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Flipped versus Conventional Classes in a Saudi Arabian University

by

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Declaration

I declare that this thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or processional qualification except as specified.

Parts of this work have been presented at 1st International Conference on Advanced Research (ICAR- 2017), Manama, Bahrain

Abstract

This thesis presents an investigation of the implementation of the flipped classroom in higher education in Saudi Arabia, which addressed three main research questions:

1- Is there any difference in acquisition of knowledge, and student attitudes, between students who take a flipped class and those who take a conventional class?
2- Is there any difference in the use of time, and approach to study, between students who take a flipped class and a conventional class?
3- What factors affect the implementation of flipped class?

The study compared two groups of students, those who learned using the flipped classroom and those who learned through traditional lectures followed by an activity session. In the flipped classroom, face-to-face time was reduced from 3 to 2 hours and activity time was doubled from 1 to 2 hours. The participants were 491 female students; half of them were taught in a flipped classroom and the other half by conventional method. Instructors, content, materials, assignments, and exam questions were the same in both groups. As this study used the mixed method approach, the data were collected by questionnaires, interviews, classroom observation, students' diaries, and marks' reports and Blackboard Learn reports.

At the end of the course, there were no significant differences in test or assignment marks between students studying by the two methods. With regard to students' attitudes toward the flipped classroom, 60% of the students in the flipped classroom reported that they preferred this method, whereas 14% of the students reported having a negative attitude toward it. About 45% of students in the flipped classroom group reported a positive attitude towards face-to-face lectures, differing significantly from the perspective of those in the conventional group, 75% of whom reported a positive attitude. However, even with the positive attitude toward flipped class, one of the main findings showed that only 39% of the learners "always" watched the videos as required, and the trend of watching the videos showed a decrease in the number of views over time. However, viewing rates increased sharply during the period of exam study, as learners watched these videos again, or even for the first time.

This thesis also explores flipped classroom students' study habits inside and outside the classroom, and investigates the factors behind these behaviours, including their motivations and the obstacles to study which they faced. For example, shortage of time and issues with students' self-regulation were the main factors that hindered students from watching the videos, as a result, not watching the videos influenced the quality of their participation in classroom activity negatively. Investigating the students' experience in flipped class also showed other factors which were related to the adoption of a strategic or surface approach to learning.

Lay summary

This thesis presents an investigation of the implementation of the flipped classroom in higher education in Saudi Arabia. The flipped classroom is a teaching method in which students watch an online recorded video lecture before class, then engage in learning activity during class time.

The study compared two groups of students, those who learned using the flipped classroom and those who learned through traditional lectures followed by an activity session. In the flipped classroom, face-to-face time was reduced from 3 to 2 hours and activity time was doubled from 1 to 2 hours. Half of the participants were taught in a flipped classroom and the other half by conventional method. Instructors, content, materials, assignments, and examination questions were the same in both groups. The data were collected by questionnaires, interviews, classroom observation, students' diaries, and marks' reports and Blackboard Learn reports.

At the end of the course, there were no significant differences in test or assignment marks between students studying by the two methods. With regard to students' attitudes toward the flipped classroom, most of the students in the flipped classroom reported that they preferred this method. However, even with the positive attitude toward a flipped class, one of the main findings showed that only 39% of the learners "always" watched the videos as required, and the trend of watching the videos showed a decrease in the number of views over time. However, viewing rates increased sharply during the period of examination study, as learners watched these videos again, or even for the first time.

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

This study investigates the effectiveness of using a flipped classroom approach in higher education. It examines and compares two groups of students at a university in Saudi Arabia. This introduction chapter consists of six sections. After introducing the chapter content, it presents a brief background on the context of this study—Saudi Arabia. The next section describes the study's significance and rationale. The study's main aims and the research questions are then presented, and the chapter ends with an overview of the structure of the thesis.

1.2 The context of the study

The current study investigates the use of the flipped classroom in Saudi Arabia. This context has, as do other contexts in the world, its unique characteristics, which emerge from culture, economy, and history. This section briefly summarises facts that may assist the reader in understanding the context of the study.

Saudi Arabia is one of the 20 largest economies in the world, and its revenues depend mostly on the oil industry. The education sector receives generous funds every year. For example, according to the budget statement of financial year

2020, the government spent about 54 billion United States Dollar on education for that year. Saudi's total population of 34 million, but more than 30% are immigrants; about one-half of the population is in the 25 year-old and under age group, and about one-half of Saudis between 18 and 24 years old are enrolled in Saudi universities (General Authority for Statistic, 2019). In addition, this age group forms the vast majority of undergraduate students, because in most Saudi universities, one of the admission requirements is that the applicant must have obtained a high school degree within the previous 3 years (in some universities this requirement is 5 years). This condition is a main barrier to the enrolment of older learners in higher education.

The Saudi society also has its own characteristics. All Saudi citizens are Muslims, and they are mostly conservative. In Saudi culture, it is likely that individuals of university age live in the family home, and they are expected to show obedience to their parents (Long, 2005), although, according to Al-Saggaf (2004), the influence of the family has recently started to weaken. A collectivistic way of thinking is common among Saudi students, as they see themselves as a group rather than a set of individuals (Razek and Coyner, 2013). The influence of Saudi families and the collectivistic way of thinking are addressed at the end of Chapter Two and again in the final discussion.

Having presented some of the characteristics of Saudi Arabia, I now move to presenting background information about higher education in the country. The higher education system is relatively new. The first modern university opened in 1957 with 21 students and a staff of nine (King Saud University; Saleh, 1986). Today, a total of 1,620,491 students are enrolled in 30 universities around the country. According to the latest statistics of the Ministry of Education (2019), the number of undergraduate students is about 1,360,000, and 52% of them are female. About 88% of these students are enrolled in governmental universities, which provide free education. All governmental universities in Saudi Arabia are administered by the Ministry of Education in terms of funding, planning, supervision, and coordination, although they have a degree of administrative and academic autonomy. The private universities have a greater degree of autonomy, but they follow the main principles of the Saudi education system (Ministry of Education). All universities except King Abdullah University of Science and Technology (KAUST) are engaged in single-gender education; although they have both male and female students, the genders study on different campuses (Jamjoom, and Kelly, 2013)

In recent years, serious steps have been taken to improve the quality of higher education as part of 2030 Vision. The government is attempting to increase the autonomy of individual universities, as a culture of central control previously dominated in educational institutions. In addition, there is a substantial push to improve teaching methods from its didactic nature. However, according to Alnassar and Dow (2013), even with universities attempting to improve teaching methods, the focus remained on teaching content instead of on developing student skills such as thinking, researching, and communication. Moreover, there are issues with the academic staff's understanding of their roles and issues with a curriculum that emphasises theoretical information instead of promoting critical thinking, creative thinking, and problem solving (Ibid). With regard to the use of technology, there is a significant government effort to support Saudi universities. For example, the National Centre of E-Learning and Distance Learning and the Saudi Digital Library have been established to support universities (Aldiab, et al., 2017). However, according to Binyamin et al. (2019), students' use of e-learning tools is not always satisfactory in the three governmental universities they studied.

1.3 Significance and rationale of the study

The rationale for this study stems from the importance of using the flipped classroom in higher education and implementing it efficiently. The value of applying the flipped classroom lies in its potential for taking advantage of both technology and student-centred learning. The recent surge in the role of information and communication technologies in meeting students' changing educational needs, along with pedagogies that support deep engagement in the learning experience, makes this method a suitable choice. The need to integrate technology with both pedagogical and content knowledge is greater with "digital native" students who have been exposed to technology from a very young age. In addition, the value of using this method is higher when teaching students in teacher-education programmes, who were selected to be the participants in the current study. For these learners, in addition to achieving the intended course aims, they can have the opportunity to be involved in a rich and tangible experience that bridges the gap between knowledge and practice. This experience might increase the opportunities to utilise various kinds of learning resources and to steer the attention from teacher-centred teaching to student-centred learning.

However, empirical research is needed to evaluate the flipped classroom approach. To this end, a large and growing body of literature has investigated its effectiveness, mostly focusing on students' learning and their attitudes toward using this approach to learn, as discussed in depth in Chapter Two. However, these studies have found contradictory results as to whether there is a significant difference in what students learn using the flipped classroom approach and learning using traditional approaches. This indicates the need for a more in-depth exploration of the design and implementation of the flipped classroom method. This study intends to explore this by looking at students' learning process as a complete system by investigating factors that influence the implementation of the flipped classroom.

Another significant aspect of this research is that it contributes to existing literature on the subject of students' use of time. Thus far, what we know about this topic is based on questions included in studies exploring the flipped classroom in general. This study investigates students' use of time in more detail. Using multiple data collection methods and questions about when, where, how, by what means, and for how long they are studying, coupled with students' reflections affords richer, more comprehensive and more accurate data that may deepen our understanding of students' learning and help enhance the design of the flipped classroom.

As mentioned earlier, a number of studies have examined learners' attitudes toward the flipped classroom. However, this study investigates students' learning in a different manner, attempting to investigate students' attitudes toward the components of both the flipped classroom and the conventional method, which are video lectures, face-to-face lectures, and in-class activities. This is done to identify which parts of these components determine students' attitudes.

With regard to context of the study, the research studies investigated flipped classroom in the Saudi Arabian context focused on students' achievement and their attitudes toward this method. Because there is a lack of rich, qualitative data exploring the implementation of this method, providing evidence from this context contributes to the existing literature. In addition, the outcome of this study will be beneficial to practice in the field, particularly in light of the country's plan to enhance educational outcomes as a part of the 2030 vision, which has recently received great attention from stakeholders (Our Vision: Saudi Arabia 2030, 2016, p.40).

1.4 Research questions

This research seeks to answer the following three main questions.

1- Is there any difference in the acquisition of knowledge and in students' attitudes between students who take a flipped class and students who take a conventional class in the same subject?

2- Is there any difference in students' use of time and their approach to studying between students who take a flipped class and students who take a conventional class in the same subject?

3- What factors affect the implementation of the flipped class approach in the Saudi Arabian context?

1.5 Research aims

This study investigates the effectiveness of using the flipped classroom approach in higher education. It examines and compares two groups of students. The first group was educated using a flipped classroom method, whereas the second group was educated using a conventional classroom model. The aims of this study are related to the research questions stated earlier. The study examines four main aspects: students' learning, their attitude toward their learning, their behaviour and use of study time, and factors affecting their learning experience. The first three aspects are investigated in both groups, the flipped classroom group and the conventional classroom group, whereas the last aspect is investigated mainly in the flipped classroom group.

The following are the study's main aims:

- To examine the effectiveness of the flipped classroom in comparison to the conventional method in terms of students' achievement.
- To examine learners' attitudes toward the flipped classroom.
- To examine learners' attitudes toward the components of the flipped classroom and the conventional method.
- To compare the groups in terms of their attitudes toward the method they were using.
- To compare the two groups in terms of time spent studying, both inside and outside the classroom.
- To explore learners' approaches to studying inside and outside the classroom.
- To compare the two groups in terms of their approaches to studying.
- To investigate the motivations and the obstacles that determine a learner's behaviour in watching videos and participating in activities in the flipped classroom.
- To identify factors that influence learners' experiences, positively and negatively, while implementing the flipped classroom method.
- To explore the factors that influence learners' experiences while implementing the flipped classroom method in more depth.

1.6 Thesis structure

This thesis is presented in nine chapters, as described below:

- Chapter One introduces the thesis by providing a basic overview of the context of the research, its rationale, and the significance of the study. It also presents the research aims and questions.
- Chapter Two reviews literature relevant to the flipped classroom. It demonstrates a conceptual framework for the flipped classroom method and two related aspects, which are quality of learning and student-centred learning. It addresses this conceptual framework and reviews empirical studies of student achievement, student attitudes, and factors affecting the implementation of the flipped classroom, which are the main variables in the first and the third research questions.
- Chapter Three reviews literature relevant to students' use of their studying time, which is the basis for the second research question. It organises findings derived from different contexts and areas to understand students' approaches and habits of learning inside and outside the classroom. This chapter answers questions such as when? where? and for how long? Even though most of the findings in this chapter relate to students' approaches in conventional classroom methods, some of the presented findings interconnect with aspects of students' approaches in the flipped classroom method.
- Chapter Four illustrates the methodology used in this research study. It explains the research design and the rationale behind adopting it. It also presents a summary of the context and the participants. It further

provides a detailed explanation of each method used in this study, including procedures used in the data analysis. Ethical considerations are also addressed.

- Chapter Five presents the findings that answer the first research question. The chapter provides quantitative findings that compare the use of the two methods in terms of learners' achievements and attitudes.
- Chapter Six presents the findings that answer the second research question. It shapes the findings derived from multiple tools that investigated learners' use of time inside and outside the classroom.
- Chapter Seven presents the first part of the findings that answer the third research question. It analyses data derived from open-ended and close-ended surveys to explore the factors that influence the implementation of the flipped classroom.
- Chapter Eight presents the second part of the findings that answer the third research question. The data analysed in this chapter are from student interviews and focus groups that explored the factors that influence the implementation of the flipped classroom.
- Chapter Nine discusses the main research outcome in light of the research question. It also highlights the study's contributions, its limitations, and its implications, and it makes recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW (1): FLIPPED CLASSROOM

2.1 Introduction

This chapter presents a theoretical and conceptual framework for the flipped classroom. Empirical findings from previous research are presented with a focus on studies conducted in the Saudi Arabian context. The chapter begins by defining the flipped classroom and presents two related concepts: quality of learning and student-centred learning. It then presents empirical findings on the acquisition of knowledge via the flipped classroom and students' attitudes toward it. The last section of this chapter discusses the primary factors that can influence the implementation of a flipped classroom, which are human interaction; the design of the video lecture and the classroom activities; technology; and the environment inside and outside the class.

2.2 Theoretical and conceptual framework of the flipped classroom

2.2.1 What is the flipped classroom?

The flipped, or inverted, classroom is a new approach to teaching that has received considerable attention in the last few years. The approach switches, or flips, what is normally done in class with what is normally done as homework (Herreid and Schiller, 2013). Technologies are incorporated to shift lecture content online, allowing for a more learner-centred classroom environment. The premise of the flipped classroom is that, rather than spending the limited amount of classroom time having an instructor introduce a concept by lecture, the instructor can create a video lecture and deliver it online prior to class, freeing up valuable face-to-face time for more engaging activities facilitated by the instructor (Milman, 2012). This approach nearly doubles the time students are engaged in active learning and collaboration with one another in class, and they receive the out-of-class portion of instruction from YouTube, iTunes U, and podcasts (vodcasting) or via a course-management system such as Blackboard or Moodle, which allows them to progress at their own pace (Herreid and Schiller, 2013; Brunsell and Horejsi, 2013). In addition, Khan Academy has contributed notably to increasing the popularity of this approach by providing open instructional video resources on a variety of subjects (Khan, 2011).

Looking deeply into the flipped classroom method reveals that it is based on integrating two dimensions, the online dimension and the face-to-face dimension. In this method, learning follows a linear progression. Students begin with self-learning using online materials, such as video lectures and other materials that mainly transmit knowledge in one direction. In this context, pre-recorded lectures are effective in helping students learn. Empirical evidence has shown that the lecture is as effective as other methods, such as discussions, enquiry, and independent study, in transmitting information (Bligh, 1998). Furthermore, online video lectures and other materials give students more flexibility in their learning (Ellis and Goodyear, 2009). However, despite this, watching video lectures is not enough to achieve high-quality learning. A significant number of studies have shown that giving students lectures alone is not as effective as discussion methods for promoting thought (Bligh, 1998). In addition, evidence from recent surveys showed that students are looking for a balanced use of technology (Ellis and Goodyear, 2009). These two points support the need for the second dimension of the flipped classroom approach.

In the second dimension of this approach, students engage in active, cooperative learning during class time, using the knowledge received from online learning materials and their previous experiences to construct knowledge and reflect, creating meaning. According to Dewey (1990), learning occurs through practical activity and reflection; therefore, face-to-face classes use many active-learning techniques, such as group projects, games, and debates, to foster student learning (Faust and Paulson, 1998). It is also worth noting that it is important to create a learning environment in higher education that helps students practice their academic knowledge (Laurillard, 2002). Thus, face-to-face classes can be designed as ideal environments in which to practice authentic activities.

Looking at the two dimensions of the flipped classroom approach together, the online lecture dimension provides students the needed background knowledge, and the activity sessions enable them to share their reflections on that knowledge. Therefore, the flipped classroom can be considered a combination of constructivist and behaviourist ideology (Braun et al., 2014).

2.2.2 Quality of learning

A popular approach to defining learning outcomes is the framework presented by Bloom, Engelhart, Furst, Hill, and Krathwohl, (1956), which comprises six categories to classify educational goals —knowledge, comprehension, application analysis, synthesis and evaluation. Bloom’s taxonomy was revised in 2001. The authors of the revised taxonomy used “action words” to describe the cognitive processes (remember, understand, apply, analyse, evaluate, and create). Three categories were renamed, and the order of two were interchanged (Armstrong, 2011; Krathwohl, 2002; Anderson and Sosniak, 1994). The categories of Bloom taxonomy were ordered by its complexity. The first three levels considered the lower order cognitive process— remembering, understanding, applying —while the higher order cognitive process are analysis, evaluation, and creating (Krathwohl, 2002). Bergmann (2013) believes that classroom activity in the flipped classroom should emphasise the higher levels of Bloom's taxonomy, using the opportunity for interactions between learners and instructor and learners and peers.

For more than 40 years, Bloom's taxonomy has been the dominant tool for describing learner's performance development from simple to complex levels. However, there is another approach that focuses on the learner response rather than, like Bloom, focusing on describing the level of assessment that the learner is able to perform at.

The structure of observed learning outcomes (SOLO) taxonomy is based on the notion of deep and surface approaches to learning. Deep and surface approaches were first suggested by Marton and Säljö (1976) as key approaches that are based on the level of information processing (Mizokami, 2018). According to Biggs and Tang (2011), "good teaching is getting most students to use the level of cognitive processes needed to achieve the intended outcomes that the more academic students use spontaneously" (p4). Students approach learning in two ways: the deep and the surface approach. In the surface approach, learning outcomes are on the second and third levels of the SOLO taxonomy, on which the student has the ability to memorise, identify, quote, and so on (the second, or unistructural, level) or to classify, describe, discuss, and so on (the third, or multi-structural, level). In contrast, when using the deep approach, learning outcomes are on the fourth and fifth levels of the SOLO taxonomy, on which the student has the ability to apply, analyse, plan, and so on (the fourth, or relational, level) or to theorise, hypothesise, reflect, and so on (the fifth, or extended abstract, level). The first level of the SOLO taxonomy is the pre-structure level, on which outcomes contain nothing relevant to knowledge. However, according to Biggs and Tang, (2011), "deep and surface approaches to learning are not personality traits, as is sometimes thought, but are most usefully thought of as reactions to the teaching environment" (p31). Entwistle and Ramsden, (2015) addressed other factors that could also influence students' approach to learning, including content, context, as well as interest and anxiety specially from examination.

However, some students prefer to use a strategic approach to learning, in which the level of the student's understanding depends on the assessment method. Students may use techniques such as rote learning, if that is all that they need to do to achieve high grades, and they may use higher-level thinking only when needed (Tsingos, Bosnic and Smith, 2015). Mann (2001) argues that learners who rely on external responsibility might adopt a strategic or surface approach to their learning. However, learners tend to adopt a deep, strategic approach when the assessment method assists that by evaluating their understanding of the concept (Mizokami, 2018).

Even though there are differences between Bloom's and the SOLO taxonomy, they are related in some way (Newton and Martin, 2013). This is predicted, as in Bloom's taxonomy the progress moves from lower levels to upper levels, and the learner must acquire the prior level before moving to the next (Pugente and Badger, 2003). Thus, learners who adopt a deep approach to learning are more likely to progress through to Bloom's upper levels because of their ability to integrate and reflect on knowledge. By contrast, learners who adopt a surface approach may struggle to progress past the lower levels, as their focus is on basic facts rather than the integration of concepts (Newton and Martin, 2013; Gijbels et al., 2008; Chin and Brown, 2000). In spite of the criticism that the deep and surface approaches to learning have received (Haggis, 2003), it is essential that students learn in an environment that supports their becoming deep learners who develop the skills of inquiry and independent learning which foster professionalism and effective lifelong learning (Biggs and Tang, 2011; Laird, et al., 2014).

To answer the question of whether the flipped classroom approach can result in high-quality learning, it is important to consider the following facts. In a typical classroom, some students have an intrinsic motivation for deep learning, and others do not. In university teaching, it is essential to narrow the gap between these students (Biggs and Tang, 2011). To do this, using lectures alone is not enough. It requires activities that include high-level tasks to support the use of high-level approaches. Another point to be aware of is that to help students achieve deep learning, the teaching should mediate students' life experiences to create an environment that enables a student to embrace both experiential and formal knowledge (Mori, 2018). However, because knowledge is constructed, students' differences in experiences and backgrounds could affect their learning of a given topic. According to Prosser and Trigwell (2002), students with well-developed prior conceptual understanding are likely to adopt a deep approach and to have well-developed understanding afterward. For this reason, pre-classroom materials could give all students a shared level of experience to increase learners' adoption of a deep approach.

2.2.3 Student-centred learning

Blackie, Case and Jawitz (2010) define student-centred learning as a style of teaching which shifts the manner of measuring success from a focus on covering the course syllabus to a focus of students' learning and deep understanding. A student-centred approach is rooted in the constructivist theory school, based on the work of Piaget (1967) and Vygotsky (1978). The focus here is on how students learn by interacting with the knowledge, that is considered communal. Learning occurs when learners make their own mental schemas in which to store information (Fahnestock, 2011; Alfahid, 2017). In this approach, new learning is built based on previous knowledge. Thus, the traditional way of teaching which values rote memorisation can isolate new learning from students' previous knowledge and experience (Fahnestock, 2011). In addition, the opinions and culture around a learner also have an influence on the learning, so learners tend to find a meaning that fills in the gaps when new knowledge does not fit with their prior knowledge (Von Glasersfeld, 1989).

In didactic teaching, the responsibility of the student in learning is ignored. Instructors direct the learning process, whereas learners tend to have a receptive role. However, this approach conflicts with deep learning and with the learner's responsibility and accountability for learning; it also precludes learner autonomy and interdependence between students and teacher (Lea et al., 2003).

Armstrong (2011) claims that in progressive teaching instructors try to shift didactic teaching to the use of activities and group work, as students can decide what they want to do during the learning process. However, applying classroom activity is not enough to create student-centred learning; this approach requires a design that considers learners' needs along with the learning content (Blackie et al., 2010). Additionally, the teacher has to set clear expectations about learners' accomplishments in term of quality and time (Kolb and Kolb, 2005). However, Prosser and Trigwell (2002) argue that focusing only on the process of learning and ignoring the transfer of information may result in limited knowledge of the content. This highlights the importance of the balance between content and process. Even with the great advantage of adopting a student-centred approach, the implementation of this approach might be hindered by tighter budgets, larger class sizes, and standards-based education which includes mandatory competency tests, which all require traditional teaching methods (Wiersma, 2008).

As mentioned earlier, a student-centred approach shifts the attention from teachers to learners as they actively construct their own learning. This changes the roles of learner and teacher compared with the teacher-centred approach in traditional teaching style. The teacher in the student-centred approach concentrates on the process of learning rather than the transferring of information. On the other hand, the learner is active rather than passive, and plays a key role in the learning process (Blackie, Case and Jawitz, 2010).

Many researchers now believe that a student-centred learning approach can be used in the flipped classroom (Betihavas et al., 2016; Bates, et al. 2017; Akçayır and Akçayır, 2018). Student-centred learning involves approaches such as active learning, peer-assisted learning, and collaborative learning, as well as a set of methods that can be implemented such as problem-based learning and inquiry-oriented strategies (Bergmann and Sam, 2013; Bishop and Verleger, 2013). All these approaches and methods can be implemented during the in-class activity period in the flipped classroom.

In the flipped classroom, online materials are provided for learners to read, watch, summarise, and understand before class. Having the learning content in different formats (text, videos, and visuals), students have the ability to learn the content at their own pace; they can then meet with their instructor if they face difficulties (Reidsema et al., 2017; Oraif, 2018). The pre-class phase can also reduce the gaps between students who have varying levels of existing knowledge about the learning topic. Learners can then build their learning on what they already know through in-class activities. In addition, learners extract needed information themselves and share it with their workgroup when learning through activity. Instructors also can provide scaffolding for this process (Reidsema et al., 2017).

During in-class activity, instructors can customise the activities to meet learners' needs (Roehling, 2018; Touchton, 2015); they can identify and support students who need more attention (Moffett, 2015) and provide feedback during in-class activities that helps learners develop their areas of weakness (Touchton, 2015; Roehling, 2018). This makes the valuable face-to-face class time more student-centred, as the learning materials have already been delivered to learners via online tools.

According to Hsieh (2017), in the flipped classroom, scaffolding occurs by both the pre-class materials and in-class activities. This differs from traditional courses which focus on delivering the content and provide less learning guidance. Moreover, the nature of the flipped classroom enables both instructor and learner to practice their new roles (Panuwatwanich, 2017; Al-Fahid, 2017). However, there may be a misconception that the role of the teacher is less effective in the flipped classroom, as it is replaced with videos (Overmyer, 2014).

In conclusion, the investigation of the flipped classroom method in this study is based on a student-centred approach that aims to enhance the quality of students' learning, as discussed in this section. Related concepts, such as deep or surface approaches and student or instructor roles are also considered in this research.

2.3 Learning acquisition via the flipped classroom

This section discusses learners' acquisition of knowledge via the flipped classroom. It starts by discussing the effectiveness of teaching methods, then presents findings from quantitative empirical studies with a focus of student achievement. The qualitative findings reveal learners' perspectives about their learning experience using the flipped classroom. At the end of the section are more detailed findings from empirical studies implementing this method in Saudi Arabia.

A number of empirical studies have intended to measure the effectiveness of the flipped classroom in higher education. However, questions can be raised as to what researchers mean by effective learning in higher education and how the effectiveness should be measured. According to Roehling (2018), effectiveness has been measured using two components: 1) assessments of learning objectives and goals, and 2) learners' reactions. Learning objectives and goals include foundational knowledge, higher-order thinking, skills, affective goals, and learning to learn. Learners' reactions to the flipped classroom method include learners' satisfaction and comparisons between the flipped classroom method and the lecture-based method.

Many empirical studies have studied the effectiveness of the flipped classroom by measuring the previously mentioned factors. However, many of these studies used academic achievement as one main indicator. Academic achievement indicates the extent to which a learner has accomplished performance outcomes (Steinmayr and Spinath, 2008). Additionally, formative and summative evaluation are used widely by educators to indicate learners' achievement. This could be applied to the flipped classroom method, as formative and summative evaluation are important to identify learners' improvement in different areas of their learning and to measure the overall effectiveness or impact of the course. The purpose of formative evaluation is to collect data to improve student learning. However, the final results of a summative evaluation measure student behaviour change, which is the result of learning acquisition. According to Zappe and Litzinger (2017), when planning a flipped classroom course, the instructor should be strategic to ensure that evaluation, instructional techniques, and content are aligned with the learning objectives.

The number of empirical studies investigating the flipped classroom method is growing rapidly as the use of the method continues to increase. These studies vary in their findings as to whether the flipped classroom is an effective pedagogical choice. O'Flaherty and Phillips (2015) conducted a comprehensive review of 23 studies investigating the flipped classroom method which had been conducted in five countries, mostly in the United States, Australia, the United Kingdom, Taiwan, and Malaysia. These studies provide indirect evidence of improved academic performance with the flipped classroom method. There are very few studies reporting strong evidence that the flipped classroom method is more effective than conventional teaching methods. The improvement was measured using examination grades, overall improvement from pre-test to post-test marks, or final course grades compared to historical controls.

Akcayir and Akcayir (2018) conducted a review of 71 research articles and found that more than one-half of the studies (52%) indicate that the use of the flipped classroom method improves students' learning achievement. These studies measured improvement using grade point averages (GPAs), standardised test scores, and course grades. Another review, conducted by Lundin et al. (2018), of 31 publications indicates that the flipped classroom method improved student learning, but the authors argue that as the evidence on which these findings are based is the improvement of students' test results or their self-reports, the findings may be "an effect of the bias of self-reported studies conducted by teachers themselves but may also be related to the rhetorical conviction and current hype around the flipped classroom approach"(p15).

Hsieh (2017) highlights an important element, which is the internalisation of knowledge and the ability to transfer this knowledge to a new setting. He suggests that flipping his course (in the field of education) fostered deeper understanding and increased learners' engagement with concepts. This allowed learners to transfer what they had learned not only to the course assessments but also to their future classrooms. Additionally, an empirical study demonstrates that the flipped classroom is more efficient in instilling deep learning than are conventional teaching methods (Hung, 2014). However, O'Flaherty and Phillips (2015) claim that there is a lack of conclusive evidence that this method helps in improving lifelong learning and other 21st-century skills.

