchasing hundreds of new classroom gadgets to increase student's engagement. This project aims at providing minimal solution and implementation of flipped learning. This is because the aim of every effective learning and teaching structure is that it should not have to be expensive so that we can reach to wider radius of learners.

The Cons of Flipped Learning

- *Additional Work for Lecturers and Instructors.*

Additionally, there is a concern that implementing a flipped classroom adds an extra workload on teachers, as there are several elements that must be integrated carefully to allow the class to flourish. Responsibilities include taping and uploading condensed lectures, which take time and skill, and introducing activities in the classroom that will enhance the subject matter as well as motivate students to participate and prepare for class. Though teachers can gradually integrated flipped elements into their classrooms, it will still require additional time and effort from teachers.

- *Students Does Not Value Online Lessons*

As compared to time spent lecturing in front of class and students listening attentively, online lessons are seen to be less valuable than that. There is also the concern that since flipped learning are dependent on student participation; educators must trust students to watch the lectures at home. Unfortunately, there is no way to guarantee students will oblige or cooperate with the flipped model. Hence, in this project, the use of checking mechanism is added to ensure compliance of students in watching the video.

- *No Direction or Guideline for Lecturers and Instructors to Implement*

A major roadblock or barrier to the implementation of the flipped learning is that many educators do not know where to begin, what videos to be made, how to deliver, what to do within the classroom and many more when it comes to flipped learning

concept. For educators, who are used to and still uses the traditional model, a framework is needed to assist them with the implementation of the flipped learning (Gerstein, 2011).. This is tackle through project by providing a model or a framework that was developed and tailored to fit the educational system of UTP.

2.3. Flipped Learning in Malaysia

Interactive learning via online medium such as e-Learning is not uncommon in Malaysia Higher Education context. It has been an effective alternative blended learning approach in many higher learning institutions in Malaysia (Jaryani et al., 2013). However, flipped learning is a fairly new concept in Malaysia compared to e-Learning (Embi et. el, 2014). In this study we would like to focus on adaptation of Flipped Learning via pre-recorded lectures video along with comprehensive in class activities, hence, by looking into the readiness of blended learning in Malaysia, we may conclude the same readiness of Malaysian students towards adapting flipped learning.

Embi et. al (2014) has done a comprehensive studies on Blended Learning Readiness in Malaysia involving 144 Malaysian trainee teachers from different states. The graphical representation of the results of this study is as below:-
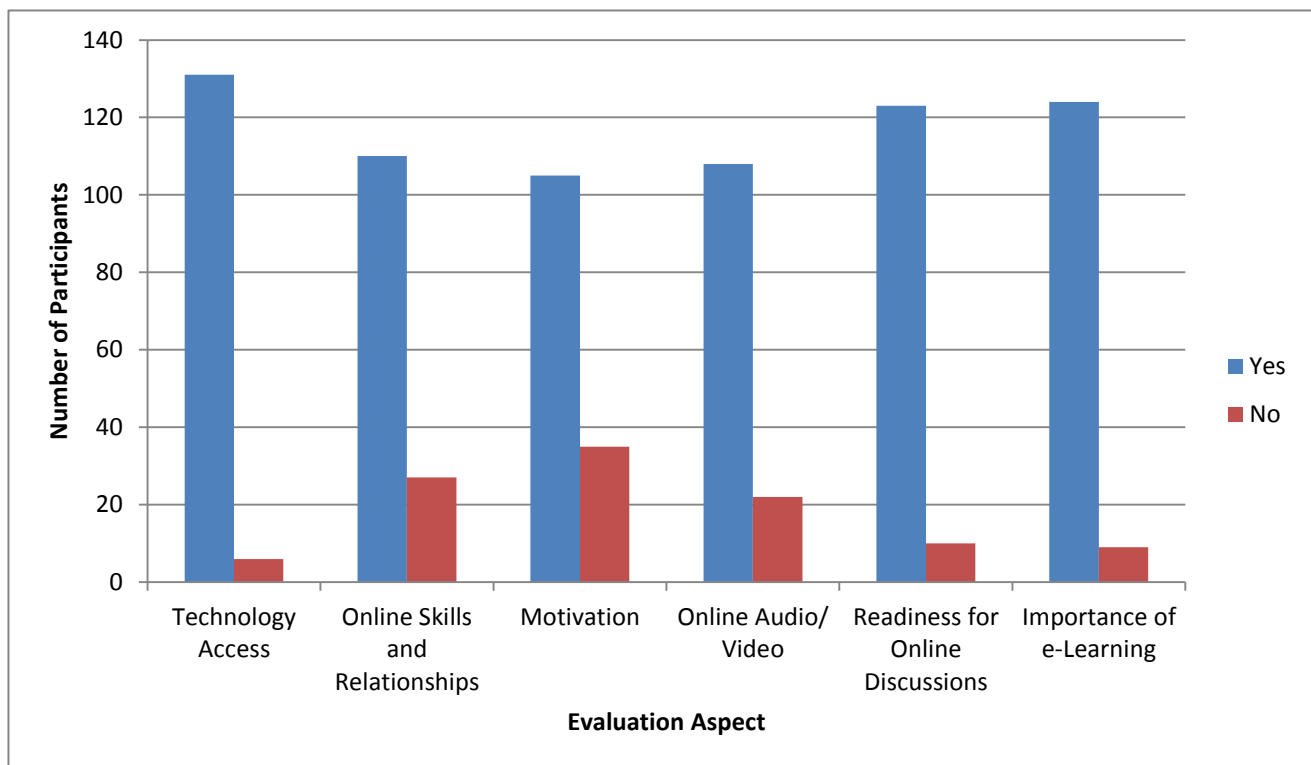
Chart 1: Chart of Blended Learning Readiness Assessment in Malaysia based on studies by Embi et. el (2014).

Based on the data above, it is safe to conclude those Malaysian students are ready for interactive learning via online instructions videos. In this section we will look further into practices of flipped learning that has been establishes in several Malaysia Higher Education Institutes.

Universiti Kebangsaan Malaysia (UKM)

A study by Embi and Hamat (2014) analyses UKM initiative in employing a portfolio-based management system known as iFolio to promote meaningful Blended Learning experiences in undergraduate courses at the university. Students of selected courses were to complete a weekly task-based online tutorial of the course's main content before weekly face-to-face (f2f) session for two hours in class. The results are positive from the learners point of view and increment in engagement of students in the learning process are seen from this implementation (Embi & Hamat).

Universiti Malaysia Sarawak (UNIMAS)

At UNIMAS, a system called Morpheus is used to strengthen students' engagement in teaching and learning process (Kee Man & Kian Sam, 2014). With Morpheus, instructors are able to design learning activities that promotes students to be actively involved in finishing tasks that enable sustainability of their level of engagement, all via online. Kee Man & Kian Sam concluded at the end of their studies, students' engagement boost after Morpheus was introduced as it requires more involvement of the instructors rather than merely uploading lecture notes.

Universiti Malaysia Terengganu (UMT)

Azhan and Saman (2014) establishes a study in UMT on the use of Push-Pull and JiTT technique involving a group of 100 Bachelor of Computer Science students of the university. Through tracking of the activities of the students in their Learning Management System, the studies involves developing videos to assist learning and quizzes are embedded at the end of the videos to ensure understanding is accomplished. The results are highly positive.

Universiti Pendidikan Sultan Idris (UPSI)

UPSI utilizes several technology platforms in integrating technology into education. Based on studies by Saad et. al (2014), teaching and learning processes are extended through MyGuru, a multifunction platform that allows lecturers to produce teaching resources and upload it into the system. Like most e-Learning system, MyGuru has the capability of monitoring students' activities like forums and assignments submission with extended purpose to establish a learner-centered education (Saad et. al). As per denoted by Saad et. al, another platform that is used in UPSI in rehabilitating blended learning in its education system is the MobiLearn, a mobile learning application that assist online teaching and learning by customizing appropriate modules.

Universiti Malaysia Sabah (UMS)

Kean Wah et. al (2014) made a studies on implementation of flipped learning among students of UMS which resulted in a thorough learning when used as a complement to the more conventional face to face approach. Kean Wah et. al suggested a good platform as a starting point to learn the affordability and challenges of flipped learning in higher education context.

International Medical University (IMU)

IMU's School of Pharmacy has its own significant approach in enabling Flipped Classroom methodology into its education system. With i-Lectures, students are required to view the platform prior to coming to classes (Alsagoff et. al, 2014). This is where lecturers are able to provide student with feedback, opportunities for discussions decision making activities and case studies. The results of i-Lectures implementation is tremendously successful with positive feedbacks from the students and the empowerment of students with more engaging and effective learning experiences which is proven to be beneficial (Alsagoff et. al, 2014)

There are plenty other Higher Education Institutes of Malaysia who have successfully implement Flipped Learning and gain its' astounding benefits. With proper implementation and guided assistance for instructors to correctly execute flipped learning in their courses, many more universities, including Universiti Teknologi PETRONAS (UTP) will be able to solve student understanding issues in the traditional teaching and learning process.

2.4. Technology that Enables Flipped Learning

The potential to embrace the changes in teaching and learning environment where learning can now take place at 'anywhere, anytime, and using any device' is made possible with the advancement of technology. In other words, learning in a Digital Age is available at the click of a mouse and at a tap on the screen. The growth of information and communication technologies (ICT) has revolutionized the way

people learn and get information (Wan Fatimah et el., 2007). The major part of flipped learning implementation is the technology enablement in education. Hence, in this section we will be looking into technology that enables the implementation of flipped learning.

As the flipped class becomes better known, new tools may emerge to support the out-of-class portion of the curriculum. Greater numbers of courses will likely employ elements of the flipped classroom, supplementing traditional out-of-class work with video presentations and supporting project-based and lab style efforts during regular class times (EDUCAUSE, 2012). At a certain level of adoption, colleges and universities may need to take a hard look at class spaces to ensure they support the kind of active and collaborative work common in flipped classes.

Screen-capture software, such as Camtasia, Adobe Captivate, Jing, and others, can be used to create the digital lectures, which can be accompanied by digital presentations, Excel Spreadsheets and other relevant materials (EDUCAUSE, 2012). Faculty can also demonstrate problem solving using these software programs. Accountability for completing pre-class assignments can be monitored using automatically-graded, unit-based online quizzes. Not only does this step motivate students to take the preparation seriously, it also provides the faculty member with important information that can inform subsequent planning for course activities and topic review. If students are experiencing a problem with a particular topic, this can be addressed by a mini-lecture in class followed by active practice assignments. Frydenberg (2012) suggests counting the quizzes toward the final grade to motivate students.

2.4.1. Videos, Screencasts Maker and Related Software in Flipped Learning

Bergmann and Sams (2014) introduces the Flipped-Learning Toolkit which include the technologies necessary in a flipped learning implementation. There are two (2) categories of tools that will be very useful in maximizing the potential of flipped learning adoption in teaching and learning methodology. The tools are as follow:-

Content Creation Tools

Lecturers may opt to have camera-created videos which can be as simple as using the video camera in a smartphone or tablet, or even a consumer-grade handheld camera for their flipped learning implementation (Bergmann & Sams, 2014). However, in this study we will focus on screencasting software with video capturing feature via webcam to make the videos for flipped learning implementation in UTP based on the flipped learning model focussed in this study.

- Screencasting Softwares

With the extensive varieties in software options to create education videos, it is a challenge for lecturers and instructors to choose the best content creation tool. Screencasting software allows the recording screen and some of these softwares have a features of recording video and audio simultaneously which makes it very synonymous in flipped learning environment whereby lecturers and instructors can record their computer screen as class board replacement and capturing themselves teaching the lesson (Bergmann & Sams, 2014). In higher education context, slide decks, interactive white boards, or other presentation software has already been utilized in classroom teaching making the use of screencasting tools in delivering lessons an effortless deed for lecturers and course instructors (Hirsch, 2014).

In this study we will compare the top screencast software to be implemented into UTP Flipped Learning Platform. The comparison made is as below:-

Screencast Tool & its Features		CamStudio	CAMTASIA	Screencast-o-matic	Screenr	Jing	Webinaria	SnagIt	Collaaj
Distribution Type		Download	Download	Download & Online	Online	Download	Download	Download	Download
Price		Free	$75 - $179 per license	Free; $15/ year	Free; $19-$280/month	Free; $14.95/year	Free	49.95$ per license	Free; $5 -$75 per license
Platform	Windows	✓	✓	✓	Not applicable	✓	✓	✓	✓
	Mac OS	×	✓	✓	Not Applicable	✓	×	✓	✓
Length Limit		Unlimited	Unlimited	15 Mins ; Unlimited with Pro version	5 Mins; Unlimited with Pro version	5 Mins; Unlimited with Pro version	Unlimited	Unlimited	2 Mins; Unlimited with Pro version
Webcam Recording		✓	✓	✓	×	Pro Version	✓	✓	✓
Audio Recording		×	✓	✓	✓	✓	✓	✓	✓
Video Editing		×	✓	Pro Version	Pro Version	Pro Version	✓	✓	Pro Version
Captions		×	✓	✓	✓	×	×	✓	Pro Version
Generated File Type		AVI, SWF	MP4, SWF, M4V, AVI, MOV, RM, MP3	MP4, AVI, FLV, animated GIF	MP4	MP4, FLV	AVI, FLV	MP4, FLV, AVI, MOV	MP4, SWF, M4V, AVI, MOV, RM, MP3
Upload to Web		No	No	YouTube	Screenr	YouTube, Facebook	No	Google Drive, OneDrive	Collaaj
Unique Feature		Mouse highlighting	Special effects and filters	Draw and zoom with Pro Version	High quality videos	Simple interface, pause while recording	Open source software	Fast	iPad app available

Table 4: Screencast Software comparison, adapted from Douch (2014), UVM(n.d), Walsh(2010), Agarwal(2012), and SocialCompare(n.d.)

*Note: All prices stated are in $ USD

Distribution Tools

The second part of module delivery of flipped learning implementation is distributing the pre-recorded videos to students. In this study, we establish the assumption that all students have access to online content. Hence, the delivery of video lectures to students will defy the limitation of student not having internet access to watch the videos. Nevertheless, in general context, adjustment to the situation would be by having the student accessing the video lectures via physical media such a USB drive or DVD (Bergmann & Sams, 2014). In this study we will compare between the major video streaming site which is be the best distribution tools for flipped learning implementation as according to Flipped Learning Network (FLN)(2013).

- Video Streaming Site

Site & its Features	YouTube	Vimeo	Daily Motion	Facebook
Significance	World's Most Popular Video Sharing Platform.	Website of choice for amateur/semi-professional videographers	World's second-largest video sharing website	Video sharing with Facebook's huge audience, without having to leave the site
*Advertisement	✓	×	✓	×
Price	Free	Free ; $59.99 for Pro Version	Free	Free
Per Upload Limit	20 GB	500 MB per week	2 GB	1GB
Pros	Multi capabilities and advance features	No advertisement and high quality content	Less restriction on content	Huge audience and a multifunctional tool, not just video sharing.
Cons	Viewer will easily get diverted to different content	Lower number of audience	Content searches are less distributed	Not a video streaming site

Table 5: Streaming Site comparison, adapted from the stated site, King (2014) and Selin (n.d.).

*Note: Advertisement in this context is advertisement prior to video streaming, not advertising on sidebars of the website.

Chapter 3

3. Methodology

In the methodology part, the main elements in identifying the best flipped learning model for implementation in Universiti Teknologi PETRONAS (UTP) and the development of Flipped Learning Enabler Platform for UTP on the research method, development method and tools and requirements gathering techniques. All these elements will be elaborates in details in this chapter.

3.1. Meta-Analysis Educational Research

In statistics, meta-analysis comprises methods for contrasting and combining results from different studies in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies. Meta-analysis can be thought of as "conducting research about previous research."

Meanwhile, Education research is the study that examines education and learning processes and the humans' attributes, interactions, organizations, and institutions that shape educational outcomes. The aim of this methodology is to describe, understand, and explain how learning takes place in a person's life and how formal and informal contexts of education affect all forms of learning. Education research embraces the full spectrum of rigorous methods appropriate to the questions being asked and also drives the development of new tools and methods.

To determine the area of flipped learning suitable to be adapted in Universiti Teknologi PETRONAS (UTP) environment, the hybrid of Meta-Analysis and Educational Research methodology is used. In this project, we studied past research, case studies of successful flipped learning implementation, flipped learning communities and flipped learning articles to analyse the best practice in flipped learning and environment of flipped learning implementation that is similar to UTP in order to structure and model the approach of flipped learning that is to be implemented in UTP. The studies and outcomes of this meta-analysis educational research are placed in Chapter 2: Literature Review section of this paper. In Chapter

5: Results and Discussions, we will look into the model of flipped learning that is to be implemented in UTP environment.

Apart from that, the result of this research will direct the project in developing the Flipped Learning Enabler Platform for UTP flipped learning implementation which includes the instruction to guide lecturers and instructors in UTP to implement flipped learning in their course. This guideline is established based on the result of this methodology.

The requirements and designs of the Flipped Learning Enabler Platform for UTP are also developed from the results of the studies done through this methodology. Alongside with that, the technological implementation in enabling flipped learning in UTP education system is identified through this analysis whereby the software to be integrated into the platform are determined. This is done by comparison study of common software and tools used in Flipped Learning Model. The distribution tool to be connected to the platform has also been identified to find the best possible solution for student accessibility to the videos.

The Flipped Learning Enabler Platform for UTP will include sample videos for flipped learning implementation and case studies from higher education institutes around the globe that has successfully implement flipped learning in their classroom approach. All of this information was gathered through the meta-analysis educational research done in this project. The research include looking into other various model and concept in the same context of flipped learning such as Blended Learning, Networked Learning and M-Learning to install comprehensive understanding and oversee the correlation of these media enabled classroom learning approach.

3.2. Project Development Methodology

In this research Rapid Application Development (RAD) methodology was used to development of Flipped Learning Enabler Platform for UTP because it avoids long planning phase and allows prototype to be rebuild and redefined repeatedly to identify the most significant and useful features for implementation to deliver good

result and output. The prototype development stage will iterate where new and different features will be added and lastly be tested to ensure that all the platform's features is well suited to the users' requirements and functions.

This methodology helps to support the development of the platform and at the same time helps to ensure the high level of quality in the product. Lastly, this methodology also helps in allowing the prototype to be built quickly and concurrently in the building phase.

Figure 5 below shows the important phase for the project. Project will be developed based on RAD methodology where project will be divided into few different phases which consists of phases such as Planning Phase, Analysis Phase, Design Phase, Implementation Phase, System Prototype, Testing Phase and Maintenance phase. Each of the analysis, Design and Implementation phases will be perform concurrently and on each cycle resulting in a system prototype that will be reviewed by the lecturers of UTP, who are the target user of the platform, in order to measure the effectiveness of the prototype model.
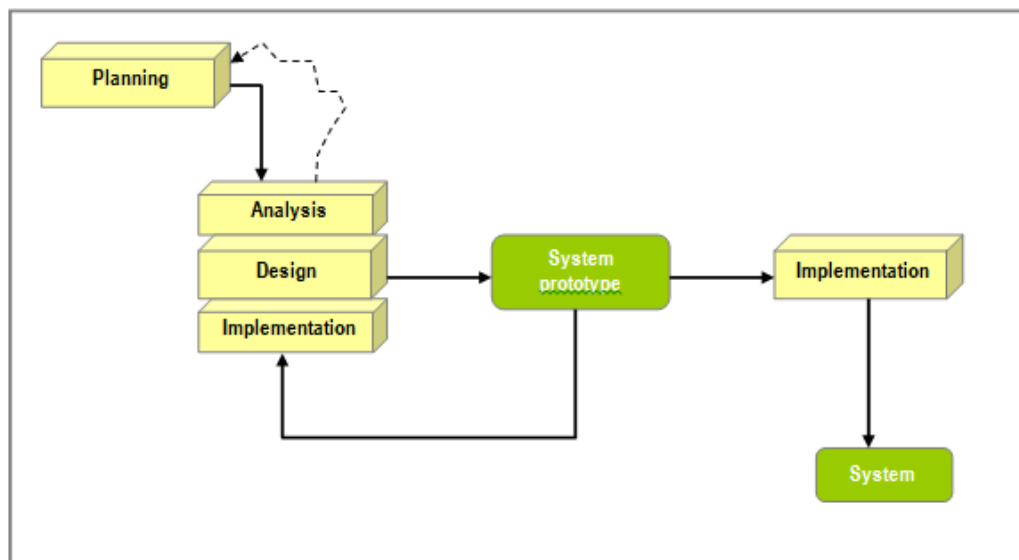

Figure 7 : Rapid Application Development (RAD) Methodology
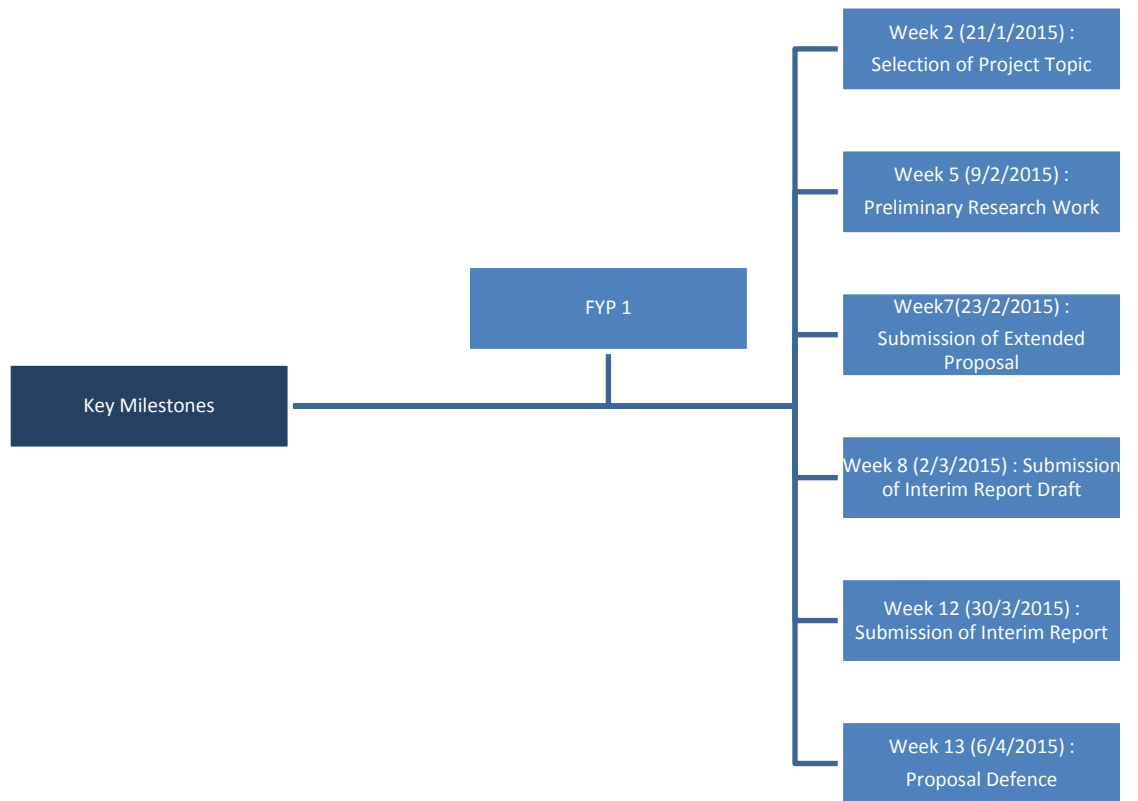
3.3. Project Activities

The current project activity for development of Flipped Learning Enabler Platform for UTP is now in the Development Phase as the progress of the project. Below are the progress activities that have been done:

3.3.1. Planning

For this stage of the project development, a high level view of the project was initiated. Some readings and research was carried out to get an idea of the project's feasibility. During this phase, the goals and the objectives of the project has been determined. These goals will be used as a point of reference for the rest of the development process to ensure that the project stays on track.

