Is It An Innovation That Contributes Value-Added Learning? A Critical Review of Literature Review on Flipped Learning Environments

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Abstract
This study presents a comprehensive examination of flipped learning as an emerging pedagogical approach within the realm of education. The primary objectives were to investigate the design, efficacy, and challenges associated with flipped learning, with a focus on its impact on students' learning experiences, including engagement, motivation, and achievement.Through a thorough review of 28 empirical studies on flipped learning, this research provides valuable insights into its evolution and application. The findings are organized into three main sections. First, the study delineates the main features of flipped learning studies, including publication trends, educational contexts, research purposes, subjects, and research designs.Second, the study scrutinizes the design of flipped learning, emphasizing the dual phases of pre-classroom preparation and in-classroom activities. The use of instructional videos, digital texts, quizzes, and various classroom activities are explored, shedding light on the diverse approaches within flipped learning.Third, the study critically evaluates the efficacy of flipped learning, particularly its impact on student achievement, motivation, and engagement. Findings from the reviewed studies suggest that flipped learning can significantly enhance students' academic performance, promote motivation, and foster engagement in the learning process. However, some variations in outcomes exist, highlighting the importance of factors such as instructional design and context.Additionally, the study highlights common challenges faced when implementing flipped learning, including student workload, adjustment to the new learning environment, technology access issues, content creation demands for educators, and the role of parental support.In conclusion, this research offers a holistic perspective on flipped learning, underscoring its potential as an effective educational strategy while acknowledging the challenges associated with its adoption. These findings can inform educators and institutions seeking to optimize their learning environments and pedagogical practices.

1. Introduction

Flipped learning attempts to modify and make a learning environment have a great ubiquity. The number of studies, which discussed the benefit and the potentiality of flipped learning in various disciplines, math (Clark, 2015; Muir and Geiger, 2016), computer science (Johnson and Renner, 2012; Wang, 2017), English (Sung, 2015), nursing (Gilboy et al., 2015), increased in the past five years. This can be an indicator toward moving to find alternative pedagogical practices to the traditional ones. Indeed, many studies have highlighted the negative issues associated with the traditional way of learning in terms of not improving the students' learning and the fact of making students as passive learners (Gewertz, 2008; King, 2012). According to Knight and Wood (2005), there is an accumulating evidence which proposes that traditional learning is a relatively inadequate pedagogical tool for reinforcing conceptual understanding. Generally, traditional learning refers to lectures-based learning, which often fails to provoke the students' engagement especially the meaningful intellectual engagement (Smith et al., 2005).Furthermore, there has been a lot of criticism regarding the insufficient ability of the educational institutions in providing more valuable education to students(McLaughlin et al., 2014). In addition, since technology has been integrated with education, teachers and scholars have sought to suggest pedagogical practices that could be seen as alternative to the traditional model. Some have supported the view for adopting active learning to encourage students to be active learners (Prince, 2004; Michael, 2006).This is to keep students engaged and to improve their performance and add value to students' learning experience. Thus, flipped learning can be regarded as one of the suggestions, which have spread among teachers since Bergman and Sam's have shared their experience in 2012.

Flipped learning has become one of the most common discussions among teachers as a new way of teaching and learning, and as an alternative to traditional methods. It is considered as a pedagogical practice that is utilizing the advancement of technology and employing active learning. In 2015, flipped learning listed in NMC Horizon Report as one of the effective digital strategies (Johnson et al., 2015). Although, it considers as a new pedagogical practice, flipped learning has gained a rapid popularity. This common use can be due to the change

that flipped learning has impacted the way of learning and teaching, which is opposite to the traditional method. Although there is no clear idea about the concept of flipped learning, it generally aims to move what usually occurs in the classroom to be done as a homework and what is used to be as homework is asked to be done in the classroom (Bergmann and Sams, 2012). In addition, 'flipped learning' as term means that students gain first exposure to the instructional content outside of the class, usually via reading or other audio-visual means, and then use class time to do the harder work of assimilating that knowledge. This happens through problem-solving tasks, discussions, or debates(Butt, 2014).

Dozens of reports in specialized websites, journals, and papers presented in conferences in the field of education have proposed that flipped learning is a valuable educational practise (Enfield, 2013; Millwood et al., 2013; Flipped Learning Network, 2014; Schmidt and Ralph, 2016). This is the case across all subjects and all ages ,for example, information system (Mok, 2014), Economy (Lage et al., 2000), engineering (Everett et al., 2014), nursing(Bernard, 2015), education(Kurt, 2017), computer science(Huang and Hong, 2016), math(Chen et al., 2016) and extra .. .They mentioned that Flipped learning considers as an effective approach to students' experience, especially in terms of improving students' engagement within the classroom(Sadik, 2015); increasing their motivation to learn (Davies et al., 2013) and encouraging their interaction in the classroom (Smith, 2015). However, empirical studies about flipped learning are found to be limited and a few were published. In addition, the value of flipped learning as a learning method is still under investigation. On one hand, there is a growth of the implementation of flipped learning among schools and universities. This is based on reports that emphasis that the effectiveness of flipped learning lies on utilising the advancement of technology in education (Hamdan et al., 2013).On the other hand, other scholars perceive that the effectiveness of this way is a result of the employment of active learning in its design(Jensen et al., 2015). Indeed, Flipped learning allows teachers to apply various activities by moving classroom content out of the class.

This review critically discusses the studies focusing on the use of flipped learning as an engaging learning approach. The aims of this review are to explore the design of flipped learning, examine its effectiveness on students' experience as a new pedagogical method and this is on the light of studies, and to uncover the challenges that may hinder the implementation of flipped learning. This paper will firstly tackle the concept of flipped learning and discusses its value for students' learning. Secondly, the purpose and the method will be presented. Thirdly, the results obtained from various empirical studies will be reviewed. Then, the review discussed the result of empirical studies on the light of research questions.

1.1 Theoretical Background

Flipped learning is regarded as one of the most distinguished innovation resulted from the recent developments in educational technology. Despite the novelty of flipped learning, it seems that there is a common consensus among researchers and educators on its general concept. Flipped learning could be considered as an instructional method or a strategy that is utilising the advancement of technology and applying the student-centred pedagogy (Bishop and Verleger, 2013). According to Love et al. (2014), the teacher in a flipped learning shifts the content of the lesson from classroom to be out of it, while classroom time is mainly used for learning activities. To simplify this even more, in this way, the content of lectures in terms of resources should be available online such as videos, textbooks, etc (Bergmann and Sams, 2012). Whereas, the classroom time should be devoted to student-centred activities (ibid). Therefore, flipped learning is basically composed of two main components. Firstly, students should acquire new knowledge via pre-classroom tasks such as reading some materials or being exposed to instructional videos. Secondly, students should involve in classroom activities to construct and consolidate their knowledge in a greater depth. Although this concept of flipped learning has become popular as a result of Aaron Sams and Jonathan Bergmann' efforts in 2007, there was a similar concept in 2000 which was known as the "inverted classroom" and this was related to the work of Lage and Treglia. They attempted to encourage students to view lectures before coming to the class, then students are asked to work in groups discussing the content of the lectures that have been given previously(Lage et al., 2000). The lack of technology at that time could be the reason behind the unpopularity of their work. Nevertheless, flipped learning, generally speaking, can be referred to as inverted learning because they essentially have the same concept.