Raffaghelli (2017) conducted a review of 17 studies that had been published from 2013 to 2017, most during the period 2015–17. Six of them were systematic reviews, and eight were critical reviews of research analysis. The analysis of these studies, particularly, scoped the higher-level skills based on Bloom's taxonomy, and traditional forms of assessment which mainly connected with low-level skills. Raffaghelli argues that there is not clear evidence that the flipped classroom method is effective as an instructional method, in spite of its popularity.

With regard to differences between introductory courses and higher-level courses, O'Flaherty and Phillips (2015) compared studies conducted on introductory or first-year courses versus studies conducted on second-, third-, or fourth-year courses. They found no evidence as to whether the flipped classroom is best introduced in introductory years or in higher-level years.

I turn now to in-depth investigation of learners' perspectives on their learning experience using the flipped classroom method. According to Reidsema et al.

(2017), learners have different perceptions about the usefulness of the flipped classroom in terms of its two dimensions: their engagement with the content as active learners and the usefulness of the pre-class preparation. In several other studies, however, learners comment that the use of the flipped classroom method enhanced their learning experience, helped them develop communication and teamwork skills, increased teacher-student engagement, promoted independence in learning, and reinforced innovation in learning compared to a conventional class. By contrast, there was still other learners who were quite negative as to the usefulness of the flipped classroom method (Pierce and Fox, 2012; Strayer 2012; Ferreri and O'Connor, 2013; McLaughlin et al., 2013; Davies et al., 2013; Critz and Wright; 2013).

It is important to note that in previous studies the effectiveness of the flipped classroom was mostly compared to conventional teaching methods. However, Jensen, Kummer, and Godoy (2015) compared a flipped classroom to an active non-flipped classroom to investigate the effects of this method on learners' achievement. Their quasi-experimental design study is quite similar to the research study presented in this thesis. Their results indicate no differences between the two groups. This finding may support what Kay and MacDonald (2019) have suggested: that focusing on in-class activities and instruction methods is more important than designing pre-class learning materials.

From the discussion above, it is clear that empirical studies vary in their findings about whether the flipped classroom is an efficient pedagogical choice.

According to Lundin et al. (2018), it is difficult to make generalisable or transferrable judgment about the value of the flipped classroom.

I now turn to empirical studies that investigate the effectiveness of the flipped classroom method in Saudi Arabia. A review of studies that investigate learners' academic performance in Saudi higher education finds nine studies indicating the flipped classroom method improved learners' performances on tests. All these studies used quantitative approaches, and most of them used quasi-experimental designs and showed a significant effect (Al-Rowais, 2014; Alsowat, 2016; Abdelshaheed, 2017; AlJaser, 2017; Abdel-Fattah 2017; Alru'sa, 2018; Albjedy, 2018; Alnuhayt, 2018; Al-Hebaishi, 2018). One study, however (Sajid et al., 2016), found no significant difference in performance between learners who were taught using the flipped classroom method and learners who were taught in face-to-face lectures. The following paragraphs present these findings in greater detail.

Sajid et al. (2016) assessed learners' academic performance using flipped classrooms compared to conventional teaching for 127 participants, of whom 64 were female and 63 were male. The students' summative assessment marks were compared with their previous year's marks as a historical control to measure statistical significance. The comparison of marks using a *t*-test did not show a significant increase in academic performance.

Studies by Alnuhayt (2018), $N = 45$, AlJaser (2017), $N = 52$, and Albjedy (2018), $N = 54$, compared experimental and control groups, using pre- and post-tests for both groups. Each study found a significant difference between the two groups' performances in favour of the experimental group. Moreover, in a comparison of pre- and post-tests for the experimental group, a 2-tailed *t*-test showed a significant difference in favour of the post-test, which confirmed the effectiveness of using the flipped classroom method.

In studies by Al-Rowais (2014), $N = 64$, and Al-Hebaishi (2018), $N = 70$, the independent samples *t*-test showed a significant difference between two groups (experimental and control) on the post achievement test. Alsowat (2016), $N = 67$, used the same approach to examine the impact of the flipped classroom method by comparing post-tests for experimental and control groups. The test focused on higher-order thinking skills: analysing (11 items), evaluating (9 items), and creating (6 items). An independent samples *t*-test showed statistically significant differences between the mean scores for analysing, evaluating, and creating in favour of the experimental group. The effect size was large for all three domains.

Studies by Abdel-Fattah (2017), $N = 33$, and Alru'sa (2018), $N = 50$, employed a one-group pre-test–post-test quasi-experimental design. Results indicated significant effects on students' marks. In these two studies, however, the improvement of learners' marks was not necessarily due to the use of the flipped classroom, as there was no control group.

A study by Abdelshaheed (2017) had two experimental groups in two different courses, advanced English writing, $n = 33$, and teaching English language, $n =$

29, and no control group. The study found a significant difference between the mean scores obtained on the pre-test and post-test of each course favouring the post-test. However, it found no statistically significant difference between the mean post-test scores of the two groups, given the nature of the two courses.

From the above, it seems most studies conducted in the Saudi context show a positive effect of flipped classrooms on learners' academic performance on tests. With regard to gender differences, there is a shortage of studies assessing male learners' academic performances. Studies by Alnuhayt (2018), AlJaser (2017), Abdelshaheed (2017), Alsowat (2016), Al-Rowais (2014), Al-Hebaishi (2018), Alru'sa (2018), and Albjedy (2018) were conducted on female learners, whereas only the study by Sajid et al. (2016) included both male and female students. The Abdel-Fattah (2017) study did not reveal the genders of participants. Therefore, it is recommended to consider closing this gap by studying male students in Saudi Arabia.

Other variables such as skills, engagement, and self-efficacy were also examined using quasi-experimental designs. Aboraya and Alket (2016) examined learners' programming skills by comparing post-course applications marks of the experimental and control groups. A Mann-Whitney test indicated no significant difference in programming skills between the two groups. For self-efficacy, a study by AlJaser (2017), $N = 68$, measured the effectiveness of using the flipped classroom method on self-efficacy. A scale of self-efficacy was used. The work showed statistically significant differences at the level of $p < .05$ between the mean responses on the self-efficacy scale of the experimental and control groups in favour of the experimental group. This result confirms that the flipped classroom method supports thinking creatively and strengthens cognitive development and meta-cognition. Another conclusion of this study is that the element of active participation in this method reinforces learners' feelings of self-efficacy, in contrast to receiving knowledge through lectures. Thus, the flipped classroom method helped learners develop problem-solving skills and confidence in their abilities to perform the required tasks.

Another variable also examined in the Saudi context is learners' engagement. The study by Alsowat (2016) examined the impact of the flipped classroom on learners' engagement. A questionnaire was administered to the experimental group only to assess the differences in learners' engagement before and after the treatment. The results showed a statistically significant difference between the mean scores of the pre- and post-administrations of the engagement scale in favour of the post-administration, which meant that the use of the flipped classroom method was effective in improving learners' engagement.

A related aspect highlighted by Sajid et al. (2016) is the importance of this method for examinations. The study showed that nearly 71% of learners reported that the flipped classroom method helped in examination preparation and in clarifying objectives and concepts.

In conclusion, the influence of using flipped classroom on students' academic achievement does vary according to the discussed literature. In this research study, the first research question investigates students' academic achievement in a particular context that has its own characteristics; a discussion of the findings of international and local empirical studies helps with comparing the findings of this research study to those conducted in other contexts.

2.4 Learners' attitudes

This section discusses learners' attitudes toward the flipped classroom. It starts by defining "attitude", then presents findings from empirical studies with a focus on the field of education. The quantitative findings present the overall attitudes toward the method, whereas the qualitative findings highlight mainly the reasons behind students' resistance to the flipped classroom. The end of the section offers more detailed findings about students' attitudes toward implementing this method in Saudi Arabia.

Studying learners' attitudes is popular in educational research, because a positive attitude toward a subject may increase the extent of learning and engagement with the content. When learners appreciate or value a teaching method, they are more motivated to learn and increase their performance (Roehling, 2018). Furthermore, positive attitudes help students to be active learners and transfer knowledge outside the school (Khoo and Ainley, 2005).

Before talking about attitudes in education research it is important to define the term. In general, there is not a consensus definition of the concept of attitude.

However, according to Thurstone (1931), attitude is “a reaction for or against specific psychological objects” (p 249). This concept consists of three main elements, which are cognitive, affective, and behavioural attitudes. Cognitive attitude is related to cognitive ability and is based on knowledge about attributes and consequences. Affective attitudes refer to the intensity of positive or negative feelings. A behavioural attitude implies a subject’s reaction to the object (Eagly and Chaiken, 1993; Ajzen and Fishbein, 2005; Maio and Haddock, 2010).

It is difficult to measure attitude by sight; however, it can be measured by direct or indirect methods. Among direct methods, a self-reported questionnaire is widely used. It usually consists of Likert rating scales (1932) and statements that require a response indicating the degree of feelings. Responses may differ in direction (positive, negative, or neutral) and strength (weak or strong). Strong attitudes are linked to a “strongly agree” or “strongly disagree” positive or negative response to a 5-point Likert scale statement (Fazio and Olson, 2003; Brunstein and Schmitt, 2004; Maio and Haddock, 2010; Ferguson and Fukukura, 2012). Indirect measurement of attitude is based on an individual’s performance on affective tasks and tests. This method is popular in psychological research (Brunstein and Schmitt, 2004).

Most reviewed studies of students’ attitudes toward the flipped classroom method used surveys with Likert scales or open-ended questions. The majority of learners in most of the reviewed research studies had a positive attitude toward the flipped classroom, although there were contrary opinions about the method.

For example, in Apedoe. et al's (2017) case study, most learners found using the flipped classroom method enjoyable and effective in helping them understand course content. About 70% of students enjoyed both video lectures and in-class activities. The percentage of students reporting a positive attitude toward the effectiveness of video lectures and in-class activities was 76% and 67%, respectively. Several other studies support these findings. For example, studies conducted by Mason et al. (2013), Prober and Khan (2013), Yeung and O'Malley (2014), Young et al. (2014), Butts (2014), and Hoffmann (2014) showed high positive attitudes and satisfaction related to the use of the flipped classroom.

Other studies have explored learners' attitudes toward the flipped classroom compared to conventional methods (e.g., Zainuddin and Halili, 2016; Akçayır and Akçayır, 2018; Roehling, 2018). The findings of these studies also indicate that large majorities of learners had positive perceptions of the flipped classroom compared to conventional teaching methods. Findings in a review by Roehling (2018) indicate a general positive attitude toward the flipped classroom, as 67% of the studies in the review found that learners tended to rate the flipped classroom more highly than traditional learning. Akçayır and Akçayır (2018), who conducted a review of 71 research studies, also support these findings, and they claim that some studies showed that the flipped classroom helped learners to improve their attitudes toward learning experiences in general.

A review by O'Flaherty and Phillips (2015) analysing 28 studies from five countries, mostly in the United States, with several in Australia, the United Kingdom, Taiwan, and Malaysia, show that the majority of learners have a positive perception of the flipped classroom. However, a substantial minority have some negative views about the flipped classroom method, and suggest that this method may not be applicable to all subjects. On the other hand, Strayer (2012) performed a comparative research study between a flipped classroom and a conventional classroom for a statistics course. The study showed that learners in the flipped classroom were less satisfied with the teaching method than learners in the conventional classroom. Likewise, in McLaughlin et al.’s study (2014), learners were less satisfied with the flipped classroom than the conventional classroom. The learners’ issue, in particular, was with the learning from the activities, they found difficulties with the oriented learning content, as they were not sure of their ability to generate their own conclusions.

Qualitative findings from several case studies support the earlier quantitative findings. Wilson (2016) conducted a case study about flipping an “instructional design course”, which is similar to the course on which the flipped classroom was applied, in this thesis. The results indicate that, in general, the course was enjoyable for both students and instructors, and learners were motivated to use this method in more courses.

Other literature, however, highlights learners' negative attitudes toward the flipped classroom. The main issue behind these attitudes is resistance to and difficulty adjusting to a new learning style. Various case studies have explored the reasons behind learners' resistance to flipped courses in educational schools. For example, Morris in Apedoe et al. (2017) conducted a case study in flipping a childhood study course. She found that some still favoured the traditional lecture-based learning, since being the focus of the class during the activity, sometimes caused unexpected level of rigor, though many students appreciated the flipped classroom method. In addition, Black (2017), in her case study of flipping an education course, found that some learners were resistant to active learning, which requires group discussion, collaborating, moving around the room, and handling different viewpoints, because they were not used to such activities. However, these learners eventually became less resistant as the students grew to know each other, started to see the value of incorporating different viewpoints, and applied the course concepts to real life. In a study by Strayer (2012), some learners had difficulty adjusting to the flipped classroom or to any different learning method because they believed in the effectiveness of the traditional classroom for supporting learning and did not see a need to experience new elements such as recorded lectures, group work, and classroom discussions with both the instructor and students. The feeling of missing a face-to-face setting during a video lecture was also addressed by Long Cummins, and Waugh (2019).

Likewise, Spector and Leard (2016), in a study of flipping a childhood education course, found that the changing to flipped classroom caused resistance; therefore, students did not use the resources provided at the beginning. This resistance was a result of unfamiliarity and the fear of failure, especially because the course started out in a traditional format and was then flipped. Eventually, however, learners moved from being completely dependent learners using traditional methods to being autonomous, self-sufficient learners with a positive attitude toward using such methods in their teaching. The authors also argue that if the flipped classroom had been announced and implemented earlier in the course, it is more likely that learners would have accepted having the given resources as part of the course and would have been more motivated to use them.

However, even though unfamiliarity appeared to be a reason for a negative attitude, according to Bennett and Kottasz (2001), Spector and Leard (2016), Black et al. (2017), and Long Cummins, and Waugh (2019) learners adapted to such a method eventually. Their performance also improved once they accepted the new responsibilities, and some became strong advocates for using this method.

Another issue driving learners' resistance is the increase in their responsibilities, especially for the pre-class activities. Long (2016) addressed this issue when she investigated flipping an undergraduate course titled "Introduction to Education". In her study, learners mentioned that they were forced to enhance their time management skills. They had more responsibility in the flipped classroom, whereas they were used to getting information directly in the lecture-based format. Ayles-Anne Wilson (2016), in investigating flipping an instructional design course, found that a major issue was that several learners stopped doing their pre-class tasks. Learners mentioned that these tasks increased their workload, and they already had other coursework and assignments for their degree program. Long (2016) addressed another kind of responsibility: the responsibility to analyse the online content, as the videos were short and concentrated.

Difficulty accepting a new role for students and teachers is also a reason for learners' resistance, as these roles differ from what students may have expected, causing confusion and resistance, especially when the students are used to a traditional learning culture (Roehling, 2018). According to O'Flaherty and Phillips (2015), some students were resistant to taking on new responsibilities. However, in studies by Young et al. (2014) and Mason, Shuman, and Cook (2013), students seemed to adapt to the new roles. However, more clearly describing the new roles of students and instructors would reduce their resistance (Mason, Shuman and Cook, 2013).

In the Saudi Arabian context, several studies have been conducted to investigate learners' attitudes toward flipped classrooms. Sajid et al. (2016), Zain-Alabdeen (2017), Alnuhayt (2018), Abdelshaheed (2017), and Alsowat (2016) evaluated learners' attitudes toward flipped classrooms. In these studies, learners taught using the flipped classroom method completed 5-point Likert scale questionnaires. The results showed that most participants had positive attitudes toward the flipped classroom method.

In Sajid et al.'s (2016) study, N = 127, about 69% of participants expressed satisfaction with the flipped classroom method as a novel, appropriate, and effective learning method. About 81% of participants felt that this method was better than the didactic teaching method. These results were consistent with Zain-Alabdeen's (2017), N = 50, findings, in which about 60% of learners had a positive attitude toward using videos and technology in the learning process. However, in this latter study some learners' perceptions about the flipped classroom were negative based on the amount of time they need to prepare for classes, and because they were more accustomed to face-to-face lectures.

The percentage of students having a positive attitude was high in Alnuhayt's (2018) study (N = 45). She found that the majority of participants agreed with statements about finding the flipped classroom method enjoyable and finding it useful. The percentages of positive responses to these two statements were 91% (M = 4.46, SD = 0.65) and 95% (M = 4.58, SD = 0.58), respectively. Whereas, about 25% of participants agreed that face-to-face lectures were more useful than recorded video lectures (M = 2.79, SD = 1.10). Similarly, in Alsowat's (2016) study, N = 67, the mean scores of learners' attitudes were high, and statements about joyfulness, ease of use, usefulness, and willingness to use the method in the future were also high, ranging from 4.12 to 4.18 (SD = 0.8).

Abdelshaheed (2017), $N = 62$, investigated learners' attitudes toward the flipped classroom in two different courses (an English language course and a teaching methods course). She learned that about 90% of students found the method enjoyable, and about 80% would be happy to use it in the future ($M = 4.24$, $SD = 1.01$; $M = 4.00$, $SD = 1.23$). When comparing a classroom activity to a face-to-face lecture, a high percentage of students found the activity more useful (80%, $M = 4.00$, $SD = 1.23$). Similarly, students preferred having the lecture as homework (86%, $M = 4.31$, $SD = 1.23$). By contrast, a smaller percentage found the flipped classroom difficult (25%, $M = 2.52$, $SD = 1.28$).

Al-Rowais (2014), $N = 64$, used pre- and post-questionnaires to examine changes in attitudes after using this method. The paired samples *t*-test showed a statistically significant difference (at the 0.05 level) between the pre- and post-measurements in favour of the post-method administration. This outcome was supported by results from Abdelshaheed (2017), in which a low percentage of students found it difficult to adjust to the new method (27.5%, $M = 2.17$, $SD = 1.29$).

In conclusion, it is clear that students' attitudes towards the flipped classroom are not commonly a problem, as students eventually adapt to it. However, an understanding of the influences on students' attitudes helps with the design of the investigatory tools for this study and with comparing the findings to those in other contexts. In addition to the presented work, the investigation of students' attitudes in this study includes students' attitude toward the elements of both flipped classroom and conventional methods to identify which of these elements influence the overall attitude toward each method.

2.5 Components of the flipped classroom

This section explores the implementation of the flipped classroom method. According to Bishop and Verleger (2013), O'Flaherty and Phillips (2015), and Swart (2017), the implementation of the flipped classroom varies among different contexts, and the findings in a particular context cannot necessarily be applied to other contexts, given the complication of the method's features.

The literature has proposed some guidelines for flipped classroom implementations. According to Chen et al. (2014) and Schwarzenberg et al. (2018), effective implementation of the flipped classroom method should be based on the following factors: learner-centred learning, intended content, students' engagement, flexibility, skilled instructors, and accessible and user-friendly platforms. However, Long, Cummins, and Waugh (2019) emphasise removing the internal barriers of performance expectancy and technology self-efficacy. In the Saudi Arabian context, three factors were identified that influence the implementation of e-learning: self-efficacy, personal drivers, and access to the requisite resources (Mutambik, et al., 2018).

As this research investigates factors that might affect the implementation of the flipped classroom, it is worth reviewing other work that has investigated these factors. The following sections present these factors.

2.5.1 Learner–teacher interaction

One of the main factors that affects the implementation of the flipped classroom is the level of interaction with the instructor. This aspect was highlighted as a disadvantage by some learners and an advantage by others. In the first case, students seem to miss this element during the video lecture, whereas other learners value the level of interaction during the classroom activity phase.

In research studies, students' responses showed some criticism of the level of interaction in the first phase of the flipped classroom. Targets for this criticism include the lack of opportunity to ask questions; missing the physical appearance of the instructor, which boosts the learning of some students; and the encouragement of student engagement during the lecture (Yeung and O'Malley, 2014; Roehling, 2018). With the virtual appearance of the instructor in the recorded videos, students lose some of the advantages of interaction with instructors, such as the instructor's ability to observe students' reactions, to motivate them to listen and respond to the content, to measure the level of their understanding, and to provide instant feedback when they need it (Wolff and Chan, 2016; Apedoe et al., 2017; Yeung and O'Malley, 2014; Roehling, 2018).

On the other hand, students seem to value the element of interaction during in-class activity sessions and are satisfied with the level of this interaction. The interaction in this phase is not only with the teacher but also with peers in presentations, group projects, and think–pair–share activities (Hsieh, 2017). This direct interaction helped students find immediate support when they faced difficulties, and it deepened the relationships between teacher and students and among students (Roehling, 2018). Additionally, this interaction helped students develop cognitive skills and acquire knowledge and helped to reduce cognitive overload (Angeli, Valanides, and Bonk, 2003; Al-Harbi, 2011).

However, the fact that some students miss the interaction during lectures raises an important question: to what extent do students find the interaction during in-class activity enough to support their learning? A survey conducted by Zain-Alabdeen 2017, $N = 50$, showed that 60% of students believed that the flipped classroom method offered more time for questions and discussions. However, this result does not fully answer this question.

In the Saudi context, studies conducted by Al-Rowais (2014), Al-Hebaishi (2018), Aboraya and Alket (2016), and Abdelshaheed (2017) emphasise interacting with the instructor during class. They identify several benefits of this interaction, including the instructor's ability to clarify challenging points students encountered while studying on their own, the ability to provide immediate feedback and discuss students' work and assignments, and the ability to provide the support students need to achieve a greater understanding of concepts and a mastery of skills.

However, Saudi students also highlighted the limitations of a lack of interaction during the online lectures, as it reduces their ability to ask questions and to discuss and fully understand the content (Sajid et al., 2016). A group of students in the Sajid et al. (2016) study believed that using recorded lectures for new topics is challenging, as such situations require direct interaction with the instructor. They suggested using this method only for reviewing concepts. Learners in the Al-Hebaishi (2018) study suggested students use an online discussion platform while watching the recorded lecture.

In another study investigating the importance of interaction in online learning among Saudi students, results showed that the following aspects seem to be important ($M > 3.4$ on a 4-point Likert-type scale): communication from the instructor, frequent opportunities to question the instructor, and the opportunity to get meaningful feedback. Learners' interaction with peers appeared to be less important, and interaction via video appeared to be the least-favoured aspect ($M = 1.71$, $SD = 0.914$) of online learning (Alubthne et al, 2018).

2.5.2 Video lectures

This section explores the factors related to video lectures. Even though other kinds of pre-class materials can also be used in the flipped classroom, the focus here will be on videos. There are two main aspects widely addressed in the literature in this regard, which are the content of the video and its length.

Starting with the content, it is important to highlight that developing an educational video can be time-consuming and expensive. However, instructors need to be realistic when flipping their classrooms to get the best video they can with available resources (Reidsema et al., 2017). To achieve that, it is worth searching first for available videos that suit the topic, with consideration given to credibility, licensing, and terms of use (Crawford, and Senecal, 2017). In addition, it is important to consider whether the content meets the educational goals without being overbroad or too deep (Crawford, and Senecal, (2017).

However, instructors can design and develop videos that meet their instructional goals when needed. Roehling (2018) addressed different types of videos that can be used in the flipped classroom method. These are monologue videos, in which the teacher speaks directly to the students through the camera; dialogue video, such as a recording of a lecture presented in a face-to-face class session; and voiceover presentations, which have recorded audio embedded in a slide presentation.

The use of narrative Microsoft (MS) PowerPoint seems to be a common approach in the flipped classroom. Several empirical studies that used narrative MS PowerPoint showed that this method was effective in terms of students' achievement (Alnuhayt, 2018; Abdelshaheed, 2017; AlJaser, 2017; Al-Rowais, 2014; Al-Hebaishi, 2018; Abdel-Fattah, 2017).

Another aspect to highlight is how students engage with content of the video. Reidsema et al. (2017) argue that it is essential to consider developing activities which encourage students to integrate with the content and challenge them to understand it. A study conducted by Enfield (2013), N = 37, takes this into consideration. In this study, the videos were designed by the instructor so students could work along with the videos to increase their participation. The results show that about 38% of students found the content engaging and interesting, 57% found it somewhat engaging, and only 5% found it not interesting.

Another aspect to highlight in this regard is the contradiction of the importance of seeing the presenter. Crawford and Senecal (2017) argue that the appearance of the presenter is not critical to students' learning, and the narrative MS PowerPoint type of video may be suitable in this case. An additional factor to consider is the quality of the recording, the sound volume, and background noise, as these can affect students' attention (Roehling, 2018), and learners' tolerance of poor-quality video has decreased (Khanova, et al., 2015).

A study by Brecht (2012), N = 381, tested three video designs. Design 1 was developed using Microsoft's Producer for PowerPoint software. It used keyboard writing, pointer movement, and screen scrolling during the narrative lecture. In this design there was an issue in the screen instability. Design 2 was developed using more advanced video capture software. Only MS PowerPoint files were used. Content formats were redesigned, reducing the length of the video by 24%

compared to Design 1. Design 3 contained Design 2's content formats with minor improvements that included reducing display time, eliminating music, and using only relevant cartoons. This reduced the video length by 7.5%. In the study results, Design 2 had the highest scores for both learners' rating and grade distributions.

In a study by Khanova et al. (2015), qualitative data highlighted the importance of the video content quality, as videos described as "edited, concise, simple, and engaging" were noted as being beneficial to learning, whereas videos that were described as "monotonous", "boring", or "full of errors" were found to be difficult to learn from.

The second aspect of video widely addressed in the research is video duration. Hsieh (2017) argues that in the flipped classroom videos should be broken into smaller chunks so that students can avoid cognitive overload. Heijstra and Sigurðardóttir (2018) found that students were more likely to complete watching shorter videos than longer ones. Roehling (2018) recommends videos of 20 minutes or less for higher education students, as students tend to lose attention after that.

A study conducted by Farley, Risko, and Kingstone (2013), *N* = 21, investigated the effect of the length of instructional video on undergraduate students' attention, fidgeting, and memory. Students were filmed while they watched a 40-minute lecture video, and they were assessed every 5 minutes. The results show that that students' attention decreased over time, while fidgeting increased. In the memory assessment, excluding the data from a particular period (at 30 minutes), the first half of the lecture was better remembered than the second half. This indicates that the length of the video could be one of the complicating factors that affect retention.

However, the above findings contradict those from a study conducted by Slemmons et al. (2018), *N* = 203, which compared two groups of students. The first watched a 20-minute video, and the second watched the same video divided into 10-minute segments. The results indicated that video length did not appear to impact students' retention. A study by Enfield (2013), *N* = 37, surveyed students' opinions on the length of video lectures in the flipped classroom. About 32% of students found a duration of 20 minutes too long, 65% found it an appropriate length, and 3% thought it too short.

In Khanova et al. (2015), students commented on the ideal length of videos. In general, many students considered longer videos to be a problem. Some found videos in the 20-minute range acceptable. Other students found videos of 20 to 30 minutes reasonable, but videos of 35 to 40 minutes were not. The different findings in this regard indicate that the preferred video length varies among students. However, students in general tend to prefer shorter videos.

2.5.3 In-class activities

This section presents factors related to classroom activity. The literature highlighted three main points to consider: the design of the activity, the instructor feedback, and the peer interaction.

Planning activities is a major challenge, and a great deal of time and effort is required to maximise the achievement of learning outcomes (Panuwatwanich, 2017). The effort includes choosing which content will be moved outside the classroom and the tasks that will be used during class time. This decision should aim to facilitate higher-order thinking by moving lower-order learning to the video lectures and focusing on higher-order learning in class time (Wolff, and Chan, 2016; Roehling, 2018). It should also help learners absorb the knowledge and transfer this knowledge to a different setting. In Hsieh B.'s (2017) experience of flipping a teacher education class, the activity successfully allowed the students to transfer the course concepts to both the course assessments and their future classrooms. In Panuwatwanich's (2017) case study, the in-class activities were designed to include problem-based and case-based learning. This design encourages students to learn actively and improve their critical thinking and analytical skills.

Another aspect to consider in activity design is bridging the gap between the acquisition of knowledge in pre-class materials and the activities during class time. Students highlighted this issue clearly in Khanova et al. (2015). They also commented that there was redundancy in the tasks, as the topic had already been presented in pre-class materials. At other times, however, the tasks presented a new topic unrelated to the recorded videos. Students commented on the need to have an element of the lecture to help them bridge pre-class and in-class activity. In Enfield (2013), students were asked to rank different kinds of activity in terms of how engaging and useful they were. The analysis showed that group activities that practiced skills previously introduced in videos were ranked much lower than instructor-led demonstrations of new concepts or concepts previously introduced in videos. This finding identifies an important factor to consider when designing a task: the need for tasks that are challenging but compatible with students' skills (Schwarzenberg et al., 2018). A balanced challenge improves students' learning (Vygotsky 1978) and has a positive impact on their academic performance (Hattie 2009).

To encourage learners to engage in an activity, the activity should be enjoyable, meaningful, and challenging. Findings in multiple studies have shown that the in-class activity should be more involved, and the value of the tasks is appreciated. Reflecting on meaningful tasks encourages student engagement and increases the value of these activities (Khanova, et al., 2015; Schwarzenberg. et al. 2018; Prince, 2004; Mutch et al., 2017).