The project is feasible to the time frame allocated for Final Year Project (FYP) that is eight (8) months. This project requires establishing the framework design for flipped learning model to fit UTP educational system and designing a web-based application platform that aims to serve as an enabler to implement Flipped Learning in UTP. Proper planning is needed in order to ensure the success of the flipped learning implementation. Key milestones and Gantt chart is used to act as a benchmark to ensure the completeness of every task on particular time frame during the project.

3.3.1.1. Key Milestones

Figure 8: Key Milestones for the development in the first semester (FYP I)
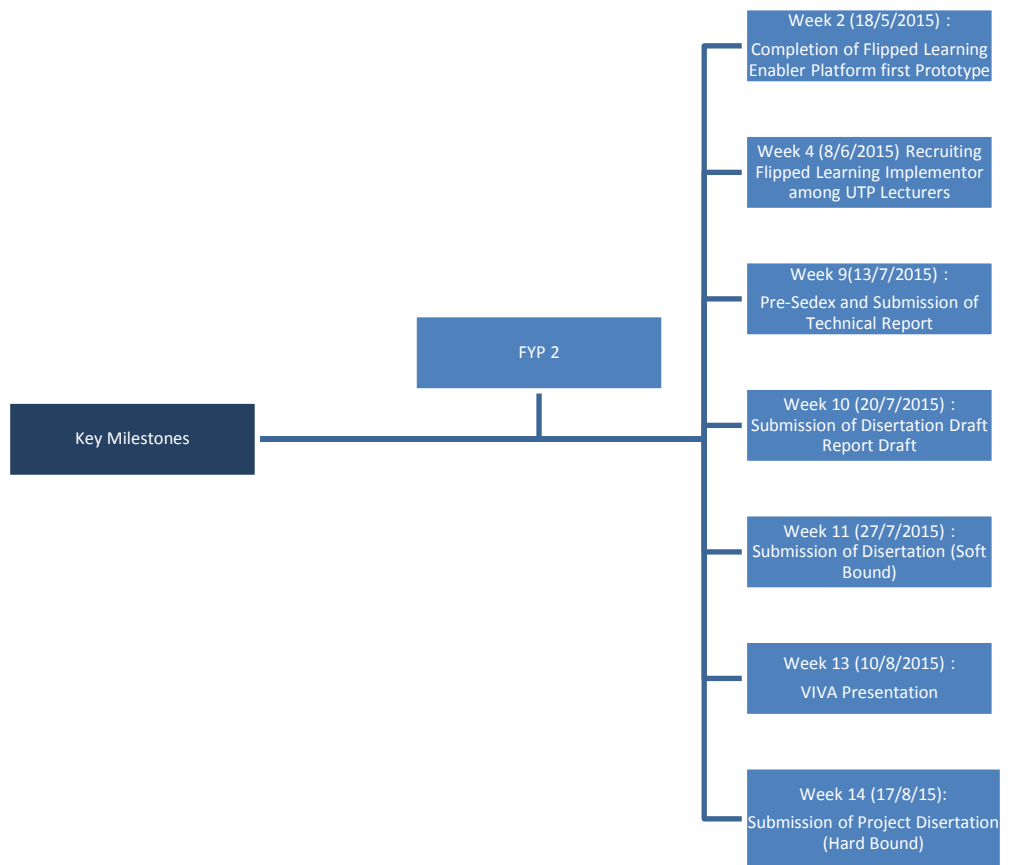
Week 2 (18/5/2015) : Completion of Flipped Learning Enabler Platform first Prototype

Week 4 (8/6/2015) Recruiting Flipped Learning Implementor among UTP Lecturers

Week 9(13/7/2015) : Pre-Sedex and Submission of Technical Report

Key Milestones

FYP 2

Week 10 (20/7/2015) : Submission of Disertation Draft Report Draft

Week 11 (27/7/2015) : Submission of Disertation (Soft Bound)

Week 13 (10/8/2015) : VIVA Presentation

Week 14 (17/8/15): Submission of Project Disertation (Hard Bound)

Figure 9: Key Milestones for the development in the second semester (FYP II)

3.3.1.2. Gantt Chart

ACTIVITIES/WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FYP I														
Selection of Project Topic		▓	X											
Preliminary Research Work on Flipped Learning		▓	▓	▓										
Preliminary Research Work on Technological Implementation			▓	▓	▓									
Literature Review				▓	▓	X								
Submission of Extended Proposal							X							
Submission of Interim Draft								▓	▓	X				
Submission of Interim Report										▓	▓	X		
Proposal Defence													X	
FYP II														
Submission of Progress Report	▓													
Completion of Flipped Learning Enabler Platform first Prototype	▓	X												
Preparing Flipped Learning Implementation Guide and Plan		▓	▓	▓										
Recruiting Flipped Learning Implementer among UTP Lecturers				X	▓									
Flipped Learning Implementation					▓	▓	▓	▓						
System Testing							▓	▓	▓					
Acceptance Testing							▓	▓	▓					
Pre-Sedex and Submission of Technical Report								▓	X					
Submission of Dissertation Draft Report Draft								▓	▓	X				
Submission of Dissertation (Soft Bound)										▓	X			
VIVA Presentation												▓	X	
Submission of Project Dissertation (Soft Bound)													▓	X

Figure 10: Project Gantt Chart With Milestone (FYP I & FYP II)

*Note: X indicates Milestone

3.3.2. Analysis

In this phase, some of the analysis on the objective, scope and research elements is being done to make sure the development process will be clear and easy to achieve during the design phase and meet the requirements.

Based on the analysis done on the information gathered through the Meta-analysis Educational Research specifically on the models of flipped learning approach being implemented in various educational systems, from high schools to higher educations, the proposed Flipped Learning model for UTP implementation is developed. And from this proposed model, the feature of Flipped Learning Implementation Guidelines in the Flipped Learning Enabler Platform for UTP is established for reference and manual for lecturers and course instructors of UTP to adapt flipped learning into their courses.

The user requirements of Flipped Learning Enabler Platform for UTP are also identified in this phase and all research findings based on the Meta-Analysis Educational Research will be added into this project development. Project requirements will be divided into:-

- Functional and non-functional requirement.
- Hardware and software requirements

3.3.2.1. The Flipped Learning Enabler Platform for UTPs' Guidelines Feature

Based on the research done on case studies and successful implementations of flipped learning projects in educational environment around the globe, the guidelines for flipped learning implementation in UTP was established and is placed in the Flipped Learning Enabler Platform for UTP as one of the function of the system. These guidelines are tailored to fit the flipped learning area decided for UTP which will be discussed further in Chapter 5: Results and Discussions. This section of the project paper is focussed more on the UTP's Flipped Learning Enabler Platform system background.

These guidelines are one of the mechanisms to achieve objective 1 of this project that is to determine the area of flipped learning suitable to be adapted in UTP environment.

The guidelines established for the UTP Flipped Learning Enabler Platform are as below:-

Flipped Learning Implementation Guidelines

1. Pick a topic or chapter in the course
Selection of a topic or chapter to be delivered by flipped learning model.
1.1. Guide on topic or chapter selection:-
     • It is recommended that the topic selected is instruction-based in nature in order to create a procedural lesson in the video lectures.
     • The length of the topic lessons is independent from its viability to be taught using flipped learning.
     • Pick a topic with

2. Plan the flipped learning lesson for the chosen topic
2.1. Flipped learning lesson plan must include the two vital part of the model that is:-
     • Video Lectures Content
     There are several options to model the video lecture for the topic selected such as:-
     - Screencast + Audio
     - Screencast + Lecturer self-video (include audio)
     - PowerPoint Presentation + Audio
     The video should deliver the instructional, theory, and concept content of the topic and it is advisable to focus on main content or important sub-topic within the selected topic to be delivered in the video.
     The video does not supposed to cover all parts of the topic, it is best to be kept short and simple but precise.
     • Class Activities Content

Class activities must be formed to allow students to practice and implement what has been learned from the video. Class activities can be in the form of:-

- Group discussions
- Case studies discussions
- Problem solving activities
- Group projects

2.2. It is important that the two part of the flipped learning lesson plan must be integrated with one another and there are significant connection between both.

2.3. As part of the flipped learning lesson plan, a checking mechanism shall be opted to be included at the end of the video. This is to check whether student has complied in watching the video. Checking mechanism can be:-

- Pre-class mini assignments
- Online short quizzes

Students are to bring the answers to class.

3. Plan the video content prior recording

3.1. The video content shall follow the outlines established for UTP implementation. The outlines are as below:-

- The video duration must be within 20 minutes or less
- The video shall be in MP4 format
- Videos' subtitles are optional but highly recommended
- The video shall not contain copyrighted materials obtained without permission

4. Create video lecture

By using the integrated screencast application embedded in the platform, the lecturer/instructor shall record the video as according to the planned lesson and video content.

4.1. The guidelines in creating the video is established as below:-

- Ensure all materials and content has been prepared on screen
- Ensure the microphone and webcam is functioning
- Start recording by clicking the start button
- Ensure that the materials display, the self-video recorded and the

	audio lectures are in-sync with one another
	- Stop recording once everything has been covered as planned
	- Edit the video to cut unnecessary content
	- Make subtitles or add caption to clarify any unclear instruction in the video
	- Add additional video content or pictures if necessary.
	- Add the checking mechanism activity at the end of the video.
	- Once the editing is completed, the video shall be downloaded.
5.	Delivering the video lecture created to students The lecturer/instructor shall distribute the video according to the flipped learning lectures video distribution guidelines established for UTP implementation as per below:- 5.1. Video Distribution Site The selected video streaming site to be used to distribute the video to students is YouTube. The lecturer/instructor shall use the YouTube account readily available with their Google account to upload and distribute the lectures video. 5.2. Days given for student to watch video As established the flipped learning model for UTP implementation, students shall be given a minimum of 4 days to watch and revise the lectures video prior to class.
6.	Uploading to YouTube The lecturer/instructor shall upload the created video to their YouTube channel. 6.1. Privacy Setting When uploading to YouTube, the option of "Unlisted Video" in the "Privacy Settings" section shall be selected to ensure that the video is only viewable by sharing the videos' link.
7.	Sharing Videos' Link to Student The link to the video lectures can be shared through UTP ELearning or via email.
8.	In-Class Implementation As according to the flipped learning lesson plan, the in-class activities shall proceeded after the videos had been watched by the student. 8.1. Test Student Understanding

From the in-class activity, the lecturer shall test whether the video delivered
lesson is understandable by student or not.

8.2. Clarify Unclear Instructions

In cases whereby majority of student is not clear with the lesson learned
through the video, lecturer shall clarify the unclear instruction in class.

8.3. One-on-one Teaching

Student who may need extra tutoring shall be attend to in class.

3.3.2.2. Requirements Definition

Requirement definition is usually the first part of any software development. In this
study, requirements definitions are done through Meta-Analysis Research
Development whereby the required features for a Flipped Learning Enabler Platform
are identified through past research done by flipped researchers. The main target
users of this development are the lecturers of UTP. Hence, the requirements
elicitation is revolved around the focus group; UTP lecturers and course instructors.

Based on the research, the functional, non-functional and the hardware and software
requirement is identified as per below.

- **Functional Requirements of the UTP Flipped Learning Enabler Platform**

Function 1	The platform shall enable screencasting
Description	The application system shall trigger the Screencast-O-Matic application service from its domain site through the platform site to allow user the usability of Screencast-O-Matic

Function 2	The platform shall allow user to record video and audio
Description	The application system shall trigger the webcam and mic to be active to allow recording of user's webcam video and audio.

Function 3	The platform shall enable video editing capability; add caption,

	add delete video snapshots
Description	The application system shall support all the functionalities as above provided through Screencast-O-Matic

Function 4	The platform shall enable user to download video into their computer
Description	The application system shall allow user to download videos they made into their own computer after finished editing

Function 5	The platform shall establish and display the guide for flipped learning implementation in UTP
Description	The application system shall have a dedicated page for flipped learning background and guidelines provided for user references

Function 6	The platform shall provide sample videos and case studies of flipped learning methodology for users' references
Description	The application system shall have a dedicated page for flipped learning sample videos and case studies for users' references

- **Non-functional Requirements of the UTP Flipped Learning Enabler Platform**

Features	**Description**
Usability	The platform shall provide ease of learning. The platform must be easy to learn for both novices and users with experience from similar systems.
Portability	The platform shall run on most commonly used web browser. The system shall not require user to download and install any software. The platform shall run independently.
Adaptability	The platform shall be able to adjust itself to meet the needs of the users.
Availability	The platform shall be available 99% of access by users.

Table 6: Table of Non-functional Requirements of the UTP Flipped Learning Enabler Platform

- **Hardware and software requirements**

Tools	Specification
Hardware	Personal Laptop and Hosting Storage Space on Biz.nf
Software	- WIX Website Builder Platform - Screencast-O-Matics Web Application - YouTube API - Web Browser (Google Chrome, Mozilla Firefox, Safari and Internet Explorer) - Free Subdomain from Biz.nf

Table 7: Table of Hardware & Software Requirements of the UTP Flipped Learning Enabler Platform

3.3.3. Design

Next the process will move on to the design phase where the Flipped Learning Enabler Platform will be developed with the selected tools and method. The element focus during this phase is to make sure it will be user friendly to the target group that the lecturers and course instructors of UTP. Several suitable functions will be created and used in developing the platform.

3.3.3.1. Requirements Modelling

- Use Case Diagram for The Flipped Learning Enabler Platform for UTP
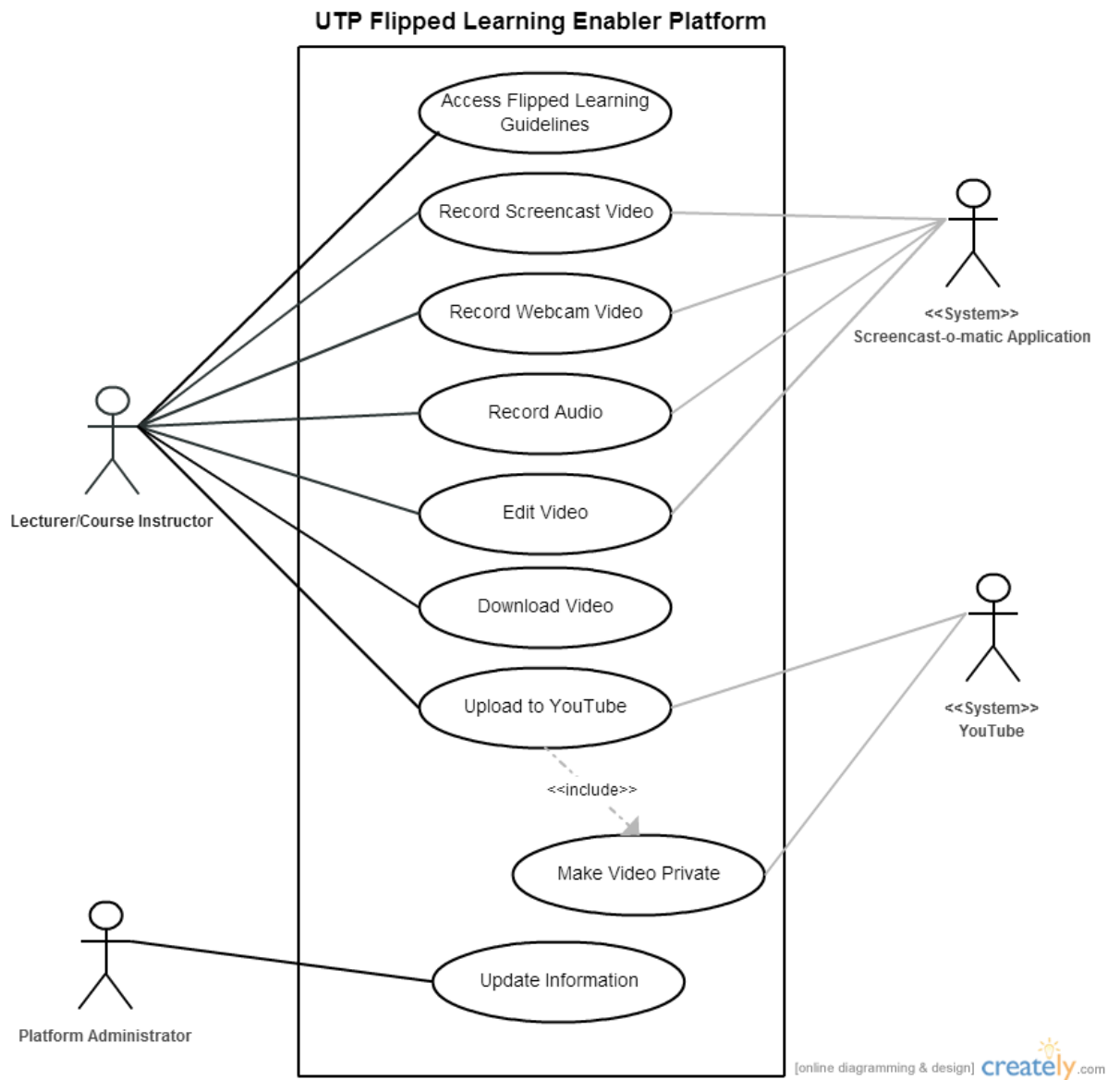
Figure 10: Use Case Diagram for The Flipped Learning Enabler Platform

- Activity Diagram for The Flipped Learning Enabler Platform for UTP
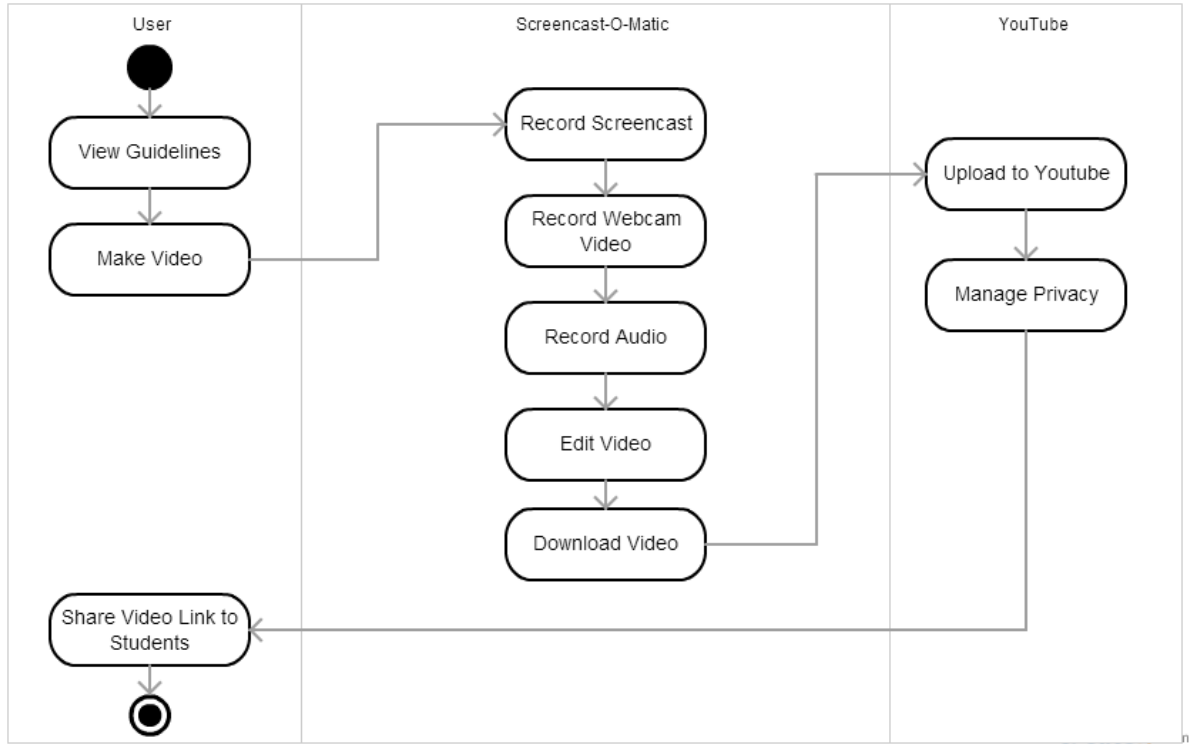
Figure 11: Activity Diagram for The Flipped Learning Enabler Platform