Flipped learning aims to exploit the features of advanced technology to provide rich educational environment by including various learning activities such as video, e-text, quiz, online forum … etc. Indeed, Learning management systems (LMS) (Baris, 2017; Wang, 2017), blackboard (Talley2013;Wilson), ALEKS (Srayer,2012), Moodle (Butt,2013) and MyLabIT (Davies et al., 2013) were often used by many studies in flipped learning. These technologies are easy to navigate, which is an important feature that might keep students engaged. These technologies have typically the same features by offering tools to enrich educational environments as illustrated in figure 1 below (Coates et al., 2005).
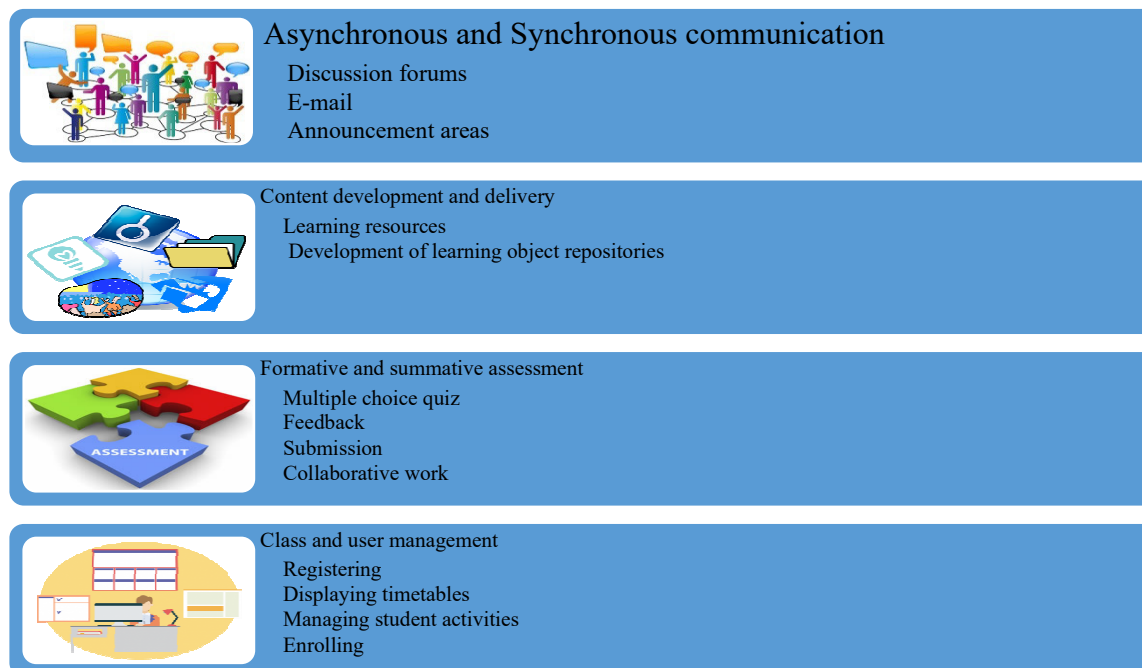
Asynchronous and Synchronous communication
Discussion forums
E-mail
Announcement areas

Content development and delivery
Learning resources
Development of learning object repositories

Formative and summative assessment
Multiple choice quiz
Feedback
Submission
Collaborative work

Class and user management
Registering
Displaying timetables
Managing student activities
Enrolling

Figure 1

Furthermore, YouTube is used as a tool to upload instructional videos(Chao et al., 2015; Hao, 2016; Karaca and Ocak, 2017). As for other learning activities such as t-text and quiz, there are e-platform such a Moodle (Hao, 2016), Khan academy (Kirvan et al., 2015; Tawfik and Lilly, 2015) and Edmodo (Kurt, 2017)which can provide which can provide this farcicalities. It is obvious that the development of technology has offered the practitioners multiple options to apply flipped learning and particularly to create educational environment out of the classroom. Nevertheless, each online platform has different features. Therefore, choosing the tool can be based on how the teachers would design their educational environment. In most cases, instructional video is used in the design of flipped learning, and that is to provide explanation of certain concepts to students. The teachers can produce instructional videos by a software to record the lecture (Schultz et al., 2014) or to record their voices over the PowerPoint slides (Peterson, 2016). Although teachers who do not have high technology skills, they can utilize online platforms such as Khan Academy (Kirvan et al., 2015), TED Ed (Sohrabi and Iraj, 2016), which provide such ready-made instructional video.

However, The misconception associated with the aim of flipped learning is that it is only concerned with employing technology to provide online materials (Bishop, 2013), whereas the aim of flipped learning is actually to make students active in the learning process, either by using pre-classroom materials or being immersed in in-classroom activities. Thus, the technology has the capacity to create virtual learning environments in flipped learning especially out-classroom. This way allows the teachers to deliver all the content of classroom in an online platform, while the students should engage in pre-classroom activities to prepare themselves. Following this phase, students should engage in active learning activities in the classroom. It can be noticed that the student in flipped learning is the centre of the learning process. This indicates that flipped learning is oriented towards utilising the advantages of student-centred instruction. Bergmann and Sams (2012) explained that instructors in flipped learning provide opportunities for students to learn independently and also learn from each other in the classroom. The flipped learning seems reach all learner types due to varieties of using technological tools and allowing then to engage in varieties of activities in classroom. According to Enfield (2013), flipped learning offers opportunity for students who have different learning styles more personalized choice in how to learn the concepts.

The general concept of flipped learning implies that the learning process and its environment is based on the concept of students-centred approach. Moreover, it is contended that the theory behind flipped learning is the constructivist theory (Bishop and Verleger, 2013; Sohrabi and Iraj, 2016). In constructivist perspectives, learning occurs when the learner construct knowledge by following minimal instruction and integrating a new experience with a prior knowledge (Marlowe and Page, 2005). In this sense, flipped learning incorporates the constructivist learning by allowing the students to be exposed to basic knowledge before going to classroom, while they use their time in classroom to explore the learning concept more in depth and build their knowledge constructively. However, constructivist learning has received a criticism over the principle of the learning processes, where there is no evidence based on controlled studies that supports this view (Kirschner et al., 2006). In addition, this approach of learning may be regarded as less effective and negative because the students lack guidance or they

may be subject to misunderstanding and lacking the full picture to what they have been given (ibid). Thus, flipped learning may lose its reliability when constructivist theory is implemented in this approach. In other words, when teachers are in the process of designing lessons via flipped learning approach, they should pay extra attention to provide ample opportunities of guidance and make concepts clear for students in the pre-classroom phase. Indeed, leaving students to deal with a new information without guidance may affect the progress of their learning. Nevertheless, social constructivism, which is another learning theory, is claimed that it is employed in flipped learning (Tong, 2014; Long et al., 2016; McCue, 2016). Vygotsky (1978) explained that learning occurs through social interaction. He emphasized that children can learn when teacher or/and peers offer scaffolding when learning. This theory incorporates within flipped learning by making classroom time rich with excessive collaborative activities. One of the basics of flipped learning is that it encourages students to work together and shifts the role of the teacher to act as a facilitator in the classroom. Perhaps employing the social constructivism theory in flipped learning design may add value on to the learning environment where there are opportunities to enrich the learning environment by applying several of activities such as discussion, debate and collaboration in classroom, which consequently accentuates the principle of the theory.