The second factor related to the implementation of classroom activity is adequate instructor feedback. In the flipped classroom, students need extra support and feedback, as they finish the first phase on their own. In general, feedback has a significant influence on achievement (Hattie, 2009), and feedback in the flipped classroom is no exception. Schwarzenberg et al. (2018) found that students scored between 0.27 and 2.68 points higher when effective feedback was given. According to Hattie (2009), effective feedback should include clear objectives in advance and the feedback an instructor gives must be clear to the student based on clear criteria and self-assessment. Moreover, the feedback should occur on a regular basis (Hsieh, 2017).

Razek and Coyner (2014) investigated instructor feedback in a Saudi university. They found learners are used to having summative feedback in the form of marks at the end of the course. Having no access to answers and no comments on assignments is common. However, the study showed that offering students the opportunity to correct and resubmit their assignments after receiving instructor feedback increased their learning motivation and their perception of self-efficacy.

The third factor related to the implementation of classroom activity is peer instruction. In flipped classrooms, students participate in small groups and interact with other students. This provides opportunities for peer instruction, as students collaborate to solve problems or complete projects (Bergmann and Sams, 2013; Nederveld and Berge, 2015; Tucker, 2012). According to Hattie (2009), peer instruction in general affects student achievement positively, but the findings of Schwarzenberg et al. (2018) suggested that peer instruction did not correlate significantly with student achievement in a flipped classroom.

Group dynamics is an important aspect to consider here. In group work students use different ways to communicate, such as sharing knowledge, agreeing, disagreeing, negotiating, and clarifying (Hass, 2006). However, factors such as motivation, low self-confidence, anxiety, and fear of error can affect students' participation. Moreover, it is a challenging task to manage student groups and the internal dynamics inside the groups. In a study by Mutch et al. (2017), one of the requirements was that members switch among three roles: leader, scribe, and time-keeper. The study found that the dynamic of most groups was smooth and needed only minor external supervision to keep students on track. However, a few groups faced a problem in that one team member was dominant. This negatively affected the participation of other group members, mostly those who were less confident or slower learners (Puente and Tajonera, 1999). Nonetheless, teacher experience in manging group work played an important role in determining the effectiveness of this strategy (Haas, 2006).

2.5.4 Technology

This section presents technology issues, with an emphasis on the situation in Saudi Arabia. According to Alhabeeb and Rowley's (2018) survey of Saudi Arabian universities, $N = 306$), the most important factor influencing e-learning was the technology infrastructure. This factor was more important than the instructor and student characteristics. However, the literature also highlighted other issues in implementing technology in education: access to the internet and technology, the quality of the internet, technical issues, and students' skills with technology.

Starting with the first issue, access to the internet and technology, it is commonly known that a lack of access to technology (the internet and computers) affects e-learning, and many research studies confirm this (Al-Harbi, 2011; Mutambik et al., 2018; Selim, 2007; Ngai et al., 2007). Bates, Almekdash, and Gilchrest-Dunnam (2017) addressed this issue as one of the main concerns when implementing the flipped classroom method. Students' lack of access to technology can be an obstacle, especially for students with low socioeconomic status. However, according to Perrin (2015), this pattern has changed in recent years in the United States, as more than one-half of the lowest-income households (56%) use social media, although it is expected that this factor around the globe would differ from what is found in the United States.

As the study in this thesis is conducted in Saudi Arabia, it is important to have a clear and thorough understanding of internet usage in Saudi Arabia. According to the latest survey conducted by the Communication and Information Technology Commission (2015), for the age group of 12–65 years old about 91% of participants use the internet. For undergraduate students, the percentage is 97.9%. The survey also shows gender differences, as use by females seems to be higher than that by males (96% and 88%). According to the same survey, around 86% of internet users spend 2 or more hours a day on the internet, whereas most students (64.8%) spent 4 or more hours a day online. The survey also shows that 26% of participants use the internet in educational or learning activities.

Moreover, it is important to note that technology access including computers and internet is widely available in Saudi Arabia, as about 87% of households have internet access and 85% have a computer device. Among those who do not use the internet, 81% cite lack of knowledge or interest as the reason, whereas for 24.7% the internet is not available where they live. About 12% cannot afford the internet. A very small percentage of those who do not use the internet (2.5%) mentioned that their family does not allow it.

With regard to where participants use the internet, the survey shows that 86% use it at home, whereas only 16% use it at their place of education. On this point the survey shows gender differences, as female participants tend to use the internet more in homes and places of education (90% and 21.2%, respectively) than do male participants (77.4% and 12.8%, respectively).

Based on the data presented above, internet access is not a significant issue for learners in Saudi Arabia. However, there is a gap between the data provided by the Communication and Information Technology Commission (2015) and the perspective of academics and faculty in Saudi universities. According to Alharthi (2018), N = 391, lack of access to the internet is one of the limitations to using the flipped classroom.

Another issue to highlight is whether the speed of their internet access influences students' learning. In the flipped classroom, accessing the pre-class material requires a high-speed internet connection. The need is even greater when the materials contain video files. According to Amoroso and Guo (2006), the type of internet connection affects students' adoption of technology. However, Robertson, Soopramanien, and Fildes (2007) argue that interest in learning is what determines students' adoption of technology, regardless of internet speed. This latter point is consistent with Al-Harbi's (2011) finding that there is no difference between students with high and low internet speeds in their adoption of e-learning in Saudi Arabia. However, the interviewed students in Al-Harbi's (2011) study mentioned that having a high-quality internet connection is essential in e-learning. This study also suggested that having a high-speed internet connection makes the learning experience more enjoyable.

The official survey conducted by the Saudi Arabian Communication and Information Technology Commission (2015) investigated the type of internet that users preferred. It found that mobile internet is the most popular type (82% of participants). For home usage, about 58% of users access the internet using a 3G/4G router, while 40% use DSL/FTTH technologies. This may be because users find the pricing for internet at home using DSL/FTTH is unacceptable, whereas the pricing of 3G/4G router is acceptable. However, the level of satisfaction is above acceptable for both services but is slightly higher for

DSL/FTTH technologies. The survey also shows that around 39% of participants have faced problems with their service providers.

Based on data presented above, mobile internet seems to be dominant, and internet service seems to be acceptable in general. However, according to Alubthne et al.'s (2018) study, which explored students' needs in blended learning experiences in Saudi Arabia, internet quality was a critical problem, and slow and inefficient internet has a negative impact on students' learning. Their descriptions of internet connections included "weak", "low speed", and "does not cover all areas with the same efficiency". Students emphasised the internet speed problem and blamed telecommunications companies, which they said should improve service.

After presenting the situation related to internet access and infrastructure in Saudi Arabia, I now discuss the third factor, which is technical problems. Students can face technical problems during the online phase of the flipped classroom – for example, difficulty streaming, downloading, or accessing from various devices – which may interfere with their learning in the flipped classroom (Roehling, 2018). Thus, ongoing IT support is required to solve technical problems when using a flipped classroom (O'Flaherty and Phillips, 2015).

However, it is important to know to what extent technical problems impact student learning in the flipped classroom. According to Enfield (2013), $N = 37$, most of the students who faced technical problems found them annoying but the problems did not affect their learning (46% of the students), whereas about 32% of students faced technical issues that did negatively affect their learning. An additional 22% of students faced a technical issue that was not annoying.

In Saudi Arabia, Alubthne et al. (2018) conducted a study exploring the quality needs for e-learning in Saudi universities. The findings show that technical problems were one of the most important factors. These problems included inaccessibility to resources, disconnection, and poor connection during online lectures. Students mentioned that such problems affected their ability "to catch up". Students also mentioned that they faced difficulties with technical support availability during off-hours, and they suggested that the number of technical support staff should be increased, and their technical skills should be developed. Moreover, providing technical support is not only important for students, it also one of the five critical factors that may hinder faculty members in Saudi universities from adopting the flipped classroom, according to Kutbi and Hashim (2017).

The last aspect highlighted in the literature is students' skills in using technology. This was addressed as an issue in older research studies, such as those by Agarwal and Prasad (1999) and Arbaugh and Duray (2002). More recently, this factor is no longer considered a problem, as students have the skills to engage in e-learning experiences (Taha, 2014), although lack of familiarity with digital learning interfaces can be an issue. Alubthne et al.'s (2018) study in a Saudi university found that some participants encountered difficulties because they were unfamiliar with the Learning Management System (LMS) interface.

2.5.5 Classroom learning environment

The physical classroom space is one of the factors that can affect the implementation of the flipped classroom. The classroom should be equipped with furniture and technological equipment that accommodates various sorts of learning activities when flipping a class (O'Flaherty, and Phillips, 2015; Roehling, 2018). Yang, Becerik-Gerber, and Mino (2013) investigated the impact of ten classroom features on students' performance. These features are temperature, air quality, artificial lighting, daylight, acoustics, visibility, room layout, furniture, hardware, and software. Students rated visibility and hardware as the most important factors and daylight and acoustics as the least important. This section discussed some of these aspects in the following paragraphs.

First, to achieve better visibility, two factors should be considered: adequate distance between the students and the teacher or the blackboard and a clear line of sight for all students that is not obscured by other students or objects (Guardino and Fullerton, 2010). To have better accessibility, the following aspects should be considered: adequate classroom size and space between seats sufficient for convenient movement (Veltri, Banning, Davies, 2006).

The second aspect is the room layout. There are two common classroom layouts: rows of seats where students sit side-by-side and groups of seats where students sit face-to-face. The first arrangement is normally used in lecture classes and places the focus on the instructor. Moreover, those who sit in front of the classroom can benefit from eye contact with the instructor, have clear visibility of visual aids, and participate more often in discussions and activities than other students (Niemeyer, 2003). This arrangement hinders easy interaction in group activities (Haas, 2006). The second arrangement is usually used for group work and discussion, as it supports learners' interactions. A space between groups should be considered to allow enough room for the instructor to move freely between groups (Guardino and Fullerton, 2010; Brooks, 2011). A third arrangement involves adjustable furniture, which offers the flexibility of using both arrangements and benefit from their advantages (Panagiotopoulou, et al. 2004).

The third factor in the classroom learning environment is the technological equipment. This usually involves computers, data projectors, smart boards, speakers, internet service, and the software installed on computers. Studies have explored the impact of such equipment on learning. Lowerison et al. (2006) found no significant relationship between computer use and student achievement. Moreover, a study by Schmid et al. (2009) showed that heavy use of technology in a classroom is less effective than low and moderate use of it. Shuell and Faber (2001) argue that the technology should be used as a "cognitive tool" rather than a "presentation tool".

In Saudi Arabia, students' views on using high-technology equipment appear to be positive. Alelaiwi et al. (2015) found that learners preferred using a smart environment in a classroom, but they were annoyed by slow internet speed. Ahmad et al. (2017) found that the use of smartboards affects students' motivation positively. However, Almohaisen (2007) argues that even though Saudi universities are equipped with good technical facilities, use of this technology needs to improve to achieve quality learning. In contrast, according Al-Rowais (2014), there is a need to provide equipment to improve teaching and learning in Saudi universities. From the perspective of faculty, studies by Alharthi (2018) and Kutbi and Hashim (2017) highlighted that learning environments including classroom technology upgrades, learning space design, and learning and teaching facilities could hinder the implementation of flipped classrooms in Saudi Arabia.

2.5.6 Learning environment outside the classroom

As the first phase of the flipped classroom takes place outside the classroom, it is important to explore the learning environment outside the classroom. Before discussing this, it is necessary to highlight that students in Saudi Arabia prefer to study at home rather than in a library or in university facilities, which is a topic that will be addressed in detail in Section 3.1.3 (Alrefaai, AbdulRab, and Islam, 2013; Baothman, AlJefri, Agha, and Khan, 2018). Along these lines, the latest survey conducted by the Communication and Information Technology

Commission (2015), presented earlier in Section 2.5.4, shows that 86% of internet users use it in their homes, whereas only 16% use the internet at their place of education. Therefore, the environment outside classroom could have a notable influence on students' learning. This section discusses two related factors: the influence of students' responsibilities and the influence of family and peer attitudes.

It is commonly known that e-learning can be a suitable solution for balancing job and family responsibilities. It provides flexibility and reduces the requirements for face-to-face time, allowing students to schedule their learning to meet their obligations. Al-Harbi (2002) argues that this assumption suits the Saudi society, where it is common for young women to get married and be mothers. Moreover, Alubthne's (2018) study which explored this factor in Saudi Arabia found that participants with family and work responsibilities do prefer online learning. However, Al-Harbi's (2011) findings show the opposite: students with family or job obligations did not differ in their attitudes toward adopting e-learning compared to other students. Moreover, the interviews in Al-Harbi's (2011) study showed that busy students prefer face-to-face settings, as online learning requires more time management skills, especially, when dealing with life obligations, which is not the case in scheduled face-to-face settings.

Another aspect to consider is the effect of society views on learner acceptance of online learning. According to Razek and Coyner (2013), Saudi students adopt a collectivistic way of thinking and see themselves as a group rather than a number of individuals. This could increase the influence of the surrounding society. Al-Harbi (2011) investigated the impact of the society on decisions to adopt learning among students in Saudi Arabia. The study focused on three groups: peers, family, and instructors. The study found that peers' opinions had the most significant impact on whether students would accept online learning. This finding is consistent with Razek and Coyner's (2014) findings that Saudi students tend to compare themselves to their peers.

With regard to the student's family, it is important to highlight here that one of the main attributes of Saudi society is strong family ties. In Saudi society, it is likely that individuals of university age live in the family home. They are also expected to show obedience to their parents (Long, 2005). A survey by Al-Harbi (2011) found that the family has a significant impact on students' acceptance of e-learning. However, according to Al-Saggaf (2004), the influence of the family has begun to weaken recently due to engagement with the online community.

In conclusion, understanding the main factors highlighted in previous work helps with designing the tools used to investigate the implementation of flipped classrooms in this study and with comparing the findings to those in other contexts.

2.6 Chapter summary

After defining the notion of the flipped classroom and its two phases – watching a video lecture before class and then participating in classroom activity – this chapter discussed the concept of quality learning and the concept of student-centred learning, as there is a strong argument in literature that the flipped classroom method supports these notions. However, the empirical findings varied with regard to the effectiveness of the flipped classroom on student achievement. On the other hand, students appeared to have positive attitudes toward this method, and those who showed resistance to it eventually accepted it.

This chapter highlights some factors that affect the successful implementation of a flipped classroom. These factors are quality human interaction, especially with the instructor; an acceptable design for videos and activities; an adequate technological infrastructure; and a supportive environment inside and outside the classroom.

CHAPTER THREE: LITERATURE REVIEW (2): STUDENTS' USE OF TIME

3.1 Introduction

The previous chapter reviewed the literature related to the flipped classroom; this chapter presents how students use their study time, to help answer the second research question of the thesis. Investigating this topic helps us to understand the behaviours of students who are being taught in a flipped classroom. Most of the literature found, however, explores students' habits with conventional methods; therefore, it is important to study these habits, as they are closely related to students' behaviours in the flipped classroom. The topics studied include the amount of time students spend studying and their study habits in both flipped and conventional classrooms. The chapter first discusses these topics in the conventional classroom and then discusses the use of time in the flipped classroom. The chapter presents findings from both international and local (Saudi Arabian) contexts.

3.2 Use of time in conventional courses

3.2.1 Time spent studying

This section investigates the quantity of time learners spend studying outside the classroom. Díaz-Mora, García, and Molina (2016) defined the main academic activities that undergraduate students spend their study time on. The first activity is attending university class, which includes attending lectures, taking examinations, and participating in workshops and seminars. The second activity is self-study, which includes reading textbooks and notes, completing practical exercises and cases, and searching for information including searching in libraries and on the internet. Other activities include taking private classes outside the university, doing work or presentations in groups, meeting colleagues to study together, and exchanging notes. Time spent on these different kinds of activities varies among learners in different situations, especially those activities conducted outside the classroom.

In general, it is expected that students spend two hours studying per credit hour (Bajwa et al., 2011). However, not every student meets this expectation. A number of studies have investigated the number of hours students spend in self-study. A study in the United States found that students tend to spend fewer hours than university requirements, and this time declined from 24 hours per week in 1961 to 14 hours per week in 2003 (Babcock and Marks, 2010). A survey of first-year students conducted in 2009, *N* = 26,758 students, found most students spend less time in self-study than expected. Only 34.6% of students spent more than 10 hours per week in self-study (Ruiz et al., 2010). A recent study by Díaz-Mora, García, and Molina (2016) showed that the students spent 7.87 (*SD* = 1.96) hours a day in academic activities inside and outside classrooms, most devoted to class attendance (2.92 hours) and self-study (2.63 hours).

With regard to studying at a distance, an older study conducted in 1999 at the Open University of Hong Kong compared the number of study hours of high-achieving students and low-achieving students, *N* = 712, finding that on weekdays about 51% of high-achieving students and 57% of low achievers spent less than 5 hours studying. However, high-achieving students spent more time studying on the weekends than did the low achievers (Chan et al., 1999). A recent study compared learners in a fully online course to those in a face-to-face course, finding that most of the online learners spent less time studying than what was expected for a face-to-face course. The face-to-face learners spent 6 hours a week learning in class, whereas 25% of the online learners spent less than 3 hours a week, and 48% of them spent 3 to 4 hours a week (De Paepe, Zhu, and Depryck, 2018).

Based on above data, it is clear that it is common that students spend less time studying than expected, although the number of hours spent studying differs in different settings. This raises the question of whether these figures also differ among different cultures. Franklin (1999) compared the amount of time Asian students and European and American students spent studying (N = 30). He found that 27% of Asian students studied over 3 hours daily, whereas European and American students spent a maximum of 3 hours studying per day.

However, the case in Saudi Arabia (the focus of this thesis) seems to be different. Alsaqri, Alkwiese, and Dayrit's study conducted in 2018, N = 180, found about 46% of nursing students allocated a specific number of hours for studying, and 39% of them did this sometimes. Alrefaai, AbdulRab, and Islam (2013) gathered additional details about the number of hours students spent studying. Their study, conducted at King Khalid University, Saudi Arabia, N = 440, found that only 23.9% of the students studied more than 1 hour daily and that male students tended to study for more hours than female students. Another study at a health sciences college in the Eastern Province, N = 60, conducted by AbdulRazzak (2016), found that most students (78.3%) did not study as a daily routine. Of those who did study daily, only 7.7% spent 3 or more hours every day. Moreover, Alzahrani, Soo Park, and Tekian (2018), in a study of medical students, N = 257, found that about 75% studied for less than 4 hours daily during times when they did not have examinations; however, about 73% of students studied more than 10 hours for an examination. Another point to highlight here is that according to Alrefaai, AbdulRab, and Islam (2013), financial difficulties and hours spent having fun with friends correlated with fewer hours spent studying per day.

In the studies presented above, the number of hours spent studying barely reached the number required to ensure success (that is, two hours of study per credit hour) for those who had a daily studying routine. However, most Saudi students tend to cram study near the time of examinations. This is discussed in greater detail later in this chapter (see Section 3.2.3).

I turn now to answering an important question: whether there is a relationship between the number of hours students spent studying and their academic performance. Empirical studies investigating this matter have had mixed results – with various studies showing a positive correlation, a negative correlation, or no relationship (Lahmers and Zulauf, 2000; Ackerman and Gross, 2003; Stinebrickner and Stinebrickner, 2004; Krohn and O'Connor, 2005; Nonis and Hudson, 2006; Nonis and Hudson, 2010; Díaz-Mora, García, and Molina, 2016).

Some studies have shown a positive relationship between study hours and academic achievement. A research study by Lahmers and Zulauf (2000), $N = 79$, found that study time was positively associated with learners' GPA in an agricultural economics course. The increase in the GPA (on a 4.0 scale) was about 0.025 points for each extra study hour per week. Stinebrickner and Stinebrickner (2004), $N = 273$, found the predicted marginal grade increase associated with an additional hour of studying per day.

Díaz-Mora, García, and Molina (2016) found that the relationship between students' study time and their academic achievement varied according to the type of academic activities the hours were devoted to. Time spent attending university lectures, self-studying, or doing work in groups had a statistically significant positive effect on students' achievement.

On the other hand, Ackerman and Gross (2003), $N = 176$, found that the average grades of learners with less free time were higher than the grades of those who had more free time. Krohn and O'Connor (2005), $N = 85$, reported that the number of hours students spent studying had a significant but negative effect on their grades, although this effect was small.

Other studies have shown no relationship between study time and academic performance. Nonis and Hudson (2006) conducted a study of undergraduate business students, $N = 264$, using students' journals and a survey, and found that the amount of time spent studying had no direct effect on academic achievement. Nonis and Hudson (2010), $N = 201$, reported similar results, finding no significant positive relationship between students' study time and either their short-term measures of performance or their cumulative long-term performance.

The previous set of contradictory findings leads to an important question about whether the quality of study time matters. Díaz-Mora, García, and Molina (2016) argue that assuming that the quantity of study time influences academic performance without considering qualitative variables might not be efficient. These qualitative variables could be motivation, ability, and study habits and skills (Díaz-Mora, García, and Molina, 2016; Nonis and Hudson, 2010; Nonis and Hudson, 2006).

When talking about study habits, it is important to mention that the literature has viewed effective study habits as determinants of academic performance (Alzahrani, Soo Park, and Tekian, 2018). Nonis and Hudson (2010) argue that study habits moderated the relationship between study time and academic performance positively or negatively, as the impact of study time would be greater when effective study habits were being used. There are research studies showing that study habits influence academic performance (Baothman, AlJefri, Agha. and Khan, 2018; Díaz-Mora, García, and Molina, 2016; Alrefaai, AbdulRab, and Islam, 2013; Borg, Mason and Shapiroet, 1989; and Okpala, Okpala, and Ellis, 2000). These study habits include scheduling, being in a suitable environment, having the ability to concentrate, having access to notes, and having the appropriate materials. These are discussed in greater detail later in this chapter (see Sections 3.2.3 and 3.2.4).

3.2.2 Time in non-academic activities

This section explores the amount of time students spend in non-academic activities and discusses whether this factor influences learning. Díaz-Mora, García, and Molina (2016) investigated the non-academic activities on which students spent the most time. They found that these activities were vital tasks, leisure, and communication. The study reported that students spent 9.25 hours per day in eating, sleeping, and personal care. Leisure and communication activities consumed a mean of 3.18 hours per day. This included time spent using the telephone, email, or social networks or spent watching television. Other activities seemed to be less popular, such as taking complementary courses, doing sports, or engaging in a social life. As a point of comparison, students in the same study spent 7.87 hours per day on academic activities (SD = 1.96).

Lahmers and Zulauf (2000), *N* = 79, reported that average hourly use of time during the week of their survey was as follows: "students sleep 55.4 hours, planned recreation/leisure 20.4 hours, study 20.3 hours, in-class 16.6 hours, job 12.5 hours, television 10.7 hours, travel time 10.1 hours, eating 8.0 hours, personal hygiene 7.5 hours, student organizations/activities 3.3 hours, other 1.8 hours, and phone 1.5 hours" (p 550).

In the case of Saudi students, Alrefaai, AbdulRab, and Islam (2013) identified three popular non-academic activities among Saudi undergraduates. They found that 42.5% of the students spent 1–2 hours daily with friends, and 17.3% spent more than 4 hours. About 49% of the students watched TV for 1–2 hours a day, and 10% spent more than 4 hours on that activity. However, the activity on which they spent the largest block of time was surfing the internet, as 46% used a mobile telephone for 1–3 hours per day, and 26% used it for more than 5 hours a day. Alsaqri, Alkwiese, and Dayrit (2018) also found that Saudi nursing students, *N* = 180, used mobile social media for a long period of time, as 41.7% of the students spent more than 10 hours per week at that activity, and 84% of students used it more than six times a week. The most used social networks were Twitter and Snapchat followed by WhatsApp.

Several research studies investigated the differences between male and female Saudi students in terms of time spent on non-academic activities. Alrefaai, AbdulRab, and Islam (2013) found that male students spent more hours watching TV. This result matched Jameel et al.'s (2019), N = 347, findings that most of the male students (84%) spent twice as much time watching TV as female students. With regard to using mobile telephones, Alrefaai, AbdulRab, and Islam (2013) found that female students spent more hours using mobile telephone. Jameel et al. (2019), N = 347, found that social networks kept both sexes busy in much of their spare time, but the percentage of males who do that is more than that for females (55% versus 42%). On the other hand, Alsaqri, Alkwiese, and Dayrit (2018) found no significant differences between male and female students' usage of social networking. With regard to other activities, Alrefaai, AbdulRab, and Islam (2013) reported that female students spent more hours meeting friends, and Jameel et al. (2019) found that 84% of male students spent time on outdoor games, which was a much higher percentage than for female students.

Knowing the activities that learners spend the most time on, it is important to know whether these activities can affect their studying. Belardi (2013) found that about 40% of interviewed students reported that using digital tools is their main distraction. Additionally, more than 50% of those interviewed mentioned that when they are studying they use their laptops or telephones to text friends. Rosen et al. (2013) found that school students and undergraduate students were distracted by Facebook or by texting when studying at home, as they never concentrated on any one task for more than 6 minutes.

Díaz-Mora, García, and Molina (2016) demonstrated that sports and vital tasks had significant and negative correlations with student grades, but the coefficient was small. Time spent on communication and leisure, however, had no impact on academic performance. Brint and Cantwell (2010), N = 6,000, found a positive correlation between academic performance and both time spent with the family and time spent sleeping; however, they found a negative correlation between academic performance and time spent on "passive" entertainments. Physical exercise and volunteering had a positive but not a direct effect on students' marks. Ackerman and Gross (2003) compared the academic performance of students according to the amount of free time they had. They determined that those with less free time had higher grades than students with more free time.

Studying Saudi students, Alzahrani, Soo Park, and Tekian (2018) found that the percentage (36%) of students with high GPAs who occupied their study breaks surfing the internet was higher than the percentage (27%) of students with lower GPAs. Moreover, 25% of students with high GPAs preferred to have fun sometimes during study time, whereas 50% of the lower GPA students never mixed fun with study. According to Alsaqri, Alkwiese, and Dayrit (2018), there was a direct, statistically significant, positive relationship between the amount of time a student spent on social media and effective study habits. However, it is important to emphasise that most students reported that they do prioritise studying over other activities.

3.2.3 Study habits outside the classroom

This section presents the main studying habits, including students' ability to concentrate, when and where they study, and the study resources they prefer to use.

Ability to concentrate

One of the main factors related to study habits is students' ability to concentrate when studying. Nonis and Hudson (2010) argue that the interaction between the time spent studying and the ability to concentrate had a positive effect on academic performance, as those students who both spent more studying time and had a better ability to concentrate had higher achievement. In the Saudi context, Alrefaai, AbdulRab, and Islam's (2013) findings confirmed this, as they demonstrated concentrating while studying is an effective study habit that impacts student performance. However, a study by Alzahrani, Soo Park, and Tekian (2018) showed that 45% of students sometimes were distracted during study, and 28% of students were interrupted most of the time. No differences were seen between genders or between students with higher GPAs and those with lower GPAs in terms of ability to concentrate during study.

Kornhauser (2014) offered some tips to increase concentration during study. These were studying in a place that is quiet and is properly lighted, heated, and ventilated; using a comfortable chair; being in good physical condition; and having enough sleep. Some of these tips also related to other study habits such as when and where students tend to study. These are discussed as follows.

When students study

The time students choose for studying is essential in creating an effective study routine. One issue that research studies highlighted is the difference between scheduling study time during the semester and cramming before an examination. A study by Franklin (2006), $N = 30$, of students' study habits found that most students crammed the night before an examination. Moreover, Hora and Oleson (2017) found that more than one-half of their participants procrastinated, putting off studying until the last day or even the night before an examination, whereas in the same study a substantial number of students started to study several days before an examination.

It seems Saudi students experience the same issue. Alrefaai, AbdulRab, and Islam (2013) reported that 37.3% of Saudi students often study in a haphazard, disorganised way under the threat of examinations, which is not the case of only 18.4% of the students. In the same study, about 12% of students tended to start preparing for examinations from the beginning of the semester, whereas the largest percentage of students (29.1%) tended to study for an examination only the day before it. However, Alsaqri, Alkwiese, and Dayrit (2018) saw a different trend, as 46% of their participants followed a definite study schedule, and 30% easily found enough time to study for an examination. Nonetheless, only 22% of students studied even without the threat of a quiz or examination. In terms of gender differences, Alrefaai, AbdulRab, and Islam (2013) found that male students have a greater tendency to cram prior to an examination than female students do, who tend to study on a more regular basis. The results of Alzahrani, Soo Park, and Tekian (2018), *N* = 257, confirm this: about 63% of their female students studied two or more weeks before final examinations, whereas only 48% of the male students did.

A question can be raised here about the impact of cramming on students' outcomes. An experiment conducted by Kornell (2009) demonstrated that learning a large stack of content is more effective than breaking content into smaller chunks, as 90% of participants learned more using the former method. Moreover, Nonis and Hudson (2010) argue that, for short-term outcomes, scheduling study time may not be as significant for students' performance, as some students performed well even though they did a poor job of scheduling study time. Michaels and Miethe (1989) found that having a study routine had a negative effect on a learner's marks.