- System Flow Diagram for The Flipped Learning Enabler Platform for UTP
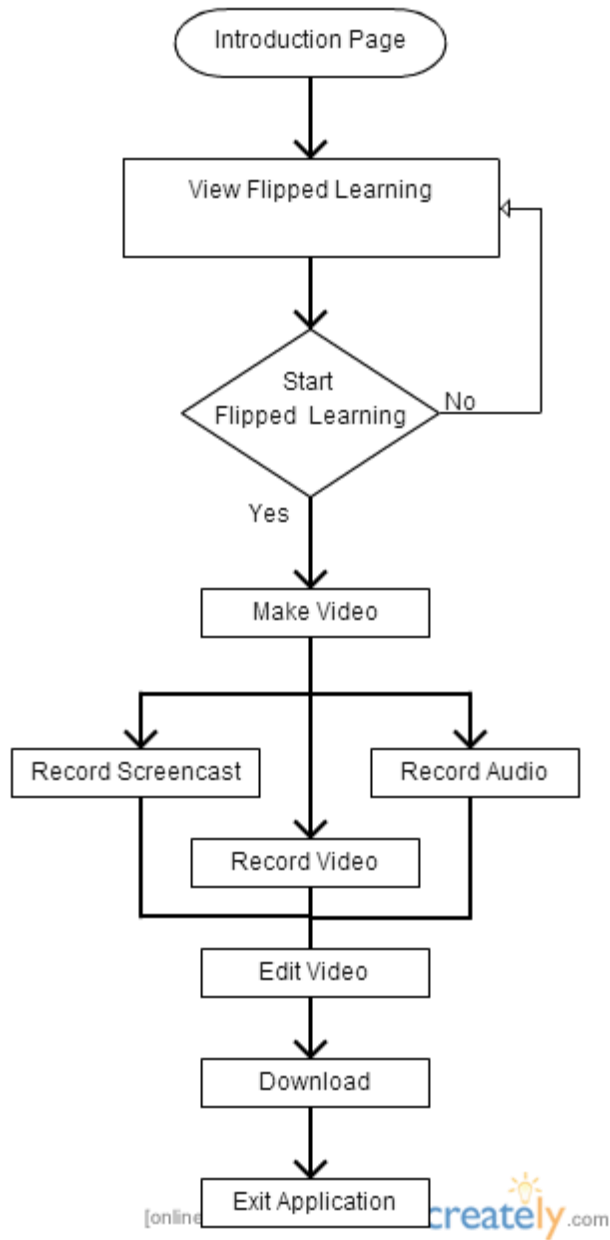
Figure 12: System Flow Diagram for The Flipped Learning Enabler Platform

- Functional Decomposition Diagram for The Flipped Learning Enabler Platform for UTP
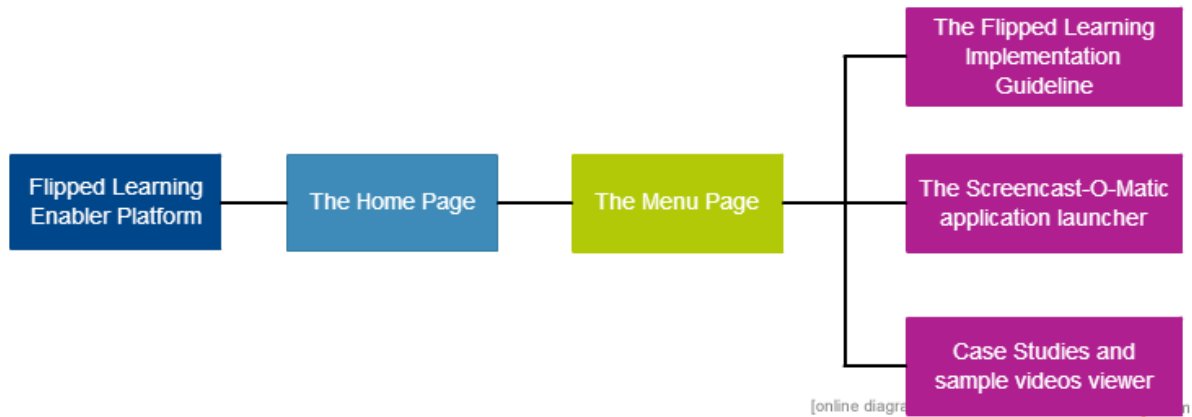
Figure 13: Functional Decomposition Diagram for The Flipped Learning Enabler Platform

3.3.3.2. System Architecture of the Flipped Learning Enabler Platform for UTP

The system architecture selected for the Flipped Learning Enabler Platform is the *Service Oriented Architecture (SOA).* SOA is a technique that involves the interaction between loosely coupled services that function independently. Figure 3 depicts the underlying principle behind SOA for software and application development.

Figure 14: The concept of Service Oriented Architecture (SOA)

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For the development of the Flipped Learning Enabler Platform for UTP, the integration of three (3) services is observed in order to integrate the functional requirements of the platform system. The three (3) services are Wix Website Builder, Screencast-O-Matic and YouTube.

Benefits of using SOA with regards to this project are:-

- Lower software development and management costs
- Shorten development time especially when time is a major constraint in this project
- Using existing software modules rather than writing new ones means lower development and testing costs and – in this case, an even greater saving – lower maintenance costs
- Service composition is the putting together of a number of simple services to make a more complex one, in this case integrating the three (3) different software services.

Figure 15 shows the SOA proposed for the Flipped Learning Enabler Platform for UTP.
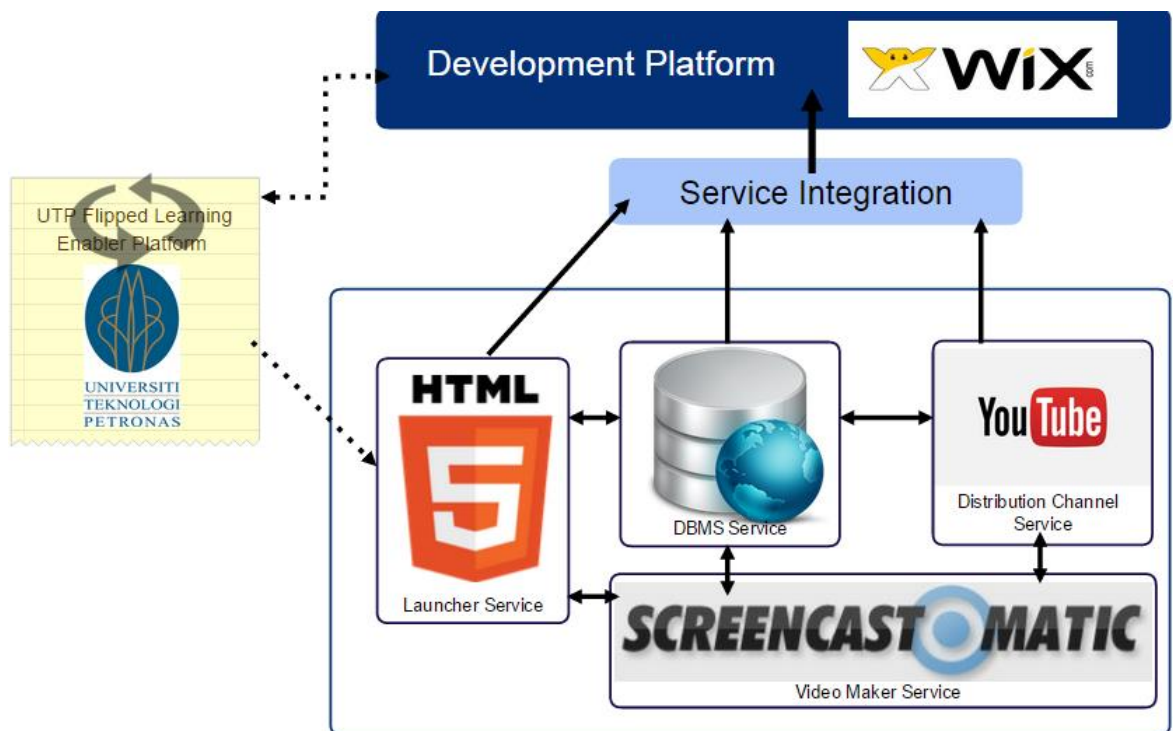
Figure 15: Proposed SOA Diagram for The Flipped Learning Enabler Platform

3.3.3.3. Interface Design of the Flipped Learning Enabler Platform for UTP

The Flipped Learning Enabler Platform for UTP will follow the proposed design that is developed using online prototype and wireframe maker, *Moqups*. The depicted Graphical User Interface (GUI) design is limited to the three main functional features of the proposed platform which is the homepage, the guidelines and about page, and the screencasting plus video recording function of the Flipped Learning Enabler Platform for UTP.
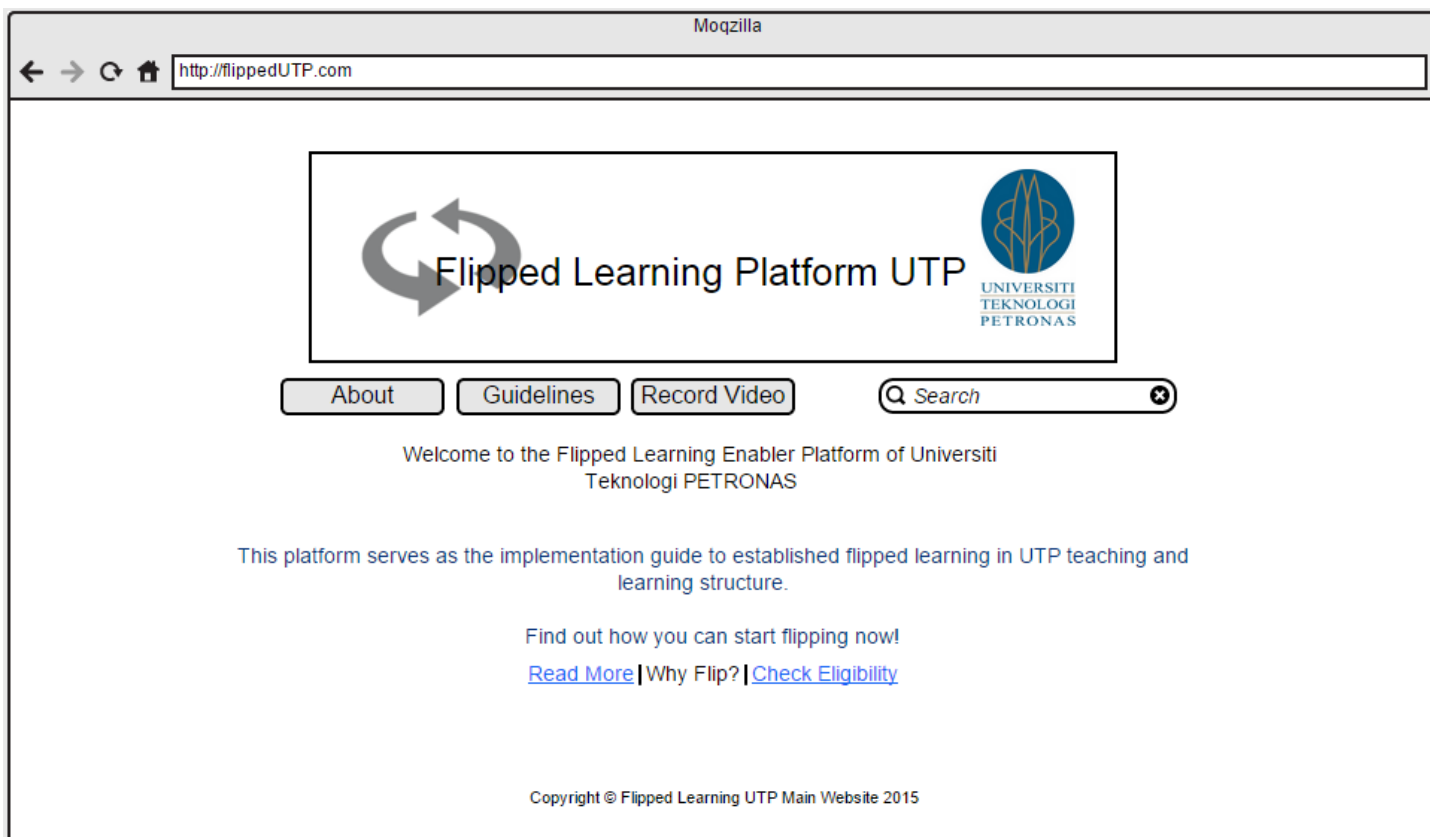
Figure 16: Proposed Homepage UI for the Flipped Learning Enabler Platform
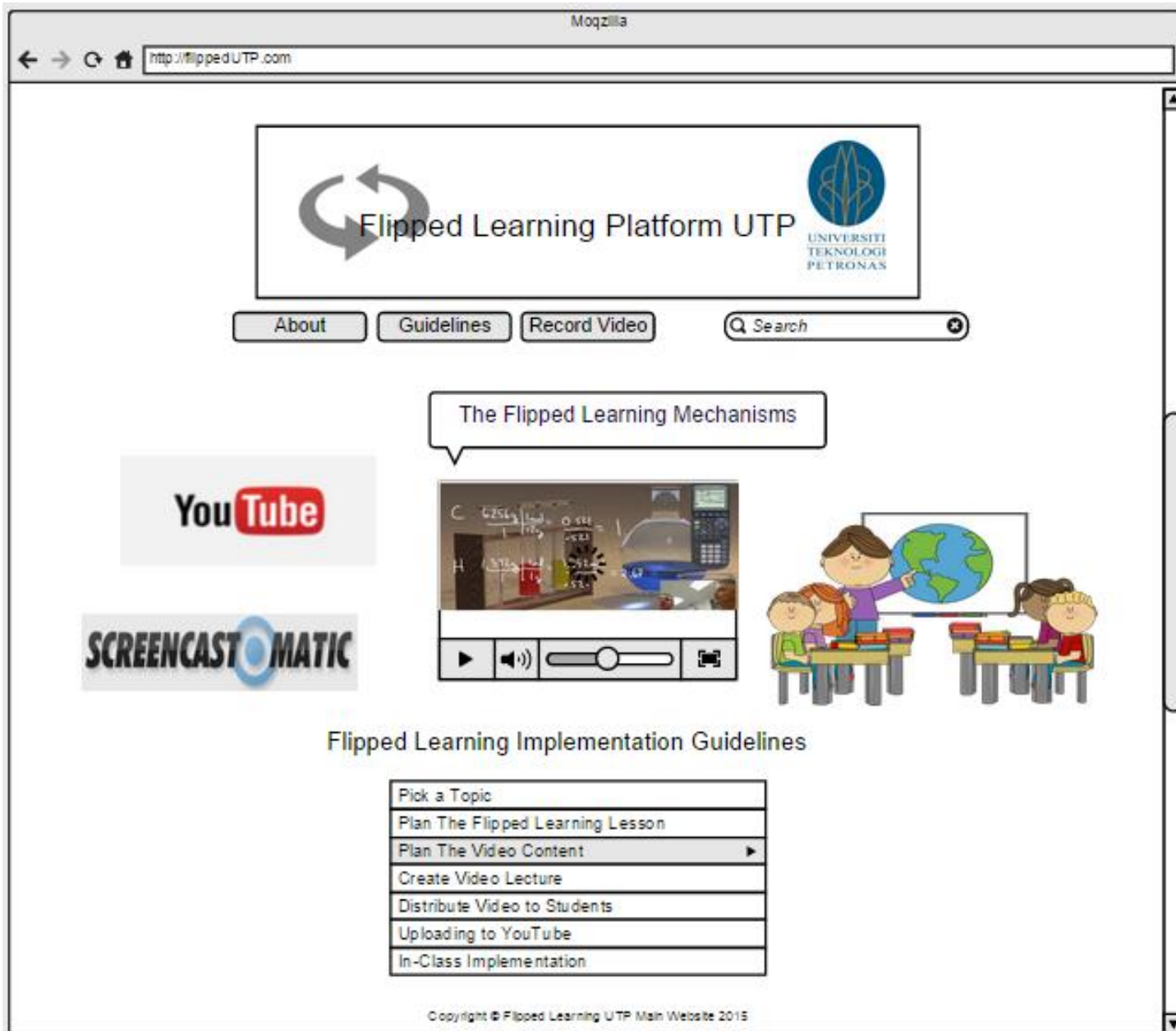
Figure 17: Proposed "Guidelines & About" UI for the Flipped Learning Enabler Platform
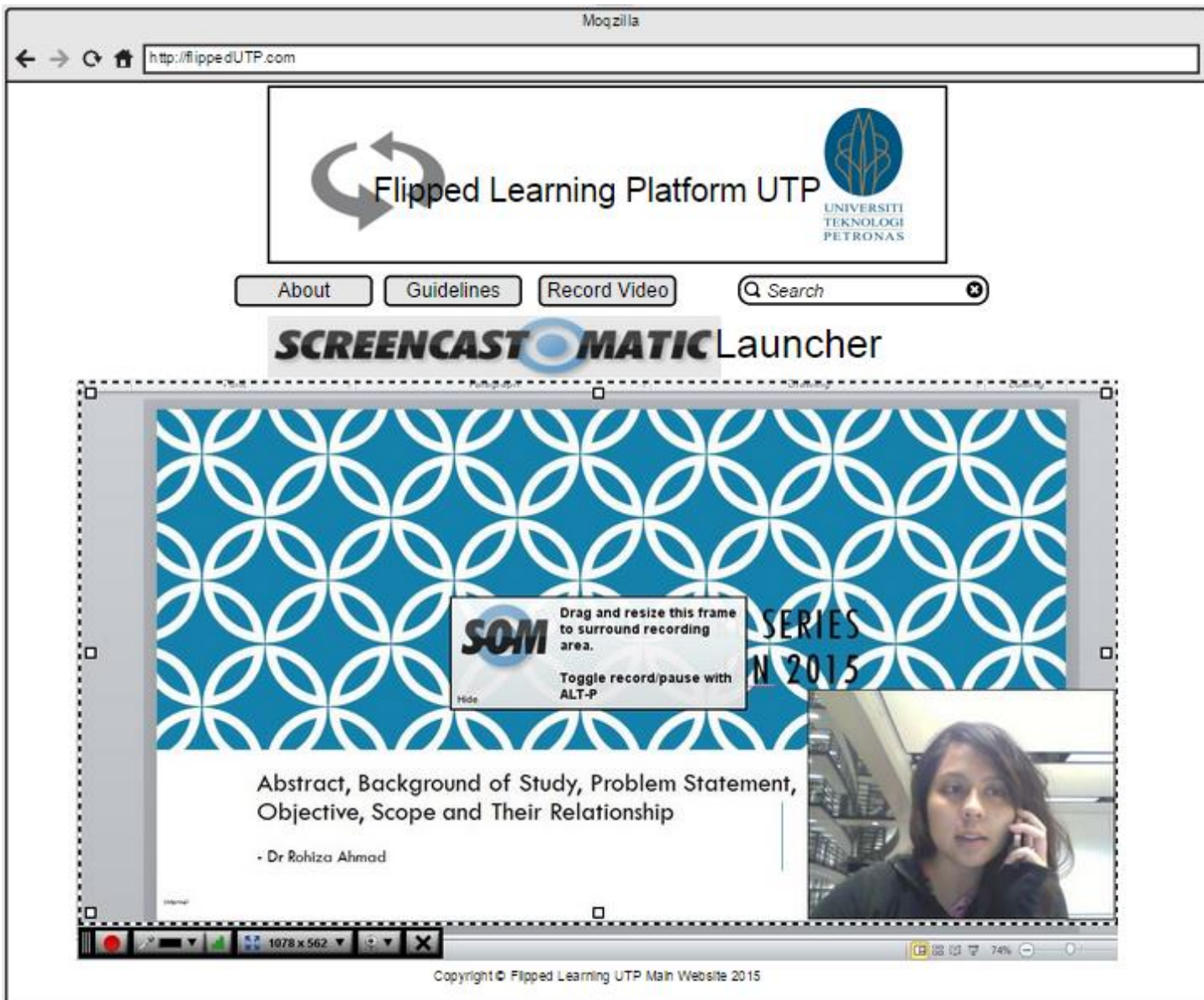
Figure 18: Proposed "Screencasting & Video Recorder Functionalities" UI for the Flipped Learning Enabler Platform

3.3.4. Development

In accomplishing objective 2 of this project that is to build flipped learning enabler platform that can assist instructors to implement flipped learning in their courses within UTP environment, the development of the required integrated system that can be accessible from everywhere to promote ease of use and mobility would be a crucial part of the whole implementation processes.