Furthermore, it is evident that flipped learning attempts to make students be active learners comparing to other traditional learning approaches, where the students are passive and they just receive information. It can be clearly noticed that flipped learning can be one of the pedagogical approaches that can reform learning environment by utilising the advantage of technology to engage the students in pre-classroom tasks, and then encourage them to be involved in active learning opportunities in classroom. Indeed, this practice may overcome the pressure that faces teacher when attempting to apply active learning in classroom. Many studies have stated that the adoption of active learning in classroom is hindered by the pressure to cover a wide variety of topics in an already packed curriculum which results in leaving little room for innovative practices (Bishop and Verleger, 2013; Dove, 2013).However, One of the first reports about flipped learning published in 2014 by (Hamdan et al.), outlined four pillars to apply flipped learning in the right way, and they are as follows:

1) Flexible environment: flipped classroom allows for a variety of learning modes, educators often physically rearrange their learning space to accommodate the lesson or unit.

2) A shift in learning culture: flipped classroom facilitates learning experiences through pedagogies that engage students in in-class active learning activities with intense interaction among students and the teacher.

(3) Intentional content: content is redesigned intentionally and deliberately so that students can be prepared before coming to class to take part in various active learning activities.

(4) Professional educators: educators observe their students and give them relevant feedback continuously.

Providing this kind of new learning environment for students can have benefits on their learning experience. According to Bergmann and Sams (2012) the flipped learning values itself by providing the students with an opportunity to test their knowledge, interact with other participants, and critically analyse the concepts learnt during the lectures. There are several benefits of flipped learning on students' learning experience (Baker, 2012; Bergmann & Sams, 2012; Hamdan et al., 2013; Butt, 2014;). Smith (2015), for example, noticed that students participated more in a flipped learning classroom than when they were taught in a traditional classroom. In the former approach, students were expected to engage with online materials, which were provided by the teacher. This stage is considered as highly essential in flipped learning as the students must come to the classroom with prior knowledge in order to participate in the classroom activities. In another interesting study, Coufal (2014) found that students were greatly interested in instructional videos. This interest showed more engagement incidents through greater involvement and higher levels of confidence when participating in classroom activities. This study also showed that instructional videos can improve students' engagement with content first and then the classroom environment. It is worth mentioning that moving the content of lessons out of the classroom can make the classroom more valuable in terms of using active learning and higher cognitive activities (Lage et al., 2000; Roach, 2014). Moreover, students seemed to favour having the time to prepare themselves for class and using the video facility. This is because they can control this type of media by pausing, replaying, and fast forwarding it (Butt, 2014). Also, when students complete the homework in class, this can give the teacher a better insight about their shortcomings, weaknesses and learning the styles (Herreid and Schiller, 2013).Flipped learning also seems to serve as a pedagogical approach that can achieve the requirements of 21st century skills. Studies showed that learning process in this approach can develop critical thinking, reasoning skills and creative thinking of the students(Herreid and Schiller, 2013; Al-Zahrani, 2015). However, despite the sheer benefits that flipped learning offers, various obstacles seem to be hurdling the implementation of it. Scheg (2015) stated that since students, in flipped learning, have to learn and prepare themselves for classroom activities before going to class, this in itself might create resistance from students to such task. Therefore, if such scenario happens, students will come to class unprepared and this can consequently lead to disengagement in the learning

Although, there has been a lack of studies about flipped learning, the majority of literature about it was in the form of self-reports, conference papers and dissertations. Nevertheless, this brief overview showed flipped learning as an innovation which has been introduced recently. Also, flipped learning seems to be rich with

pedagogical practises for students in terms of utilising technology to encourage them to do pre-classroom tasks and employ active learning in-classroom. Therefore, the efficacy of flipped learning on students learning experience is the aim of this review. In addition to this, it aims to determine if flipped learning can be an approach that contributes to value-added students' learning.

1.2 Purpose
The purpose of this study is to present a critical review of studies that have investigated flipped learning and to discuss the results of these studies to find out the potentiality of flipped learning as an approach to improve learning environment.
1.2.1 Aims and Questions
The flipped learning is considered as one of the new pedagogical practices in education. This study aims first to determine the background of this practice and to:
●   Identify the design of flipped learning
●   Investigating the efficacy of flipped learning on students' learning experience especially; engagement, motivation and achievement.
●   Exploring the challenges of applying flipped learning.
This critical review will revolve around the following questions:
Design of flipped learning:
How is the learning environment designed in flipped learning?
Efficacy of flipped learning on students' learning experiences
To what extent does flipped learning contribute to have value-added learning environment?
What is the effect of flipped classroom approach on students' achievements?
What is the effect of flipped classroom approach on students' engagement and motivation?
Challenges of applying flipped learning
What are the challenges facing flipped learning?

2 Method and Martials
This review aims to provide a critical analysis of publications and papers that explored the effect of flipped learning as innovation on the learning environment. The strategy used in this study is a manual search by using online resources, which was undertaken in November and December 2017. As mentioned in the Theoretical Background section, this new innovation is called as 'flipped' and 'inverted', so the four following phrases while searching were used: "flipped learning", "flipped classroom", "inverted classroom" and "inverted learning".
    The articles on peer-reviewed journal were targeted in this review. This is to ensure that the selection is for high-quality paper, and to avoid grey literature, which is defined as everything that have not been published in traditional way or academically, "lack bibliographic control", which means that it can be hard to be traced or search for it (Levin, 2014). So, the strategy has excluded the following:
1-   Thesis on applying flipped learning
2-   Reports on the experience of applying.
3-   Unpublished documents.
4-   Conference proceedings.
5-   Reports on websites

Criterion	Inclusion	Exclusion	
Design of flipped Learning	*Utilizing online platform And students attend face-to-face class*	Using Textbook for pre-classroom and/or the attending the classroom optional	
Language of Articles	English	Non-English	
Context	Primary Secondary and Undergraduate	Post-graduate	
Type of Articles	Peer Reviewed	Thesis, Reports, Unpublished documents, Conference proceedings, Reports on websites	
Time	2000-2017	Before 2000	

Table 2. Criterion
    The bulk of this study was collected by applying comprehensive research. This is by using the keywords "flipped learning", "flipped classroom", "inverted classroom" and "inverted learning" in English language in a number of sources: (1) journals related to educational technology research, education based computer research and educational research. The search covered more than 15 journals (see appendix 1) and 3 databases; (EBSCOHOST, ProQuest and Scope) which are the most popular in the education field. The databases and the journals were determined as they were good sources which combined many publications.

A list of articles in journal (57) and database EBSCHOST (44), ProQuest (155) and Scopus (369). Following this, the researcher classified the 64 articles into two groups, those belonged to the purpose of the research and those which did not. However, some articles were not included as they were irrelevant either to the aims of this review (34) or misconception of flipped learning (2). Twenty eight studies were used that match the purpose of this review.