By contrast, Díaz-Mora, García, and Molina (2016) showed that scheduling study time increased academic performance. Moreover, Klingsieck et al. (2012) found that in a distance university setting, students with higher levels of procrastination were less likely to have good grades. Chan et al. (1999) also found that high achievers spent more time studying on weekends than did low achievers.

Despite these findings, procrastination may be acceptable in some cases. Chu and Choi (2005) distinguished between two kinds of procrastinators: passive and active. In passive procrastination, students fail to complete tasks on time, whereas, active procrastinators prefer to work under pressure and are more likely to complete tasks with adequate results.

In the case of Saudi students, Alzahrani, Soo Park, and Tekian (2018), $N = 257$, compared students with high and low GPAs in terms of when they started preparing for an examination. They found that the difference was minor, as about 59% of students with high GPAs studied two or more weeks before the final examination, as compared to 53% of the lower GPA group. However, Sabbah (2016) demonstrated a significant negative correlation between procrastination and academic achievement, as low achievers tended to postpone studying and cram before an examination.

Another factor for investigation is the time of day at which Saudi students prefer to study. Baothman et al.'s (2018), $N = 150$, research on the studying habits of Saudi students showed that more than one-half of participants studied at the prime time of the day. This seems to be consistent with Sabbah's (2016) findings that students like to study when they are most alert. Sabbah's study also shows that class time and breaks between classes are not favourable times for studying.

Alrefaai, AbdulRab, and Islam (2013) found that the largest percentage of Saudi students (51.6%) prefer to study in the evening. However, Alzahrani, Soo Park, and Tekian (2018), *N* = 257, compared students with high and low GPAs in terms of their preferred time of the day to study. They reported that a larger proportion of high GPA students than low GPA students preferred the mornings for studying (32% versus 18%). Among the low GPA students, 46% preferred studying at night or late at night. This contradicts Sabbah's (2016) results, as he found no significant correlation between when students studied and their achievement.

The Alzahrani, Soo Park, and Tekian (2018) study also identified gender differences, reporting that 36% of female students preferred studying during the morning, as compared to 16% of male students. Among males, 44% preferred studying at night, as compared to 24% of the female students.

Where students study

The literature highlighted two main factors related to where students prefer to study: do students accept noise in the surrounding environment and what is their preferred location? It is commonly believed that studying in an environment free from distractions is one of the effective study habits. Distractions can involve individuals, television, or games. Although it is recommended to avoid studying in places involving entertainment and to switch off devices with entertainment content (O'Hara, 2005), some students prefer to study in an environment with music or TV on (Alrefaai, AbdulRab, and Islam, 2013).

In Franklin's (2006) study, $N = 30$, most participants studied with the TV or radio on, which was described as an ineffective study habit. As this preference could vary among students from different cultures, Franklin (1999) compared Asian students and European and American students in terms of study habits ($N = 30$). He found that 67% of Asian students preferred studying in a quiet place compared with 47% of European and American students. Only 20% of students in both groups preferred to study with music playing, and very few students preferred to study with the TV on.

Sabbah (2016) found that most of the Qatari students in his research study preferred studying in a place free from auditory or visual distractions such as television, internet, or radio. Among Saudi students, in a study by Baothman et al. (2018), most (87%) Saudi medical students chose calm and quiet places to study. Similarly, Alsaqri, Alkwiese, and Dayrit (2018) found that 75% of students usually seek a calm place for study; only 14% preferred to study with music on or while watching TV.

Does studying in a quiet place have a positive effect on academic achievement? Several studies suggest it does. For example, Michaels and Miethe (1989), $N = 676$, reported that studying in a library or another quiet setting has significant positive effects on academic performance. A study by Plant et al. (2005), $N = 88$, came to the same conclusion.

The second aspect to consider in this section is the location in which students prefer to study. The literature identified two main places learners used for study: 1) libraries or study rooms and 2) home. Franklin (2006), *N* = 30, conducted a study on undergraduate students in the United States and found that most participants spent most of their studying time at home. Alrefaai, AbdulRab, and Islam (2013), in a study at King Khalid University in Saudi Arabia, showed that most students (89%) preferred studying at home, whereas a small percentage (1.8%) studied in the library. These researchers found no significant difference between male and female students in terms of their preferred place to study. However, Baothman et al. (2018), *N* = 150, reported a different trend, finding that one-half of the medical students at King Saud bin Abdul-Aziz University preferred the library or any specific assigned places at the campuses.

An important question is whether there is a correlation between academic achievement and the studying location. Chan et al. (1999) compared the study habits and achievement of students with high and low GPAs. They found that differences in preferred study location were minor, as 18% of high achievers study in university and 12% of low achievers did. This result seems to be consistent with Alzahrani, Soo Park, and Tekian's (2018) study of Saudi medical students. They found there were no significant differences between students with high and low GPAs, as about 41% of high achievers preferred to study in study rooms as compared to 50% of lower achievers. With regards to gender differences, about 44% of female students preferred studying in their bedrooms, whereas 47% of the male students preferred to study in study rooms. Finally, Sabbah (2016) found no significant correlation between the decision on where to study and students' marks.

What resources students use

This section aims to identify students' habits in terms of preferred study resources and materials. The main debate here is whether digital material is replacing paper-based or human resources.

The most commonly used resources among students are textbooks, lecture notes, and traditional online resources such as institutional learning management systems (Hora and Oleson, 2017). Hora and Oleson's study shows that more than one-half of the students used paper-based resources such as textbook, and lecture notes. However, when students needed assistance with coursework, 44% of them searched Wikipedia or Google, whereas 36% looked for a human resource, such as a faculty member. Moreover, Smith and Caruso (2010), N = 36,950, found that students commonly used wikis, YouTube, and blogs (by 33%, 24%, and 12% of students, respectively).

Karpicke et al. (2009), N = 177, found that the majority of students (84%) preferred to study from textbooks and lecture notes. When using textbooks, Sabbah (2016) found, almost all students tend to underline or highlight the most important ideas. Additionally, Baothman et al. (2018) observed that about

80% of students highlight important points in a book, but one-quarter of them had difficulty identifying the important points.

In the case of Saudi students, Al-Shahrani, Al-Sawa, and Abdelrasoul (2019) reported that most Saudi medical students (68.8%) used the internet as their primary source to study for their board residency or any other postgraduate programme. The students explained that examination questions are found online. However, paper-based resources such as textbooks and handouts, and human resources such as lecture notes also seem to be commonly used among Saudi students. Jameel et al. (2019), *N* = 347, found that most medical students think that lecture notes prepared during the class and teachers' handouts are the most useful material for study as complements to online sources and medical websites, and most of their studying time was spent on these lecture notes or teachers' handouts. Nonetheless, for about one-half of the students, textbooks were recommended resources, and they thought that these textbooks were a useful resource for their studying. The same study found that 19.3% of the students avoided textbooks because of weaknesses in English-language reading skills. In the case of revising before examinations, the teachers' handouts and lecture notes seemed to be commonly used. A study by Sabbah (2016) reported that most participants found the teachers' handouts useful for review. Baothman et al. (2018), *N* = 150, also found that about one-third of students use lecture notes for review before the next class.

Several studies investigated gender differences in Saudi students' habits in using study materials (Jameel, et al., 2019; Alzahrani, Soo Park, and Tekian, 2018). Jameel et al. (2019), $N = 347$, found that female students tend to use textbooks more than male students. On the other hand, male students tend to prefer using lecture handouts provided by the instructor. With regard to online resources, such as online versions of textbooks, journals, and medical websites, they seem to be preferred slightly more by female students. However, Alzahrani, Soo Park, and Tekian (2018) found no significant difference between female and male Saudi medical students in materials used, as they both used lecture handouts as their main resource. Nevertheless, it was clear that female students concentrated on the lecture presentations, whereas males focused on what the teacher actually said.

Studies also reported findings on the effectiveness of different kinds of study materials students used. Díaz-Mora, García, and Molina (2016) found that having good notes improved the quality of studying time. Moreover, Alzahrani, Soo Park, and Tekian (2018), in their study of Saudi medical students, found no significant difference in materials used between students with higher GPAs and those with lower GPAs. Most of both high achievers (86%) and lower achievers (84%) relied on lecture handouts and lecture notes from their classes. However, Jameel et al. (2019), $N = 347$, reported different results, finding that a greater proportion of high achievers than lower achievers showed interest in reading medical textbooks. Moreover, higher achievers noted that they favoured online versions of textbooks, pocketbooks, medical websites, and online journals, whereas low achievers preferred lecture handouts and lecture notes.

3.2.4 Study habits inside the classroom

This section discusses factors related to how students use their time during class in terms of attendance, participation, taking notes, concentration, and teacher cues.

Attendance

Students are expected to attend classes regularly. However, Alrefaai, AbdulRab, and Islam (2013) found that only about 44% of the Saudi students they studied regularly attend classes, and 43% of them arrive on time. Female students ranked higher than male students in these matters. However, Sabbah (2016) and Baothman et al. (2018) reported that most students attend all their classes and arrive at classes on time. Baothman et al. (2018), $N = 121$, found a high degree of punctuality among Saudi medical students, as most (85%) arrived at classes on time.

Does attendance have an effect on academic achievement? The literature offers conflicting findings in this regard. Krohn and O'Connor (2005) found no relation between class attendance and examination marks, but Alrefaai, AbdulRab, and Islam (2013) determined that students who regularly attended classes on time scored higher than students who did not.

Participation

Participation in class is one of the main activities that students may do during classes. However, the extent of participation varied among students. Franklin (1999) compared participation habits between Asian students and European and American students, $N = 30$, finding a notable difference between the two groups, as 40% of European-American students expressed their opinions during lectures, whereas none of the Asian students did. However, the results showed that both groups seek clarification when needed (40% and 33%, respectively).

Baothman et al. (2018), $N = 121$, reported that more than one-half of Saudi medical students participate in learning activities. Alrefaai, AbdulRab, and Islam (2013), who investigated Saudi students' habits in an English course, found that 6% always participate in classroom discussion, and about 46% sometimes participate. Those who never participate accounted for 7% of students. The authors also reported that female students are more likely to participate than male students.

In the case of participating in classroom activities and group work, Jameel et al. (2019), $N = 287$, reported that most Saudi students (82%) believed that problem-based learning and other related class activities supported their learning and encouraged them to read more. This is consistent with Sabbah's (2016) findings that students believed engaging in group work or games was useful for their learning.

However, Sabbah (2016) found that a small number of students mentioned they keep silent and do not share ideas, in contrast to a larger number of students who said they take initiative in group activities. Moreover, not all students asked questions when they needed help, whereas some students stated they like to draw the teacher's attention by speaking and by asking questions even if the questions are silly.

In answering the question of whether participation in the classroom influences academic performance, Nonis and Hudson (2010) identified classroom participation as one of the study habits likely to impact student performance. The findings of Alrefaai, AbdulRab, and Islam (2013) were similar, as they reported that students who participate in classroom activities scored higher than students who did not.

Taking notes

Taking notes during lectures is another popular habit in regular classes. Franklin (1999) compared this habit between Asian students and European-American students, finding that the majority of students in both groups took detailed notes during lectures (67% and 73%, respectively). The same study showed that about one-quarter of the students in both groups taped the lecture (27% and 20%, respectively). Baothman et al. (2018) found that more than one-half of Saudi medical students tended to take notes during classes. This is consistent with the findings of Sabbah (2016) that many students took rough, quick notes in class and wrote them more neatly and fully after class.

Does taking notes in class affect academic performance? Nonis and Hudson (2010) considered taking good notes as one of the study habits that was likely to impact students' performance. However, Michaels and Miethe (1989) found, unexpectedly, that rewriting lecture notes after class was considered a negative habit depending on students' academic marks. Moreover, Nonis, and Hudson (2010) also argue that the positive effect of having access to good notes depended on how the time with those notes was used. They found a significant negative correlation between access to a good set of notes and academic performance.

Concentration

According to Nonis and Hudson (2010), paying attention in class is one of the study habits likely to impact performance in a positive way, and it makes study time more efficient. This argument was confirmed by Sabbah (2016), who found that students who were always alert and who concentrated during class achieved higher performance than those who did not.

Several studies investigated Saudi students' habits in terms of concentrating during classes. Baothman et al. (2018), $N = 121$, reported that 77% of students tended to listen carefully to any explanations during class, and about one-quarter of students had some difficulty identifying important points during lectures. According to Sabbah (2016), some students mentioned that they have a short attention span and quickly grew absent-minded in class, whereas others were confident of their level of concentration in class. Another study of Saudi students showed that the highest percentage of students (about 38%) sometimes were inattentive in class, whereas about 19% were always attentive; about 6% of students did not pay attention in classes (Alrefaai, AbdulRab, and Islam, 2013). A study conducted by AbdulRazzak (2016), *N* = 60, reported that more than one-half of students (62%) found it easy "sometimes" to pay attention in class, whereas it was never easy for 18% of the students. About the same number (20%) "always" paid attention in all their classes. AbdulRazzak (2016) argued that having about 80% of students struggling to focus, in at least some classes, is a large percentage that needs to be taken into consideration. With regard to gender differences, Alrefaai, AbdulRab, and Islam (2013) found that Saudi female students were more able to concentrate than their male counterparts.

Teacher cues

Teachers' behaviours can affect students' studying habits. Hora and Oleson (2017) found that 40 students reported that instructors often offered cues for their studying about what topics would be covered and when they should study. Students value such behaviours because assessment was the only reason for studying and, for some students, the reason for attending class. Likewise, Sabbah (2016) found that most students while studying try to anticipate the questions the teacher will include on the examination. Some students ask the teacher about what material the examination will cover.

On the other hand, Aquino (2011), who investigated students' study habits, found that in general students do not approve of teachers' approaches and classroom management. Student opinions differed between high and low achievers, as low achievers tended to believe that teachers used their authority excessively and were narrow-minded. However, Hora and Oleson (2017) also found that few students generated their own methods and cues for studying that work for them. Moreover, the authors found that old study habits and experiences, such as habits from high school, could affect students' approaches to studying.

At the end of this section, it is worth noting that understanding students' studying habits helps with designing the tools for investigating the students' use of time, as part of the second research question. Moreover, even though the literature is focused on conventional methods, understanding students' general habits could also help in predicting the students' habits in flipped classrooms.

3.3 Use of time in the flipped classroom

This section presents findings on how learners spend their time when taught in a flipped classroom in terms of their preparation before class and their engagement in class activity. It also covers related issues such as flexibility and workload.

It is clear that learning time in the flipped classroom differs from that in the conventional classroom in two ways: the decrease in the face-to-face instruction time and the increase in the online self-study time. Baepler et al. (2014) argued that learning outcomes in a flipped classroom did not suffer, even though face-to-face instruction time was reduced by 66% compared to a conventional classroom.

Braun et al. (2014), *N* = 190, investigated the amount of time students spent in the flipped classroom, finding that the average study time was 7.3 hours per week in the flipped classroom instead of 6.4 hours, the expected time. These times included 4.5 hours of class time per week and an average of 2.7 hours spent watching videos. The maximum time that a student spent was 15 hours per week. However, even with this increase, about 45% of the students assumed that this time was profitable for learning, whereas only 18% assumed it was not, and 67% believed that the effort and learning results were balanced.

Most studies on the topic were focused on time-use effectiveness in flipped classrooms, but no study thoroughly investigated how students used their time inside and outside of flipped classrooms. Questions of when, where, for how long and by what means were not investigated, either inside or outside the classroom. This is one of the literature gaps that this study investigates. Some published studies, however, do provide evidence related to time use. The factors of flexibility, workload, failure to watch videos, and participation in activities are the ones most addressed in the literature and are discussed as follows in this section. However, it is important to highlight that those studies that investigated the flipped classroom method in the context of Saudi Arabia did not provide much evidence in this area.

3.3.1 Flexibility

Flexibility is one of the main attributes addressed by students in the literature. It is mostly linked with the first phase of flipping the classroom, as students view the recorded video lectures at times and places that they find convenient, and they learn at their own pace (Bergmann and Sams, 2015; Carbaugh and Doubet, 2016; Enfield, 2013; Roehling, 2018) addressing a flexible environment as one of the main pillars of the flipped classroom. The flexibility relates not only to watching videos but also to flexible student assessment, which reflects the active learning that occurs during classroom activities.

Student surveys and interviews in many research studies concluded that the flipped classroom approach provides flexibility and convenience, made better use of students' time, and allowed students to learn at their own pace (Davies, et al. 2013; Butt; 2014; Enfield, 2013). Flexibility was also addressed in studies conducted in the Saudi context as one of the advantages of students' experience with the flipped classroom (Sajid et al., 2016; Abdelshaheed, 2017; and Aboraya and Alket, 2016). The percentage of students who rated this flexibility positively in the Abdelshaheed (2017) study was about 79% (M = 4.03, SD = 1.35).

Given the method's greater flexibility, it is important to consider the need for effective time management. Students are used to having scheduled lectures with obligatory attendance, and a new flexible experience may be uncomfortable and require them to be more responsible and to work on their time management skills. Students also need to develop better self-regulated learning skills (Apedoe et al., 2017).

3.3.2 Workload

The most common criticism of the flipped classroom was the increase in workload compared to that in traditional courses (Roehling, 2018; Braun et al., 2014; Yeung and O'Malley, 2014; Linga and Wang, 2014; and Simonson, 2017). Braun et al. (2014), N = 190, reported that for an average student, study time increased by 0.9 hours per week, as the average study time was 7.3 hours per week in the flipped classroom, instead of the 6.4 hours per week with the conventional method.

Linga and Wang's (2014) survey, N = 280, showed that about 38.2% of students believed the flipped classroom increased their workload, whereas only 3.5% thought it did not. Most of the students (about 43 %) were neutral on the issue. However, workload was an issue for more students in Braun et al.s' (2014), with 77% of students reporting their workload had increased in the flipped classroom compared to conventional lectures; 37% of participants explicitly mentioned this point in an open-ended question. Their main complaint was that they did not have time to prepare. In Simonson (2017), students commented on the amount of time required for class preparation as “long”, “unrealistic”, “overwhelming”, and “contradict[ing] with concurrent coursework”.

The workload of the flipped classroom should be considered along with the workload of other courses. Wilson (2017) found that students stopped doing the pre-class preparation at about the middle of the term due to the high workload caused by assignments and examinations.

With regard to studies conducted in Saudi Arabia, Alsowat (2016) and Zain-Alabdeen (2017) highlighted this aspect briefly. Unexpectedly, according to Alsowat (2016), flipped learning reduced the time required of students. However, Zain-Alabdeen (2017), $N = 50$, reported that students already suffered from a lack of time because of the course work for other subjects. This made preparing for class an issue for about 54% of participants.

3.3.3 Pre-class preparation

The time spent watching the videos and studying pre-class material is an essential part of the course time. This phase is usually accorded outside classroom, where students have full responsibility to do it. Many research studies showed that the time spent watching videos was useful; in the Apedoe et al. (2017) case study, 71% of students believed that watching the videos was a very valuable use of time. In terms of achievement, Heijstra and Sigurðardóttir (2018) found a correlation between time spent watching videos and student marks, as for every additional minute of watching, a student's final grade increased by an average of 0.002 points.

Nonetheless, an important question is this: even though students believe watching pre-class videos is useful, do they watch? And how often do they do that? It seems that not preparing before class is a common issue among students learning via flipped classrooms. But happening to different extents. Reidsema et al. (2017) found that a number of students did not prepare at all, and others prepared for just an hour before the class started. In the Butt (2014) study, most of the time students did not prepare ahead of class. However, Braun et al. (2014), N = 190, reported 80% of students had watched the videos beforehand. According to Enfield (2013), N = 37, about 14% of participants never watched the videos. This percentage was about the same for high, low, and mid-level achievers. The motivation for about 80% of the students who watched the videos was an upcoming quiz; this was not the motivation for about 13% of students.

A study by Heijstra and Sigurðardóttir (2018) of students, N = 120, in a business course at the University of Iceland investigated this matter thoroughly. The result showed that the proportion of students who did not watch the videos grew as the semester progressed. The percentage of students who did not watch the video lectures at the beginning, middle, and end of the semester were 13%, 35%, and 49%, respectively.

With regard to when students tend to watch these videos, in Heijstra and Sigurðardóttir (2018), the percentage of students who watched the videos on time (either in the week of or the week before the class) was around 85% at the beginning of the course. However, this percentage decreased in the middle and at the end of the course (64% and 45%, respectively). The results also showed that many students watch the videos while working on their assignments rather than preparing for the classroom activity.

Heijstra, and Sigurðardóttir (2018) highlighted the question of whether students watch the full length of the video. It appeared that students followed the same trend mentioned above, as the trend of those who complete the video declines over time until it reached 47% of the students at the end of the semester. The same study reported that male students spent less time watching videos than did female students, and older students spent more time watching than younger students.

Several studies proposed explanations for this matter. Wilson (20017) found that students stop doing their pre-class preparation about midterm because of the increase in the workload of coursework assignments and examinations. Moreover, according to Strycker in Apedoe et al. (2017), failure to use the provided resources to prepare before class could results from a resistance to change. In her study, the class was flipped at a later stage in the term, after the course had initially been taught conventionally. Simonson (2017) cited the length of the videos and the increase in workload as the causes of students' not preparing before class. In the Abdelshaheed (2017) study in Saudi Arabia, some of the students said they found little need to watch the online videos, as they believed that classwork would be enough to learn about the topic.

Several teachers had methods to force the students to watch the pre-class videos. In Abdelshaheed (2017), the teacher assigned the students tasks after watching the videos; these tasks included completing a quiz, answering a question, or paraphrasing a topic. In a study by Johnson (2012), the teacher asked the students who did not watch the videos before class to do so in class, while the other students completed the in-class activity. According to Johnson, those students eventually realised that this led them to fall behind their classmates. On the other hand, Reidsema et al. (2017) were not concerned about students not watching the videos. They argued that students could watch these videos after class if they had not done it beforehand, because the primary goal was to have the students deeply engage in real problem-solving (Reidsema et al., 2017).

3.3.4 In-class activities

The phase of in-class activity is carried out under the supervision of the teacher, which reduces the freedom of students in their use of time. The activities students commonly engage in during class include working in groups, sharing their work with the rest of the class, discussing the videos and other related topics, and helping other students (Wilson, 2017). These in-class activities are mostly led by the teacher, either directly or indirectly (Enfield, 2013).

With regard to group dynamics, in the Mutch et al. (2017) study, one of the requirements was that group members switch among three roles: leader, scribe, and time-keeper. The study showed that the dynamic in most groups was smooth and needed little external supervision to keep students on track. However, a few groups had difficulty because one team member dominated the activity. According to O'Flaherty and Phillips (2015), the interactions between learners can enhance learners' communication skills.

Many research studies showed that the activity time is useful for learning. For example, the Apedoe et al. (2017) case study reported that 71% of participants believed the time spent in classroom activity was a very valuable use of time. Most studies showed that most students do participate in classroom activities, including studies by Aboraya and Alket (2016), Alsowat (2016), and Al-Rowais (2014). However, Black et al.'s (2017) case study found that some students were initially uncomfortable with and resistant to active learning, which requires students to move around the room. Eventually students tend to talk, putting away technology, sharing their viewpoints, and listening to other views, being more social and transferring new ideas to practice. According to Wilson (2017), one of the main reasons for students' engagement was their attitude toward this method, as students were more likely to engage in the in-class tasks if they were enjoying the course. Hsieh (2017) argue that even though educators assume that less-motivated students will be less engaged in the flipped classroom setting, they also would be less engaged in conventional settings.

Another factor related to students' engagement is the practice of calling on students to increase participation during in-class activities. Enfield (2013), *N* = 37, investigated this matter, reporting that most students found it effective for their learning (88.5%) and necessary for maintaining engagement (91.4%), whereas 11.4% found it not effective, and 8.6% believed it was not necessary.

An important question to consider is whether not preparing before class affects students' participation. According to Reidsema et al. (2017), some groups could not complete the activity adequately because they lacked the required prior knowledge that had been provided in the pre-class materials. However, students who skipped the pre-class phase did learn at the end of the class from the feedback on their work, although they spent more time on the tasks designed to achieve higher-order learning. The lack of pre-learning thus reduced the value of the flipped classroom and perhaps the performance of the students. On the other hand, students who prepared before class (who watched the videos and other materials) were better able to participate and provide assistance to other students (Wolff and Chan, 2016). Wilson (2017) found this led to students tending to teach each other during in-class activity.

In studies of flipped classrooms in the Saudi context, Alsowat (2016) found that student engagement in classroom activity was high. According to Al-Rowais

(2014), positive attitudes toward the flipped classroom promote student engagement, peer interaction, and collaboration skills. This is in line with Aboraya and Alket's (2016) observation that students worked collaboratively and most believed that the work was useful for them. Students in Al-Rowais's (2014) study also emphasised the instant support they received from the teacher during the class as beneficial in clarifying challenging points that arose while they had been studying on their own.

Finally, it appears that there is still room for further investigation to address a wider view of students' habits while using flipped classrooms. Moreover, the results presented in this section help with the design of the tools for investigating students' use of time as part of the study's second research question and with comparing the findings with those of other works in the discussion section.

3.4 Chapter summary

This chapter reviewed how students use their studying time, with a focus on students in Saudi Arabia. It appeared that students' self-study time was less than expected, but they used it to cram before examinations. Using social media and surfing the internet could be distractions for some students, but engaging in these activities during study breaks seemed harmless for others.

The studies found that investigated students' habits in the Saudi context were mostly in health science, medical, or nursing, although there was one study in the humanities that reported on an English language course. The findings identified some differences between the two fields, health sciences and the humanities. For example, studying at home was a common habit among Saudi students, but health science students preferred libraries or study rooms. Punctuality of attendance, attentiveness, and participation were higher in the health science field than in the humanities. The lecture handouts seemed to be the most popular resources among Saudi students in general, although textbooks were also popular. However, digital resources such as the internet and databases seemed to be popular among medical students.

With regard to students' behaviours in the flipped classroom, failure to watch the videos was an issue in many studies, although the extent of the problem varied. However, participation in classroom activities was not an issue. Student workload was increased to varying extents, although this was not an issue in some settings. However, the workload from other courses influenced students' pre-class preparation behaviours.

CHAPTER FOUR: RESEARCH DESIGN

4.1 Introduction

This chapter discusses the research design of the study. It begins by delineating the mixed-methods design and the rationale for using this framework in this study. The chapter then identifies the participants involved in the study and describes the procedures. It moves to discuss the research questions, the methods used to answer these questions, and the methods of data analysis. The last part of the chapter clarifies issues related to research ethics and the limitations of this study.

4.2 Use of mixed methods

The approach used in this research study is a mixed-methods approach. According to Creswell (2013), a mixed-methods approach collects and analyses both qualitative and quantitative data in a single study. Quantitative data include those gathered by tests and questionnaires and analysed using mathematically based methods (Fielding and Gilbert, 2006). Qualitative data are non-numerical data used to explore topics in-depth, gathered to determine the reasons behind the quantitative data provided by the participants, and they include data that are gathered by methods such as interviews, observations, and students' diaries (Cohen, et al., 2007).

The aim to dig more deeply than the existing literature into the potential impact of a flipped classroom method of teaching necessitated gathering a great deal of data and using a range of methods. Moreover, the use of mixed methods is more suitable to deal with the complexity of the data required to answer the research questions in this study, particularly because the mixed-methods approach is a problem-centred approach that uses methods and theories based on their applicability to the present research (Leavy, 2017). According to Creswell (2013), the mixed-methods design works from the philosophical foundations of the pragmatic paradigm, which is a deconstructive paradigm which focuses on "what works as the truth regarding the research questions under investigation" (Tashakkori and Teddlie, 2003, p. 713). The research process in this paradigm includes mixing data collection methods and data analysis procedures (Leavy, 2017), which is suitable for data about the actions, behaviours, and attitudes of participants (Brannen, 2005; Creswell, 2013).

Additionally, using various data sources in this study helps in many ways: first, it helps in converging and confirming the findings, as using different approaches to collect data results in more complete data that cover many aspects. It also provides more solid evidence through integrated findings, as the data from one method can be employed to enrich understanding of the findings from the second method (Creswell, et al., 2012). Moreover, using more than a single approach provides a more comprehensive understanding of the phenomenon by offering another perspective (Creswell, 2013; Leavy, 2017). In addition, using multiple methods provides both generality and particularity (Greene, 2008), as the findings from a quantitative method reveal regular patterns, whereas the qualitative data provide the deep understanding of the individual experiences (Greene, 2008). Using quantitative and qualitative data provides confirmatory and exploratory enquiries to deal with practical problems (Tashakkori and Teddlie, 2003), since the qualitative method provides details on and clarifies the results from the quantitative method (Bryman, 2012).

In other words, the use of mixed methods offsets the weaknesses of the two methods and combines their strengths. Quantitative methods can cover wide range of phenomena, as statistics are collected from large samples, whereas the number of participants in qualitative methods is limited. On the other hand, qualitative inquiry is from the inside, which is considered deep, rich, and meaningful, whereas quantitative inquiry is from outside, focused on what is there, without understanding processes or the meaning of participants' behaviour (Amaratunga et al., 2002). Qualitative methods assist in building an overall picture and consider the differences between participants, whereas quantitative methods are more suitable for assessing participants' behaviour (Amaratunga et al., 2002).