Before a system or an application is able to be built, requirement gatherings as well as creation of different models and designs will have to be done in order to avoid from any conflicts and issues throughout the development phase. These will eventually assist the developer by providing a clear overview about the to-be system especially in ensuring its ability to meet the targeted objectives. The development phase relies heavily on the outcome gathered from the analysis and design phase. It will be based on the Flipped Learning Implementation Guidelines established, the defined requirements, the modelled requirements, the system architecture decided for the platform and the interface design of the Flipped Learning Enabler Platform for UTP.

The website template and content management will be developed using Wix Website Builder whereas the web application backend and the database connectivity will be coded from scratch. Wix Website Builder is used in the website development process in order to speed up the delivery of prototypes as compared to development from scratch. However there are certain limitations imposed when using customized website builder such as less freedom to integrate with outside component.

The Flipped Learning Platform for UTP is also built using premade template by Graphberry. The selected template is a single page Bootstrap HTML 5 theme. Bootstrap is an integrated HTML, CSS, and Javascript framework for developing responsive and mobile-friendly webpages. For this development, enhancement is done on the single page bootstrap theme to add two more pages apart from the main page.

For the integration of Screencast-O-Matic video maker service, HTML iFrame function is used with the enhancement through CSS3 transform-origin property. An iFrame or an inline frame is used to embed another document within the current HTML document. The transform-origin property allows the changes of position of transformed elements, which in this case, the Screencast-O-Matics' 'Record Screencast' application launcher. 2D transformations of the transform-origin property allow the changes of the x- and y-axis of the element. Since the development focusses on Chrome browser, changes are made through the 'webkit-transform' and 'webkit-transform-origin' property. The source code of this implementation is attached in Appendix 1.

For the Flipped Learning implementation guideline, instruction and sub-instructions are incorporated into the platform through CSS Responsive Animated Accordion by CodePen. This accordion tab is reassembled to fit the theme of the UTP Flipped Learning Enabler Platform and also to fit the content needed to be published to the site. The accordion is styled as a stack of collapsible panels with the top-level category items used as labels. The category labels functions are provided with a consistent expand/collapse tabs. Accordion allows animated transition between tabs to boost the user friendliness of the guidelines features of the platform. The source code of this implementation is attached in Appendix 2.

Within the platform the location of UTP, where the Flipped Learning will be implemented through this project is published through Google Maps APIs. For this project we specifically use the Google Maps Web Services APIs. The Google Maps Web Services are a collection of HTTP interfaces to Google services providing geographic data for web applications. In the Flipped Learning Enabler Platform, the maps of the area around UTP are displayed through this service. The source code of this implementation is attached in Appendix 3.

In order to publish the website and have it live at a minimum cost, the development of the flipped learning platform had opted for free subdomain and hosting from Business-Class Free Hosting or Biz.nf. Biz.nf offers free ad-free web hosting with 250 MB free web space and free subdomains with '.co.nf' addresses. Although

security might be an issue when it comes to free hosting, this will not affect the project as there are no Log In and Log Out PHP scripts and Sessions sql injection involves in the development of the platform. Furthermore, biz.nf comes with the most used web panel which is the CPanel. This allows easy administration of the platform.

3.3.5. Implementation

The implementation phase is done early in the second halves of the project period in order to cover two of the project objectives which are:-

3.   To test the usability of the Flipped Learning Enabler Platform
4.   To test the impact of flipped classroom implementation.

Two of these objectives are achievable after the implementation phase of the project. The implementation phase will be done as according to the model of Flipped Learning approach developed for UTP implementation which is covered and outlined in Chapter 4: Results and Discussions. There are several steps for the implementation of the Flipped Learning methodology in UTP environment which will be discuss in this section.

UTP Flipped Learning Platform Goes Live
The Flipped Learning Enabler Platform was completed with all the necessaries functionalities and requirements by week 4 (8th June 2015) of the second halves of the project period and goes live and accessible by the link, http://utpflipped.co.nf/

Prospective users of the platform were informed about this as an introduction to the flipped learning methodology implementation in UTP environment. The targeted users are the lecturers of UTP who are interested to implement the Flipped Learning methodology into the courses they are teaching.

Documentation of Beta Testing Guide for Flipped Learning Enabler Platform of UTP

A complete plan and documentation of Beta Testing Guide for Flipped Learning Enabler Platform of UTP was made and distributed to prospective flipped educators of UTP. This Beta Testing Guide outlines the plan for Flipped Learning implementation in UTP environment through the Flipped Learning Enabler Platform. It includes guidelines to flip the class and graphical tutorial on how to use Screencast-O-Matic through the platform to make lecture videos.

The guide document was distributed to three (3) lecturers who will be flipped pioneers of flipped learning in UTP. The same guide document is also made available in the Flipped Learning Enabler Platform within the guidelines section.

The Beta Testing Guide for Flipped Learning Enabler Platform of UTP is attached in appendices as Appendix 4.

Introduction Session with Lecturers

Introduction and briefing meeting to plan out flipped learning lessons was done with the lecturers that will be involved in the first implementation of Flipped Learning methodology in UTP environment. The selected lecturers and courses for implementation are:-

- o Dr Emy Elyanee Mustapha of Computer & Information Sciences (CIS) Department
  Course: Database & Information Management

- o Dr Subarna Sivapalan of Management & Humanities (M&H) Department
  Course: Professional Communication Skills

- o Dr Mohammad Tazli Azizan of Chemical Engineering Department
  Course: Kinetic & Reactor Design

Producing Lecturers Video through UTP Flipped Learning Enabler Platform

The selected lecturer had the freedom of making their lectures videos from wherever they are as long as they have the internet connection. Since this is the beta testing

stage for the flipped learning enabler platform and the implementation of flipped learning methodology in UTP, full guidance and assistance were given to lecturers throughout the video making processes. However, most preparation and recording are done independently by the lecturers.

Lectures Videos Distribution to Students

For the courses of Professional Communication Skill and Database & Information Management, videos were distributed to students in the week of 13th July 2015 and they were given one week to go through the lessons. The Kinetic and Reactor Design course video lectures, on the other hand were distributed to students in the following of the same month, 20th July 2015. The students were given the same amount of time to watch the lessons.

In-Class Implementation Plan

Discussions and mini assignments were done the following week after the lecture videos were distributed to the students in order to complete the flipped learning methodology implementation into the selected courses.

3.3.6. Testing

Testing phase is crucial to test the success of Flipped Learning concept implementation in UTP environment and the usability of the Flipped Learning Enabler Platform. The methodology that is used for the two (2) testing plan, the System Testing and Concept Testing would be the qualitative and quantitative surveys. This methodology is used after the implementation phase of the Flipped Learning concept on the selected courses, through interviews and questionnaires directed at the participants of flipped learning implementation in UTP – the lectures, course instructors and students.

3.3.6.1. Acceptance Testing for UTP Flipped Learning Enabler Platform

Acceptance testing, also known as Beta Testing is a testing technique performed to determine whether or not the UTP Flipped Learning Enabler Platform has met the requirement specifications. The main purpose of this test is to evaluate the platform's compliance with the requirements for the Flipped Learning methodology implementation and verify if it is has met the required criteria for delivery to end users.

Acceptance testing is widely used in Extreme Programming and Rapid Application Development (RAD) due to its flexibility and informality. Hence, it is chosen to test the Flipped Learning Enabler Platform based on user experiences in terms of usability and viability for future development in the context of UTP environment as per one of the objective of this project.

Quantitative survey is chosen as tool to perform the acceptance testing survey on the user, in this context, the lecturers of UTP who uses the platform. The survey is constructed based on the requirements, both functional and non-functional requirements, as per outlined in the Analysis phase under section 3.3.2.2 Requirements Definition. The acceptance testing survey form can be referred in Appendix 4.

Chapter 4

4. Results and Discussion

4.1. The Flipped Learning Framework for Implementation in Universiti Teknologi PETRONAS (UTP)

The flipped learning methodology definitely has the ability to positively impact students in every discipline within UTP from engineering to technology. With the right amount of professional development, mixed with the right amount of lecturers' willingness to transfer some control to their students, this new "homework" approach can aid in UTP students' learning. However, without the right amount of training for lecturers, or without the proper methods to distribute the technology and video information, the flipped model is doomed to fail. As with any new instructional approach, a level of comfort and confidence must be deployed in order to be an effective model.

On a different note, the perception that the flipped learning model is the absolute solution for every type of classroom is false. The flipped learning model may work for some, and may not work for others. It may work better in some classes, and be less effective in others. There will always be issues with access, ability, and approach. The flipped model will work if a committed attempt is offered and if the right material is incorporated in the curriculum, but it is not the sole solution to reshaped education and the way teaching and learning are done.

Hence, for implementation of flipped learning in UTP, the right framework of implementation must be developed. For this project, using the Meta-analysis Educational Research by looking into numerous thesis and work of prior researchers, case studies and success stories of Flipped Learning implementation around the globe, the best approach to flipped learning in UTP is established as per Table 8. The selected procedures and features is chosen based on how compatible and similar is UTP educational system and student background with the compared institution in the case study. Furthermore, in selecting the best content creation tool or screencasting and video maker tool, comparison between best software are done to select the best

to fit the requirements of the platform to be developed. Distribution channel is selected by the most common from student perspective.

Proposed Framework	UTP Flipped Learning Model
Flipped Learner Background	UTP is a Higher Education Institutes
Course(s) To Flip	Variety; within Engineering and Information Technology Scope
Video Lectures Duration	4 to 20 Minutes
Days Given For Student To Watch Videos Prior To Class	Minimum 4 Days
Checking Mechanism If Student Have Watch The Video	Pre-class mini assignments and short online quizzes
Screencast Software Selected	Screencast-O-Matic
Distribution Channel Selected	YouTube

Table 6: Screencast Software comparison, adapted from the stated site, King (2014) and Selin (n.d.).

4.2. The Flipped Learning Enabler Platform for Universiti Teknologi PETRONAS (UTP)

The Flipped Learning Enabler Platform for UTP is designed with a logo of "Flipped UTP" and black & yellow as theme colour. "Flipped UTP" is chosen as the name of the platform and the implementation project name for Flipped Learning concept implementation in UTP.

This platform is accessible by any user at http://www.utpflipped.co.nf. Built with the capability to trigger Screencast-o-matic video maker application from this site itself, the Flipped Learning Enabler Platform for UTP was promoted to lecturers and course instructors to be used in implementing flipped learning methodology inside the campus. This cost-free solution is intended to promote the usage of technology in education especially in UTP.
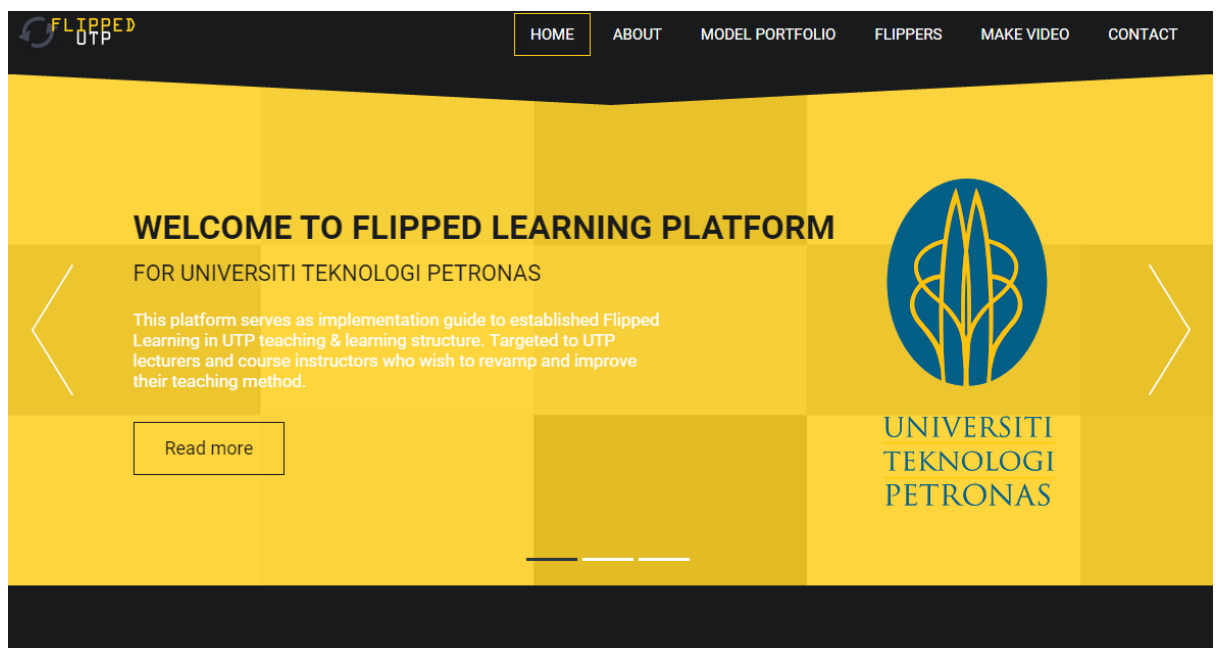
Figure 19: Welcome screen for FLIPPED UTP platform
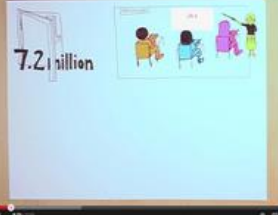
Figure 20: Samples & Implementation methods for the platform
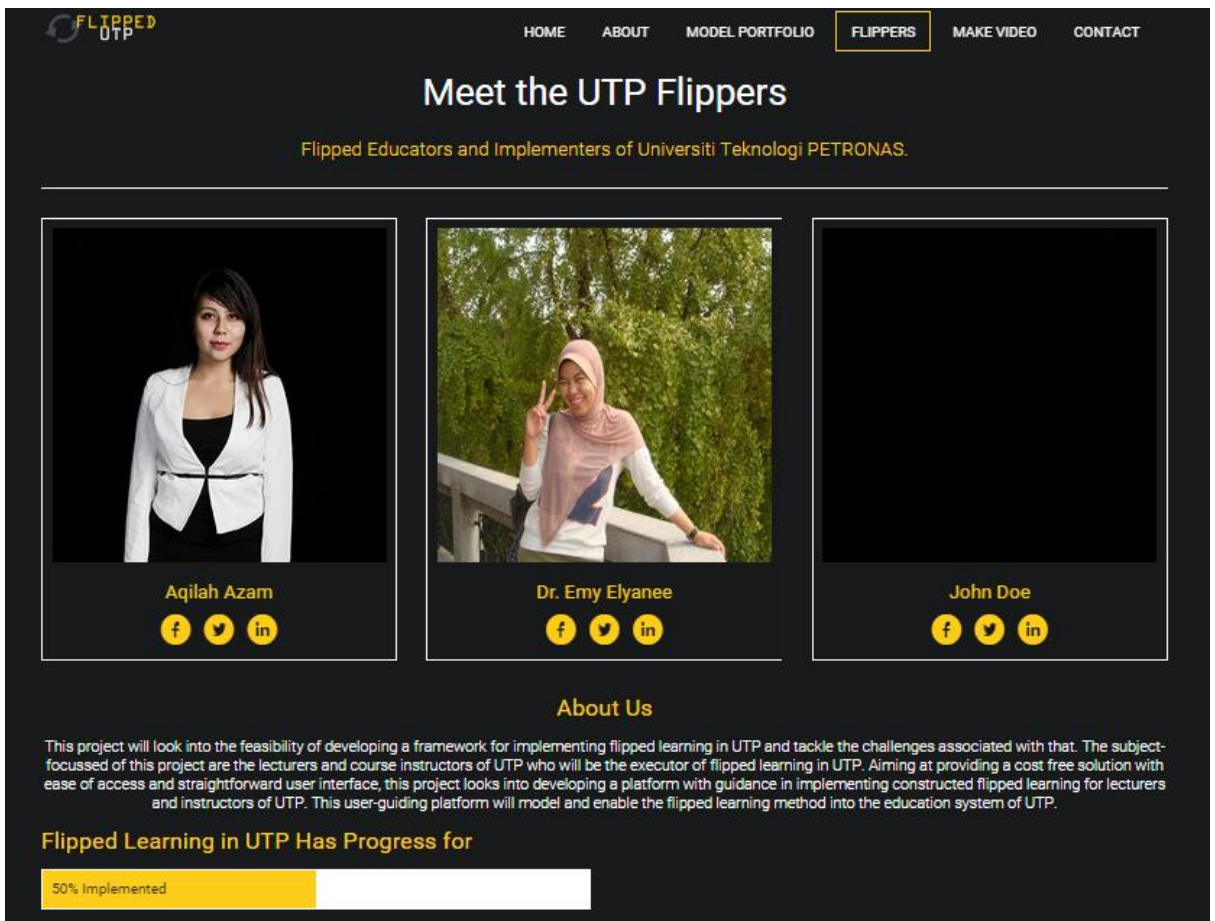
Figure 21: Credits for developers

Figure 22: First step in Video-making

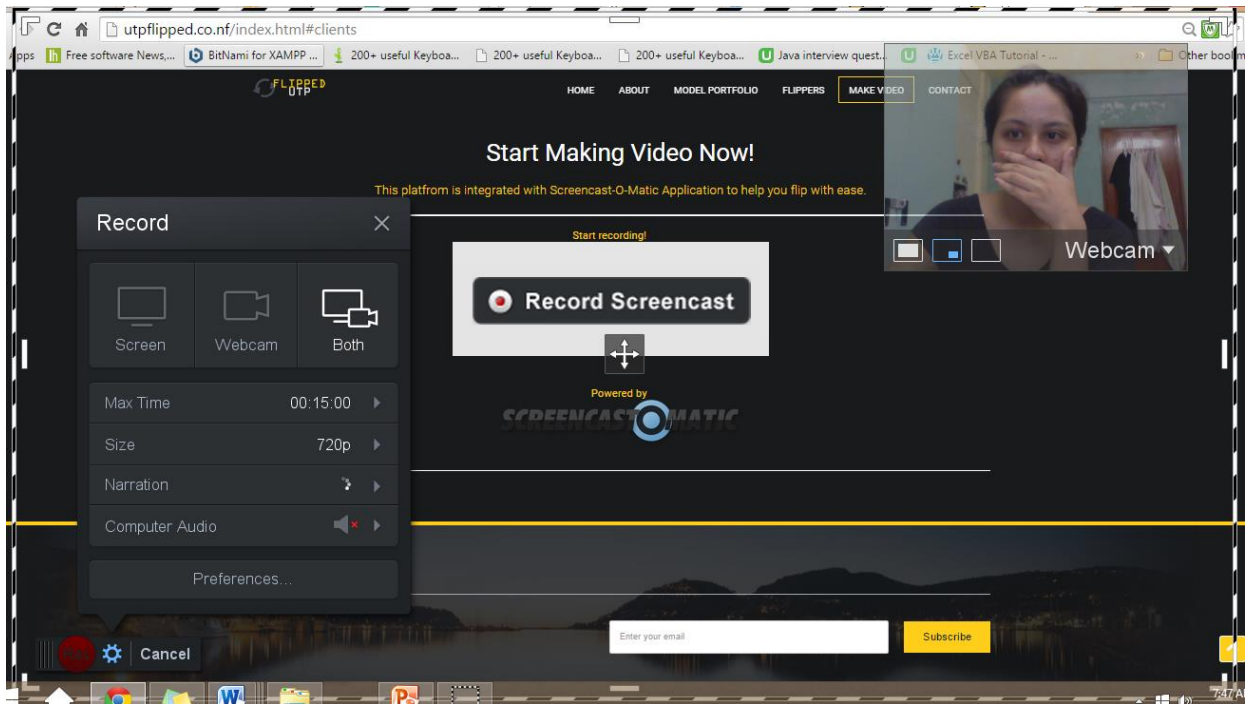*Figure 23: Steps to successfully use the platform with aid*