3. Results

This review yielded 28 empirical studies of flipped learning and the main finding of these studies were summarised in Appendix 2. In this section, the review showed the features and the analysis of the finding of the studies. The findings were divided into three sub-sections. Firstly, I organised the studies under the sub-section 'the main features of the flipped learning studies' where the year of publication, the type of context, the purpose of study, the subjects and the research design were considered. Second, I arranged the papers according to the design of flipped learning that these studies applied. Finally, I synthesized the findings of these studies in the light of the following subjects:

(1)   Efficacy of flipped learning on the students' learning experience especially the achievements.
(2)   Efficacy of flipped learning on the students' motivation and engagement.
(3)   Challenges of applying flipped learning.

3.1 Main features of the flipped learning studies

As known, flipped learning is considered as a new trend in education research, and it is a new educational practise. The first paper was published in 2000 which used the phrase "inverted classroom" and then there were no papers between 2000 until 2011. Since 2012, the publication of related papers has started to increase as follows: 2012 (1), 2013(1), 2014(2), 2015(6), 2016(8) and 2017(9) (see Appendix 1). Most of these papers were conducted in higher education context (16), whereas studies conducted in high school context are just (10). The majority used the phrase "flipped learning". As for the subject that these studies focused on, there were in various and different subjects, computer science (6), math (8), engineering (3), English (3), Science (1), Biology (1), Psychology (1), Introduction to Communication (1), Educational Technology (1) Economy (1),History (1) and classroom management(1) . Science subjects (18) were more investigated than social science (11).

Looking at the research design and methods, the majority of studies (11) were based on quasi-experimental method, while others were based on mixed methods (6), survey (4), quantitative design (2), case study (2) and action research (3). Regarding to the purpose of studies, the aims of studies divided into four themes. The first theme investigated the benefits and challenges of flipped leaning. The papers in this theme focused on the benefits and challenges of introducing a new learning experience "flipped learning" (4). The second theme explored the design of flipped learning, the study interested to understating the design of flipped learning and how its factors could influence students learning (3). The third theme considered the students' attitudes towards flipped learning, and the study focused on finding the students' satisfaction and their reaction toward flipped learning experience (4). Finally, the majority of studies focused on examining the impact of flipped learning as an intervention on the students' learning. Almost (17) papers investigated the students' achievements, engagement and motivation.

3.2 Design of flipped learning

The learning practise in this approach is re-designed by dividing it into two phases. First, pre-classroom phase which provides educational materials via online platform for students to have as a way to build a prior knowledge about the content of the lesson. Second, the In-classroom phase which involves providing learning activities. The studies investigated flipped learning where the design of the learning practise was slightly different (see figure 2). Regarding to pre-classroom phase, the majority of studies used video as a source of content (27) and some of them added reading textbook (9) and others required taking a quiz (11). There was one study which did not provide instructional video or digital textbook, it only provided a presentation of storyboard related to next week activities (Wang, 2017).

As for in-classroom phases, almost all of the studies (25) encouraged students to work in collaborative and problem-solving activities and to be engaged in group-discussions. As for in-classroom phases, almost all of the studies, 25 of them, encouraged students to work in collaborative activities. It was found that problem solving was the main type of activities used in 12 studies. However, there was one study which focused on students by giving them activities to do individually, while the teacher assisted them when needed (Muir and Geiger, 2016). In addition, Zhang et.al (2016) applied a different design by asking students to do pre-classroom tasks such as digital textbook, taking handwritten note and quiz, and then for the in-classroom activities, students were asked to watch YouTube video which is linked to the conceptual reading to create a classroom-discussion. Students also had to work in small groups and finish the quiz. One study, however, added one additional phase to the design of flipped learning which is post-classroom, where the students had to research on the topic using

keywords and find new content (Sohrabi and Iraj, 2016).

In the findings of the review, it is noted that some studies added some additional elements to the flipped learning design. For example, asynchronous group discussion in pre-classroom phase was used (Kim, 2017; Chen Hsieh et.al, 2017 ; Aidinopoulou and Sampson, 2017). In addition, Hokiewicz (2014) made the pre-classroom quiz obligatory, and worth of 10% of the final grade. This is to encourage students to prepare for classroom. Furthermore, one study applied BYOD in-classroom phase in which students were asked to take quiz to determine if they did the pre-classroom task (Hao, 2016). Furthermore, there were studies (4) which customised the beginning of classroom by a question and answer (Schultz et al., 2014; Chao et al., 2015; Aidinopoulou and Sampson, 2017; Wang, 2017). Finally, Kirvan (2015) applied a different design, particularly in in-classroom phase. This is by asking students to take pre-assessment at the beginning of classroom to evaluate their prior-knowledge and then divide them into two groups. The first group included the students who misunderstood the pre-task given to them and failed the assessment. Consequently, the teacher had to re-teach them, while the second group involved those who passed the assessment. As a result, they were asked to engage in collaborative problem-solving activities.

Pre-classroom		In-classroom	
Watching Video	27	Collaborative PBL	25
Reading Text	9	Individual PBL	1
Quiz	11	Quiz	3
Online Discussion	3	Q&A	3

Figure 2 Design of Flipped learning

3.3 Efficacy of flipped learning on student learning experience (Achievement)
Regarding the impact of flipped learning on students' learning experience, there were studies (20) which attempted to investigate the efficacy of flipped learning on the students' learning. Furthermore, there were 16 out of 18 studies which focused on the students' achievements in this approach of learning. The result of these studies was slightly different. Almost these studies aimed to compare students' achievements in experimental group, where flipped learning was conducted, and a control group, which is exposed to traditional learning. This is to determine the impact of flipped learning (Mason et al., 2013; Schultz et al., 2014; Kirvan et al., 2015; Jensen et al., 2015; Hung, 2015; Clark, 2015; Chao et al., 2015; Bhagat et al., 2016; Huang and Hong, 2016; Chen, 2016; Peterson, 2016; Karaca and Ocak, 2017; Baris, 2017; Kurt, 2017; Aidinopoulou and Sampson, 2017; Kostaris et al., 2017). Some of the results in these studies drew a comparison between flipped learning and the traditional learning. It is found that the students' achievements were significantly improved in when using the former way of learning (e.g. Schultz et al., 2014; Chao et al., 2015; Bhagat et al., 2016; Huang and Hong, 2016; Peterson, 2016; Karaca and Ocak, 2017; Baris, 2017; Chen Hsieh et al., 2017; Kurt, 2017; Kostaris et al., 2017). One study, which was a quasi-experimental on 82 high school students, conducted by Bhagat et al., (2016) found positive impact on specific group of students. The students in this study were divided into high, average and lower level based on their summative scores in math. The results showed that the performance levels for lower achiever who exposed to flipped learning were better than the lower achiever in traditional classroom. Furthermore, Chen Hsieh et al., (2017) conducted a qualitative research and indicated that applying flipped learning in teaching English has improved students' learning especially in English idioms.