In this study, six tools have been used: surveys, grade records, and "Blackboard Learn" records for quantitative methods and students' diaries, interviews, and observations for qualitative methods. These tools are used to answer three research questions that use different methods (qualitative, quantitative, or mixed methods). The first research question (Is there any difference in acquisition of knowledge or in attitudes between those who take a flipped class and those who take a conventional class in the same subject?) uses quantitative methods (marks records and a survey). The findings from quantitative analysis were also used as a base to interpret the findings in the other research questions in this study. In the second and third research questions (Is there any difference in time use or approach to study between students who take a flipped class and those who take a conventional class in the same subject?) and (What factors affect implementation of a flipped classroom?), I used the mixed-methods design as quantitative and qualitative methods used together for most investigated aspects. Table 4.1 illustrates the research questions and the methods used to address them.

A mixed-methods design needs to consider the timing of data collection, as the data can be collected sequentially or concurrently (Creswell, 2009). In this study most data were collected during the course, and the tools were designed before data collection. However, a survey investigating students' use of time was designed based on student interviews. In this case, qualitative data were gathered first, as exploring the topic comes before expanding the understanding by collecting data from a larger number of participants (Creswell, 2009).

Table 4.1. Research questions and methods used to address them

Research question	Approach	Method
Is there any difference in the acquisition of knowledge and in students' attitudes between students who take a flipped class and students who take a conventional class in the same subject?		
Academic achievement	Quantitative	Examinations grades
Students' attitudes	Quantitative	Questionnaire
Is there any difference in students' use of time and their approach to studying between students who take a flipped class and students who take a conventional class in the same subject?		
Use of time	Mixed methods	Diaries, Blackboard Learn, and attendance reports, Interviews, Observation, and Questionnaire
What factors affect the implementation of the flipped class approach?		
	Mixed methods	Questionnaire, and Interview

4.3 Pre-experimental design

This study aims to investigate the effectiveness of using the flipped classroom method compared to the conventional method. To explore the effectiveness, the research was undertaken as a pre-experimental study instead of using experimental design. In true experimental research, the design carefully controls the conditions of the setting and measures the difference that an intervention makes. However, according to Cohen, Manion, and Morrison (2007), it is impossible to use a true experimental design in educational settings. In addition, the use of this design has been criticised in educational settings, as it can change human behaviour artificially so that it does not represent real-life situations (Beaumont, 2009).

The design used in this study is a static-group comparison design, which is the same as the post-test-only control group design in a true experimental design, but it is not randomly distributed. This design compares two groups. The first is given an intervention, and the second is not. In a final phase, both groups are given a post-test to determine whether there is any difference that can be attributed to the intervention (Leavy, 2017). This design has a weakness as it has no pre-testing phase, which makes it difficult to ensure that the two groups are comparable and to generalise the findings (Beaumont, 2009).

This setting has two groups, one taught via the flipped classroom method, which is the intervention in this design, and the other group taught via the conventional method. This second method was already used in this context, and no intervention accrued. This context attempted to control as many conditions as possible, as the two groups of students were taking the same course, were taught by the same instructors, and had common assignments and examinations. However, the two groups were not randomly selected and could not be isolated from each other for ethical reasons. These points are discussed in greater detail in Section 4.6.

4.4 Research study context

This project was conducted in the College of Education at one of the universities in Saudi Arabia. This university was chosen for convenience reasons. I had worked there previously, which eased coordination and offered a better chance to convene the management and educators to implement the flipped classroom method.

The course used in this study is part of the undergraduate programme, where students take courses for an average of 18 hours per week each semester. It is a compulsory course, "educational technology", which focuses on three main topics: communication and teaching aides, instructional design, and new trends in educational technology. The course is three credit hours, and students are assessed by examinations (70%) and assignments (30%). Students need to achieve 60% to pass this course.

Each semester, about four to six cohorts are opened for students to register in. Each cohort consists of a maximum of 60 students, and there is no minimum number of students in each cohort. In terms of facilities, 13% of the classrooms in the College are equipped to be interactive, Wi-Fi access is provided for all students and instructors, and a learning management system (Blackboard) is used widely on the campus and in this course in particular. This study was conducted during the entire course, which was offered once in the first semester and once in the second semester.

4.5 Participants in the study

This study involved 491 students divided into two groups of participants: 234 students taught via the flipped classroom method and 257 students taught by the conventional method. Each group consisted of five cohorts that were taught by three instructors named Sarah, Emily, and Nancy (pseudonyms). A teaching assistant was responsible for teaching the activity class for the conventional group. All participants (students and teachers) were female. Table 4.2 illustrates the number of participants in each cohort.

Participants in the two groups were not selected at random, since students self-register for the course. Non-random sampling can be used when researchers have no intention of generalising from their findings (Cohen, Manion, and Morrison, 2007). Both groups comprise undergraduate Saudi females between 18 and 24 years of age whose mother tongue is Arabic. To minimise instructor influence on the research outcomes, each instructor taught the same number of cohorts for both methods.

Table 4-2. Cohorts of participants

Cohort	Method	*N*	Instructor
FS1	Flipped classroom	32	Sarah
FS2	Flipped classroom	47	Sarah
FE1	Flipped classroom	57	Emily
FE2	Flipped classroom	58	Emily + Nancy
FN1	Flipped classroom	53	Nancy + Emily
CS1	Conventional	38	Sarah
CS2	Conventional	56	Sarah
CE1	Conventional	54	Emily
CE2	Conventional	60	Emily
CN1	Conventional	60	Nancy

4.6 Research Procedure

4.6.1 Setting up the flipped and conventional courses

After approval for this research study was obtained, four teaching members from the school recorded the video lectures and designed the classroom activities to match the existing curriculum, which had already been designed. I was one of those four members, and another of the four was one of the instructors in this course.

As mentioned earlier, two methods were used for teaching the two groups of students. The first method was the flipped classroom and the other was the conventional method. Students used the online registration system to enrol in this course. One-half of the cohorts were assigned to a flipped classroom, and the other half were assigned to a lecture-based class. For ethical reasons, an announcement was published online clarifying which cohorts would be taught using the flipped classroom method. However, based on student interviews and overheard student discussions, a large number of students did not receive the announcement, and their choice of cohort was based on which cohort suited their schedule. Before starting the implementation, all participants were given a presentation about this research study, and their questions were answered. At this stage, all students consented to participate in this study.

4.6.2 Data collection during the courses

In the flipped classrooms, students had video lectures in the form of narrated MS PowerPoint presentations (voice-over only), delivered via the Blackboard Learning Management System. Each video lecture lasted between 15 and 30 minutes. These videos were in one continuous clip or were divided into two separate videos. Each class meeting lasted 2 hours and was mainly focused on practising what had been learned from the video lecture. Students were given several tasks to complete in groups. Each group, which consisted of 5 to 7 students, worked together on the task then shared their answers with the instructor and other groups.

Classes that followed the conventional method, which had been in use before this course, remained unchanged. Students were assigned to a lecture of about 2 hours and then, with another instructor, had a 1-hour activity session. In this session, students were assigned one or two tasks in groups. Content, materials, assignments, and examination questions used in the two methods were identical.

It is clear that both methods have two elements: activities and lectures. However, in the flipped classroom, the lectures were online pre-recorded videos, whereas the conventional method group had face-to-face lectures. Moreover, the time assigned for engaging in activities in the flipped classroom was double that assigned in the conventional method. At the same time, students in the conventional group were assigned to spend more time in face-to-face learning (3 hours versus 2 hours). In addition, in the conventional method students were given one task that lasted for 30 minutes, whereas in the flipped classroom students were assigned 4 to 7 tasks, each lasting for 5 to 15 minutes.

This study was applied to 10 cohorts; five of them were taught via the flipped classroom method and the other five by the conventional method. Another variable in this study is the instructor. Three instructors taught the 10 cohorts. Each taught the same number of cohorts using both the flipped classroom method and the conventional method. This minimised the potential effect of the teacher when comparing learners' marks or the average classroom time in each method. Yet having instructors teach using both methods provided an opportunity to investigate how different instructors could affect the implementation of these methods. Classes were conducted at different times, in the morning and afternoon. The classrooms were also organised in different layouts, and the number of students in each class varied.

4.6.3 Post-course and data gathering

At the end of each course, quantitative data were collected. These data were from surveys, marks records, and Blackboard Learn records. However, the qualitative data from students' diaries, interviews, and observations were collected during the course.

4.7 Data collection methods and data analysis

This section discusses the methods used in this study in more detail. As mentioned earlier in this chapter, six tools, both qualitative and quantitative, were used to gather the data: questionnaires, students' marks, Blackboard Learn reports, classroom observation, students' diaries, and semi-structured student interviews.

4.7.1 Students' marks

Students' marks were used to compare academic achievement between the two groups. Data were obtained from the instructors' reports at the end of the course. Each instructor was responsible for assessing the students who she had taught. All instructors used the same rubrics to evaluate students in both conventional and flipped classrooms. The total mark was 100, and the sub-marks were given as follows: 5% group presentation, 5% practical assignment, 5% written assignment, 10% participation in the workshops, 5% quiz, 20% midterm examination, and 50% final examination. It is clear that 75% of the mark is for examinations, 15% for group assignments, and 10% for individual assignments. Students need to achieve 60% to pass the course.

All examinations and assignments were common to both the conventional and flipped classroom groups. The midterm examination and the final examination were criterion-referenced achievement tests. These provide data about exactly what a student has learned by measuring achieved performance in a given content area (Cohen, et al., 2007). The examinations were developed by the course instructors and consisted of short essay questions and multiple-choice questions.

A quantitative analysis approach was used for students' marks. Given the nature of the first research question (Is there any difference in acquisition of knowledge between students who take a flipped class and a conventional class?), a statistical approach is required to test the hypothesis that there are no statistically significant differences between the two groups. Descriptive analysis, including mean, standard deviations, and range of scores, were used to provide an overall view of the data. In addition, inferential statistics were used to identify any differences in students' learning between the two groups. T-test was applied to students' grades to assess differences in achievement. This parametric test was used because the data were normally distributed, indicating a parametric test was the appropriate choice (Fielding and Gilbert, 2006). Skewness and kurtosis values, histograms, and box plots were used for testing normality of distribution.

4.7.2 Questionnaires

The questionnaire is one of the main methods used in my study, as it is a useful tool for collecting survey information and helps to provide structured data, often numerical and often comparatively easy to analyse (Cohen, et al., 2007). Three questionnaires are used in this study, for three different purposes. The first is used to investigate student attitudes (Questionnaire A); the second explores the implementation of the flipped classroom (Questionnaire B); and the third investigates the amount of time students spent studying (Questionnaire C). The three questionnaires are attached in the Appendix (see Appendices 1 to 4).

Questionnaire A

The attitude questionnaire was used to investigate the second part of the first research question. It is mainly focused on measuring students' attitudes toward the flipped classroom and the conventional method. It covers four main elements related to these two methods, which are students' attitudes toward video lectures, face-to-face lectures, classroom activities, and the combination of video lecture and classroom activity. The goal was to learn what determines students' attitudes.

I designed this questionnaire, as I could not find a suitable one with the same aim. This questionnaire is primarily an agreement response format with a 5-point Likert scale that ranges from "strongly agree" to "strongly disagree" (McCoach, et al., 2013). It consists of 15 statements that measure three main factors: 1) the student's feelings about the approach in terms of their enjoyment of it and the perceived difficulty of it; 2) how the student values the approach's usefulness; and 3) the student's willingness to engage in learning through the approach (McCoach, et al., 2013; McMillan, 2006).

For this questionnaire, there were two versions, with minor changes made to fit the context of each group. The questionnaire was paper-based and was distributed and collected during the last week of the course. It is important to mention that students from the conventional group did not experience using the video lectures, although the questionnaire asked about their perspective on using them. On the other hand, students from the flipped classroom had experienced face-to-face lectures, as they are widely used on campus.

A quantitative analysis approach was also used for analysing data on academic achievement. As the questionnaire used a 5-point Likert scale, each choice was given a value as follows: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*. Descriptive analysis of data was used for all questionnaire items, which included frequency distribution, graphical illustrations, mean, standard deviation, and median (McCoach, et al., 2013). The frequency percentage was used to show how often each data score occurred in the two groups. Coloured graphical illustrations (bar charts) were used to visualise comparisons of the two groups' responses (Field, 2006). Descriptive statistics were also used to compare the two groups to identify differences in students' responses to each item.

The second phase of analysing the data used inferential statistics to identify any differences between the two groups (flipped classroom and conventional). A Mann-Witney test was used to compare the students' attitudes for each questionnaire item. This non-parametric test was used because the data in this survey are ordinal, and this test is the suitable choice for comparing two independent samples. The effect size was calculated using the same procedure used in the Mann-Witney test equation (Pallant, 2016). The data were analysed with IBM SPSS statistics software, version 23.

Questionnaire B

The second questionnaire used in this study aims to explore the implementation of the flipped classroom to assist in answering the third research question. It was distributed among students in the flipped classroom group. It consists of both closed-ended questions and open-ended questions. I designed this questionnaire. The closed-ended questions cover expected factors, whereas the open-ended questions explore the factors that matter more to the students. The wide use of open-ended questions allows participants to express their point of view on their experience and to raise unanticipated issues and factors (Silverman, 2014). The questionnaire was distributed and collected in the last week of the course.

The data from the closed-ended questions were analysed by applying descriptive statistics; the open-ended questions were analysed qualitatively in several stages, as Cohen et al. (2007) suggested, by first generating natural units of meaning, categorising and ordering these units, structuring narratives to describe the contents, and finally, interpreting the data. However, as the responses to the open-ended questions were short and some of them frequently repeated, these data sets were also analysed quantitatively by calculating frequencies of occurrence in textual data (Ross, et al., 1994). An MS Excel spreadsheet was used for this purpose.

Questionnaire C

The third questionnaire aims to investigate students' use of study time to assist in answering the second research question. It consists of two parts: the first part consists of numeric, open-ended questions which ask about estimated time spent studying. The second part is multiple-choice questions about different habits students do during studying. It is designed based on information mentioned by students in interviews. The goal was to collect these data from a wider range of students, and providing quantitative data helps in assessing whether these habits are widespread among students. The questionnaire was designed during the data collection period and was distributed and collected in the last week of the course. There are two versions with minor differences, one for the flipped classroom group and the other for the conventional group. A limitation of this questionnaire is that the data collected here are estimated and not accurate, as they depend on participant memory.

The first part of the questionnaire is divided into three cases: time spent when working on an assignment, time spent when studying for the examination, and time spent when students have no assignment or examination. Descriptive analysis was used to understand how much time each group spent studying outside the classroom and to compare groups. These statistics included mean, median, and standard deviation. To test whether there was a significant difference between the two groups, inferential statistics was used. A Mann-

Witney test was used to compare the weekly time spent in the two groups. This non-parametric test was used because the data were not normally distributed, and this test is analogous to the independent samples *t*-test, which compares two independent sets of data. The data set was tested for normality of distribution using the Shapiro-Wilk's test, skewness and kurtosis values, histograms, and box plots.

The second part of the questionnaire is divided into three parts, asking about how students behave during in-class activity, while studying from the textbook, and while watching video lectures (in the flipped classroom group version) or face-to-face lectures (in conventional group version). Quantitative analysis was used to identify the percentage of each behaviour by calculating the frequency.

4.7.3 Classroom observation

Observation was used to gain an informed understanding of how students use their time during class as part of the effort to answer the second research question. The observation was focused on events as they happened in a classroom, to collect "live" data from naturally occurring social situations (Bryman, 2012). The observation involved three main elements: 1) identifying the main teaching activities in the classroom, 2) calculating the amount of time that students and instructors spent on each teaching activity, and 3) focusing on students' behaviours during classroom activities and their degree of engagement in tasks.

To collect such data, a semi-structured observational approach was undertaken to make comparisons between the two settings in this research, and observed data were noted and the time was calculated. This semi-structured observation seems to be more suitable than structured observation, as it illuminates agendas of issues in a far less predetermined or systematic manner, whereas structured observation is used to confirm or refute hypotheses that have already been made (Cohen et al., 2007).

There are many advantages to choosing this method of observation, as it is a useful way to record nonverbal behaviours, and data collected by this method are more valid and authentic than mediated or inferential methods, because what persons do can be different from what they say they do (Bryman, 2012). However, one drawback in this approach relates to reliability, as participants might behave differently, either consciously or unconsciously, because they are being observed. Another limitation is that decisions about which data are collected may be influenced by the researcher's personal bias (Cohen, et al., 2007).

Observation in this study was non-participant observation which targeted students. Ten cohorts were observed, divided between conventional and flipped classroom groups, at different times during the course. It is worth noting that the duration of the classes being observed differed between the two groups, as the conventional method classes were observed for 3 hours while the flipped classroom classes were observed for 2 hours.

The observation took place in two situations: when all students in the class were engaged in a common activity, usually with the instructors, and when groups of students were engaged in a group activity. For the first situation, the aim was to identify the main teaching activities in the classroom and to calculate the amount of time that students and instructors engaged in each activity. The observation sheet consists of three main areas: timeline, open space to record teaching activities, and a space for researcher notes. For later situations, the observation focused on what individuals did, how often each member participated, and the degree of their participation. Most working groups were observed for the full time of one task, which lasted for an average of 7 minutes for the flipped classroom group. In the conventional group, however, the observation occurred during only part of the task, and it lasted for about 6 minutes for each group of students. The observation sheet for classroom activity contained a visual drawing, and three symbols were used to calculate the number of times participating for each student and to evaluate the student's responses during the task. The two types of observation sheets are attached in the Appendix (see Appendices 6 and 7).

In this research study, 18 class sessions were observed for a total of 30 hours. However, to compare the two methods in terms of the actual time that students spent in each element (lectures and activities), six observed sessions were selected for data analysis. These sessions were for the same lesson in the six cohorts, which included one conventional classroom and one flipped classroom for each instructor. This approach to selecting cohorts was intended to make the comparison as accurate as possible by minimising the effect of differences in time spent between different lessons and instructors.

All observed actions were recorded instantly in a written or graphic way, as the observed classes were not video recorded for cultural reasons. The selected recording procedure may have caused unintended human errors. To increase my skills in handling classroom observation, I conducted pilot observations to evaluate the categories and procedures in terms of being appropriate, being comprehensive, and effectively contributing to the purpose of the research.

To encourage participants to act naturally, they were told that the observations were not meant to assess or evaluate their behaviours as individuals or influence their participation marks. However, students still might have acted differently while the observer was present.

The data analysis was primarily meant to generate numerical data from the observations to allow for comparisons between the two settings. Duration, frequencies, and patterns were calculated (Cohen, et al., 2007). The data were analysed in two phases. The first phase was classifying the main teaching activities listed in the descriptive field note. The second phase involved a numerical analysis to calculate the actual time for each activity in order to compare the cohorts. Microsoft Excel was used to organise and analyse these quantitative data. With regard to students' participation, the visual diagrams were classified and organised using quantitative data to allow comparisons between the groups.

4.7.4 Semi-structured interviews and focus groups

In this research study, both interviews and focus groups were used to collect in-depth data about students' use of time and to explore the factors affecting the implementation of the flipped classroom. These data contributed to answering the second and third research questions. Both groups, those in the flipped classroom and the conventional classroom, were interviewed. However, for investigating the factors influencing the implementation of the flipped classroom group, the focus was on the data from that group, although data from the conventional group were also used for comparing students' views about some factors.

Although interviews are time intensive and may be affected by personal bias (Robson, 2002), this method is useful for providing verbal and nonverbal data. In addition, asking follow-up questions helps focus on responses about complex and deep issues (Cohen, et al., 2007). These advantages make this method suitable for gaining in-depth understanding of participants' experiences, opinions, beliefs, and feelings. In addition, the method can be used in parallel with other methods, which can provide insight for understanding unexpected results from other methods (Creswell, 2013). Using semi-structured interviews offers several advantages: the order of the questions can be modified, explanations can be given, and questions that seem inappropriate can be skipped or others added as topics arise (Robson, 2002).

In the present study, interviewees were selected, based on classroom observations, students' diaries, and midterm examination marks, to generate a sample that represented as many types of students as possible. The interviews were held during the second half of the course. A total of 20 students were individually interviewed from the two groups. Each interview lasted 10 to 30 minutes, but they were made longer or shorter based on the interviewee's time and their willingness to talk. Table 4.3 provides more details about each interview.

A total of 49 students participated in the focus groups, although some students were more active than others. The number of participants varied among the focus groups, ranging from 3 to 5 participants per group. The discussions lasted for between 22 minutes and 58 minutes. The participants in a given focus group were usually from the same cohort and were taught by the same instructor. This arrangement was for the convenience of the participants, as the schedules of students in each cohort were similar. Table 4.3 provides more details about each focus group.

As students' feelings, fears, desires, and attitudes might influence the validity of their responses, particularly as participants might be hesitant to criticise the learning methods, students were ensured anonymity and confidentiality before the interviews were conducted, and they were assured that their views would not affect their marks. After interviewees' consent was obtained, they were briefly told how the session would be conducted and about their roles during the discussion. In all focus groups, I worked as a facilitator. Interviews took place in an unoccupied classroom, as it was not easy to book a private meeting room on campus. Distractions from other students or staff sometimes occurred, although their effect on the discussion was minor.

The questions were usually asked in a given order; however, this order was sometimes varied based on the flow of the discussion. In some cases, new questions were asked to probe interesting aspects. Leading questions were avoided to minimise bias. The language of all questions and discussions was Arabic, as it is the mother tongue for all participants, and its use eliminated language barriers that could have prevented students from expressing their opinions freely.

The main factor affecting the duration of the interviews was restrictions on students' time. Student schedules were full with classes, and the interviews were usually conducted during breaks and in unoccupied classrooms. All interviews and focus groups were audio recorded then transcribed, as the idea of video recording was not acceptable in this context for cultural reasons.

Interviews were analysed qualitatively using thematic analysis. Unlike content analysis, which involves identifying trends in the words, my use of thematic analysis sought for deeper understanding, and reporting patterns were used to explore students' behaviours and the factors influencing their experience (Vaismoradi et al., 2013). Cohen et al. (2007) suggested several stages to conducting athematic analysis, first generating natural units of meaning, then categorising and ordering these units, structuring narratives to describe interview contents and, finally, interpreting the interview data. Manual analysis was used.

Table 4-3. Number and duration of individual interviews and focus groups

Method	Instructor	Number of interviews/participants	Duration
		Individual interviews	
Flipped classroom	Sarah	6	10 to 30 minutes
Flipped classroom	Emily	3	15, 15, and 17 minutes
Flipped classroom	Emily+ Nancy	3	13, 16, and 22 minutes
Conventional	Sarah	5	11 to 20 minutes
Conventional	Emily	2	17 and 22 minutes
Conventional	Nancy	1	15 minutes
		Focus groups	
Flipped	Sarah	5	42 minutes
Flipped	Sarah	3	34 minutes
Flipped	Sarah	3	27 minutes
Flipped	Emily+ Nancy	5	56 minutes

Method	Instructor	Number of interviews/participants	Duration
Flipped	Emily	3	53 minutes
Flipped	Emily + Nancy	5	45 minutes
Conventional	Sarah	3	22 minutes
Conventional	Sarah	2	25 minutes
Conventional	Emily	5	49 minutes
Conventional	Emily	6	58 minutes
Conventional	Nancy	3	25 minutes
Conventional	Nancy	6	63 minutes

4.7.5 Students' diaries

Students' diaries were used to collect data about students' use of time outside the classroom. These enabled students to respond freely and immediately when recording their behaviours, feelings, and perceptions (Duke, 2012). However, in this study students wrote in their diaries once a week, and forgetting may have influenced the accuracy of the data.

In the present study, students' diaries gathered data about how students used their study time outside the classroom, in parallel with observations which were used for events inside the classroom, but from the student point of view

(Thomas, 2013). One advantage to using diaries in this research is that they offer access to practices not easily observed. More importantly, they provide an in-depth look at a variety of students' activities, including self-study and learning by interacting with other students, for extended periods.

Some students' diaries were also used as precursors to interviews, with some students being selected to illuminate related issues. Because diaries are time-intensive to complete and onerous for diarists (Duke, 2012), the diary form in the present study was a single page consisting of a table in which students could record activity and give detailed data about when, where, for how long, and so on. This table made the diary simpler to complete. In addition, the diary form contained an open space that students could use however they wanted. A full explanation and examples of diary writing were provided for students before they were asked to use this method. The student's diary form is attached in the Appendix (see Appendix 5).

I collected a large number of students' diaries, although most were very brief. The diaries were presented three times during the semester: the beginning, the middle, and the end. For each period, the diaries were sampled based on three criteria: to involve cohorts representing all three instructors; to involve high, medium, and low achievers; and to involve enough data.

The analysis of these diaries included thematic analysis, following the themes used in the interviews. However, as most diaries were brief, they were used primarily for confirming findings emerging from the interview themes (Briggs et al., 2012). These data were also quantified to allow for intergroup comparisons (Ross, et al., 1994). Calculations of the frequency of occurrence of certain behaviours were used to identify common behaviours among students in this setting. A Microsoft Excel spreadsheet was used for this purpose.

4.7.6 Document analysis

In this research study, two type of documents are used to explore students' use of study time as part of efforts to answer the second research question. These documents are Blackboard Learn reports for the flipped classroom group and attendance reports for the conventional group.

Blackboard Learn reports were reviewed to determine whether students watched the videos on time and when they watched them. The system provided a report for each video lecture (10 video lectures) for each cohort (5 cohorts). This produced a total of 10 X 5, or 50 reports. Each report consists of timetables recording when each student hit the video button (the exact date and the number of hits). Another table was also generated listing the most popular hours of the day, which illustrated the total number of hits for each hour of the day.

These reports have some limitations. Firstly, they record when the student hits the video button online, but they do not tell whether the student watched the video or how much time they spent on a video. They also did not detect which students downloaded these videos onto their devices to watch them again. Another limitation is that these reports show a number of hits on the same day, which could be a result of technical problems or distraction while watching a video.

Three samples of these reports were chosen for analysis, as analysing the complete set of reports would have been too time consuming. In addition, other methods (surveys and interviews) were used to gain the same objective. Finally, the credibility of these reports is not high given the limitations mentioned above, and this was also confirmed by some interviewees.

In the first phase of sampling, three cohorts taught by different instructors were scanned to identify whether there were notable differences because of instructor influence. Three videos were selected for this comparison, one at the beginning of the course, the second in the middle, and the third from the last weeks of the course. As there were no notable differences, one cohort was chosen to represent the five cohorts, and three videos were selected to represent three periods of the course (beginning, middle, and end).

The second document used in this study is attendance reports for the face-to-face lectures in the conventional method. Five reports were used, one for each cohort in the conventional group. The report consists of a table of students' attendance for all the 10 face-to-face lectures during the course. To compare the two groups (flipped classroom and conventional method), sample attendance reports were matched to reports on flipped classroom cohorts (described above) taught by the same instructor. Comparisons were made for the same three periods of the course mentioned above.

Before discussing the analysis of the Blackboard Learn reports, it is important to note that each report provides a table which consists of rows presenting all the students in the cohort, columns presenting time, and each cell of the table consisting of the number of hits on the video file for a particular day during the semester. The analysis of these reports was numerical, by evaluating the time students spent using any tool in the course interface (Whitmer, et al., 2016). In this research, the semester timepoints and periods were categorised based on the video published day, class day, midterm examination, and final examination period. The number of students who clicked on the video file was calculated, manually, for each period of time to compare across periods. A Microsoft Excel spreadsheet was used for this purpose. However, multiple hits on the same day were ignored, as the number of students who watched the video that particular day was the focus. In the reports, there was also additional information about the total number of clicks in each hour of the day that was used to identify the preferred times to watch videos.

4.7.7 Applying the mixed-methods approach

The various methods discussed earlier are typically used for different purposes. However, sometimes two methods are used for the same purpose to gain data from different angles (a process known as triangulation). Table 4.4 illustrates the aim in using each tool based on the research question addressed.

The different data sets were analysed in chronological order. First, the data gathered for the first research question, which are students' marks and their attitudes toward the learning method, were analysed. This was followed by the analysis of the data sets for the second and third research questions.

It is important to mention that when analysing complex sets of qualitative and quantitative data, the integration can occur in four ways. First, data sets can corroborate and confirm the findings of each other. Second, one data set can elaborate and expands on the understanding gained from another. Third, the findings from one data set can reveal new aspects needing more investigation by another method. Fourth, two data sets can be juxtaposed to provide a comprehensive understanding (Leavy, 2017). All four integration cases were seen in this study, especially in answering the second and third research questions. The quantitative data were analysed before the qualitative data, then the results were integrated to draw a conclusion. This order was chosen because the quantitative data provide an overall understanding of a larger range of participants, whereas, the qualitative data could explain the result of the first research question. However, while conducting interviews, it became clear based on the initial analysis of these interviews, that there was a need to design a survey to explore some behaviours in a larger group of participants.