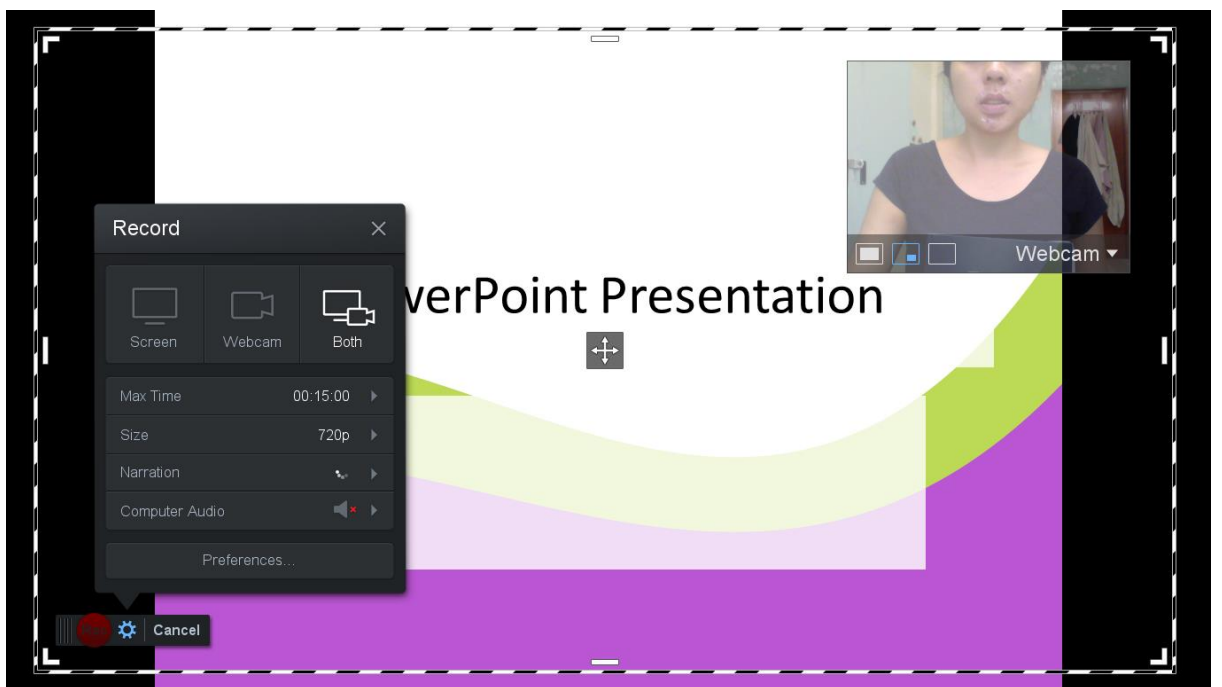*Figure 24: Initial screen of video-making with options*

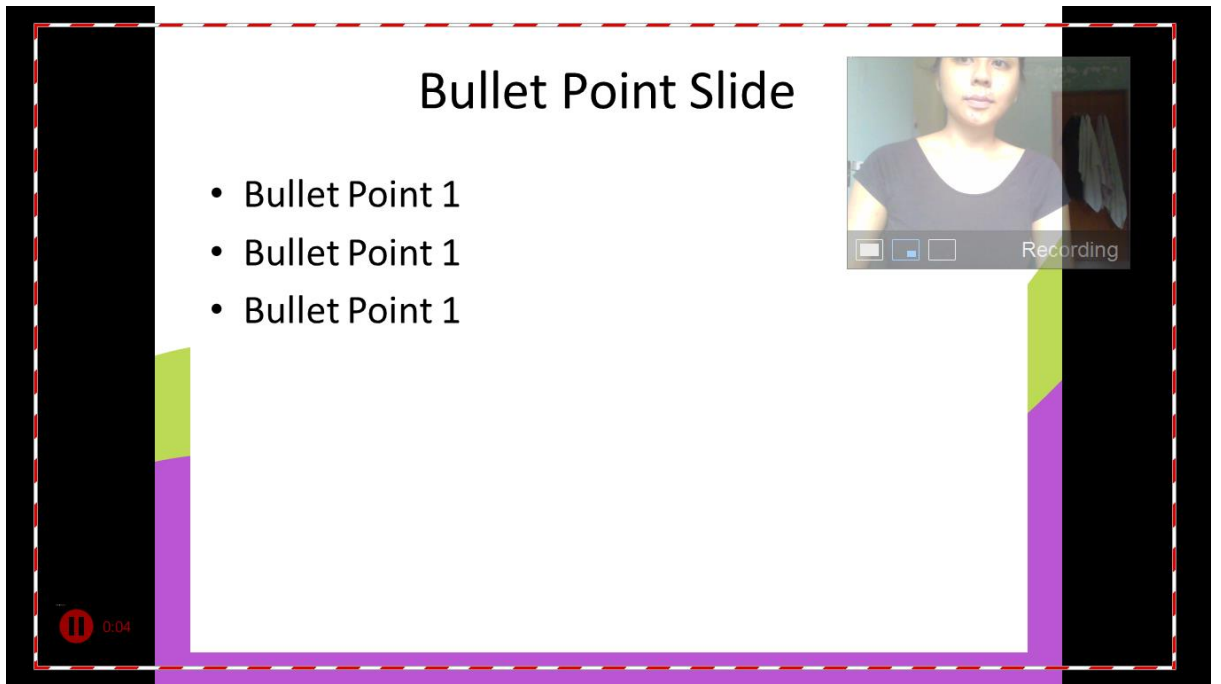*Figure 25: Using both camera and PowerPoint presentation*

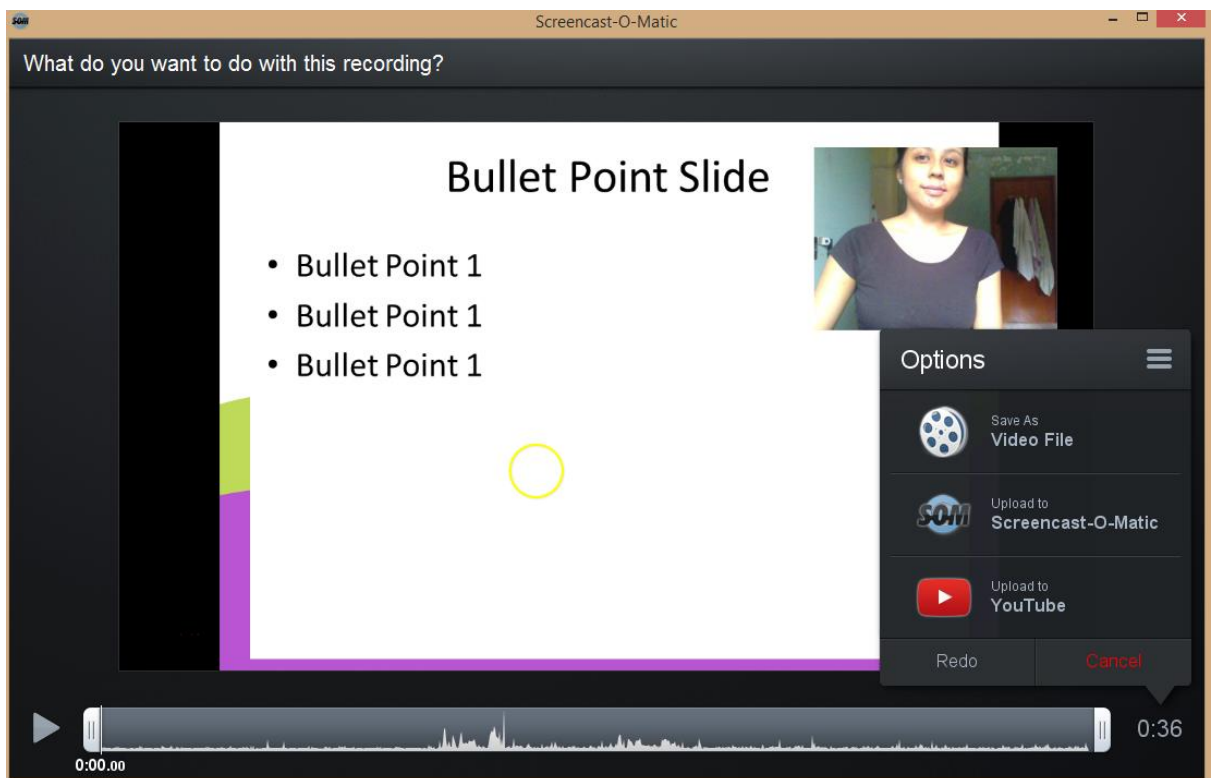*Figure 26: Example for PowerPoint presentation with webcam*

Figure 27: Options for upload after finished recording

4.2.1. The Flipped Learning Enabler Platform for Universiti Teknologi PETRONAS (UTP) Acceptance Testing Results

Acceptance testing is done to test the Flipped Learning Enabler Platform based on user experiences in terms of usability and viability for future development in the context of UTP environment. Quantitative survey is chosen as tool to perform the acceptance testing survey on the user, in this context, the lecturers of UTP who uses the platform. The survey is constructed based on the requirements, both functional and non-functional requirements.

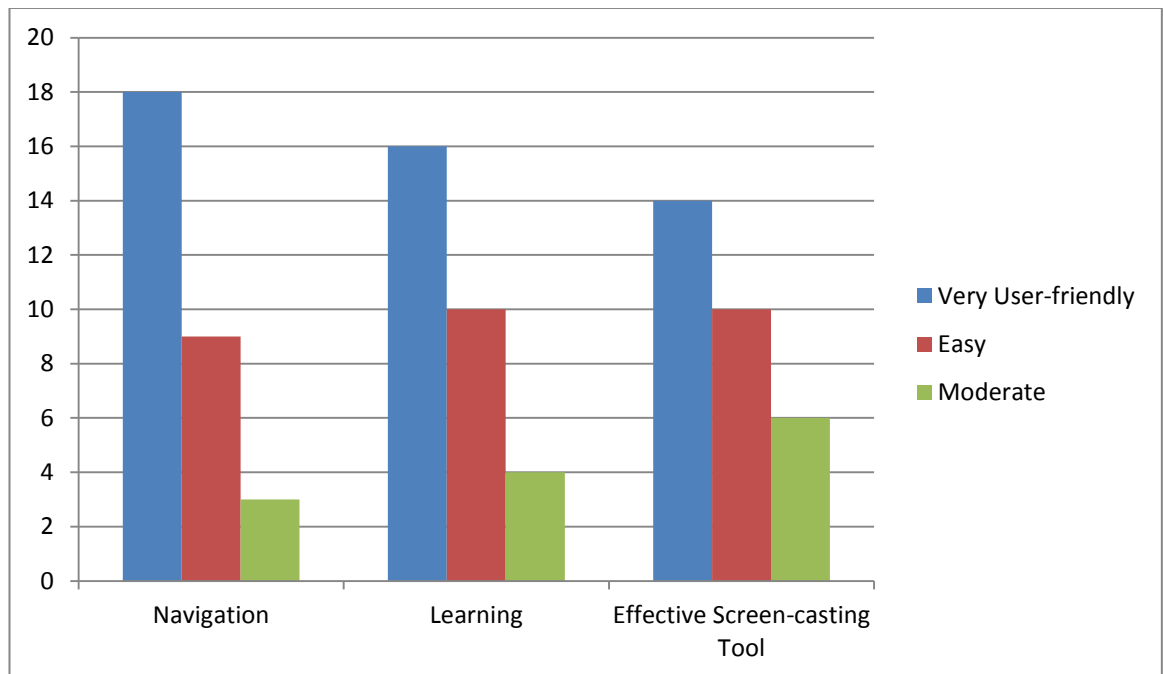The results of the acceptance testing on 30 respondents are as below:-

Chart 1: Usability of UTP Flipped Learning Enabler Platform

The answer from majority of the respondent are positive and they find the Flipped Learning Enabler Platform for UTP is very useful in aiding flipped learning implementation in UTP as well as to promote the concept to be enabled to many more courses in UTP.
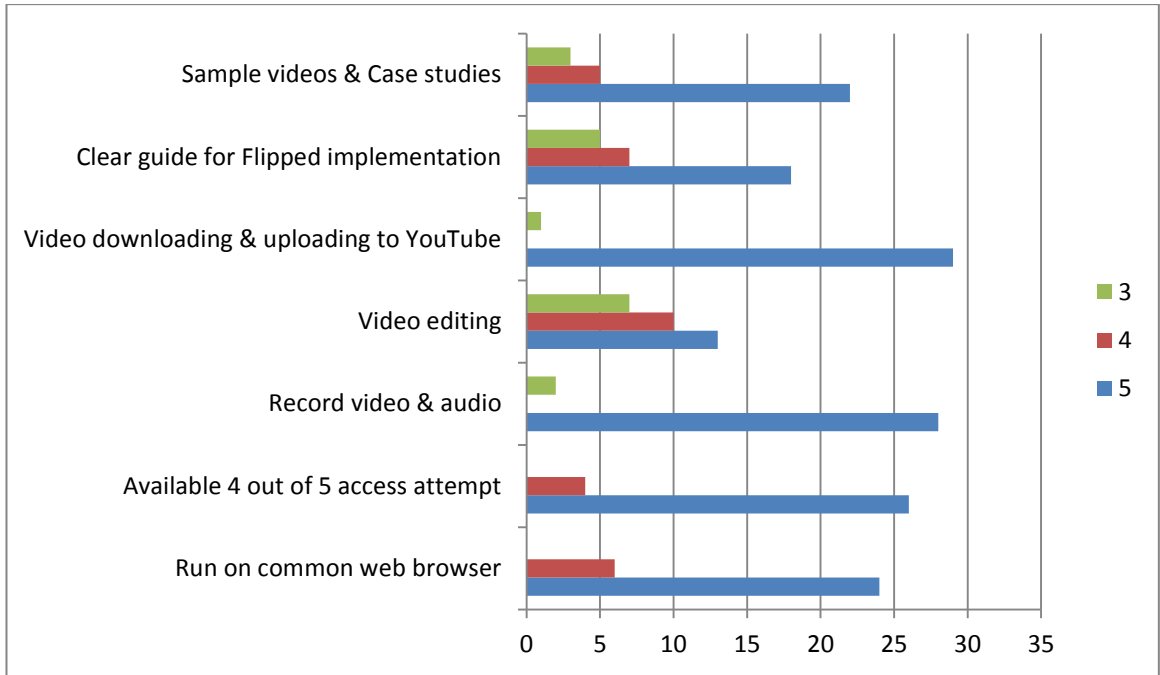
Chart 2: UTP Flipped Learning Enabler Platform functionalities scores (1 to 5 of less relevant to highly relevant)

Apart from that, feedbacks have been gathered from the respondents. Some notable user feedbacks are:-

User	Feedback
User 1	"The platform is recommended to stream the videos made by UTP lecturers so that we can use it as references"
User 2	"Integration of user profile capability for students and lecturer will enhance the usability of the platform"
User 3	"Promote the usage of the platform not just for lecturers but also for students of UTP"

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Chapter 5

5. Conclusion and Recommendation

5.1. Conclusion

The Flipped Learning Enabler Platform and Adaptation in Universiti Teknologi PETRONAS (UTP) project is focused on enhancing the learning experience of students in the campus by introducing new teaching and learning model to promote active learning and student engagement. This project serves as an initial foundation for learning through technology or specifically through flipped learning methodology in harnessing effective understanding by UTP students in the learning process.

The Flipped Learning Enabler Platform and Adaptation in Universiti Teknologi PETRONAS (UTP) project is focused on enhancing the learning experience of students in the campus by introducing new teaching and learning model to promote active learning and student engagement. This project has successfully implemented Flipped Learning concept to three (3) courses taught in the department of Computer & Information Sciences (CIS), Management & Humanities (M&H) and Chemical Engineering (CE) as according to the framework developed from this project.

The Flipped Learning Enabler Platform has been tested on its usability from user perspective and it is found to be useful and adaptive for user to implement Flipped Learning concept into their teaching methodology. The platform is also useful to promote the concept of Flipped Learning to not only UTP lecturers, but also students who wants to grasp the idea and concept behind learning through this adaptive methodology.

This study lays a foundation for enhancement in teaching and learning methodology in Higher Education Institutes (HEIs) context that are rapidly evolving. New trends and new ways of teaching and learning are emerging every day, thus, experimentation on new methodology can certainly boost the student involvement in educational research.

5.2. Recommendation

Future recommendations are needed in order to improve the Flipped Learning Enabler Platform for UTP for future enhancement. The improvement process will allow the platform to have better design interfaces, improve user and system interactions and also to ensure the system can run smoothly without any interference.

Addition of video streaming capabilities alongside with user log in and profile functionalities will promote the usage of the platform that can be very beneficial in UTP education system. it is hope that such project in this context can be developed and expended using this project as its take off point because further development of functionalities of the UTP Flipped Learning Enabler Platform definitely has a big potential for future project expansion especially in maximizing its usability to incorporate student involvement in utilizing the platform as well as using it as learning aids in classes.

One recommendation for the project would be to speed up the development process so that the usability and adaptability can be tested and improvement can be made with regards to the Rapid Application Development Methodology that is used in the development process in this project.

Another recommendation for further development and expansion of this study is to eliminate time constraints that are faced in this project in implementation of flipped learning in UTP to obtain better results out of the flipped learning implementation. This is because, on average, a full term or semester of flipped implementation is needed to ensure accurate test for effectiveness as per suggested by Embi et. al (2014).

Lastly, involvement of lecturers in modelling the framework for flipped learning implementation will be highly advantages as they have better experiences in modelling their teaching and learning structure for the whole semester.

References

Aspden, L., & Helm, P. (2004). Making the connection in a blended learning environment. *Educational Media International*, *41*(3), 245-252.

Alsagoff, Z.A (2013, September 4). *From Flipped to Gamified Classroom Learning!* [Blog post]. Retrieved from http://zaidlearn.blogspot.com/2012/09/from-flipped-to-gamifiedclassroom.html

Azhan, M. H. N., Saman, M. Y. M., & Abdullah, M. L.(2012). On enhancing active e-learning through content syndication, international conference on active e-learning.

Bergmann, J., & Sams, A. (2012). Before You Flip, Consider This: Leaders of the Flipped Classroom Movement Say Each Teacher Will Have a Different Experience, but Securing School Leadership Support, Time, and IT Resources Will Be Important to Every Effort. *Phi Delta Kappan*, *94*(2), 25.

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. International Society for Technology in Education.

Bergmann, J., & Sams, A. (2012). Flip your classroom. *International Society for Technology in Education*.

Bergmann, J., & Sams, A. (2012). How the flipped classroom is radically transforming learning. *The Daily Riff*, 1-3.

Bishop, J. L., & Verleger, M. A. (2013, June). The flipped classroom: A survey of the research. In *ASEE National Conference Proceedings, Atlanta, GA*.

Carroll, J. M., Borge, M., Xiao, L., & Ganoe, C. H. (2008, July). Realistic learning activity is not enough. In *Advanced Learning Technologies, 2008. ICALT'08. Eighth IEEE International Conference on* (pp. 3-7). IEEE.

Chen, H. Y. L., & Chen, N. S. (2014, July). Design and Evaluation of a Flipped Course Adopting the Holistic Flipped Classroom Approach. In *Advanced Learning Technologies (ICALT), 2014 IEEE 14th International Conference on*(pp. 627-631). IEEE.

Chitravelu, N., Sithamparam, S., & Choon, T.S. (1995). *ELT methodology principles and practice*, Malaysia: Penerbit Fajar Bakti Sdn. Bhd.

Davis, C. (2013). Flipped or Inverted Learning. *Enhancing instruction with visual media:Utilizing video and lecture capture*, 241.

EDUCAUSE Learning Initiative. (7). Things You Should Know About Flipped Classrooms. *EDUCAUSE Creative Commons*.

Embi, M. A. (2015). Blended & Flipped Learning: Case Studies in Malaysian HEIs. Universiti Kebangsaan Malaysia

Findlay-Thompson, S., & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education & Accreditation*, *6*(1), 63-71.

Flipped Learning Network (2013). *A review of Flipped Learning*

Flipped Learning Network (2014). *A review of Flipped Learning(Revised 2014)*

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*,*7*(2), 95-105.

Garrison, D. R., & Vaughan, N. D. (2013). Institutional change and leadership associated with blended learning innovation: Two case studies. *The internet and higher education*, *18*, 24-28.

Gerstein, J. (2012). Flipped classroom: The full picture for higher education.*User Generated Education*, *15*.

Hamdan, N., McKnight, P. E., McKnight, C. & Arfstrom, K. M. (2013). The Flipped Learning Model: A White Paper Based on the Literature Review Titled A Review of Flipped Learning. *Arlington, VA: Flipped Learning Network*

Hamat, A., & Embi, M. A. (2010). Constructivism in the design of online learning tools. *European Journal of Educational Studies*, *2*(3), 237-246.

Embi, M. A., Hamat, A., & Sulaiman, A. H. (2011). The use of learning management systems among Malaysian university lecturers. *The International Journal of Learning*, *18*(4), 61-70.

Jaryani, F., Sahibudin, S., Zamani, M., Masrom, M., Salehy, S., & Jamshidi, J. (2013). E-Learning effects on learning quality: A case study of Iranian students. *Journal of Administration and Development, Mahasarakham*

University, 1(3), 16-27.

Jiugen, Y., Ruonan, X., & Wenting, Z. (2014, May). Essence of flipped classroom teaching model and influence on traditional teaching. In *Electronics, Computer and Applications, 2014 IEEE Workshop on* (pp. 362-365). IEEE.

Joutsenvirta, T., & Myyry, L. (2010). Blended Learning in Finland. *Viitattu*, *15*, 2010.

Kee Man, C. & Kian Sam, H. (2014). Morpheus UNIMAS: Strengthening Student Engagement in Blended Learning Environments. In *Blended & Flipped Learning:Case Studies in Malaysian HEIs*

Khine, M. S., & Lourdusamy, A. (2003). Blended learning approach in teacher education: combining face-to-face instruction, multimedia viewing and online discussion. *British Journal of Educational Technology*, *34*(5), 671-675.

Lavelle, J.P., Stimpson, M. T. & Brill, E. D. (2013). Flipped Out Engineering Economy: Converting a Traditional Class to an Inverted Model. In *Proceedings of the 2013 Industrial and Systems Engineering Research Conference A. Krishnamurthy and W.K.V. Chan, eds.*

Motteram, G. (2006). 'Blended'education and the transformation of teachers: a long-term case study in postgraduate UK Higher Education. *British Journal of Educational Technology*, *37*(1), 17-30.