Other studies attempted to explain the factors in which they lead to the positive impact of flipped learning on students' achievement. For example, Zhang et al., (2016) explained that allowing students to take multiple quizzes can promote students' learning. Also, classroom activities can help the students to deeply understand the content. In addition, Wang (2017) reported that applying problem-solving activities in flipped learning can have positive impact on students' achievement. In addition, the preparation for classroom and engagement in classroom is related to positive impact of flipped learning on students' achievement (Hodkiewicz, 2014). Interesting conclusion was given by Mason et al., (2013) about the impact of flipped learning on students' achievement. They concluded that flipped learning can improve students' achievement and it has no negative consequences on their achievements.

On other hand, there were findings which showed opposite results. Clark (2015) carried out a quasi-experimental study and found that there was in-significant difference on the students' performance between flipped learning and the traditional one. Moreover, Chen (2016) showed that there was no difference in in the students' general achievements. Nevertheless, there was a little increase in their test scores. Simultaneously, Jensen et al. (2015) showed that the students' scores were equivalent in the control group and the experimental one. Furthermore, there was another study which showed that the impact of flipped learning can happen

gradually. According to Hung (2015), it was found that there was no difference in the first week of implementing flipped learning. However, the following weeks showed that there was a positive difference in the students' assessments. Finally, no studies have been found to report negative influence of flipped learning on students' achievement. However, Aidinopoulou and Sampson (2017) carried out action research on 49 primary school students. The students' scores, in the first semester, were significantly higher in the flipped learning group than the tradition one but the scores were similar in the second semester.

3.4 Efficacy of flipped learning on students' motivation and engagement

Due to the importance of students' engagement, some studies aimed to evaluate the students' engagement in flipped learning. Two studies revealed that students were more engaged in classroom activities and more enthusiastic to work with each other compared to students in traditional classroom (Strayer, 2012; Kirvan et al., 2015; Kurt, 2017; Kostaris et al., 2017). Likewise, Chen Hsieh et al. (2017) reported that students were more engaged with the learning tasks given. Hodkiewicz (2014) and Tawfik and Lilly (2015) found that engaging and doing pre-classroom preparation can help the students to engage more in classroom activities. Additionally, there was another study which found that students reported that they believe that flipped learning has encouraged active engagement and participation compared to their experience in traditional classroom (Clark, 2015). Also, students showed that using technology has enhanced an increase in their level of engagement with instructional content (ibid). Furthermore, Hung (2015) found that the students were engaged more in- and out classroom than those from traditional classroom. However there was one study found the opposite result. Jensen et al., (2015) showed that students' engagement did not improve in flipped learning particular with pre-classroom phase compared to traditional learning.

Regarding to students motivation, seven studies agreed that flipped learning can promote students' motivation (Chao et al., 2015; Tawfik and Lilly, 2015; Clark, 2015; Chen Hsieh et al., 2017; Baris, 2017; Kurt, 2017; Kostaris et al., 2017). Kurt, (2017) found that students motivation increased as they stated pre-classroom and particularly video had motived them to learn and was enjoyable. Likewise ,there was one study which stated that the use of video as a source can be positive factor that can increase the students' motivation in flipped learning (Chao et al., 2015). In addition, one study mentioned that the original video created by teacher can add sense of relatedness compared to external video which can affect the students' motivation toward learning (Muir and Geiger, 2016). Furthermore, Clark (2015) explained that the type of classroom activities can also enhance the students' motivation. The students reported that the collaboration in groups motivated them to participate in the classroom (ibid). Flipped learning changed the classroom environment which consequently can promote students' motivation (Tawfik and Lilly, 2015). However, two studies showed opposite results. Yough et al., (2017) found that there were no difference between students' motivation in flipped learning and traditional learning. Aidinopoulou and Sampson, (2017) observed that students unmotived toward flipped learning as a result of unprepared which reflect on their engagement in classroom activities.

3.5 Challenges of applying flipped learning.

Applying a new learning experience can cause some challenges either for the teachers or the students. The studies highlight some of these challenge (see Table 4). The main challenge was found to be in the pre-classroom task. Five studies found that students described that the pre-classroom tasks were regarded as a workload and time consuming (Schultz et al., 2014; Hodkiewicz, 2014; Hao, 2016; Zhang et al., 2016; Kim, 2017). According to Schultz et al., (2014), students reported that the main negative feature of flipped learning was the homework. Thus, having two flipped classrooms can create tough work. The second challenge to be found in the studies is that students take time to adjust to the flipped learning environment. Chen, (2016) found that students did not accept the concept of flipped learning at the beginning, and they came to class unprepared in the first week. After few weeks, they started to adjust to the new learning environment. Moreover, Clark (2015) reported that students felt that the instructional content of flipped learning focused on higher order thinking which was difficult to them compared to their previous learning experience. Students preferred to have an introduction of what flipped learning is before implementing it (ibid).

In another study, the nature of pre-classroom content was considered as a challenge. For example, Taiwanese students found difficulty to prepare for classroom as the martials provided to them were in "English", which is not their native language (Kim , 2017).Additionally, the teacher in this pre-classroom task is not available during the instructional video. Besides, the length of video was regarded as an obstacle to interact with instructional content (Schultz et al., 2014). Furthermore, some difficulties that some students encountered were represented in accessing the internet and having a good quality of connection (Sohrabi and Iraj, 2016). In addition, teachers themselves faced some challenges as well. According to Mason et al., (2013), creating instructional video was time-consuming which took sometimes 100 hours. In addition, teachers indicted that homework had to be carefully made to ensure that the students can prepare well before being engaged in-classroom. Thus, this adds extra effort on the teacher who is using this approach (Chen, 2016). Furthermore, the

challenge for teacher Primary school was that familiarized parents of students with flipped learning, where the family plays significant role in children learning and can contribute to or obstruct the efficiency of flipped learning (Aidinopoulou and Sampson, 2017).

Table 3 Challenge of implementation flipped learning

Challenge	Author
Workload for students	Schultz *et al.*, 2014; Hodkiewicz, 2014; Hao, 2016; Zhang *et al.*, 2016; Kim, 2017
Adjusting to new experience	Mason *et al.*, 2013 ; Chen, 2016 ; Kim, 2017; Yough *et al.*, 2017
Accessing to technology	Sohrabi and Iraj, 2016
Creating sources	Mason *et al.*, 2013; Chen, 2016
Parents help	Aidinopoulou and Sampson, 2017

4. Discussion

4.1 Design of flipped learning

The design of flipped learning in most studies generally depended on some elements either in pre-classroom phases (a computer-based student preparation) or in-classroom phases (an interactive group-based learning environment). The common element used in pre-classroom phase was the instructional video and it was used either as the only resource for the students' preparation (Strayer, 2012; Schultz et al., 2014; Bhagat et al., 2016; Chen, 2016) or with other additional resources (Chao et al., 2015; Muir and Geiger, 2016; Karaca and Ocak, 2017; Kim, 2017). The usage of video is beneficial and can be viewed as a value-added feature in this phase as it increases the students' motivation, enhances learner autonomy and learning experience (Willmot et al., 2012), and have the potentiality for deeper learning of the subject. However, some studies used short videos, which are about 5 to 15 minutes as a part of students' preparation (Mason et al., 2013; Hodkiewicz, 2014; Bhagat et al., 2016). Then, adding extra learning resources such as digital texts to read and discover concepts further via websites (Kirvan et al., 2015; Baris, 2017; Kim, 2017; Kurt, 2017). This practice seems to be appropriate and beneficial in this phase as it allows students to have comprehensive understanding. Furthermore, quizzes were employed in pre-classroom in some studies. This is either to test the students' knowledge or to guarantee that students prepare themselves for the classroom activities (Jensen et al., 2015; Hao, 2016; Yough et al., 2017). The importance of the quizzes appears in determining the level of the students' understanding and ensuring that teachers have an insight about the students' understanding so they can intervene efficiently during classroom time. The unavailability of the teacher can be seen as a criticism against flipped learning especially in the pre-classroom phase (Schultz et al., 2014). Thus, few studies attempted to utilise the potential of asynchronous discussion (Kim, 2017; Chen Hsieh et.al, 2017; Aidinopoulou and Sampson, 2017) in a way to overcome the absence of teacher. Employing asynchronous discussion in flipped learning design can enrich the learning environment in the pre-classroom phase as well as add value for flipped learning design. Indeed, the students can have the opportunity to experience virtual interactions with the teacher or peers via asynchronous discussion.