Table 4-4. Methods used based on research question

Aim	Method	Group
RQ1		
Compare students' achievements	Students' marks	Flipped classroom /conventional
Explore students' attitudes	Questionnaire A	Flipped classroom /conventional
RQ2		
Describe teaching activities and explore the timeline inside classroom	Observation	Flipped classroom /conventional
Investigate video lecture attendance	Questionnaire B	Flipped classroom
	Blackboard reports	Flipped classroom
	Interviews	Flipped classroom
Investigate face-to-face lecture attendance	Attendance report	Conventional
Students' approach to video lecture and face-to-face lecture	Diary	Flipped classroom
	Interviews	Flipped classroom /conventional
	Questionnaire C	Flipped classroom /conventional
	Observation	Conventional

Aim	Method	Group
Students' approach to classroom activity	Interviews	Flipped classroom /conventional
	Observation	Flipped classroom /conventional
	Questionnaire C	Flipped classroom /conventional
Explore students' approach to studying outside classroom	Questionnaire C (duration)	Flipped classroom /conventional
	Diary	Flipped classroom /conventional
	Interviews	Flipped classroom /conventional
RQ3		
Explore motivational and hindering factors	Open-ended questionnaire B	Flipped classroom
	Interviews	Flipped classroom
Explore factors affecting students' experience	Open-ended questionnaire	Flipped classroom
	Interviews	Flipped classroom
	Closed-ended questionnaire B	Flipped classroom

4.8 Validity and reliability of the data

This section highlights aspects related to the validity and reliability of methods used in this study. Qualitative and quantitative research designs have different criteria for assessing these two concepts. In qualitative data, validity involves honesty, objectivity, depth, richness and scope of the data, and the extent of triangulation (Winter, 2000). In quantitative data, validity can be achieved with suitable sampling and appropriate tools and statistical methods (Bryman, 2012).

It is important to note that it is difficult to confirm that a study is 100% valid (Cohen, et al., 2007), but I tried to maximise the research's validity by assuring accuracy of the data and procedures. In addition, avoiding being selective in reporting data and focusing on what actually happened have helped to increase the validity of the work. Data selected were as representative of the whole data set as possible and represent different points of views. Triangulation of methods is used extensively in this research study, as this increases the internal validity (Silverman, 2013).

For external validity, which refers "to the degree to which the results can be generalized to the wider population, cases or situations" (Cohen, et al., 2007, p 133), in quantitative research the variables must be controlled and isolated, and samples must be randomised. However, controlling variables and randomising the sample were not viable in this research study, as discussed earlier in Section 4.3. As a result, there is no attempt made to generalise the findings of this study.

With regard to qualitative data, the term external validity includes transferability and comparability. It is possible to assess the participants and settings in this study to assess the possibility of comparison and transferability into different settings (Cohen, et al., 2007). To achieve this, as many details as possible and thick descriptions are provided so that others can determine the degree of transferability of the findings to another setting.

Reliability refers "to the degree of consistency with which instances are assigned to the same category by different observer or the same observer on different occasions" (Silverman, 2013, p 282). The meaning of reliability differs in quantitative and qualitative research. Quantitative research assumes the possibility of replication, with similar results found if the research were carried out on a similar group and a similar context. However, purists critique the need for this in qualitative research, arguing that different findings from a single setting can be reliable if the methodology is valid. In qualitative research, reliability involves fidelity to real life, authenticity, comprehensiveness, consistency, neutrality, and meaningfulness to the respondents (Silverman, 2013; Seale, 1999). To ensure reliability of the qualitative data, I have documented the procedures and categories used consistently (Seale, 1999).

Regarding quantitative data, internal consistency was used to measure reliability using Cronbach's alpha in SPSS software (Pallant, 2016).

4.9 Ethical considerations

This section discusses the ethical issues in this study and important steps taken to address them. In the initial stages of this study, ethical approval for the entire project was obtained from the Ethics Committee in the School of Education, University of Edinburgh. In addition, permission to gain access to the research context in Saudi Arabia and to carry out the research there was obtained from the instructors of the course and from the Dean of the College of Education.

The flipped classroom was used for the first time in the context of this study. As a result, a full description of the method was provided to students during the registration period, and an announcement was published on the school announcement page. Students self-registered for the course, thus they had the opportunity to choose between a flipped classroom cohort and a conventional cohort. Students were also able to transfer to another cohort depending on cohort capacity.

In terms of informed consent, students' consent to participate was obtained after the purpose of the study, procedures, possible benefits, the right to withdraw, the right to confidentiality, and the right to ask questions about any aspect of the research were explained to them (Creswell, 2013; Cohen, et al., 2007). An informed consent form that participants signed to show their agreement to the previous provisions was developed in the Arabic language, the mother tongue of the participants. The culture of the participants was respected by avoiding video recording of both students and instructors.

A potential ethical issue considered in this study is confidentiality and anonymity. This issue was resolved by ensuring that anonymity and confidentiality are maintained. Since students used their real names in data collection instruments, it is possible that their names might appear in the analysis. Therefore, it was ensured that the given data were covered by a non-disclosure agreement and protected, and they were to be used only for this research. All the gathered data were stored securely on my devices. In the research report, no participant names or other personally identifiable information were used, and the instructor's names were changed to avoid their being recognised. Moreover, the name of the university was kept anonymous in this study, as it may render the participants identifiable.

It was anticipated that participants might express concern that information they gave could affect their grades. Therefore, I assured participants that all data would be protected, and access to them prohibited to any other party, including the instructors.

4.10 Chapter summary

This study was designed to compare two groups taught via a flipped classroom and a conventional method as part of work to answer the first and second research questions. However, it focusses on learners' experiences in the flipped classroom group in the third research question. A mixed-methods approach was used, as data were gathered via students' marks, questionnaires, students' diaries, interviews, and observation to achieve an overall understanding of students' behaviours inside and outside the classroom. To investigate students' experiences in the flipped classroom, both questionnaires and in-depth interviews were used. The next four chapters present these findings in detail.

CHAPTER FIVE: RQ1 FINDINGS

STUDENTS' LEARNING AND ATTITUDES

5.1 Introduction

This chapter investigates the effectiveness of the flipped classroom approach in higher education by evaluating and comparing two groups – a flipped classroom group and a conventional method group – in terms of two variables: academic achievement and attitude toward learning. Two tools were used here: teacher reports of students' marks and a survey that assessed students' attitudes. This chapter consists of two sections: findings on students' academic achievement and findings on students' attitudes toward the learning method. Each section presents descriptive statistics and then compares the student groups using inferential statistics.

5.2 Students' academic achievements

5.2.1 Overview

This section compares students' academic achievement in the two groups (flipped classroom and conventional method) using their final marks. The data gathered from instructors' reports include marks of 491 students – 234 students from the flipped classroom group and 257 students from the conventional method group. The full mark was 100, and students needed to achieve 60% to pass the course.

5.2.2 Descriptive statistics

The descriptive data for students' total marks show a notable similarity between the two groups. As presented in Table 5.1, the mean of total marks is 79.9 for both groups, with a standard deviation of 10.1 in the flipped classroom group and 9.4 in the conventional group. The median is 80 for both groups. The highest marks in the two groups are similar (98 and 96), and the lowest mark in both groups is 45. This similarity clearly suggests that there is no significant difference in marks between the groups. Inferential statistics are presented below to confirm this finding.

Table 05-1 Mean, median, maximum, and minimum values and standard deviations for students' total marks

	n	**Mean**	**Standard deviation**	**Max**	**Min**	**Median**
Flipped classroom	234	79.87	10.13	98	45	80
Conventional	257	79.92	9.40	96	45	80

5.2.3 Testing normality

Normality was tested visually and by testing the data's skewness and kurtosis. First, the histograms, and normal Q-Q plots, and box plots illustrated in Figures 5.1, 5.2, and 5.3 show that the data sets are normally distributed for both the flipped classroom and conventional class groups.

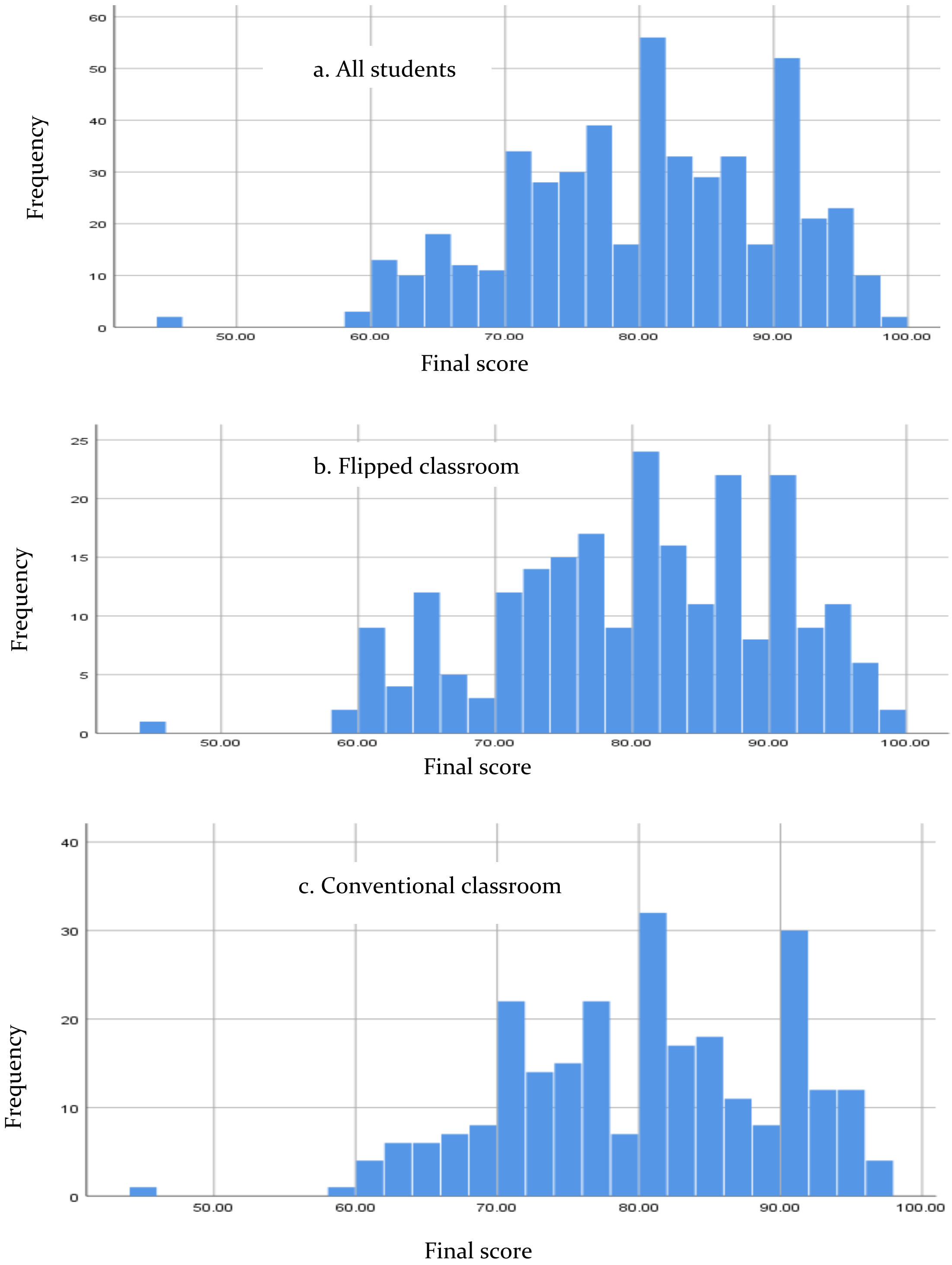


Figure 5-1. Histograms of the final marks data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.

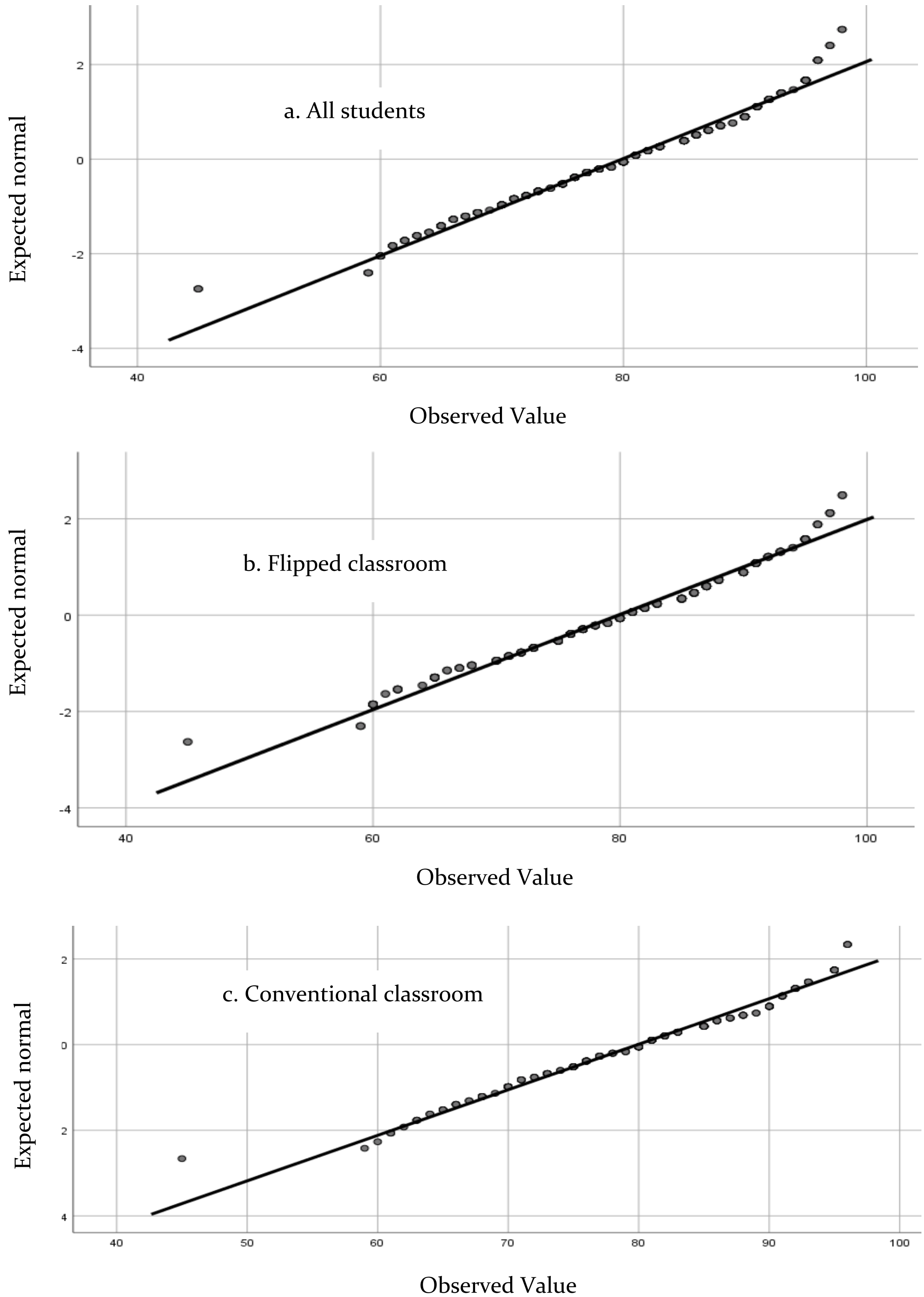
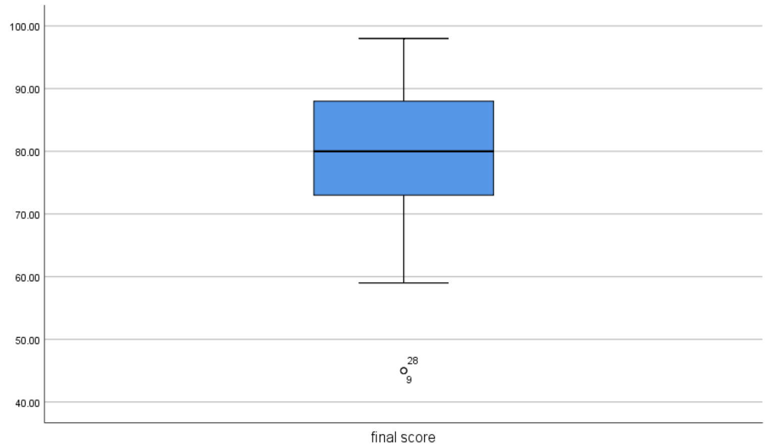


Figure 5-2: Normal Q-Q plots of the final marks data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.



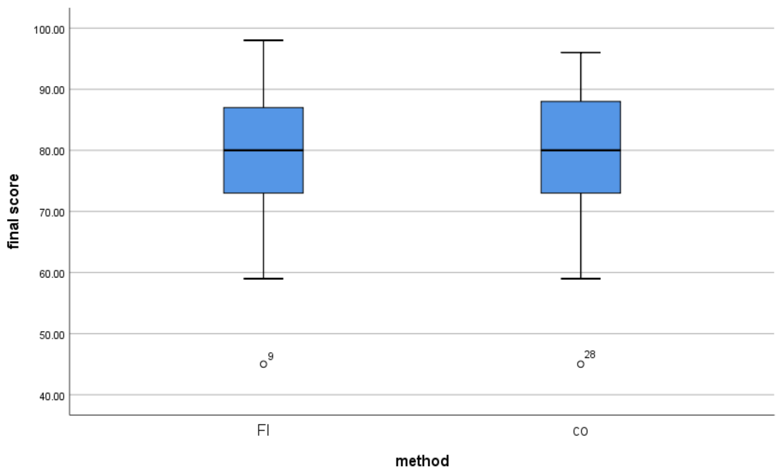


Figure 5-3: Box plots of the final marks data for a) all students and b) the flipped classroom group (left) and the conventional classroom group (right).

Normality was also tested by determining kurtosis and skewness values for the data sets of the two groups. As the sample is medium sized, the z-value should be between -3.29 and +3.29 in normally distributed data (Kim, 2013). The z-values of skewness are -2.47 for the flipped classroom group and –2.05 for the conventional group. As these values are between -3.29 and 3.29, these data sets are not skewed and do not differ from normality. The z-values of kurtosis are -1.08 for the flipped classroom group and -1.06 for the conventional group, as listed in Table 5.2. These values indicate that the distributions of these data sets do not differ from normality.

Table 5-2. z-values for kurtosis and skewness

Method	Skewness	Skewness Std. error	S/Std. error	Kurtosis	Kurtosis Std. error	K/Std. error
All students	-.354	.110	-3.22	-.328	.220	1.49
Flipped classroom	-.392	.159	-2.47	-.345	.317	-1.08
Conventional	-.311	.152	-2.05	-.322	.303	-1.06

5.2.4 Inferential statistics

A t-test was used to compare the students' total marks in the two groups. I chose this parametric test for two reasons. First, the data set was normally distributed, and a parametric test is a suitable choice in such cases (Fielding and

Gilbert, 2006). Second, a *t*-test is used to compare two independent sets of data, which is the case here.

I ran a *t*-test in SPSS software to compare the two groups (flipped classroom and conventional method). As illustrated in Table 5.3, equal variances are assumed, as the significance value of Levene's test is .274 (> .05). The two-tailed *t*-test showed that there is no significant difference in students' marks between the flipped classroom group (M = 79.87, SD = 10.13) and the conventional classroom group (M = 79.92, SD = 9.40), p = .955 (> .05), $t(489)$ = -0.057.

Table 5-3. Results of *t*-tests

	Levene's Test for Equality of Variances		*t*-test for Equality of Means						
			T	*Df*	Sig.(2-tailed)	Mean Differen-ce	Std. Error Differe-nce	95% Confidence Interval of the Difference	
	F	Sig.						Lower	Upper
Equal variances assumed	1.199	.274	-.057	489	.954	-.05038	.88178	-1.7829	1.68215

5.3 Students' attitudes toward teaching methods

5.3.1 Overview

This section investigates students' attitudes toward the flipped classroom and conventional classroom methods. Students' attitudes toward the four components of the learning methods were also surveyed to identify the elements that determined their attitudes. These components are video lectures, face-to-face lectures, classroom activities, and the combination of video lectures with class activities as used in the flipped classroom method. The survey explored students' attitudes toward these elements in terms of enjoyment, ease, and usefulness. It also assessed their attitude toward change, in addition to assessing their attitude toward the method they experienced in the course and their views about using that method in the future. A 5-point Likert scale survey was used that contained 15 items, each of which featured five answer choices: *strongly agree*, *agree*, *neutral*, *disagree*, and *strongly disagree*.

5.3.2 Comparing the two groups using descriptive statistics

This section uses descriptive statistics to explore students' attitudes and compare the two groups. Minimum and maximum values, medians, and frequencies are used to describe students' responses for each item. The five response choices were given values as follows: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*.

Students' attitudes toward the teaching method

Before presenting the findings on students' attitudes toward the teaching method used, I explore students' attitudes about changing the learning method used in the classroom. Students' responses to the item "changing the learning method is **in**convenient" do not differ markedly between the two groups, as both groups have a median of 3 (neutral), and the difference between the means of the two groups' responses is small. The percentage of students who disagreed with this statement is 45% in the flipped classroom group and 41% in the conventional group, whereas the percentages of students who agreed with the statement in the two groups are 24% and 30%, respectively. These data do not indicate a notable difference between the two groups, as in both groups, more students tended to accept changing the teaching method.

I now investigate students' attitudes toward the teaching method they experienced in their classroom and their willingness to use that method in the future. In other words, investigating the flipped classroom group attitude toward flipped classroom, and conventional group attitude toward the conventional method. First, students' selections vary between *strongly agree* and *strongly disagree* in the two groups. The descriptive analysis shows differences between the groups, as illustrated in Table 5.4. The median of students' responses in the flipped classroom is 4, which is higher than the median value of 3 for students in the conventional group. Moreover, the means are also higher in the flipped classroom group than in the conventional group.

Before presenting findings about the attitudes of students in the conventional classroom toward the flipped classroom method, it is important to note that they did not have direct experience with this method but did have previous knowledge of it before applying the study. The survey shows that their attitudes did not differ much from their attitudes toward the conventional method used in their classroom. Comparing their attitudes with those held by the flipped classroom group of students shows that the mean and the median for the latter group are slightly higher.

Table 5-4: Maximum and minimum values, means, standard deviations, and medians of students' attitudes toward learning methods

Item	Method	*N*	Max	Min	Mean	Std. Deviation	Median
Difficulty of changing method	Flipped	195	5	1	2.63	1.28	3
	Conventional	207	5	1	2.85	1.29	3
Satisfaction with method experienced	Flipped	190	5	1	3.72	1.10	4
	Conventional	198	5	1	3.03	1.24	3
Willing ness to use experienced method in future use	Flipped	190	5	1	3.63	1.27	4
	Conventional	198	5	1	3.33	1.27	3
Attitude toward flipped classroom	Flipped	190	5	1	3.72	1.10	4
	Conventional	202	5	1	3.09	1.12	3

In examining the frequency of students' responses related to the teaching method they experienced and their willingness to use it again in the future, it is notable that in the flipped classroom group, students with a positive attitude outnumbered those with a negative attitude (60% and 14%, respectively; 60% and 20%, respectively, for future use). Among students taught with the conventional method, the percentage of students with a positive attitude is nearly like the percentage with a negative attitude (38% and 34%, respectively). In this group, however, more students preferred to use the conventional method in the future than those who do not (46% and 25%, respectively).

In comparing the two groups, it is clear that the percentage of students with a positive attitude toward the teaching method they experienced is higher in the flipped classroom group than in the conventional method group (60% and 38%, respectively). The negative attitude is the opposite (14% in flipped classroom and 34% in conventional method). This result suggests that students' acceptance of the method they experienced was higher in the flipped classroom than that in the conventional classroom. Figure 5.4 illustrates students' selections in the two groups.

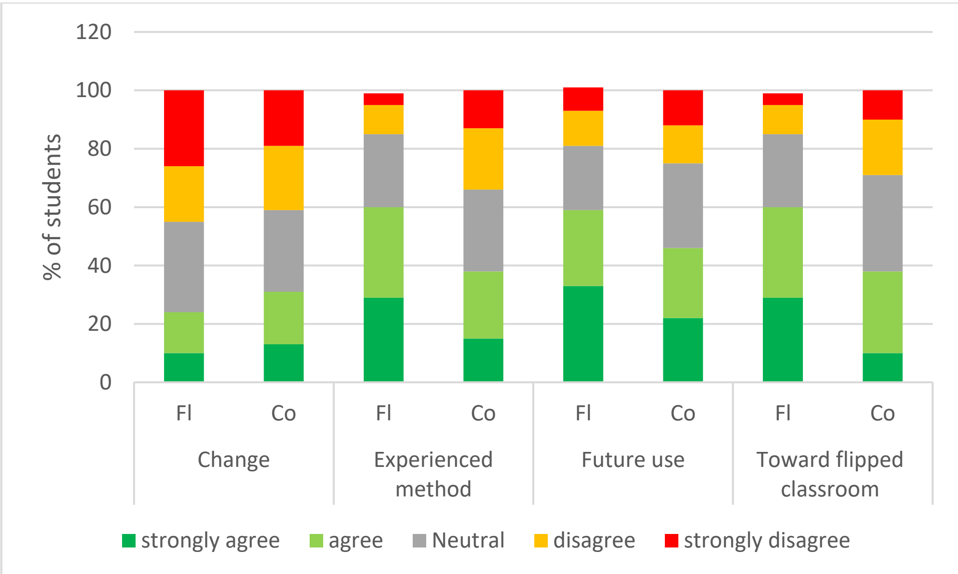


Figure 5-4: Students' attitudes toward learning methods.

Students' attitudes toward video lectures

Three aspects of students' attitudes toward video lectures were investigated: the extent to which students found video lectures enjoyable, easy, and useful. It is important to highlight that students in the conventional classroom did not experience video lectures, but they had prior knowledge of such lectures and knew they were used in other classrooms. In general, students' opinions varied, as their selections in response to these three items range from *strongly agree* to *strongly disagree* in both groups. However, descriptive analysis reveals specific differences between the two groups, as presented in Table 5.5. The medians of the responses by students in the flipped classroom to questions asking whether they found the video lectures enjoyable and useful are 4, whereas the medians of the responses to these questions in the conventional group are both 3. For both groups, the median of the responses to the question about ease of use is 3. For all three items, the mean student response of the flipped classroom group is greater than that of the conventional group (Table 5.5).

Table 5-5: Maximum, and minimum values, mean, standard deviations, and median of students' attitudes toward video lectures for flipped classroom group(FL)and conventional class group (Con)

	Method	***N***	**Max**	**Min**	**Mean**	**Std. Deviation**	**Median**
Enjoyable	Fl	196	5	1	3.78	1.1	4
	Con	205	5	1	2.87	1.27	3
Easy	Fl	195	5	1	3.37	1.16	3
	Con	203	5	1	2.61	1.15	3
Useful	Fl	195	5	1	3.73	1.15	4
	Con	203	5	1	2.66	1.3	3

With regard to the frequency of responses, most students in the flipped classroom group agreed or strongly agreed that the videos were enjoyable and useful (65% and 63%, respectively), whereas fewer students disagreed (12% and 13%, respectively). However, in terms of ease of use, the gap was smaller, as about 46% of students found it easy to study using these videos, whereas 22% disagreed.

Among students in the conventional method group, who did not have video lectures, students did not find such videos particularly enjoyable or useful are 40% and 48%, respectively. However, the percentages of students with positive attitudes about these two features are almost as large: 35% and 33%, respectively. With regard to ease to learn by video lectures, about one-half of the students disagreed, whereas less than one-quarter of them agreed.

In comparing the two groups, students from the flipped classroom group had more positive attitudes toward video lectures than did students in the conventional group. Figure 5.5 illustrates students' answer selections in the two groups.

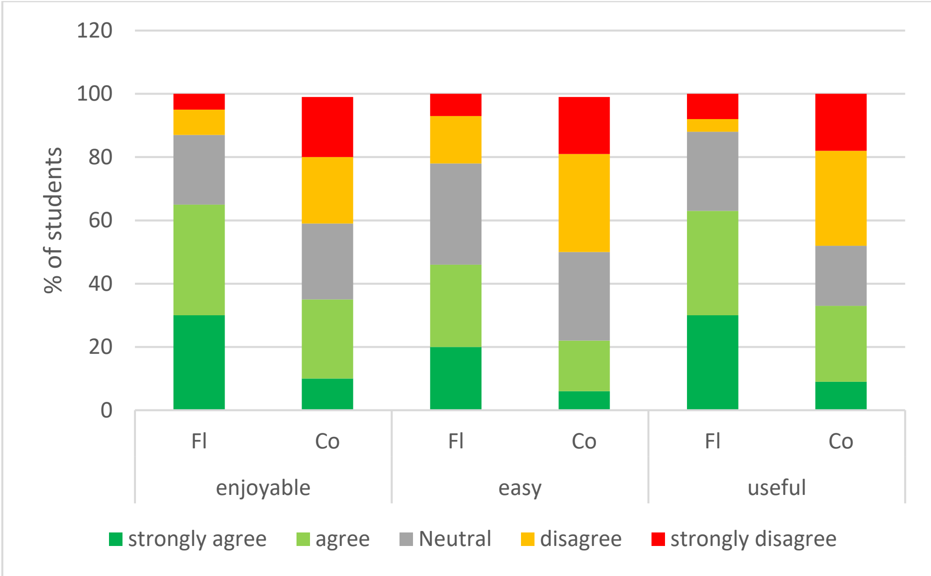


Figure 5-5: Students' attitudes toward video lectures.