Roach, T. (2014). Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. *International Review of Economics Education*, *17*, 74-84.

Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning strategies.*Journal of Family & Consumer Sciences*, *105*(2), 44-49.

Phillips, C. R., & Trainor, J. E. MILLENNIAL STUDENTS AND THE FLIPPED CLASSROOM. *JOURNAL OF BUSINESS AND EDUCATIONAL LEADERSHIP*, 102.

Sams, A., & Bergmann, J. (2013). Flip Your Students' Learning. *Educational Leadership*, *70*(6), 16-20.

Szafir, D., & Mutlu, B. (2013, April). ARTFul: adaptive review technology for flipped learning. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1001-1010). ACM.

Saad, W. Z. (2015, January). Effective Blended Learning of Microbiology using Interactive Web 2.0 Applications. In *2014 International Conference on Advances in Education Technology (ICEAT-14)*. Atlantis Press.

Stansfield, M., McLellan, E., & Connolly, T. (2004). Enhancing student performance in online learning and traditional face-to-face class delivery.*Journal of Information Technology Education: Research*, *3*(1), 173-188.

Steed, A. (2012). The flipped classroom. *Teaching Business and Economics*,*16*(3), 9.

Tucker, B. (2012). The flipped classroom. *Education Next*, *12*(1), 82-83.

Wan Fatimah Wan Ahmad Afza Shafie, Josefina Barnachea Janier & Aliza Sarlan (2007). Exploring Universiti Teknologi PETRONAS students' attitudes towards learning application of integration using courseware. *Proceedings of 1st International Malaysian Education Technology*

Appendices

Appendix 1: Source Code of iFrame and Transform-Origin Property

```
HTML
<div id="wrap">
    <iframe id="frame" src="http://screencast-o-matic.com/screen_recorder">
      <p>Your browser does not support iframes.</p>

        </iframe></div>
        </center>
</div>
```

```
-----------------------------------------------------------------------------------------------------CSS
#wrap {
   width: 500px;
   height: 180px;
   padding: 0;
   overflow: hidden;
         text-align: center;
}
#frame {
   -ms-zoom: .0;
   -ms-transform-origin: 0 0;
   -moz-transform: scale(1.0);
   -moz-transform-origin: 0px 50px;
   -o-transform: scale(1.0);
   -o-transform-origin: 0px 50px;
   -webkit-transform: scale(2.5);
   -webkit-transform-origin: 13% 125%;
}
#frame {
   width: 1200px;
   height: 350px;
   overflow: hidden;
}
```

Appendix 2: Source Code of CSS Responsive Animated Accordion

HTML

```html
<div class="accordion">
   <dl>

     <dt>
     <a href="#accordion1" aria-expanded="false" aria-controls="accordion1" class="accordion-title accordionTitle js-accordionTrigger">Pick a Topic</a>
     </dt>
     <dd class="accordion-content accordionItem is-collapsed" id="accordion1" aria-hidden="true">
                    <div id="para">
     </div>
                    <div id="topic"> <img src="images/topic.png"/>
                    </div>
     </dd>

     <dt>
     <a href="#accordion2" aria-expanded="false" aria-controls="accordion2" class="accordion-title accordionTitle js-accordionTrigger">
     Plan The Flipped Learning Lesson</a>
     </dt>
     <dd class="accordion-content accordionItem is-collapsed" id="accordion2" aria-hidden="true">
                    <div id="para">
     </div>
                    <div id="topic"> <img src="images/topic.png"/>
                    </div>
     </dd>

     <dt>
     <a href="#accordion2" aria-expanded="false" aria-controls="accordion3" class="accordion-title accordionTitle js-accordionTrigger">
     Plan The Video Content</a>
     </dt>
     <dd class="accordion-content accordionItem is-collapsed" id="accordion2" aria-hidden="true">
                    <div id="para">
     </div>
                    <div id="topic"> <img src="images/topic.png"/>
                    </div>
     </dd>

   </dl>
</div>
```

CSS

```css
.accordion dl {
  border: 1px solid #ddd;
}
.accordion dl:after {
  content: "";
  display: block;
  height: 1em;
  width: 100%;
  background-color: #fece1a;
}

.accordion dd {
  background-color: #4e555e;
  font-size: 1em;
  line-height: 1.5em;
}

.accordion p {
  padding: 1em 2em 1em 2em;
}

.accordion {
  position: relative;
  background-color: #4e555e;
}
```

```css
.container {
 max-width: 960px;
 margin: 0 auto;
 padding: 2em 0 2em 0;
}

.accordionTitle {
 background-color: #fece1a;
 text-align: center;
 font-weight: 700;
 padding: 2em;
 display: block;
 text-decoration: none;
 color: #fff;
 -webkit-transition: background-color 0.5s ease-in-out;
        transition: background-color 0.5s ease-in-out;
 border-bottom: 1px solid #fece1a;
}
.accordionTitle:before {
 content: "+";
 font-size: 1.5em;
 line-height: 0.5em;
 float: left;
 -webkit-transition: -webkit-transform 0.3s ease-in-out;
        transition: transform 0.3s ease-in-out;
}
.accordionTitle:hover {
 background-color: #000000;
}

.accordionTitleActive,
.accordionTitle.is-expanded {
 background-color: #000000;
}
.accordionTitleActive:before,
.accordionTitle.is-expanded:before {
 -webkit-transform: rotate(-225deg);
    -ms-transform: rotate(-225deg);
        transform: rotate(-225deg);
}

.accordionItem {
 height: auto;
 overflow: hidden;
 max-height: 50em;
 -webkit-transition: max-height 1s;
        transition: max-height 1s;
}
@media screen and (min-width: 48em) {
 .accordionItem {
  max-height: 150em;
  -webkit-transition: max-height 0.5s;
         transition: max-height 0.5s;
 }
}

.accordionItemCollapsed,
.accordionItem.is-collapsed {
 max-height: 0;
}

.animateIn {
 -webkit-animation: accordionIn 0.65s normal ease-in-out both 1;
        animation: accordionIn 0.65s normal ease-in-out both 1;
}

.animateOut {
 -webkit-animation: accordionOut 0.75s alternate ease-in-out both 1;
        animation: accordionOut 0.75s alternate ease-in-out both 1;
}

@-webkit-keyframes accordionIn {
 0% {
  opacity: 0;
  -webkit-transform: scale(0.9) rotateX(-60deg);
```

```css
      transform: scale(0.9) rotateX(-60deg);
    -webkit-transform-origin: 50% 0;
        transform-origin: 50% 0;
  }
  100% {
   opacity: 1;
   -webkit-transform: scale(1);
        transform: scale(1);
  }
}

@keyframes accordionIn {
 0% {
   opacity: 0;
   -webkit-transform: scale(0.9) rotateX(-60deg);
        transform: scale(0.9) rotateX(-60deg);
   -webkit-transform-origin: 50% 0;
        transform-origin: 50% 0;
 }
 100% {
   opacity: 1;
   -webkit-transform: scale(1);
        transform: scale(1);
 }
}
@-webkit-keyframes accordionOut {
 0% {
   opacity: 1;
   -webkit-transform: scale(1);
        transform: scale(1);
 }
 100% {
   opacity: 0;
   -webkit-transform: scale(0.9) rotateX(-60deg);
        transform: scale(0.9) rotateX(-60deg);
 }
}
@keyframes accordionOut {
 0% {
   opacity: 1;
   -webkit-transform: scale(1);
        transform: scale(1);
 }
 100% {
   opacity: 0;
   -webkit-transform: scale(0.9) rotateX(-60deg);
        transform: scale(0.9) rotateX(-60deg);
 }
}
#topic{
 position: absolute;
  left: 0px;
  top: 0px;
  z-index: -1;
            margin-left: 680px;
}
#para{
  float: left;
            width: 700px;
```

Appendix 3: Source Code of Google Maps Web Services APIs

```
JAVASCRIPT
function initializeMap() {

    var lat = '4.385830'; //latitude.
    var lon = '100.978953'; //longitude.

    var centerLon = lon - 0.0105;

    var myOptions = {
        scrollwheel: false,
        draggable: false,
        disableDefaultUI: true,
        center: new google.maps.LatLng(lat, centerLon),
        zoom: 15,
        mapTypeId: google.maps.MapTypeId.ROADMAP
    };

    //Bind map to elemet with id map-canvas
    var map = new google.maps.Map(document.getElementById('map-canvas'), myOptions);
    var marker = new google.maps.Marker({
        map: map,
        position: new google.maps.LatLng(lat, lon),
    });

    var infowindow = new google.maps.InfoWindow();

    google.maps.event.addListener(marker, 'click', function () {
        infowindow.open(map, marker);
    });

    infowindow.open(map, marker);
}
```

Appendix 3: Beta Testing Guide for Flipped Learning Enabler Platform of UTP

Flipped Learning Implementation in Universiti Teknologi PETRONAS (UTP)

Prepared by,

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Bachelor of Technology (Hons) (Business Information System)

Under the supervision of,

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Beta Testing For Flipped Learning Enabler Platform of UTP

INTRODUCTION

As part of my final year project (FYP), as per title, "Flipped Learning Enabler Platform: For Universiti Teknologi PETRONAS (UTP) Environment", I would like to initiate the implementation of Flipped Learning, a method of teaching & learning in promoting new and modern approach in education especially in Higher Education Institutes Context, with the help of UTP's Lecturers.

This project will look into the feasibility of developing a framework for implementing flipped learning in UTP and tackle the challenges associated with that. The subject-focussed of this project are the lecturers and course instructors of UTP who will be the executor of flipped learning in UTP. Aiming at providing a cost free solution with ease of access and straightforward user interface, this project looks into developing a platform with guidance in implementing constructed flipped learning for lecturers and instructors of UTP. This user-guiding platform will model and enable the flipped learning method into the education system of UTP.

Hence, this documentation is made specifically to assist Lecturers of UTP in implementing the Flipped Learning methodology into their classes. The content of this documentation are:-

- Flipped Learning Basic & Implementation in UTP
- Graphic Tutorial of How to Use Screencast-o-Matic from UTP Flipped Learning Enabler Platform

The UTP Flipped Learning Enabler Platform is accessible at,

http://utpflipped.co.nf/

Flipped Learning Basic & Implementation in UTP

The basic idea behind Flipped Learning method is the two part contents to be actualize into your class,
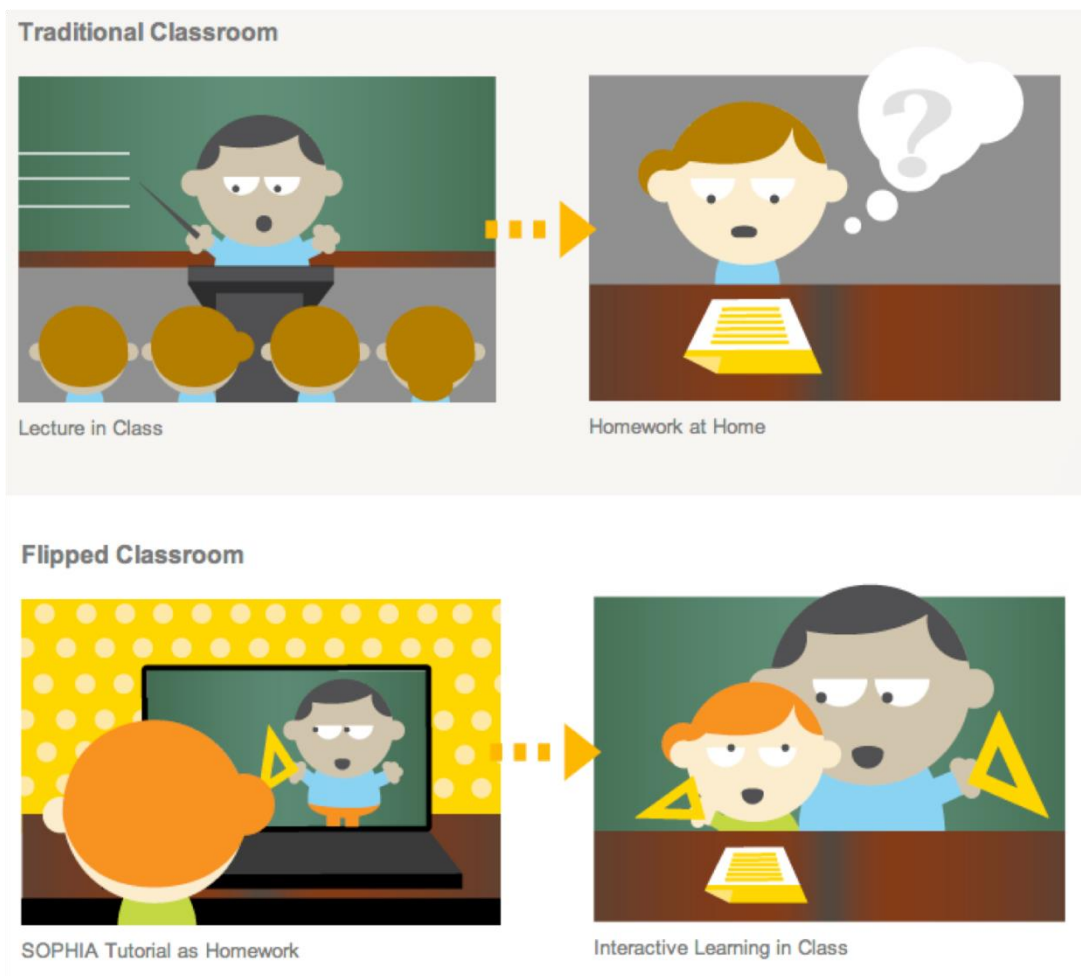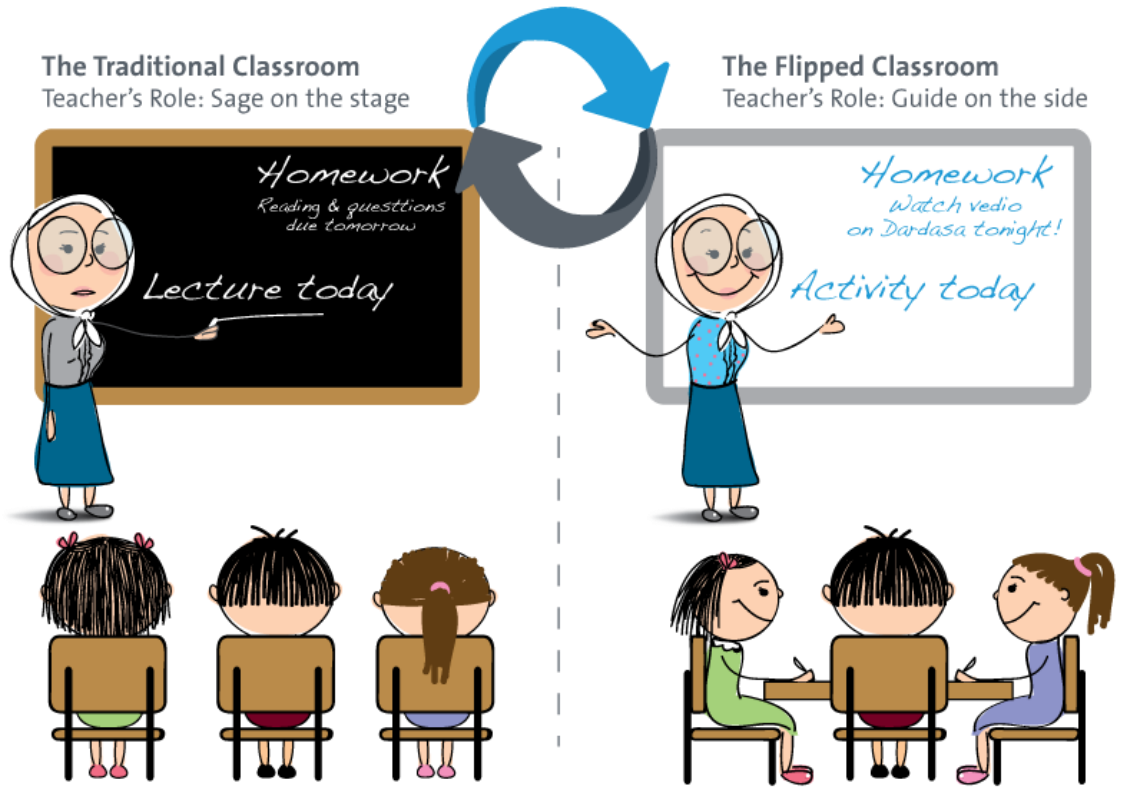
1. Video lectures
2. In-class implementation

- Video Lectures
  The video lectures will be made by lecturers themselves. This is to promote customization of video lessons that fit best to your particular students. The UTP Flipped Learning Enabler Platform is integrated with the easiest video making tool, Screencast-O-Matic to assist lecturers in making videos easily.

- In-class implementation
  Flipped Learning shift the role of lecturers from being the class presenter to being a class moderator and guider in guiding discussions and hands on activities after video lessons has been watched by students.

Traditional Classroom

Lecture in Class — Homework at Home

Flipped Classroom

SOPHIA Tutorial as Homework — Interactive Learning in Class

The flipped learning framework and guidelines is on the site for your kind references.
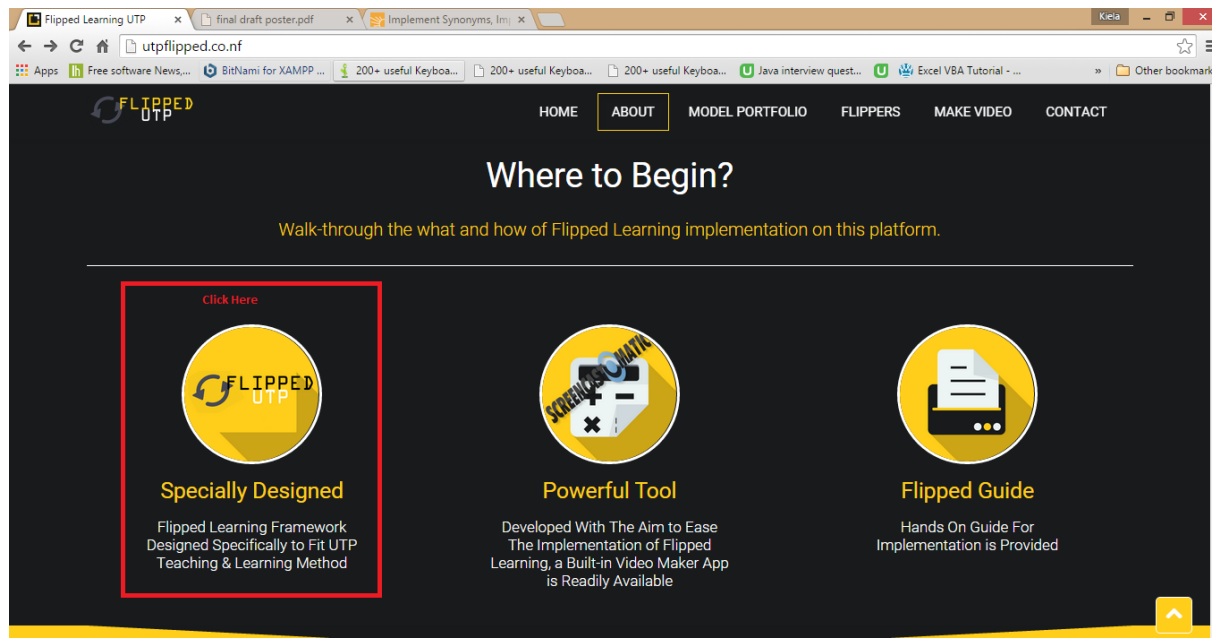
# Graphic Tutorial of How to Use Screencast-o-Matic from UTP Flipped Learning Enabler Platform

*Note: The UTP Flipped Learning Enabler Platform works best on Google Chrome web browser