Moving to in-classroom phase which should be complementary to the first phase in order to create a successful flipped learning experience (Strayer, 2012; Mason et al., 2013). The majority of studies agree with engaging students with active learning and this by applying the collaborative learning (Chao et al., 2015; Hao, 2016; Aidinopoulou and Sampson, 2017; Kim, 2017; Kostaris et al., 2017; Kurt, 2017; Wang, 2017). This, in fact, can be one of the aims of flipped learning as mentioned by (Bergmann and Sams, 2012). The type of these activities focused on encouraging the students to mostly work in-group to solve higher order-thinking activities such as Problem Based Learning (Chao et al., 2015; Jensen et al., 2015; Kirvan et al., 2015; Kurt, 2017). In this sense, flipped learning attempts to make the learning environment richer and more valuable in terms of enhancing the students' knowledge and skills such communication, collaboration and criticality thinking. Moreover, some studies stressed on the importance of making the beginning of class an activity of questioning and answering (Lage et al., 2000; Schultz et al., 2014; Chao et al., 2015; Chen, 2016; Aidinopoulou and Sampson, 2017; Wang, 2017). This kind of strategy can allow the teacher to provide immediate feedback for any misconceptions or gaps in students' knowledge, and then empowering the students before engaging them with higher-order thinking activities.

When examining the design of flipped learning in previous studies, it can be noticed that it is based on the hierarchy of bloom's taxonomy model (see Appendix 2). This is where pre-classroom phase focuses on the base of the hierarchy, the remembering and understanding, while in-classroom phase concentrates on the higher levels, the applying, analysing, evaluating and creating. This view has been aligned with reports about the design of flipped learning (McLaughlin et al., 2014; Gilboy et al., 2015). Although, these studies are made in different disciplines, they agree with the key principles of flipped learning design. Moreover, having examined and reviewed all of the studies in this paper, it can be claimed that the most of flipped learning designs are similar, and they have been an outcome of an individual and common experience rather derived from fixed approach. Indeed, there is a lack of studies that explain the underpinning theory behind the design of flipped learning, and

this can be seen as a gap in research in flipped learning area. The ubiquity of applying flipped learning in many disciplines should be accompanied with the knowledge of how to implement and evaluate this way of learning and that can be based on a strong underpinning theory.

4.2 Students' achievement
Teachers' needs to provide valuable learning practices to improve students' learning can be the reason behind implementing flipped learning. Indeed, there were studies attempting to find out the impact of flipped learning on the students' learning, particularly in their achievement. The majority of studies showed that the students' achievement increased after applying flipped learning intervention. This positive result were come up from different subjects; science course (Baris, 2017), engineering course (Chao et al., 2015), Algorithms and Programming Education (Karaca and Ocak, 2017), chemistry (Schultz et al., 2014) and English (Huang and Hong, 2016), and also from different contexts in higher education (Chen Hsieh et al., 2017; Kurt, 2017), high school (Schultz et al., 2014), elementary school (Baris, 2017). These empirical studies found positive impact on the students' achievement by comparing between traditional learning condition and the flipped learning condition (e.g. Schultz et al., 2014; Chao et al., 2015; Bhagat et al., 2016; Huang and Hong, 2016). These positive results can be related to the effect of learning environment of flipped learning, which differs from the traditional learning environment. In fact, flipped learning has a combination of learning practises that are implemented in the pre-classroom phase and the in-classroom one, which can involve having a video-based demonstration and collaborative learning activities.

Three studies, in this paper, investigated the flipped learning practises that have an impact on the students' achievement (Hodkiewicz, 2014; Zhang et al.,2016; Wang, 2017). For instance, taking quizzes before classroom activities allowed students to test their knowledge which enhanced their understanding of concepts. Zhang et al., (2016) claimed that allowing students to take multiple quizzes can promote students' learning. According to (Narloch et al., 2006) pre-classroom quiz can affect the students' achievement. In their study, they carried out a comparison between two groups, one which had the pre-classroom quiz and the second group did not take it. They found that the students who had the quiz were significantly higher in their exam scores than the other group. In addition, employing problem solving activities in flipped learning environment can stimulate students to construct the concepts deeply (Wang, 2017). Although, these two studies were just based on quantitative results, they provided an insight about the factors that can be considered in flipped learning design. Furthermore, engaging the students into a flipped learning environment in pre-classroom and then in in-classroom activities affects the students' achievement positively (Hodkiewicz, 2014).

However, it has been found that the studies were not consistent with their results about the impact of flipped learning on students' achievement. Some studies found that there was insignificant difference on the students' achievement between flipped learning and the traditional one (Clark, 2015; Chen ,2016; Jensen et al. ,2015). In addition, others found that the effect was on the students with low performance, while there was no difference on those of high performance in flipped learning and traditional learning (Bhagat et al., 2016; Kostaris et al., 2017). However, one of the reasons that might be behind this inconsistency of the findings is that there is no one particular design that was applied in these studies. Besides, there is no specific design that is derived from a fixed learning theory. It seems that the implementation was based on the general concept of the flipped learning, which is the use of instructional video and the application of collaboration activities in the classroom.

Some of these results had limitations, which can affect the reliability and validity of the results. For example, Schultz et al., (2014) explained that the design of the study depended on a mixed method, which appeared untrue. A questionnaire was used and ended by one open-ending question as qualitative data, and this method is not a mixed method. In addition, measuring the impact of flipped learning on students' achievement was based on comparing the scores of the control group who enrolled in the academic year 2011-2012 and the experimental group who enrolled in 2012-2013. Actually, the collection of the students' scores was made in different period of time. This seems to affect the validity and reliability of this result. So, data collection in different period of time was the first limitation (e.g. Schultz et al., 2014; Peterson, 2016). Moreover, the duration of study was also noted as a limitation. Some studies were conducted for short period of time such as for two weeks (Baris, 2017), three weeks (Chen, 2016)and six weeks (Bhagat et al., 2016), and these may not show the real impact of the intervention as if it were to be applied for a long time. The results may be affected by the novelty of flipped learning on students. Furthermore, the sample size in some studies can be regarded as a limitation. (Kirvan et al., 2015; Kurt, 2017) conducted their studies on just two classrooms. The results of these small size groups may not be able to be generalised. In addition, the bias of being a researcher and an instructor at the same time could be considered as a limitation that can affect the results (Mason et al., 2013; Jensen et al., 2015; Yough et al., 2017). The result of these studies might be affected by the bias of the students to their teacher. Based on what has been discussed above, challenging the positive or negative effect of flipped learning on students' achievement can be regarded as difficult if such limitations are not eliminated. Therefore, there is a need for more studies to examine the impact of flipped learning on the students' achievement.