Students' attitudes toward face-to-face lectures

The aspects of video lectures previously investigated – the extent to which students found them enjoyable, easy, and useful – were also investigated for face-to-face lectures in both groups. It is important to mention that students in the flipped classroom group were familiar with face-to-face lectures, having used them in other courses, but video lectures used in this course were a new experience for most of these students. As illustrated in Table 5.6, students' responses vary between *strongly agree* and *strongly disagree*. Descriptive analysis shows some differences between the two groups in the enjoyableness, ease to study, and usefulness of face-to-face lectures. The median of the conventional group responses is higher than that of the flipped classroom group responses: 4 and 3, respectively. The mean is also greater in the conventional group than in the flipped classroom group.

Table 5-6: Maximum and minimum values, means, standard deviations, and medians of students' attitudes toward face-to-face lectures

Face-to-face lecture	Method	*N*	Max	Min	Mean	Std. Deviation	Median
Enjoyable	Fl	194	5	1	3.39	1.05	3
	Con	204	5	1	4	0.95	4
Easy	Fl	192	5	1	3.42	1.04	3
	Con	203	5	1	4.16	0.86	4
Useful	Fl	192	5	1	3.36	1.05	3
	Con	202	5	1	3.97	0.94	4

Examining the frequency of flipped classroom student responses related to whether they found face-to-face lectures enjoyable, easy, and useful reveals that about one-half of students (44%, 45%, and 47%, respectively) did find these lectures enjoyable, easy, or useful, whereas a smaller number of students did not (19%, 17%, and 19%, respectively). Most students from the conventional method classroom agreed or strongly agreed that face-to-face lectures were enjoyable, easy, and useful (71%, 82%, and 75%, respectively). Few students in this group disagreed or strongly disagreed (7%, 5%, and 5%, respectively). Within both groups, more students responded positively than negatively on these items. However, the positive trend is notably higher in the conventional group than the flipped classroom group. Figure 5.6 illustrates students' responses to these questions.

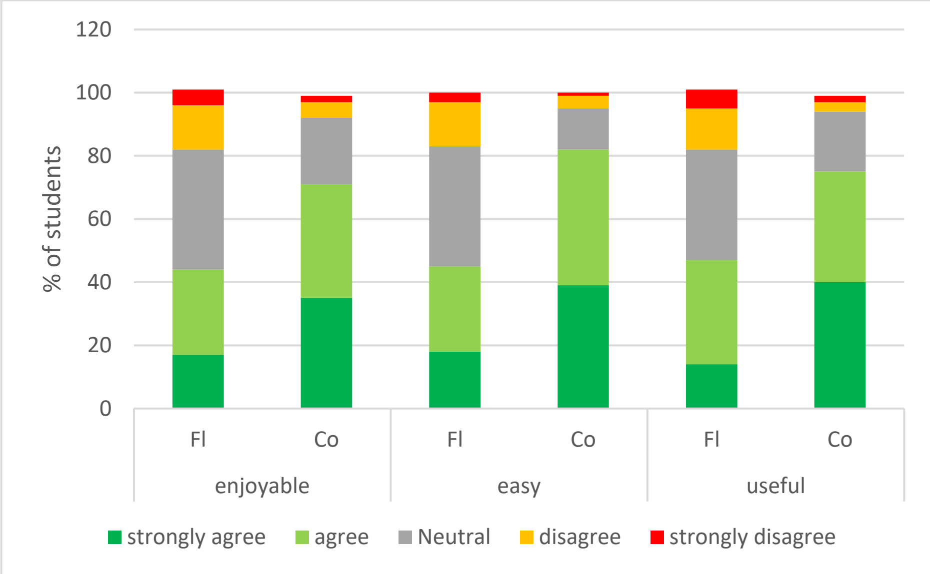


Figure 5-6: Students' attitudes toward face-to-face lectures.

Students' attitudes toward classroom activities

The three aspects of enjoyableness, ease, and usefulness were investigated for classroom activities in both groups. Before I present the findings, it is important to mention that the activities the two groups of students experienced differed in terms of task type, duration, and number. Descriptive statistics show that students' selections vary between *strongly agree* and *strongly disagree*. Responses of the two groups show some similar trends. In both groups, the median of students' responses is 4, which means *agree*. The mean of students' responses is slightly higher in the flipped classroom group than the conventional group (see Table 5.7).

Table 5-7: Maximum and minimum values, means, standard deviations, and medians of students' attitudes toward classroom activities

Classroom activity	Method	*N*	Max	Min	Mean	Std. Deviation	Median
Enjoyable	Fl	194	5	1	3.87	1.03	4
	Con	205	5	1	3.45	1.20	4
Easy	Fl	195	5	1	3.69	0.94	4
	Con	203	5	1	3.43	1.07	4
Useful	Fl	192	5	1	3.83	0.94	4
	Con	201	5	1	3.46	1.01	4

Examining the frequency of students' responses reveals that most students in the flipped classroom group (70%, 64%, and 69%, respectively) viewed classroom activities positively, whereas few students (13%, 10%, and 9%, respectively) had a negative attitude. Within the conventional method group, about one-half of students had a positive attitude toward the three aspects of classroom activities (54%, 53%, and 54%, respectively), with negative attitudes expressed by 21%, 17%, and 14% of students, respectively. In both groups, the percentage of students with positive attitudes is higher than that of students with negative attitudes. However, the positive trend is more pronounced in the flipped classroom than in the conventional classroom. Figure 5.7 illustrates students' selections related to classroom activities.

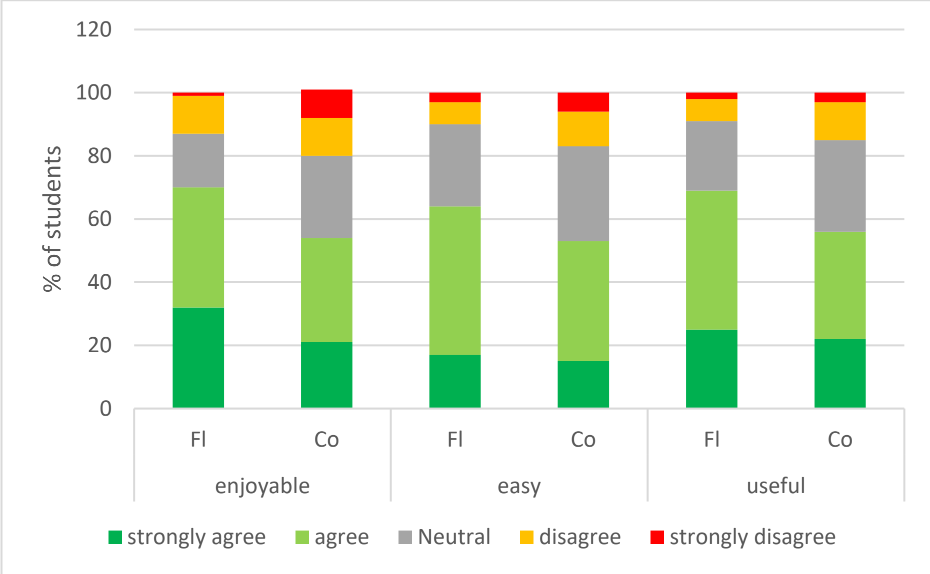


Figure 5-07: Students' attitudes toward classroom activities.

Students' attitudes toward combining video lectures with classroom activities

The previously mentioned aspects of enjoyableness, ease, and usefulness were investigated for the combination of video lectures and classroom activities, a combination that was used in the flipped classroom but not in the conventional classroom. As illustrated in Table 5.8, students' selections vary between *strongly agree* and *strongly disagree*. However, the median response value in the flipped classroom is 4, which is higher than that in the conventional group (median = 3). The mean of students' responses is also higher in the flipped classroom group than in the conventional group for these three aspects.

Table 5-8: Maximum and minimum values, means, standard deviations, and medians of students' attitudes toward combining video lectures with classroom activities

	Method	*N*	Max	Min	Mean	Std. Deviation	Median
Enjoyable	Fl	193	5	1	3.70	1.13	4
	Con	205	5	1	3.14	1.17	3
Easy	Fl	196	5	1	3.80	1.07	4
	Con	205	5	1	3.07	1.10	3
Useful	Fl	191	5	1	3.72	1.07	4
	Con	202	5	1	3.09	1.12	3

Analysing the frequency of responses from students in the flipped classroom group reveals that most students found the combination of video lectures with classroom activities enjoyable and useful (64% and 61%, respectively), with fewer students reacting negatively (17% and 13%, respectively). This situation is almost the same as that seen for the video lectures. For the factor ease of use, however, responses differ somewhat from those seen for video lectures. The percentage of students responding positively in terms of this factor was 46% for videos; it is 63% for the combination of videos with classroom activity. The percentage of students responding negatively to this factor was 22% for videos but is only 9% for the combination.

For students in the conventional method group, 40%, 35%, and 38%, respectively, had positive attitudes about the enjoyableness, ease of use, and usefulness of the combination of video lectures with classroom activities. These numbers are almost the same as those seen for video lectures. However, the percentages of students with negative attitudes about the enjoyableness, ease, and usefulness of the combination are lower than the figures seen for only video lectures: 40%, 49%, and 48% for video lectures compared to only 28%, 28%, and 29%, respectively, for the combination. This outcome indicates the importance of the combination of videos and in-class activity.

In comparing the two groups, more students from the flipped classroom group had positive attitudes about combining video lectures with classroom activity than did students in the conventional group, who did not experience this combination in the classroom. Figure 5.8 illustrates students' selections in the two groups.

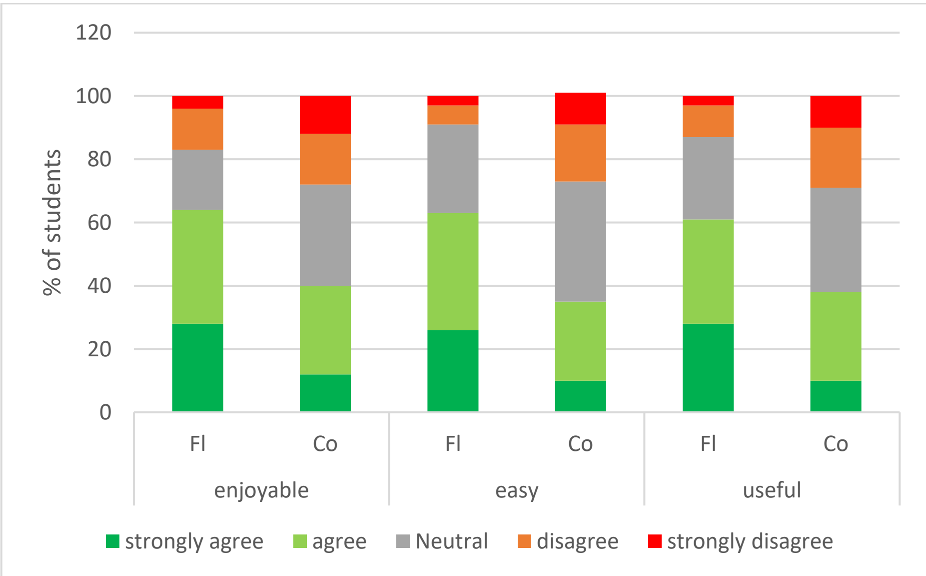


Figure 5-8: Students' attitudes toward combining video lectures with classroom activities.

5.3.3 Comparing the two student groups using inferential statistics

For each item of questionnaire, I used a Mann-Whitney test to compare the students' attitudes in the two groups (flipped classroom and conventional method). I chose this non-parametric test because the data in this survey are ordinal, and this test is the appropriate choice for comparing two independent samples (Pallant, 2016).

Mann-Whitney U tests, performed with SPSS software, showed differences between the groups in all items except "changing the learning method is inconvenient". For this one item, the test scores indicated no significant difference between responses from the flipped classroom group (mean rank = 246.98, $n = 234$) and those from the conventional method group (mean rank = 245.11, $n = 257$), $U = 29{,}840.5$, $z = -0.146$, $p = .88$ ($> .05$).

On the other hand, the Mann-Whitney tests indicated significant differences between the groups for all other questionnaire items, with $p < .05$ (see results in Tables 5.9, 5.10, 5.11, and 5.12). To quantify the size of the difference between the two groups, I used the effect size equation: $r = z/\sqrt{N}$. The results showed small to medium-sized effects according to Cohen's (1988) definitions of small effects as .10 – <.30, medium as .30 – <.50, and large as ≥.50 (Pallant, 2016; Mangiafico, 2016). For students' attitudes toward the classroom method they experienced and their willingness to use it in the future, the effect size is small. For students' attitudes toward video lectures, face-to-face lectures, and the combination of videos with classroom activity as used in flipped classroom, the effect sizes are medium. However, the effect size is small for students' attitudes toward classroom activities. This suggests that the recorded lectures and face-to-face lectures were more significant than classroom activities in determining students' attitudes toward the learning method. Tables 5.9, 5.10, 5.11, 5.12, and 5.13 provide more detailed results.

Table 5-9: Mann-Whitney *U* test for students' attitudes toward video lectures

	n	**Mean Rank**	***U***	***z***	***p***	$r = z/\sqrt{N}$	**Effect Size**
Enjoyable	Fl = 196 Con= 206	Fl = 243.39 Con = 161.64	11,977.0	-7.24	.00	.36	medium
Easy	Fl = 196 Con= 207	Fl = 238.80 Con = 167.16	13,073.5	-6.34	.00	.32	medium
Useful	Fl = 195 Con= 204	Fl = 238.81 Con = 162.9	12,321.5	-6.746	.00	.33	medium

Table 5-10: Mann-Whitney *U* test for students' attitudes toward face-to-face lectures

Face-to-face	*n*	Mean Rank	*U*	*z*	*p*	*r*	Effect size
Enjoyable	Fl = 194 Con= 206	Fl = 166.35 Con = 232.66	26,607.50	5.967	.00	.30	medium
Easy	Fl = 196 Con= 207	Fl = 160.89 Con= 240.92	28,343.00	7.20	.00	.36	medium
Useful	Fl = 194 Con = 203	Fl = 159.13 Con=237.1	27,426.0	7.05	.00	.35	medium

Table 5-11: Mann-Whitney *U* test for students' attitudes toward classroom activities

Activity	*N*	Mean Rank	*U*	*z*	*p*	*r*	Effect Size
Enjoyable	Fl = 194 Con = 205	Fl = 219.95 Con = 181.12	16,014.00	-3.49	.00	.17	small
Easy	Fl = 195 Con = 203	Fl = 212.64 Con = 186.88	17,230.0	-2.35	.018	.12	small
Useful	Fl = 192 Con = 201	Fl = 207.96 Con = 186.53	17,191.5	-1.97	.049	.10	small

Table 5-12: Mann-Whitney *U* test for students' attitudes toward combining video lectures with classroom activities

	n	Mean Rank	*U*	*z*	*p*	*r*	Effect Size
Enjoyable	Fl = 193	Fl = 227.59	14,362.00	-4.88	.00	.24	small
	Con= 205	Con = 173.06					
Easy	Fl = 196	Fl = 238.18	12,803.0	-6.52	.00	.33	medium
	Con= 205	Con = 167.45					
Useful	Fl = 191	Fl = 228.24	13,325.00	-5.48	.00	.28	medium
	Con= 202	Con = 167.47					

Table 5-13: Mann-Whitney *U* test for students' attitudes toward learning

	N	Mean Rank	*U*	*z*	*p*	*r*	Effect Size
Experienced method	Fl = 190	Fl = 223.52	13,297.00	-5.14	.00	.26	small
	Con = 198	Con = 166.66					
Future	Fl = 190	Fl = 208.15	16,216.00	-2.42	.061	.12	small
	Con = 198	Con = 181.40					

5.4 Chapter summary

Learners' total marks were compared as a proxy for acquisition of knowledge. The descriptive and inferential findings showed similarity between the groups. In the descriptive analysis, the means of total marks are about the same for both groups: M = 79, SD = 10.1 and M = 7.9, SD = 9.4. In the inferential analysis, a t-test showed no significant differences between the two groups. It therefore can be concluded that the choice of method used had no clear effect on final marks.

The second part of the chapter reported survey results investigating learners' attitudes toward the flipped classroom and conventional methods. The data suggest that both sets of learners were more accepting of the method they had just experienced than they were of the other method. The students' views about the video lecture, face-to-face lecture, and classroom activity showed a difference between the two groups, but this difference is not considered large. The data also show that students' attitudes toward having face-to-face lectures or recorded lectures may shape their attitudes toward the learning method.

The implications of these findings in relation to the first research question is discussed in Chapter Nine. Although there is no significant difference in marks between the two methods, there is a slight difference in learners' attitudes, which may influence how students behave when implementing a flipped classroom. This is explored in the following chapter.

CHAPTER SIX: RQ2 FINDINGS

STUDENTS' USE OF TIME

6.1 Introduction

This chapter presents the findings related to the second research question: is there any difference in the use of time and the approach to studying between students who take a flipped class and a conventional class? Answering this question required determining how students used their time and investigating how they approached studying in different situations for both the flipped classroom and conventional method groups and then comparing the findings for the two groups. The different situations addressed include students' behaviours during lectures (face-to-face or video lectures), during classroom activities, and when they were studying outside the classroom. Several tools have been used to collect the needed data: field notes, students' diaries, interviews, focus groups, surveys, and Blackboard reports.

The focus of the first section is on students' use of time inside the classroom. It includes identifying the teaching activities used for each method and calculating the actual time spent on each activity. The subsequent three sections focus on students' approaches during lectures, classroom activities, and self-study.

6.2 Teaching activities inside classroom

In this section, I initially identify the different teaching activities used in the two groups and compare them across groups. I then calculate the time students spent in these activities and compare the totals. The data for this section were collected by observing student cohorts taught by three instructors. Each instructor taught both flipped classroom cohorts and conventional class cohorts. Doing so, gives an opportunity to investigate how different instructors can affect the use of time in a flipped classroom.

6.2.1 Teaching activities inside the classroom

Data from field notes allowed me to identify five main teaching activities engaged in: lecturing, student presentations, group discussions, classroom discussion, and questions. This subsection describes these teaching activities and highlights the observed differences between the instructors, if applicable.

Before I describe these activities, it is important to mention that some were common to both methods but were implemented differently in the two methods in terms of duration, order, or execution. The three instructors followed the same strategies in general, but there were differences in their characteristics and their approaches to motivating students.

In the conventional method classroom, 150 minutes were assigned for face-to-face interaction: 100 minutes for lecture and 50 minutes for classroom activities. Although the first session was mainly lecturing, it included other teaching activities such as student presentations, group discussions (sometimes), class discussion, and students' questions. The second session was mainly classroom activity, which included group discussion and class discussion.

The first session usually started with the instructor's greeting students and collecting attendance. At times, however, collecting attendance was postponed to the end of class time based on an instructor's preference. Instructors spent most of the class time lecturing. However, the first session usually also involved student participation in class discussion or in answering questions raised by the instructor. Because of this student participation, the term "interactive lectures" may be more appropriate. During lectures, instructors used three types of questions to elicit student participation. The first type was a question meant to hold students' attention. These required short answers, and usually a number of students would answer them at the same time. The second type of question was based on previous information or experience, usually required an answer of one or more sentences, and one student responded at a time. The third question type asked about students' opinions. Student answers were generally longer than answers to the first two types of questions, and more than one student participated in the discussion. The three instructors used these types of questions to different extents. All instructors used the first and the second types, but the instructor Sarah used the third type more often than the other instructors.

Another teaching activity during lecture time was group discussion. This was implemented by the instructor Emily, who would ask students to discuss a question in a group of six or seven for several minutes. This happened midway through the lecture time, and the instructor continued lecturing afterwards. Moreover, during lecture time, instructors sometimes used videos, websites, or software as examples. These were used by all three instructors; however, flipped classroom students had to browse these materials by themselves.

Another important part of class time is responding to students' questions. Students usually ask two types of questions: questions about the lesson or general questions about the course. The first type of question could be asked at any time during the lecture or at the end. The second type of question was usually asked at the end of the lecture. These questions were mainly about assignments, examinations, and marks. After the class, some students approached the instructor individually to ask questions. This scenario happened with all three instructors, and in the flipped classroom, with minor differences.

Another teaching activity during class time involved student presentations. About five to seven students would present a topic which was not necessarily related to the particular lesson of that class session. The presentations usually lasted for 10 to 15 minutes. Student presentations typically occurred after the lecture, but the instructor Sarah had students make their presentations before she started the lecture. Student presentations are also a common teaching activity in the flipped classroom method, but in the flipped classroom, students make presentations during the in-class activity session.

For the second classroom session in the conventional method classroom, students had 50 minutes for classroom activities, which were managed by a teaching assistant. The second sessions usually began with greetings and the taking of attendance. Classroom activity was the main portion of the second session, as students worked in groups of five to seven members to complete a common task. The activity was usually one long task that lasted for 20 to 30 minutes. Some examples of these tasks were designing educational multimedia, developing educational multimedia using software, evaluating teaching aides, and discussing a problem related to digital education and finding solutions. Each group was required to submit a written conclusion at the end of class. After group work time, students discussed their conclusions with other groups. This lasted for 5 to 10 minutes, which included brief feedback from the teaching assistant. At the end of class, the teaching assistant collected activity papers and answered students' questions.

In the flipped classroom group, students had less face-to-face class time, as they had only 100 minutes for classroom activity, since they were required to watch recorded video lectures before class time. The activity class usually began with greetings and collecting attendance, but attendance was sometimes postponed to the end of class. Before starting the activity, instructors answered students' questions about that day's particular lesson. Usually, students then completed the activity in groups of five to seven members. Each group shared one or two activity sheets, each of which contained four to seven tasks. Examples of these tasks were designing learning multimedia using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), developing learning videos, discussing advantages and disadvantages of a new technology, evaluating a learning poster, and discussing a current educational issue in schools. Students worked on each task within their groups for 3 to 10 minutes, then engaged in a discussion with the instructor and other groups for about 5 minutes before moving to the next task. All tasks had to be submitted after class, usually in the form of a written conclusion.

As in the conventional classroom, after completing the activity, students asked two types of questions: questions about the day's lesson or general questions about the course. Students asked the first type of question before starting the activity, during the activity, or at the end of the activity. Questions of the second type, however, were usually asked at the end. The second type includes questions about assignments, examinations, and marks. Some students also approached the instructor individually after class with questions. This scenario was similar to that seen in the conventional method classroom; students asking questions before the activity was the only minor difference.

From the descriptions above, it is clear that the main difference between the groups in this setting is the absence of face-to-face lecture in the flipped classroom. In comparing this classroom component to recorded video lectures in the flipped classroom, the face-to-face lecture also involves two-way teacher–student interactivity, whereas the video lecture is a one-way connection only, from the instructor to students. However, the classroom activity is used in both methods with some changes in the number of tasks and the duration of each task.

Many teaching activities are common to both groups, either in the same scenario or with minor differences, such as student presentations and asking questions of the students. The differences in time spent on these teaching activities are presented in the next subsection.

6.2.2 Time spent in lectures and classroom activities

This section compares the two methods in terms of the actual time students spent in each element (lectures and activities). In looking at the designs of the methods, it is clear that the assigned teaching time in the conventional method was greater than that in the flipped classroom method, as 150 minutes were allocated to teach via the conventional method, whereas only 100 minutes were assigned for the flipped classroom, plus additional online video lectures of 20 minutes or less.

To compare the actual amounts of time that students spent on each class, it is important to highlight how much time was spent in sub-teaching activities. This content was presented in the previous subsection. Because these activities can differ between lessons and instructors, the same lesson was observed six times, for six cohorts, in the conventional classroom and flipped classroom for each instructor, to make the comparison as accurate as possible. Table 6.1 shows the total time spent on each element.

Table 6-1: Time spent on teaching activities in flipped classroom and conventional classroom

	Instructor Emily		**Instructor Sarah**		**Instructor Nancy**	
	Fl	**Co**	**Fl**	**Co**	**Fl**	**Co**
Lecturing	21 min	25 min	16 min	27 min	18 min	21 min
Student interaction with instructor	24 min	27 min	10 min	16 min	18 min	22 min
Student interaction with peers	32 min	26 min	26 min	20 min	29 min	20 min
Student presentations	12 min	14 min	13 min	16 min	13 min	11 min
Other activities: watching video, browsing a website	9 min	8 min	9 min	8 min	9 min	9 min
Asking questions about the lesson	6 min	7 min	0 min	0 m	3 min	2 min
Asking questions about grades or assignments	2 min	2 min	5 min	6 min	3 min	4 min
Class duration	100 min	150 min	77 min	125 min	84 min	126 min
Total actual face-to-face teaching time	80 min	109 min	53 min	93 min	67 min	89 min
Total online teaching time	16 min	0 min	16 min	0 min	16 min	0 min

The first element considered is lecturing. In this context, this is understood to mean the instructor talking while the students listen. Both methods use this element but use different means to deliver it. The lecture in the flipped classroom was an online 16-minute narrative MS PowerPoint video. It was precise and brief, focusing on the main points and linking these points with examples. At some points in the video, students were asked to pause for a minute to think about one or more question. In the activity session, some instructors gave a brief lecture summarising the video lecture or emphasising a particular point. This time was considered lecturing.

In the conventional method, the lectures were face-to-face, which allowed more interaction between students and instructor. Discussions could take place when the instructor asked a question or a student commented. I considered this kind of interaction to be another element, "student interaction with instructor", which is discussed in a later paragraph. However, I considered questions that needed only one-word responses and were asked to keep the attention of students during a lecture to be a part of lecturing.

It is clear from Table 6.1 that the lecturing time in the flipped classroom was 16 minutes of video lecture. Two instructors summarised the lesson before starting the activities, with Emily spending 5 minutes and Nancy spending 2 minutes on this task. Taking this into account, the average lecturing time in the flipped classroom was about 18 minutes.

In the conventional method, the lecturing times differed among the different instructors. As Table 6.1 shows, Emily spent a total of 25 minutes lecturing in this particular lesson. Fifteen minutes of that was a lecture that included simple questions asked of the students, and the remaining 10 minutes was pure lecturing with the students passively listening. Sarah spent 27 minutes lecturing, and Nancy spent 21 minutes. Thus, the average lecturing time in the conventional method classroom was 24 minutes, 6 minutes longer than the 18-minute average of lectures in the flipped classroom.

The second element, student interaction with the instructor, refers to time when one or more students are engaged in expressing their ideas and opinions to the instructor and the other students. In both classroom designs, students had the chance to interact with the instructor and other students. In the flipped classroom method, 100 minutes was allocated, which were developed to support this kind of interaction. They usually had a chance to discuss their opinions with the whole class after a peer discussion in groups. In the conventional classroom, a 50-minute session was assigned to allow student interaction. Interaction could also happen, however, during lecture time, depending on the instructor's style of teaching.

Comparing the interaction times of the two methods, it can be seen that in the flipped classroom, students who were taught by Emily spent more interaction time with their instructor (24 minutes) than did their peers who were taught by Sarah or Nancy (20 and 18 minutes, respectively). On the other hand, in the conventional classroom, instructors Emily, Sarah, and Nancy allowed students to spend 17, 6, and 12 minutes, respectively, participating in discussion during the lecture time. In addition, students spent about 10 minutes in class discussion during the activity session after the lecture time. To summarise, the average of the total instructor–student interaction time in the flipped classroom was about 17 minutes, whereas it was about 21 minutes in conventional classes. About 4 additional minutes of student–instructor interaction occurred in the conventional classroom compared to the flipped classroom.

The third element to compare is peer interaction. In the flipped classroom, students worked with their peers in groups before sharing their ideas and findings with the instructor and other groups. Several tasks were assigned to cover the main goals of this lesson. In the conventional method, students worked together on one task; this took place in the activity session after the lecture time. However, instructor Emily practised this kind of activity during lecture time. It can be seen from Table 6.1 that in the flipped classroom, students who were taught by Emily, Sarah, and Nancy spent 23, 26, and 29 minutes, respectively, in peer interaction.

Students taught via the conventional method spent 20 minutes on peer interaction during the activity session. However, the instructor Emily encouraged her students to interact during the lecture time, which gave them an extra 6 minutes of peer interaction compared to students taught by the other two instructors. For this element, the average time in the flipped classroom was 29 minutes, whereas the average in the conventional method was 22 minutes, thus making a difference of 7 minutes. It is important to highlight that this is the only element for which the time spent in the flipped classroom exceeded that of the conventional classroom.