1. Video making tools, Screencast-o-Matic is integrated into this platform as to assist lecturers in making video. This tool allows the recording of your computer screen as well as your webcam. The recording of computer screen can be used to display lectures note or can act as the whiteboards in assisting your pre-recorded lectures through your webcam.
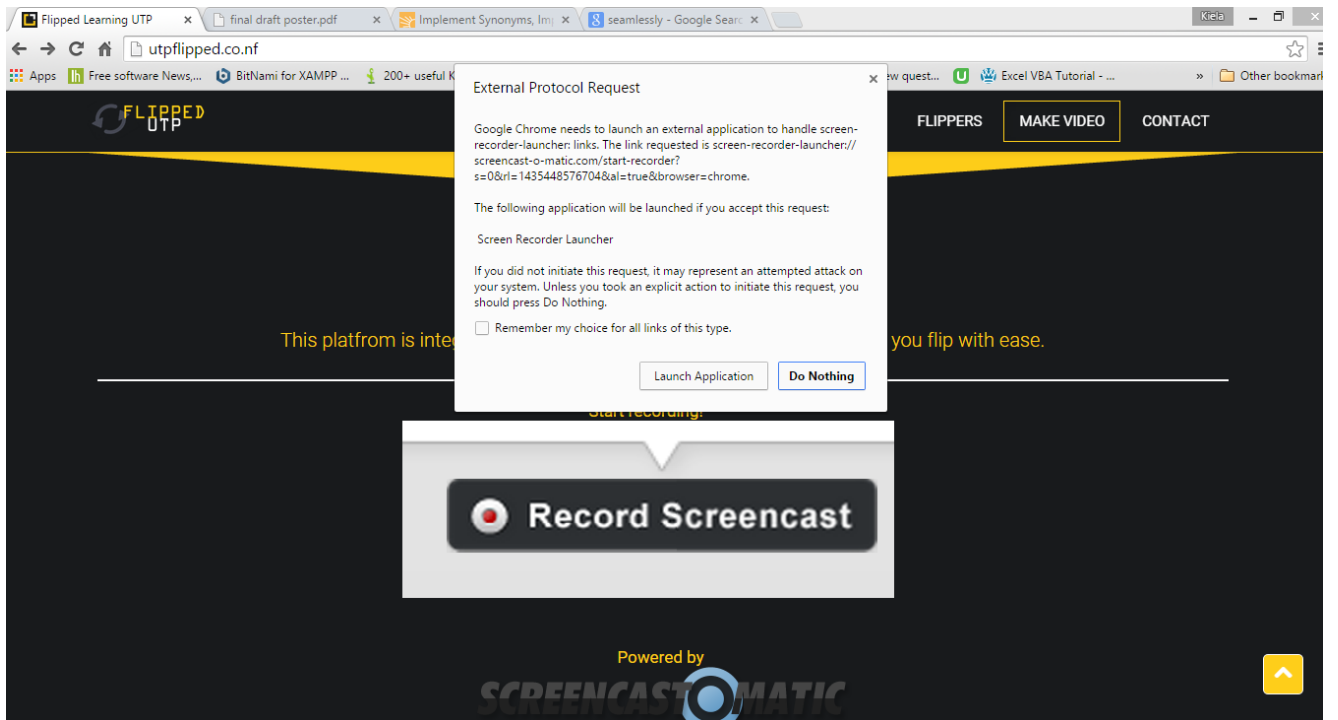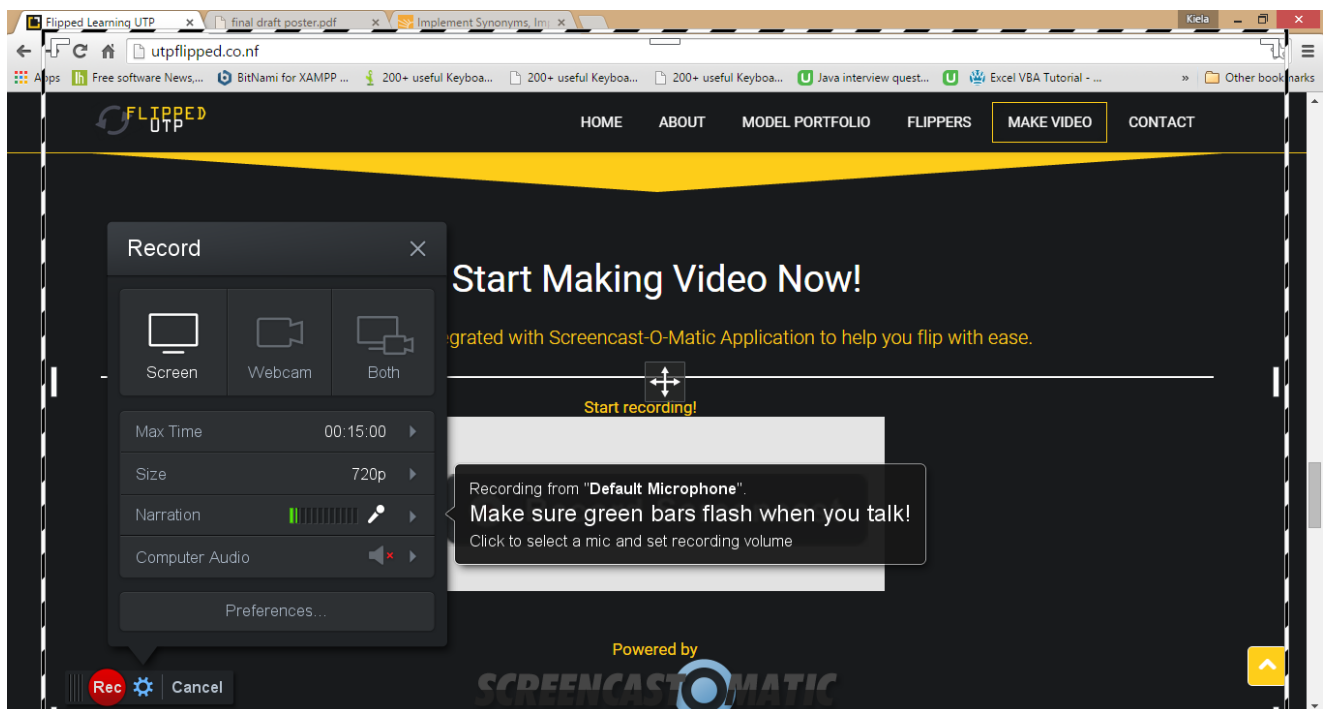   The video maker application can be access here,
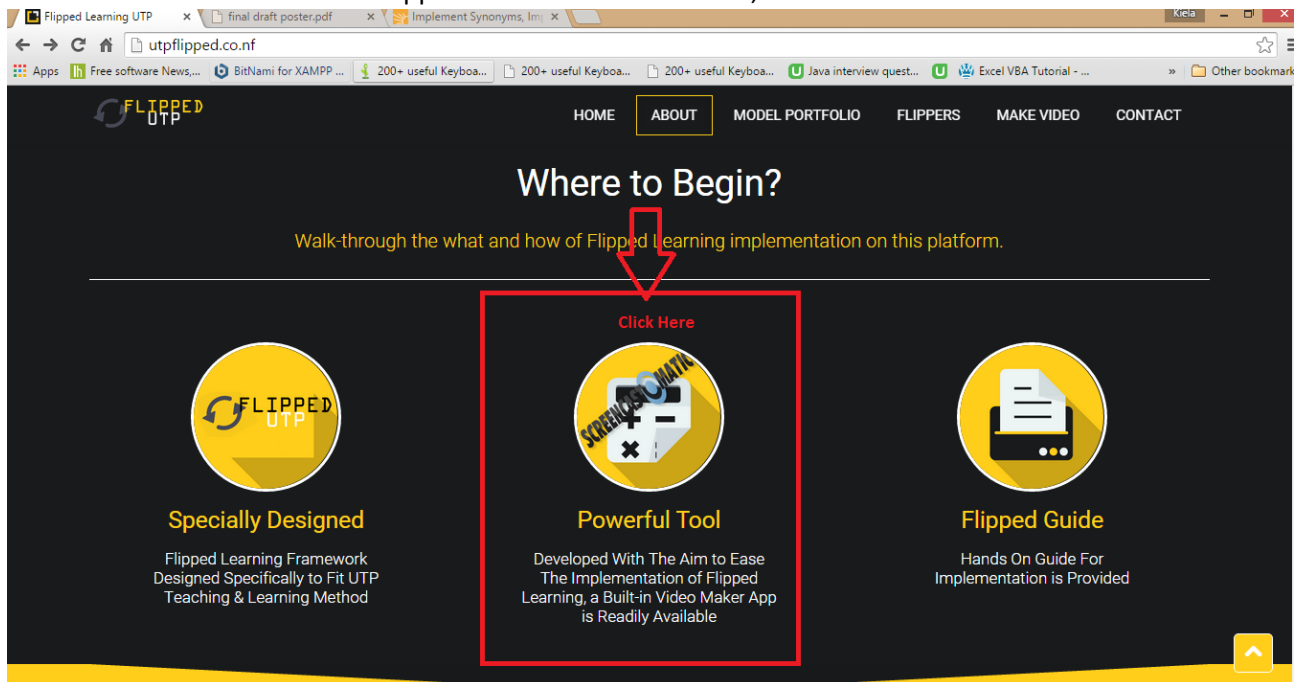

2. The initial screen for the video maker application
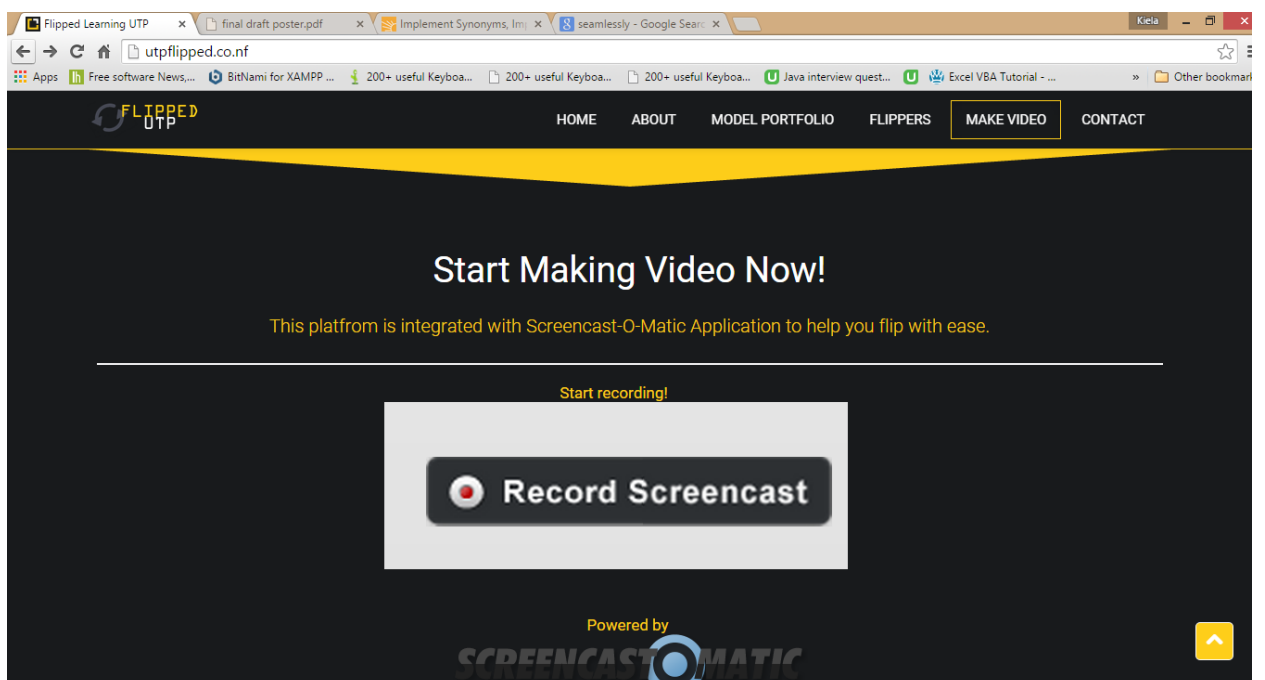
3. To begin, click on the Record Screencast button. The application will launch once Launch Application is selected in the pop-up windows as per below.


4. Once the application is launch, you will be seeing it covering your computer screen as below.

5. Before we begin recording, ensure to activate both screen and webcam for recording as below. Have the slide or an empty canvas at full screen to start recording your video lessons. And press record once ready to begin.
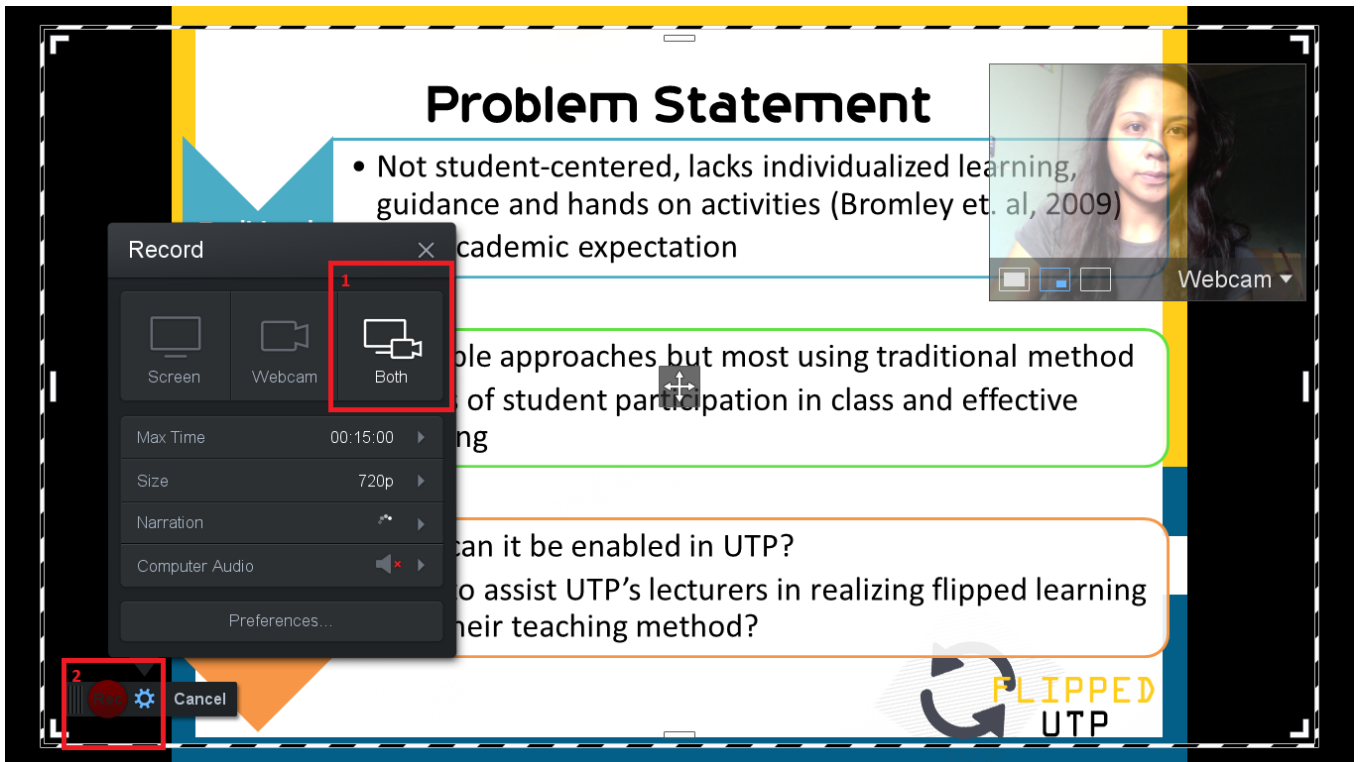

6. You can pause while recording by clicking the Rec button and also to remove snippet of recording by clicking the trash can button. Select done once recording is
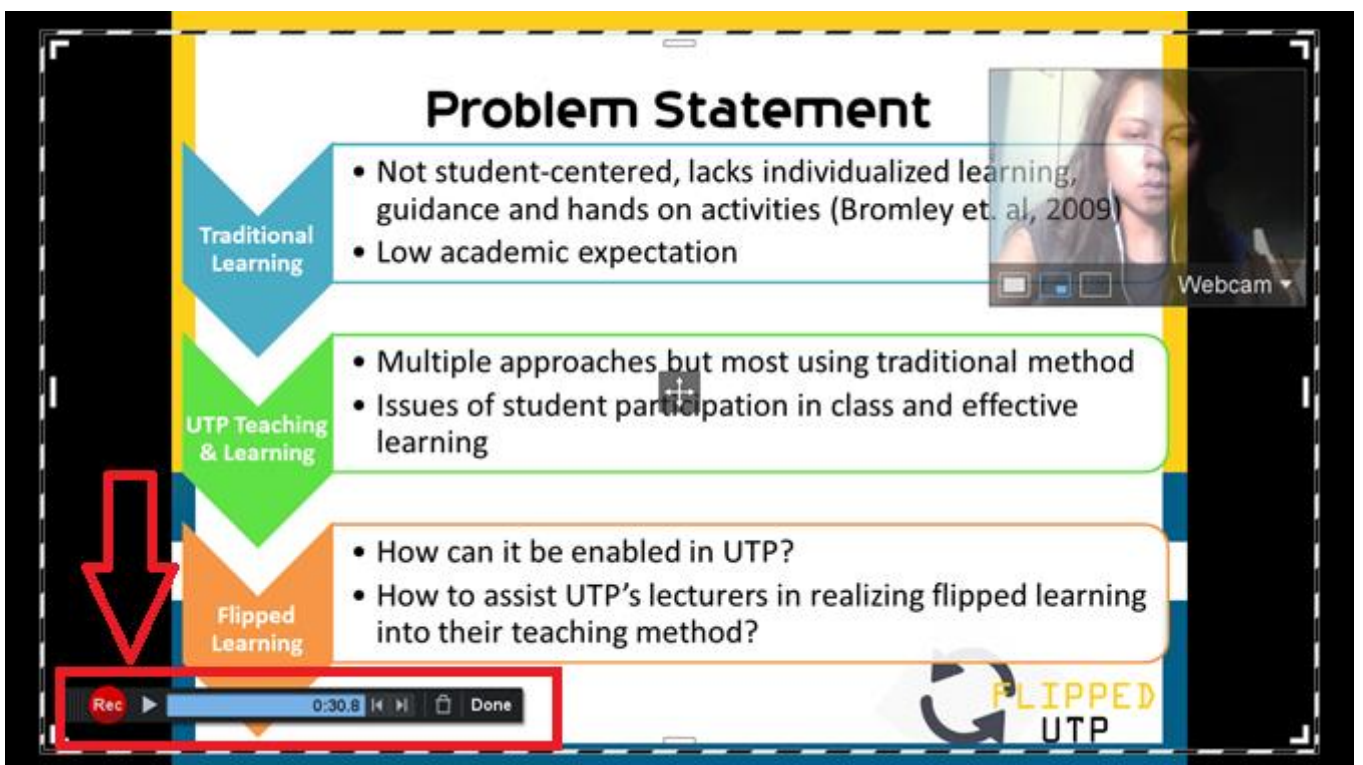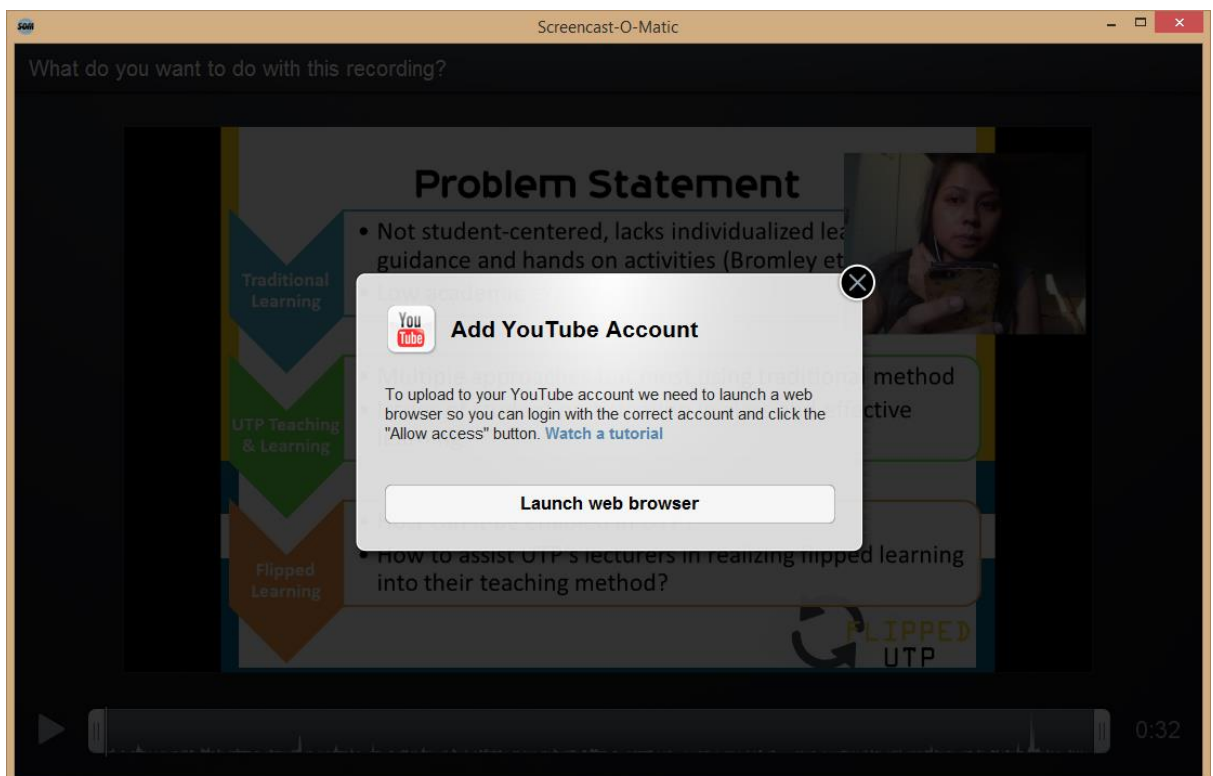
completed.