4.3 Students' engagement and motivation

Learning is currently considered as a process in which students actively construct their knowledge and skills rather than just a matter of acquisition (Barr and Tagg, 1995). It is important to engage students in learning processes to achieve learning. Flipped learning aims to engage students into active learning process. The findings showed that students are engaged more in flipped learning and they acquired value for flipped learning as a new innovation (Strayer, 2012; Kirvan et al., 2015; Chen Hsieh et al., 2017; Kim, 2017). Two studies found after observing students that they engaged more in flipped learning than the traditional classroom (Strayer, 2012; Chen Hsieh et al., 2017). It seems that the shift in classroom environment from teacher-centred to students-centred learning allows students to engage with learning process. Furthermore, flipped learning seems to offer time in classroom for teachers to provide a variety of activities, which can lead to increase the students' engagement. Moreover, flipped learning design and, in particular, the pre-classroom phase allows the students to have a good knowledge about what they will do in classroom activities which may impact positively on their engagement in classroom. Some studies confirmed that engaging students with pre-classroom materials enhances the students' engagement in classroom (Hodkiewicz ,2014; Tawfik and Lilly ,2015; Clark, 2015; Hung ,2015). It is worth to mention that the measurement of the students' engagement in pre-classroom, in some of these studies, were based on the students' online behaviour, which can be seen as a limitation (Hodkiewicz, 2014; Hung, 2015; Wang, 2017). Indeed, it is difficult to guarantee that students are engaged effectively in pre-classroom activities especially in terms of cognitive engagement.

Although, the limitation of these findings, such results offer an insight about the importance of engaging students in pre-classroom phase. It means that designing flipped learning and the pre-classroom materials can play a vital role in enhancing the students' engagement in flipped learning environment. In a study by Clark (2015), the students claimed that they engaged actively in flipped learning. Moreover, using technology enhanced their engagement in flipped learning. The researcher used technology to provide a variety of resources to students such as videos, podcasts, online articles, personations and questions on the subject area to be studied. This usage of variety of technology tools may meet the students' needs. However, flipped learning may not be applicable in a context where the school was a private religious institution. The students' engagement was not affected by applying flipped learning and the result showed that the students had a negative attitude towards using technology (Jensen et al., 2015). That said, this confirms the importance of the students' engagement in the pre-classroom phase, which can reflect their engagement in-classroom activities. Furthermore, students' engagement can not only be improved by just applying flipped learning but it needs a careful design of flipped learning environment which meets the students' needs and abilities in cognitive, technological and cultural levels.

4.5 Students' motivation

In addition, the review attempted to examine the impact of flipped learning on the students' motivation. The findings showed that there is a positive impact on the students' motivation (Chao et al., 2015; Bhagat et al., 2016; Muir and Geiger, 2016; Chen Hsieh et al., 2017). For example, Chen Hsieh et al., (2017) found that flipped learning promoted the students' motivation as it allowed for various ways of instruction, which means that each student can learn in their own pace and time. Flipped learning can satisfy the students by learning in a better way and with enjoyment as well as having the opportunity to learn on their own pace during the pre-classroom phase (Kurt,2017). Students were motivated as they enjoyed watching the video. In this sense, the flipped learning seems to have a positive effect on the students' motivation and, in particular, the intrinsic motivation. According to the self-determination theory, it divided motivation into two types: intrinsic and extrinsic motivation (Abeysekera and Dawson, 2015). The first refers to individuals who do things as they are perceived as exciting and enjoyable, while extrinsic motivation refers to individuals who do things as they attempt to pursuit a reward or avoid a punishment (Deci and Ryan, 2008).

In addition , Chao et al. (2015) claimed that video can play a significant factor to increase the students' motivation in flipped learning. Findings also showed that the type of video can have an effect on the students' motivation, the video that is created by the teacher can motive students more than the external ones (Muir and Geiger, 2016). These findings determined the students' motivation associated with flipped learning in pre-classroom phase. However, Clark (2015) found that students' motivation is promoted in flipped learning environment due to the type of collaborative activities. It is also found that flipped learning contributed to change the classroom environment which consequently can promote students' motivation (Tawfik and Lilly, 2015). Applying flipped learning makes a shift in the classroom environment from acquiring the concepts gained from the use of the traditional way to practising such concepts. As a result, this can play an important role to improve the students' motivation in the learning process. However, there was one study which found that there was no difference in the students' motivation between the two ways of learning, the flipped and the traditional (Yough et al., 2017). Finally, Aidinopoulou and Sampson (2017) observed that the students were not motivated towards flipped learning as they were unprepared and this reflected on their engagement in classroom activities. This can mean that flipped learning may not be applicable in certain contexts. This study, in fact, was done in a

primary school where the students were children. It can be assumed that they might need time to be aware about the method and their responsibility towards their own learning.

4.6 Challenges

Flipped learning is considered as a new innovation in the field of education, and applying this modern way may have some challenges for either students or teachers. This review will first highlight some of these challenges that are associated with students. The pre-classroom phase seems to be a big challenge for students as it was perceived as a workload and described as a time-consuming task (Hodkiewicz, 2014; Hao, 2016; Zhang et al., 2016; Kim, 2017 Schultz et al., 2014). Students identified several issues; the process of taking notes is hard (Zhang et al., 2016), the amount of content is abundant (Hodkiewicz, 2014 and Schultz et al., 2014) , the content itself is complex (Hao, 2016) and it is difficult to ask questions during this phases and there is lack of prompt feedback . These challenges may threaten the success of flipped learning because students may come to classroom unprepared which leads to difficulties to be engaged in classroom activities. Consequently, the teacher has to re-teach the concepts to the students, which can lead to the failure of implementing flipped learning. This can be the reason as to why some students prefer traditional classroom over this way of learning (Hao, 2016; Kim, 2017; Yough et al., 2017). Therefore, teachers might need to carefully design the pre-classroom phase and consider their students' abilities. In fact, teachers apply flipped learning to improve the learning environment and such obstacles may negatively affect the students' learning environment.

Furthermore, findings also showed that some students find difficulty in the preparation stage. This is when being exposed to the instructional videos as the delivery was in the second language and not the mother tongue (Kim, 2017). Also, teachers are unavailable during the delivery of such media tool. Besides, the instructional video is described as long (Schultz et al., 2014). This may affected the students' understanding to important concepts. That said, it can be proposed that using the instructional video is essential in the design of this way of learning. However, teachers can overcome this by creating instructional video and keeping the length as short as possible about 10 to15 minutes and segment the length of video if possible to deliver it in chunks (Schmidt and Ralph, 2016). Because of the importance of using videos in flipped learning, there is still a need to discover the best ways to employ this kind of media to flipped learning.