7. This screen will pop-up for you to select what you want to do next with the recorded video. Select upload to YouTube and proceed to upload it to your YouTube channel as per outlines in the flipped learning guideline.
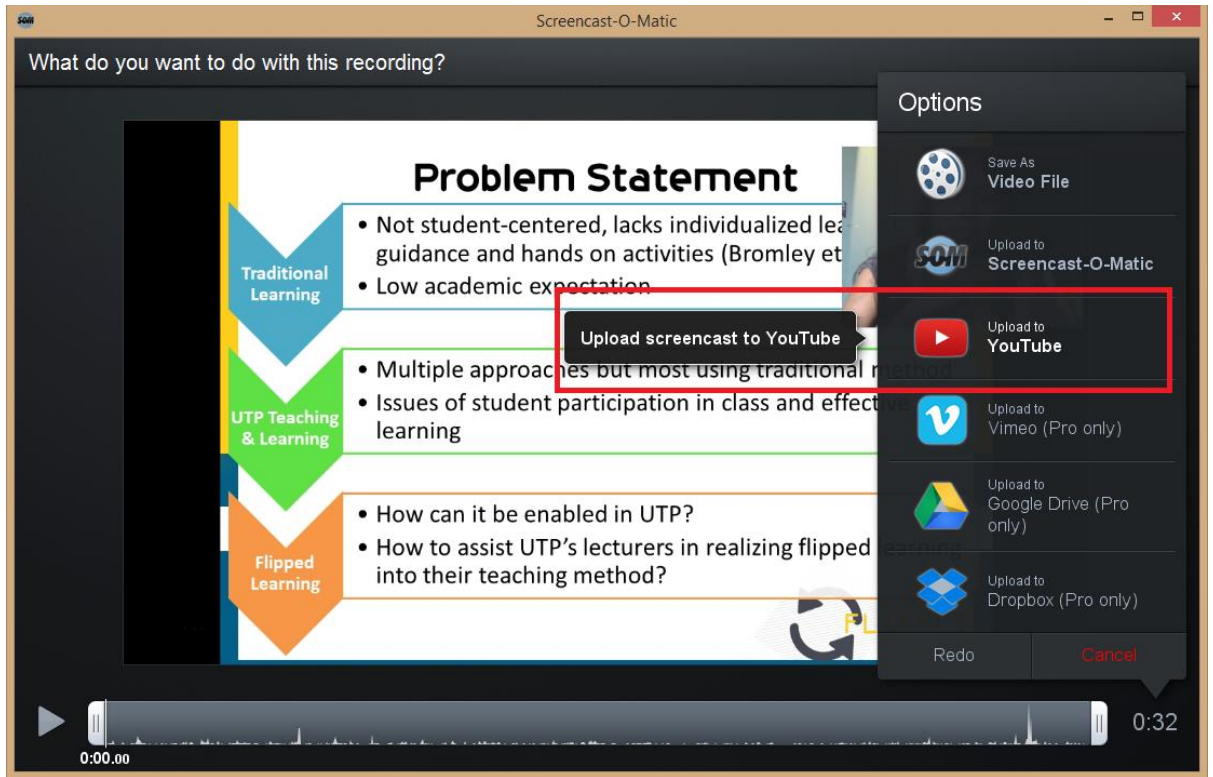
8. Pop-up screen as below will appear, click Launch web browser.

9. Once redirected at the web browser, proceed to authenticate screencast-o-matic to YouTube through your Google account.
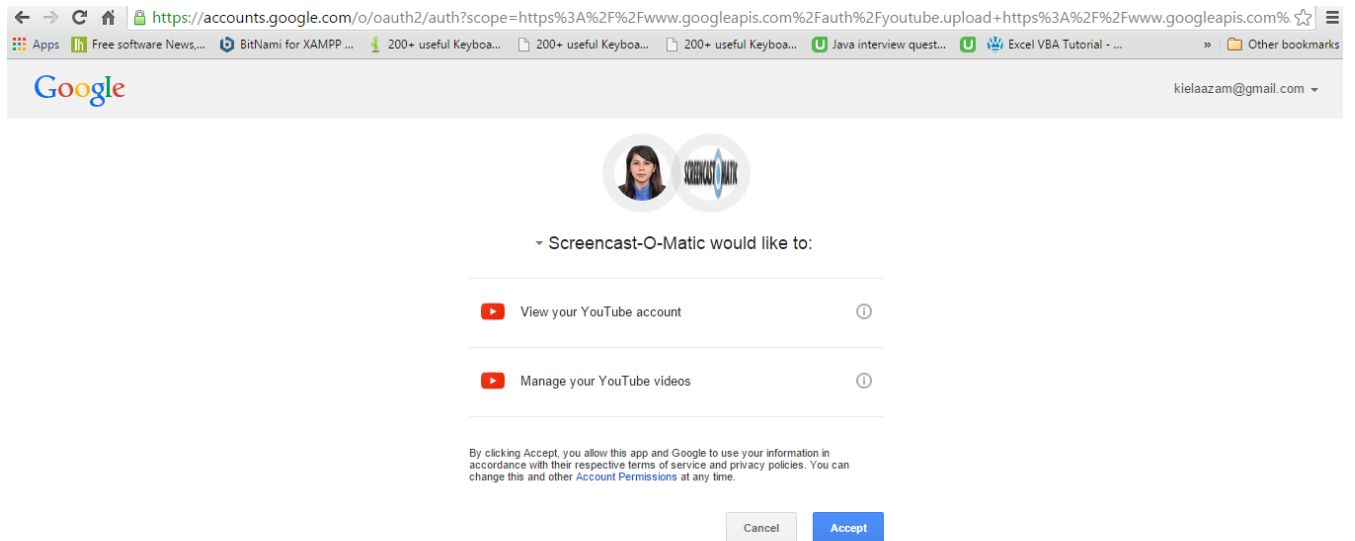
10. When authentication is successful, you will be directed back to Screencast-o-Matic screen to publish the video to YouTube. Change privacy setting to Private and click Publish.
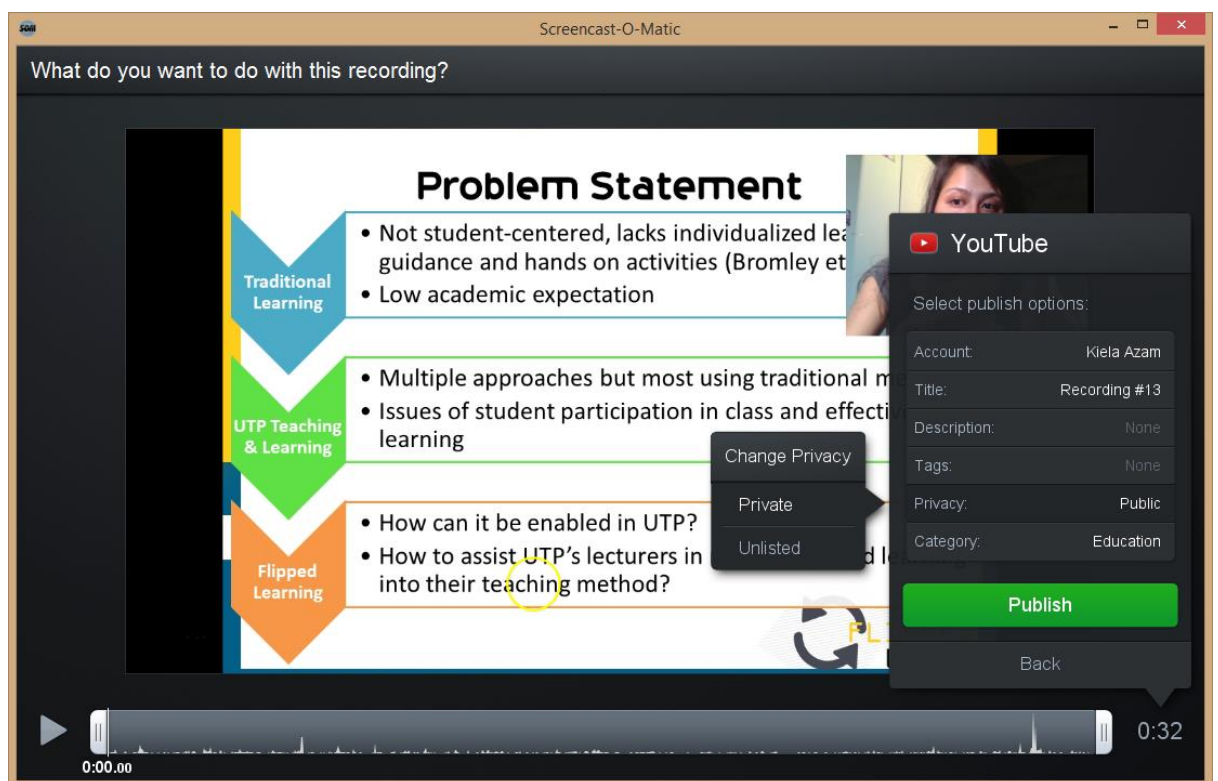
11. Wait for the recording to be published to your YouTube channel.
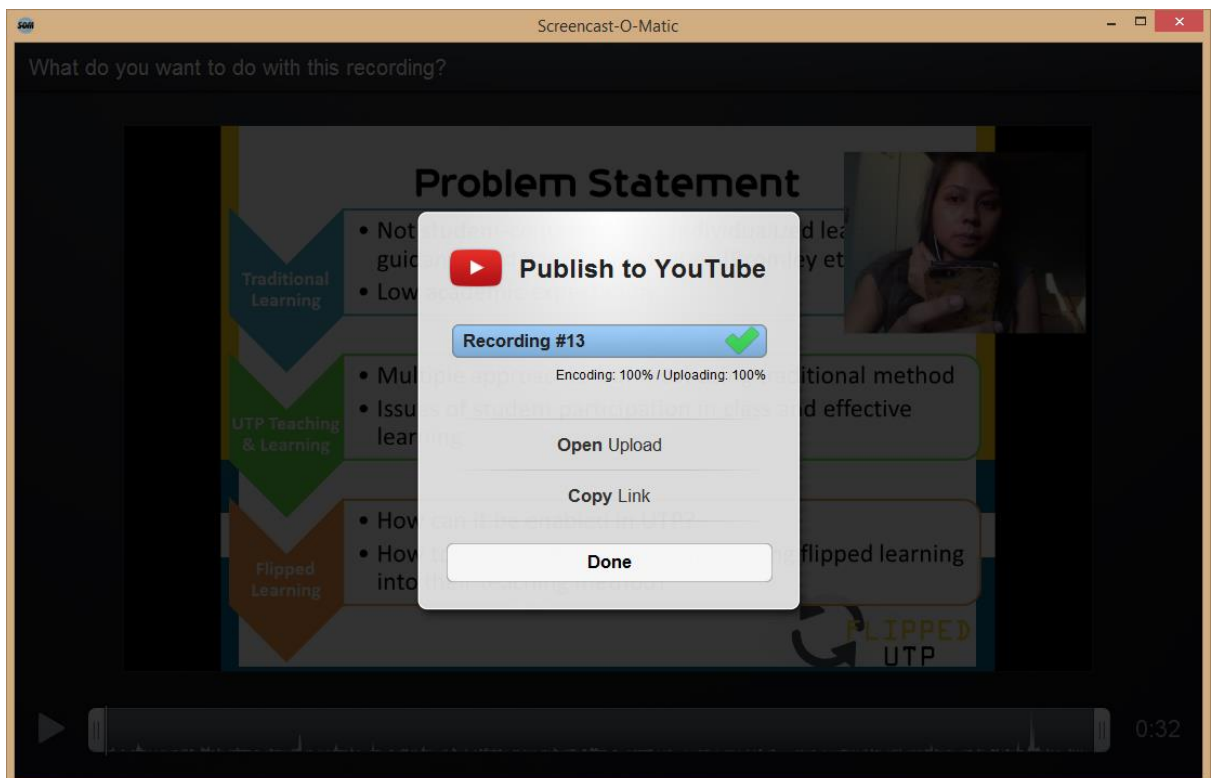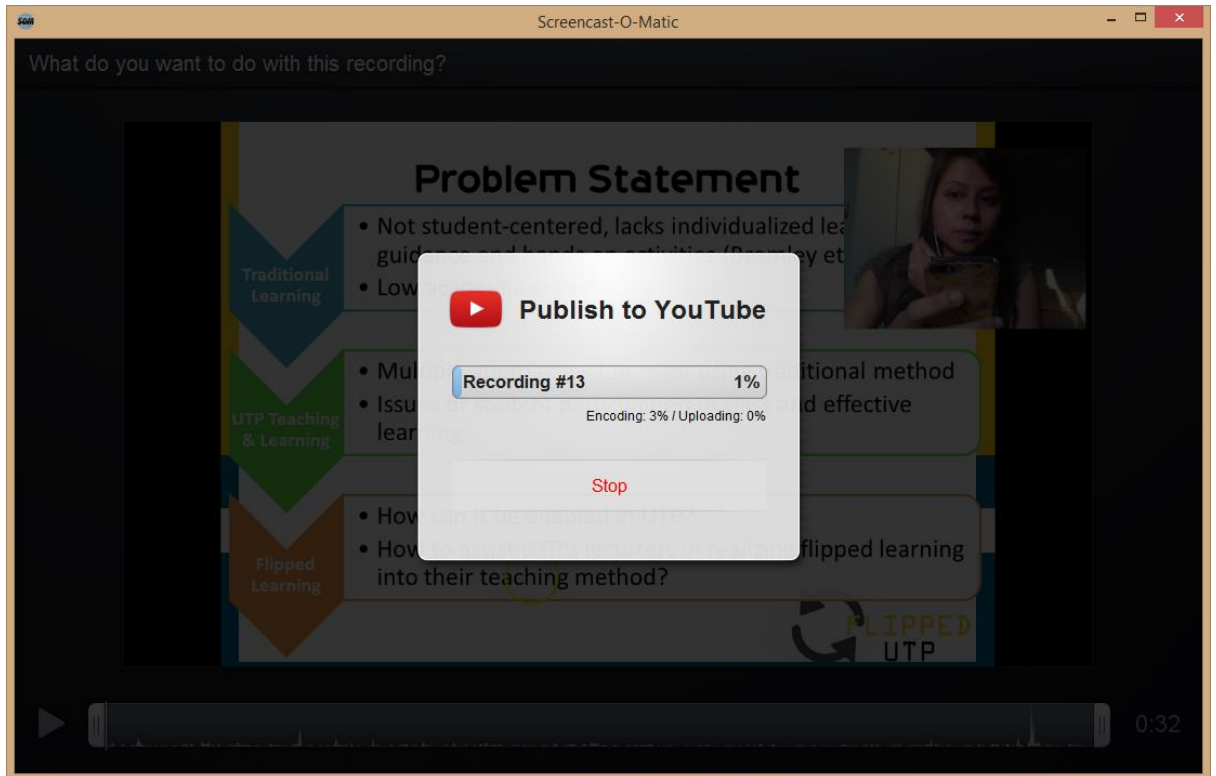
12. You may now access the successfully uploaded video on your YouTube channel as per below.
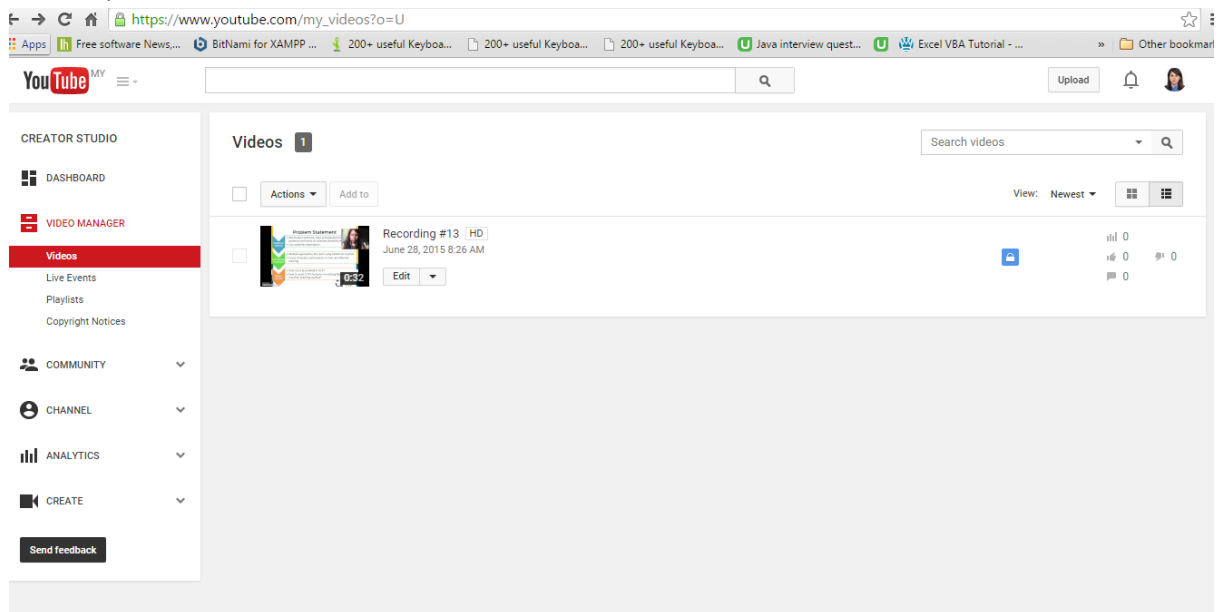
13. However, the video is private. To share the video for viewing only by your students, spread the video links through e-learning, emails, in class etc.
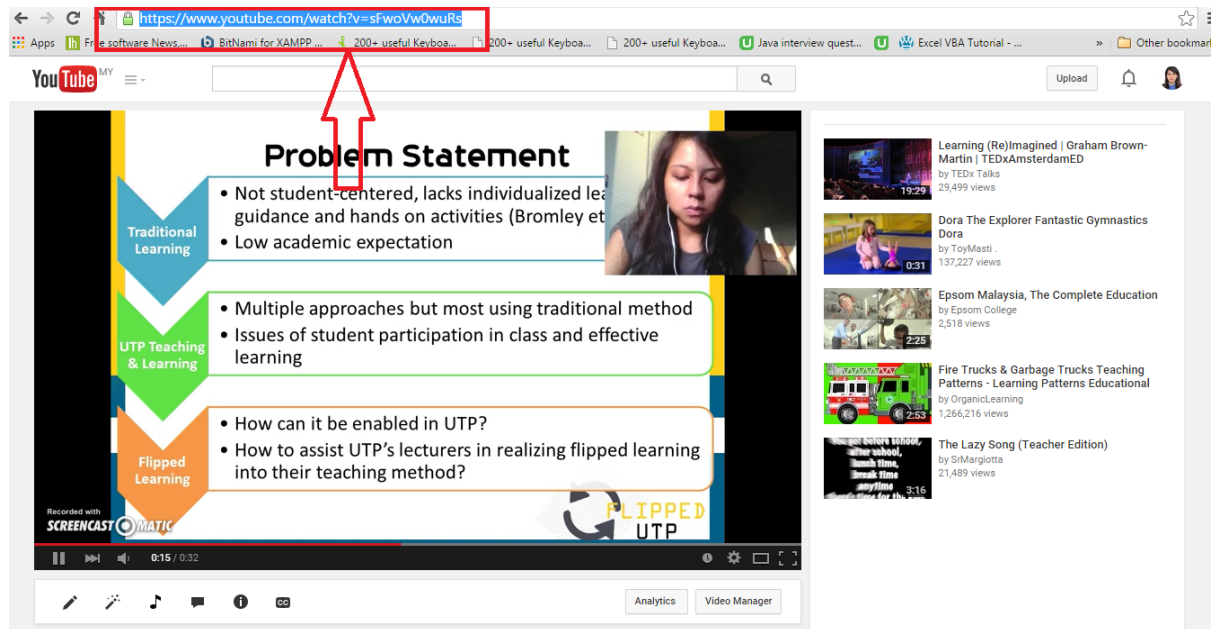
Coming to the second part of Flipped Learning teaching & learning method, the in-class implementation to test the effectiveness of the video lectures presented. The in-class implementation can be in the form of,

- Group discussions
- Case studies discussions
- Problem solving activities
- Group projects

This should be plan first hand in order to ensure the in class activities is structured and effective to student learning.

For further clarifications and assistance, please contact

Nur Aqilah at +60194091490 | kielaazam@gmail.com

Appendix 4: Acceptance Testing Survey for Universiti Teknologi PETRONAS (UTP) Flipped Learning Enabler Platform

Acceptance Testing Survey for Universiti Teknologi PETRONAS (UTP) Flipped Learning Enabler Platform

The objective of this questionnaire is to determine the fulfilment of functional requirements of the UTP Flipped Learning Enabler Platform. With these user evaluations, future enhancement for the platform will be structured.

Lecturers' Information

    a. Name :

    b. Department :

    c. Course Flipped :

    d. Number of Students in Course (b) :

Survey Questions

Rate these statements with your experience using the system with *1* being *less relevant* and *5* being *highly relevant*.

1. The platform provides ease of learning. It must be easy to learn for both novices and users with experience from similar systems.

      1   2   3   4   5

2. The platform shall run on most commonly used web browser. The system shall not require user to download and install any software. The platform shall run independently.

      1   2   3   4   5

3. The platform is available 4 out of 5 times of access attempt by user.

      1   2   3   4   5

4. The platform enables effective screen-casting tool. The application system efficiently triggers the Screencast-O-Matic application service from its domain site through the platform.

      1   2   3   4   5

5. The platform allows user to record video and audio.

        1   2   3   4   5

6. The platform enables video editing capability; add and delete video snapshots.

        1   2   3   4   5

7. The platform enables the downloading of video into user's computer or uploading directly to YouTube.

        1   2   3   4   5

8. The platform establishes and display clear guide for flipped learning implementation in UTP.

        1   2   3   4   5

9. The platform provides sample videos and case studies of flipped learning methodology for users' references.

        1   2   3   4   5

10. How do you rate the ease of navigation of the Flipped Learning Enabler Platform?

Complicated	Difficult	Moderate	Easy	Very User-friendly

11. Will you continue using the platform in the future?

Yes	No

12. Please kindly provide any comments or feedback relevant to your experience using the Flipped Learning Enabler Platfrom.

_____

_____

_____