Studies also revealed that students take time to adjust to the flipped learning environment (Chen, 2016; Kim, 2017; Mason et al., 2013). The reason could be attributed to the learning environment shift and that is the movement from the traditional to the flipped learning which entails the movement between two different pedagogy paradigms, the teacher-centred and the student-centred. Based on this, the students need time till they adapt to the new learning environment. In this case, the teacher may resort to prepare their students by introducing flipped learning, explaining the expectation of learning and the process. This may contribute to overcome the challenges or at least reduce the students' objection for such shift. However, it is worth to state that the studies that mentioned this kind of challenge applied flipped learning for 3 weeks and that is a short period of time (Chen, 2016) and the collecting of data occurred in two different periods of time and with different groups of students (Kim, 2017; Mason et al., 2013). This means that there should be more studies that apply flipped learning for a longer and uninterrupted period of time and then to evaluate the impact of this shift.

Having examined the challenges faced by students, teachers may encounter some difficulties when applying flipped learning. First, according to Chen (2016), teachers are confronted with a problem of providing effective pre-classroom materials. Furthermore, producing instructional videos is considered as time-consuming (Mason et al., 2013). That said, it might be argued that these challenges will decrease especially after the teachers design their videos and build their library of resources, and after they gain the experience of applying flipped learning. Second, what concerns teachers is the fact that students may come to classroom unprepared (Chen, 2016; Kim, 2017; Aidinopoulou and Sampson 2017). This can affect the learning process negatively because the students will not be able to engage in classroom activities. Teachers, however, can encourage the students to prepare and this is by making the quiz mandatory and make this activity as a part of the final mark as suggested by (Hodkiewicz, 2014). This may ensure that students come to classroom well-prepare. Additional challenging issue for teachers can occur when implementing flipped learning in lower level of education. It is found that teachers who applied flipped learning in primary school faced difficulties with familiarising the children's parents of this way of learning (Aidinopoulou and Sampson, 2017). This factor is significant due to the role that parents have on their children's learning in this level. Finally, flipped learning in practise requires the use of technology which some students may not have access to it. Sohrabi and Iraj (2016) found that students, in pre-classroom phase, faced some technical problems such as poor connection or access to the internet. Nevertheless, this problem can be solved and that is by providing the materials for students in the form of DVDs or flash disks (Clark, 2014).

5.Conclusion

In conclusion, this study set out to explore the design, efficacy, and challenges associated with flipped learning

in education. Through a critical review of existing literature, several key findings have emerged:

Design of Flipped Learning: The design of flipped learning typically involves a combination of pre-classroom and in-classroom activities. Pre-classroom phases often include instructional videos, digital texts, and quizzes to prepare students for in-class activities. In-class activities focus on active and collaborative learning, aiming to move beyond basic understanding to higher-order thinking skills. However, there is a lack of a strong theoretical foundation underpinning flipped learning design, suggesting a need for more research in this area.

Students' Achievement: Flipped learning appears to have a positive impact on students' achievement across various subjects and educational contexts. The combination of pre-classroom and in-classroom activities, including quizzes and problem-solving tasks, contributes to improved learning outcomes. However, the results are not consistent in all studies, possibly due to variations in design and implementation.

Students' Engagement and Motivation: Flipped learning is associated with increased student engagement and motivation. Shifting from a teacher-centered to a student-centered approach allows students to actively participate in their learning process. Pre-classroom materials and technology-enhanced resources further enhance engagement. However, the effectiveness of these materials may vary depending on factors like context and student readiness.

Challenges: Flipped learning comes with challenges, particularly in the pre-classroom phase. Students may find it time-consuming and difficult to manage the workload. Language barriers and long instructional videos can also pose obstacles. Teachers may face challenges in creating effective pre-classroom materials and ensuring that students come prepared for in-class activities. However, with experience, these challenges may diminish.

In summary, flipped learning offers a promising pedagogical approach with the potential to enhance students' engagement, motivation, and achievement. However, successful implementation requires careful design, consideration of student needs, and overcoming challenges associated with both students and teachers. Further research is needed to develop a robust theoretical framework for flipped learning design and address the variability in outcomes observed across different studies.

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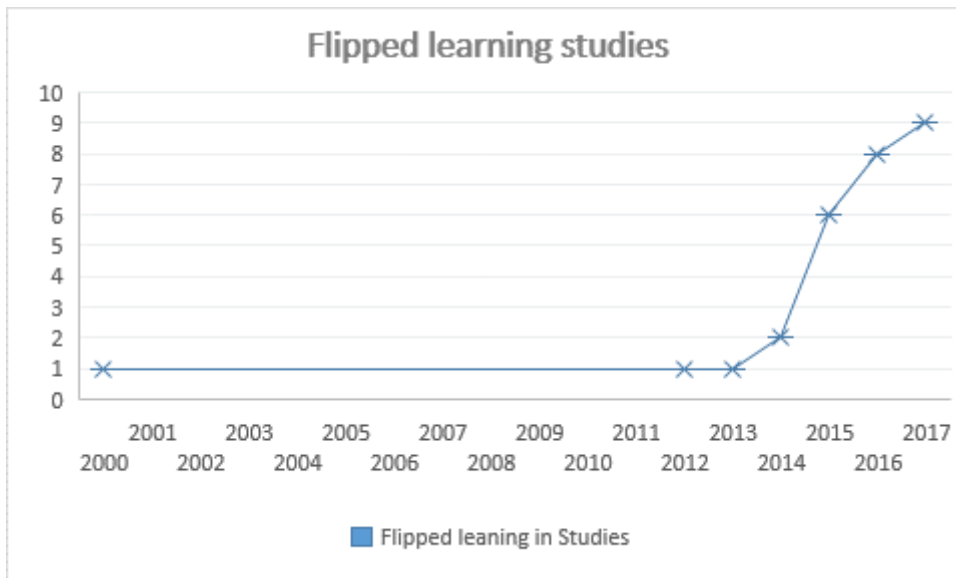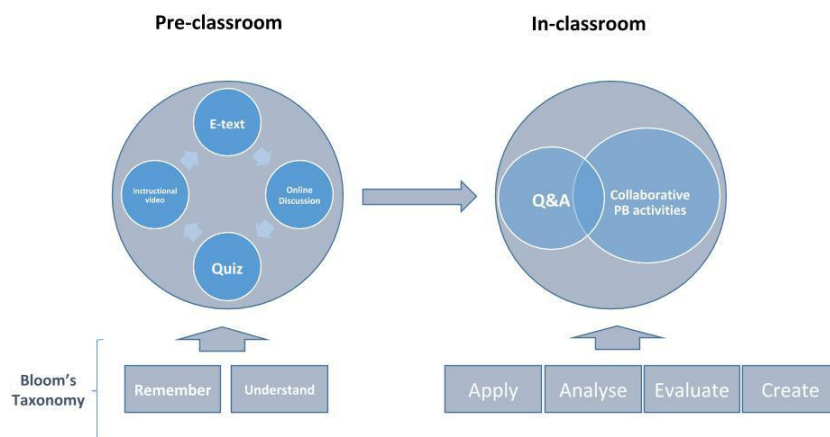
Appendix

Figure 1. Timeline of Flipped Learning Studies

Figure 2. Flipped Learning Design