In addition to the main three elements compared above, several other elements must also be accounted for during class time. In both methods, students were asked to present a topic that related to the course. Approximately five students presented each week, giving presentations that usually lasted for 12 to 15 minutes each. Additionally, this observed lesson included extra learning materials: a video clip and a website. In the conventional method, the instructor browsed the website and played the video clip using a data projector while the students watched. In the flipped classroom method, these materials were delivered to students online with the video lecture. The class time spent on these materials was about 9 minutes in the conventional classroom. In the flipped classroom group, students were expected to spend the same amount of time on these items on their own. Finally, the last element to consider is the time devoted to questions that students asked. There are two main categories of such questions: questions about the content of the lesson and questions about the course in general, such as those about assignments, grades, and group organisation. It is clear from Table 6.1 that the time that students spent on these kinds of questions differed among instructors. However, the average time spent on this element for both methods was 6 minutes.

Another aspect to highlight here is that there is a notable difference between actual teaching time and class duration. This difference usually includes time spent on greetings, attendance, and computer set-up for both the instructor's and the students' presentations. This difference was greater in the conventional classroom because these activities are repeated twice, as class time was divided into two sessions.

In conclusion, I identified three main teaching activities used in this setting: lecturing, group discussions, and class discussion. Additional secondary activities included students' presentations and taking attendance. Comparing the two methods in terms of the actual time devoted to each element, it is clear that lecturing time and time spent on student–instructor interactions in the conventional method (24 and 21 minutes, respectively) were greater than the times devoted to corresponding activities in the flipped classroom (18 and 17 minutes, respectively) by 6 and 4 minutes, respectively. Peer interactions represent the only element on which the flipped classroom spent more time (29 minutes) than the conventional classroom (22 minutes), a difference of 7 minutes.

6.3 Student approaches to video lectures and face-to-face lectures

This section identifies students' approaches to lectures in the two groups, the flipped classroom and conventional classroom, and compares them. The data presented here were collected from multiple tools: students' diaries, interviews, Blackboard reports, and surveys. These tools together enabled analyses from different angles. The data from students' diaries reveal how students use their time, with interviews providing greater detail. The survey was used to gather data from a large number of students on some of the factors discussed in the interviews. Finally, Blackboard reports gave additional data about students' behaviours with video lectures in the flipped classroom group.

Comparing students' approaches to the two types of lectures (face-to-face lecture and recorded video lecture) is quite complicated because of the differences of their natures, as not all aspects are always applicable to be compared. Unlike face-to-face lectures, where all students share the same learning environment, the flexibility of video lectures shaped new approaches by students. The focus of this section is to highlight and compare the following aspects of students' approaches to lectures: student attendance, when students attend, time spent in lecture, location, medium, and students' habits during the lecture.

6.3.1 Students' attendance or video viewing

To compare the two groups in terms of how often students attend lectures, I used data generated from three sources: Blackboard reports, survey responses for the flipped classroom group, and attendance reports for the conventional classroom group.

In the flipped classroom group, students are expected to attend video lectures every week before class time. The investigation, however, reveals different behaviours. Three samples of Blackboard Learn reports were analysed for one cohort of 58 students. The analysis indicates that most students watched the video lectures during the semester, but not all of them watched before class time as they were supposed to. In addition, the percentage of students watching the videos at the specified time decreased over the semester. The reports show that for the first video lecture, about 76% of students watched the videos on time, whereas only about 35% of students watched the sixth lecture on time and about 30% watched the ninth video lecture on time.

Additionally, some interviewed students stated that they opened the video files without watching them so that their attendance would be recorded. Given this, the actual percentages could be lower. This weakens the validity of data from the Blackboard report.

Another tool to investigate this was a survey question which was answered by 199 students from the flipped classroom. It asked how often students watched the video lectures; they responded using a 5-point Likert scale ranging from *always* to *never*. Responses show that 39.5% of students always watched the videos, 28% watched most of the time, 19% sometimes, 11.5% rarely, and 2% never watched them.

Findings from Blackboard reports and the survey were not consistent with the purpose of using the videos in this course. That students skipped several video lectures could be expected, but the fact that 32.5% of participants did not watch the videos on a regular basis could be considered an issue that needs to be resolved.

Attendance reports of a cohort of 59 students were used to investigate the conventional classroom group. These covered students' attendance in three periods during the semester (the same lessons investigated earlier in the flipped classroom group). The percentage of students attending the face-to-face lectures at the beginning of the semester was 88%, but this percentage decreased to 80% by the middle and to 61% in the last third of the semester. It is important to mention here that there is a rule that students must attend at least 75% of classes.

Both groups showed a trend of declining attendance over the course of the semester, with higher attendance rates in the conventional group than in the flipped classroom (see Figure 6.1). The requirement that students attend 75% of classes might have had an effect on this finding. Reasons for the low viewing rate in the flipped classroom group are discussed in the next chapter (sections 7.2.2 and 7.2.3).

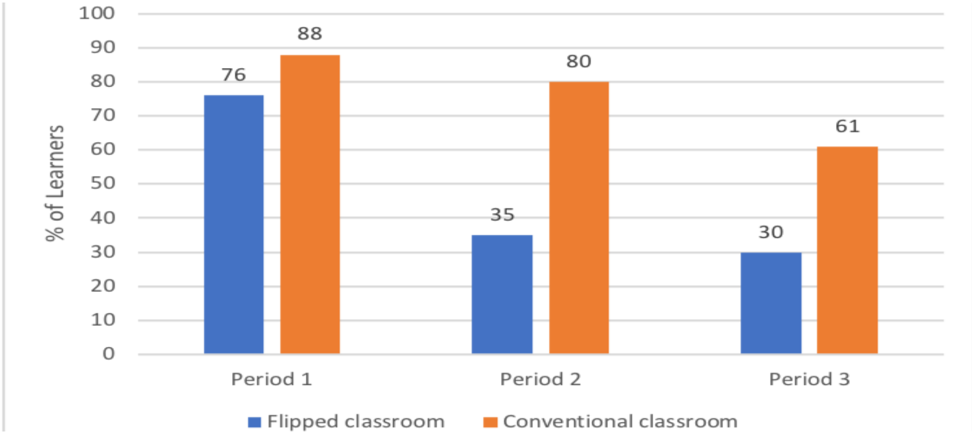


Figure 6-1: Student attendance in the flipped classroom and conventional classroom.

6.3.2 When students attended or viewed lectures

Students in the conventional classroom group attend lectures at fixed times on the university campus, morning or afternoon. Flipped classroom students, however, have the flexibility to watch the lectures at different times. This subsection investigates when students in the flipped classroom group attended lectures.

For the flipped classroom group, I used two main sources of data: Blackboard reports and students' diaries. I classified the data into three main periods during which students watched the videos: on weekends, which was when the videos were published; the early weekdays after a video was published, a time period which varied from 1 to 3 days depending on the cohort's class schedule; the day before class; the day of class; the midterm examination period; the final examination period; and the period after class, which includes the rest of the semester except for examinations periods. These time periods varied by cohort, because although the time at which video lectures were published was fixed for all cohorts (on weekends), the classes were scheduled on different weekdays. In other words, the period that these videos were available for students varied by cohort from 5 to 7 days including weekends.

Blackboard Learn reports from three periods during the semester were analysed. At the beginning of the semester, about 39% of students opened the video file as soon as the video was published (on the weekend). About 22% of students opened the video file in the early weekdays before class time, about 55% opened it the day before class, and 10% opened it on the day of the class. Moreover, about 24% of students opened the file within the first few days after the class. The video files were also opened by 57% of students during the midterm examination period and by about 15% of students before the final examination. However, many students watched the video more than once.

The second Blackboard report provided data for a mid-semester video lecture. Based on their interview comments, students consider this a busy time period, as they had midterm examinations for other subjects. The report showed fewer hits on this video file than on the earlier lecture file. About 5% of students watched the video as soon it was published (on the weekend). There were no hits on the video file during the early weekdays before class time. About 22% of students opened the video file the day before class, and 1.5% opened it on the day of class. About 5% opened the file in the few days following the class. The highest percentage of students watched the video before midterm examinations (38%), and about 19% of students watched it before the final examination.

The third Blackboard report provided data on a video lecture in the last third of the semester. It showed the number of students opening the video file was slightly higher than the number who had opened the mid-semester video. About 10% of students watched the video the weekend it was published. In the early weekdays before class time, around 3.5% of students watched the video. About 26% of students opened the video file the day before class, 8.5% opened it on the day of class, and about 12% opened it within a few days after the class. The highest percentage of students watched the video before final examination (43%).

The above results for the three analysed lectures suggest the most popular time to watch the videos was before examinations (midterm or final). This result differed from what was expected – that students would watch them before class. Moreover, most of the students who skipped watching lectures before class watched them later before the midterm or final examination, and they watched many lectures on the same day.

The second most popular period for watching video lectures was the day before class. The early weekdays, between when the video was published (on the weekend) and the day before class, was the least popular time for watching videos. Another point to highlight is publishing time to suit the majority of learners in all cohorts. Result from questionnaire B indicate that even though the length of period of availability of videos before class differed among cohorts, most students in all cohorts were satisfied with the video delivery time (81%); only 4% were not. This trend does not vary noticeably among cohorts. Figure 6.2 summarises the Blackboard report findings.

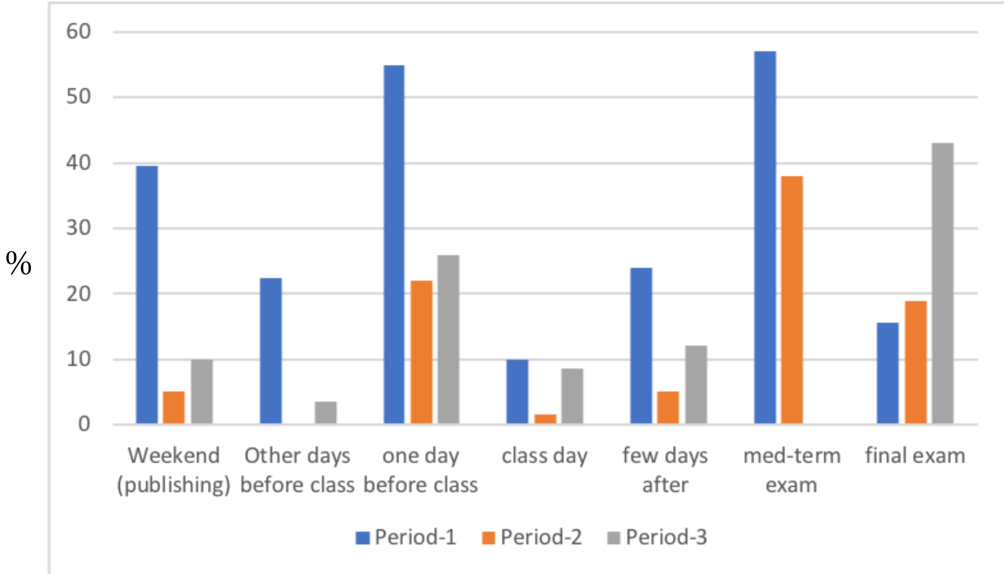


Figure 6-2: When students watched the video lectures.

The second source of data on when students watched video lectures is students' diaries. The diaries were collected at different times during the course. The data from students' diaries support the previous results from Blackboard reports. The diaries collected in the early weeks show that most students watched the videos before class time. The period with the highest percentage of students watching was the day before class, followed by the weekend on which the video was published. Only one student from the sample mentioned that she watched the video on the morning of class day. However, many students mentioned that they watched the video twice – as soon as it was published and one day before class.

The diaries collected in the middle of the term provided different results. In these diaries, the highest percentage of students stated that they did not watch the video lecture. Students who did watch the video did so on the day before class or on the day of class. However, no student mentioned that she watched the video twice. It is important to note that these diaries were collected during the period of midterm examinations (for other subjects). In the diaries, most students described themselves as "busy". For all students who mentioned they did not watch the videos, the main reason was being busy studying for another examination or submitting an assignment. A common comment here was "I watch video lecture regularly, but not this time as I am busy with exams". Another repeated comment in the diaries was "I just played video lecture for attendance, but not watching", and "I didn't focus while watching because of the exams". These comments call into question the reliability of Blackboard reports to reflect the actual situation.

The group of student diaries from late in the term provided results similar to those seen in the middle-of-term set, as the highest percentage of students did not watch the video lecture, even though there were no examinations during this period. However, the number of students who did watch the video lecture was higher than the number in the previous set of diaries.

I also assessed the students' favourite time of the day to watch these videos. Data from the three Blackboard reports showed that the peak hours were from 6 pm to 11 pm. Most students watched the lectures in these hours, as an average of 54.5% of students' hits on the video files were during this period, with between 9% and 12% of the hits during each hour within this period. The time period with the fewest hits was from midnight to 5 am. This is consistent with what students reported in their diaries, where the most frequently mentioned hours are between 7 pm and 10 pm.

In comparing the flipped classroom group and the conventional group, it appears that the time flexibility offered by the flipped classroom was not always an advantage for all students. Even though a large majority of students did watch the lectures, on many occasions they did not watch them at the assigned time. This was not the case in the conventional classroom, where the vast majority attended the lecture before the activity. However, the time flexibility gave students from the flipped classroom group an advantage in allowing them to watch the videos again before examinations.

6.3.3 Time spent in lectures or on videos

In the conventional group, all students in a cohort attend the lectures at the same time and for the same duration. In this setting, about 100 minutes was assigned for the lecture, although the actual lecturing time was an average of 21 minutes, as discussed in subsection 6.2.3. In the flipped classroom, however, students have the flexibility to watch the lectures at their pace, which can differ among students. Therefore, the focus here is on the habits of students in the flipped classroom group.

For the flipped classroom group, data were collected from two sources: students' diaries and interviews. Data from students' diaries shows that most students spent the same amount of time watching videos. However, a considerable number of students spent more time, as they paused to "write notes", to "look at the textbook", or to "understand the content". However, a considerable number of students spent less time than the video duration, as they skipped some parts of the video or turned it off. Some of those students mentioned that they "felt bored".

Data from interviews gave more insight into this. Among students who spent an amount of time equal to the video's duration, some interviewees mentioned that they "did not need [more] time to watch the video" as they "only watch the video and do nothing else". Some students who usually take notes or highlight important points in a textbook mentioned they also did that during the video.

Among students who spent more time on the video than the video's duration, one mentioned that she "needs to pause the video for few seconds to write". However, other interviewees mentioned that they spent a longer period time because they did not watch the video continuously because they were distracted by family members or became bored; boredom is attributed to the length of the videos or to the learner herself. The length of the videos and students' self-regulation are discussed further in in the next chapter (sections 7.2.3 and 7.2.4).

In comparing the time students spent in lectures for the two methods, the findings discussed in subsection 6.2.2 should be considered. The average lecturing time in the conventional class was 16% longer than that in the flipped classroom (21 and 18 minutes, respectively). However, this comparison could be applied only in the case of students who watched the video lecture for its actual length or less, but not for those who spent more time watching than the actual duration of the video or those who watched the video lectures again at other times.

6.3.4 Where students attended or viewed lectures

As with the factors addressed previously, the lecture location is fixed for the conventional classroom group, as all students attend lectures on the university campus. However, the flexibility of the flipped classroom gives students freedom to watch the lectures wherever they wish. Thus, this subsection focuses on students in the flipped classroom group.

To investigate where students in the flipped classroom group usually watched the videos, I gathered data from two sources: students' diaries and interviews. Data from students' diaries show that the vast majority of students watched the videos in their homes, with a smaller number of students watching on the campus. Among the former group of students, some were more specific and mentioned they watched the videos in their own room or in a quiet room, but a number stated they watched in the living room with their family. A less common place also mentioned in the diaries is “on the bus”, as some students have a long commuting journey to the campus.

Data from interviews support the findings from the diaries. However, in the interviews students also explained their choices. For example, the most common reason students gave for watching videos at home rather than on campus was that their schedule while on campus was tight, and they left as soon as they had finished their classes. It is important to mention that the campus is open only from 7 am until 4 pm. Other reasons cited by students were that home gave them better internet accesses and a quieter environment.

Among those students who watched the videos while sitting with their family, one interviewee mentioned that the presence of her family did not affect her attention, as she “can manage it, and … can leave if [she] needs to”. Another interviewee mentioned that her family members “do affect [her] attention”, but she “can’t resist being away from the family”. However, most interviewees stated the importance of watching videos in a quiet place.

Among interviewees who watched videos on the bus, some mentioned they did it many times. Two of them found it useful, as it saved time, especially during examination periods. One interviewee mentioned that she found it useful to listen to the video on the bus “as revision”, as she “used to watch the video twice, if possible”. However, watching videos on the bus was not the case for all interviewees, as one said that watching videos on the bus did not suit her, because of distractions.

Students in the conventional group always had lectures in a classroom equipped with the needed facilities, whereas students in the flipped classroom had to find a suitable location for watching the lectures, which for most happened to be their own room in a family home. However, even though students' homes seemed to work well for them, the home environment could have its influence. This issue is discussed fully in the next chapter (Section 7.4).

6.3.5 Student equipment for watching video lectures

It is obvious that students in the conventional class had lectures face-to-face without any medium, but there is a need to investigate what kind of medium students in the flipped classroom group usually used to watch the video lectures. Data were collected from two sources: students' diaries and interviews.

Data from students' diaries show that most students used a laptop, although a considerable number used smartphones. In the interviews, students mentioned that watching the video at home did not require a smartphone, and a laptop worked better. Those who watched the videos on the bus used their smartphones. This indicates that the medium a student used could be related to the location where the student watched. Interviewees mentioned some disadvantage of using smartphones, such as small screen size and the limitation of battery usage. One student made the interesting comment that she used her "mobile phone for entertainment, and the laptop for study. I don't like to mix things together”. This comment could add a psychological dimension to this aspect.

Regardless of which medium students in the flipped classroom group used, the main difference between the two groups in this regard was having an electronic medium for lectures instead of face-to-face interaction. This difference could give the conventional method group an advantage, whereas the electronic medium could have an effect on the flipped classroom group. The issue of lack of face-to-face interaction is discussed in detail using further interview data in Chapter Eight (Section 8.3.1).

6.3.6 Student actions during lectures or videos

Individuals from the two groups could behave differently during the lectures. Data about student actions during lectures or videos come from three sources: interviews, students’ diaries, and a questionnaire.

In interviews and diaries, students identified their habits during face-to-face lectures or recorded video lectures and at times offered explanations for their actions. A common behaviour mentioned by students from both groups was taking notes during lectures. Students would write their notes in the margin of the textbook and highlight points they found important. Focusing on the lecture without engaging in other actions is another approach taken by students from both groups.

An interesting finding is from a description by a student in the flipped classroom group. She said: “I used to listen to the video without looking at the slides, especially, when I was commuting”. Other students took the opposite approach, just reading the slides in the video without listening. Another student mentioned that she “took screen shots on [her] device in order to look at them later”. The above behaviours are interesting because they indicate that learners might differ in their preferences for using their senses for learning.

Among students in the conventional group, many mentioned that they participated during lectures, but not all students did this. Participation during the lecture was not an option for those in the flipped classroom.

Some common behaviours unrelated to learning were mentioned by interviewees from the two groups: for example, browsing social media and chatting during lectures. Students in the conventional group mentioned these happened rarely. A student said that she “used to do it in some lectures, but, not this particular lecture, as [she] can be noticed easily”. A student who did engage in these kinds of activities stated that “it depends on the lecture; I did that if it is easy”. She also mentioned another reason for these for these activities: “tedium”.

After identifying the behaviours referred to above from interviews of students in the two groups, I distributed a closed-ended survey to a large number of students (163 from the flipped classroom group and 174 from the conventional group). The survey was designed to investigate the following behaviours: taking notes, do nothing but focusing, browsing social networks, commuting, or engaging in other activities.

Quantitative data from the survey show that about one-half of the students from both groups took notes during lectures. There was no notable difference in the rate of note-taking between students in video lectures and those in face-to-face lectures (49% and 51%, respectively). The survey also indicates that in the flipped classroom about 37% of participants simply watched the videos without doing anything else, whereas about 32% of participants listened to the videos. The fact that about one-third of students preferred to listen only without watching must be considered, and it indicates that this approach was followed not only by those few students who mentioned it in their diary or the interviews. In terms of participation, about 54% of participants in the conventional group just listened to the lectures, whereas 51% participated with the instructor.

As for behaviours unrelated to learning, it appears that the percentage of students browsing social media during the lecture was not high in either group. However, it was higher in the flipped classroom group (about 15%) than in the conventional group (2%). Chatting with others on topics unrelated to the lesson was also not common, and there was not a notable difference in rates of this between the two groups (3% in video lectures and 8% in face-to-face lectures). However, survey results indicate that 10% of participants in the flipped classroom did do other things during lectures, including parenting, eating, and drinking. Figure 6.3 summarises the survey findings.

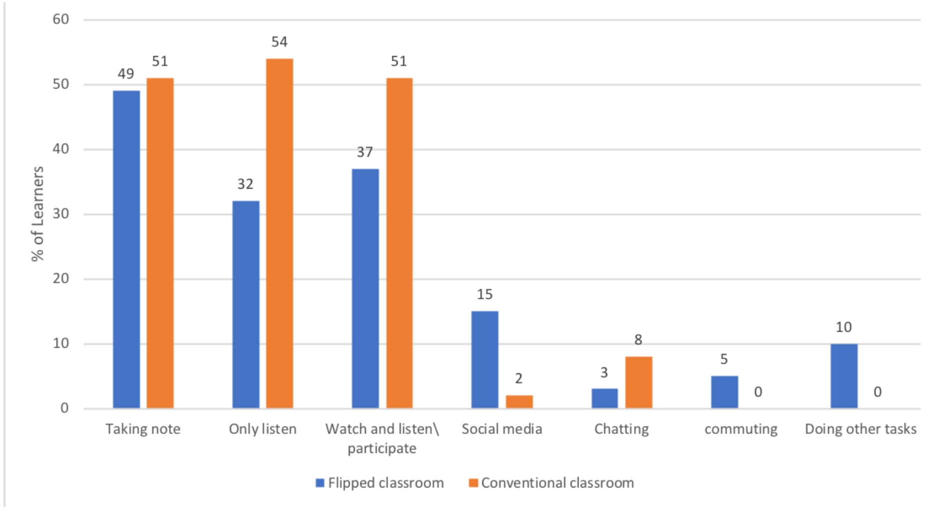


Figure 6-3: Students' habits during lectures.

6.4 Student approaches to classroom activities

This section presents student approaches to classroom activities. It investigates students' approaches as a group and their approaches as individuals. It also explores whether approaches differ between the two methods – the flipped classroom and the conventional method. The data used for this investigation were gathered from three tools: classroom observation, students' interviews, and a questionnaire.

Before presenting the findings, it is important to highlight that the flipped classroom group had a longer period of time assigned for classroom activity and had more tasks than students from the conventional group. Each session in the flipped classroom featured an average of six tasks, each lasting for about 7 minutes. Students from the conventional group, by contrast, spent about 20 minutes doing one task.

6.4.1 Student approaches in groups

I used data gathered from interviews and field notes to investigate students' approaches as a group. Data from interviews identified two approaches. The most common one was discussing the task as a group, then having a volunteer write down the conclusion and another volunteer present that conclusion to the rest of the class. Practicing this approach is expected as it was the approach prescribed by the instructors. It was mentioned by most interviewees in both the flipped classroom and the conventional classroom groups. It was also the only approach referred to in the field notes data. With regard to students' opinions about this approach, interviewees seemed to be satisfied with it, and some mentioned that they had learnt things from the group discussion. However, other students mentioned that they felt ignored in this approach, as one or two members were intolerant of their opinions. The influence of group members is discussed in Chapter Seven and Chapter Eight (sections 7.3.4 and 8.4.2).

The other approach was discussed by interviewees from the flipped classroom. In this approach, students divided the task into chunks, and each member of the group did her part. After members finished, a volunteer collected the parts to draft one conclusion. Students who mentioned this approach believed that “it saves [their] time, so [they] can finish earlier”. However, it appeared that students developed this approach only in the second half of the semester, when it started to become more common among other students working in groups. Even though students who mentioned it seemed to prefer this approach, they noted some drawbacks. One disadvantage was that some group members became “stuck” as they “did not watch the videos”. These members apparently were ignored by other members who were busy completing their parts of the task. This approach was mentioned by a focus group representing one cohort; however, it is not clear whether this approach became popular among other cohorts. The data gathered by observing students during classroom activities did not catch this approach, although this may be because students acted differently in the presence of a researcher.

In comparing approaches between the two groups, it appeared that students used the same approach in general. However, students in the flipped classroom developed another approach, as they distributed the tasks among themselves instead of discussing them as a group. However, there are no data indicating whether this behaviour was related to the use of the flipped classroom method.

6.4.2 Student approaches as individuals

Data from field notes, students’ interviews, and a questionnaire were used to investigate students’ approaches as individuals. Two aspects were investigated: students’ participation in the activities and their habits during the tasks.

The data from field notes were gathered by observing the students during classroom activities. As mentioned earlier in Chapter Four (Section 4.7.3), two sets of field notes – one from the flipped classroom and one from the conventional classroom – were analysed, each reporting on three cohorts. Both sets of field notes observed a common lesson, but the activities in the two groups differed in task number, duration, and content.

Students worked in groups of five to seven members. In the flipped classroom, most student groups were observed during the full length of one task, which lasted for an average of 7 minutes. In the conventional classroom students had only one 30-minute task to complete, and the time of observation was divided between student groups, each being observed for about 6 minutes. The observation focused on what individuals did, how often each member participated, and the degree of their participation.

The data showed that all students in the flipped classroom group and the conventional group participated to differing degrees. When a member talked, the others listened or took notes. The levels of student participation varied from adding a new idea or piece of information to discussing an existing point to agreeing with what others had said. I used these three kinds of observations to categorise the type of student participation and recorded the number of times each student in a group participated in each category.

The analysis of student participation showed an overall tendency: about two to four students in a work group were very active, about one to three members in the group had lower levels of engagement, and about three to five students participated at a level between these two extremes. This outcome was similar in the two groups, flipped and conventional.

However, when I considered the nature of each student's participation using the three categories mentioned just previously, the analysis showed a slight difference between the two classroom groups. For example, in the conventional group, usually three to five students in the group never added a new idea or piece of information, and four to five students never discussed an existing point, which included asking a question or responding to another. The number of those students is mostly lower than those in the flipped classroom group (two to four students). There is similarity between the two classroom groups in terms of the number of students who added new ideas or information several times, as their numbers in a work group were from two to three students in both classroom groups. Table 6.2 provides more details about numbers of students who participated in each of the three categories.

It is important to mention that these data do ***not*** indicate that the difference between the two groups is due to using the flipped classroom method. This difference could be the result of factors related to students themselves, the instructor, the tasks, the task duration, or a combination of factors. However, many students in the conventional group did mention in the interviews that they were "not convinced with the idea of activity". This could be another contributing factor. It is also important to highlight that the observations here have some limitations that could affect the reliability and validity of these data, as students may behave differently when they were observed. Another issue is that the categories for student responses during activities must be decided on quickly, making mistakes in an assignment more likely.

Table 6-2: Students' participation in classroom activity

Type of Student Engagement	Frequency	Number of Students in Flipped Classroom	Number of Students in Conventional Classroom
Adding new idea or information	≥3 times	3–2, rarely 4	3–2, rarely 4
	1~2 times	2–3, rarely 4	1–3, rarely 4 or 0
	0 times	2–4, rarely 5	3–5
Discussing an existing point	≥3 times	0–1, rarely 2	0-1, rarely 2
	1~2 times	1–3, rarely 0	1–2, rarely 3
	0 times	2–4, rarely 5 and 1	4–5
Agreeing with what others say	≥3 times	0–1, rarely 2	1–2, rarely 0
	1~2 times	0–3, rarely 4	0–2
	0 times	3–4, rarely 5	3–4, rarely 7

In interviews, all interviewed students from the flipped classroom group stated that they usually engaged in classroom activities. However, the level of their engagement depended on whether they had watched the video lecture. This factor is discussed further in the next two chapters (see sections 7.3.3 and

8.4.1). In the conventional group, many interviewees seemed not to believe in the usefulness of the activity. Some of those students said they still participated and completed tasks with their group. One interviewee, however, said, “I did not participate and depend on other members, especially when I have exams”. This student would study for examinations during classroom activities. Students from both groups observed that “other group members sometimes got busy doing something else during classroom activity”. These activities included studying for another examination, chatting, or “playing with their phones”.

Indeed, students’ interviews showed some of students’ behaviours that were not noticed during the observation, such as using smartphones, chatting, or studying for another subject. Even though, these side activities were mostly addressed by students from the conventional classroom, they could also have occurred in the flipped classroom group.

Students’ behaviours during classroom activities were explored using a survey with closed-ended questions which was completed by 163 students from the flipped classroom group and 174 from the conventional classroom group. It was designed to investigate the habits mentioned in the interviews and recorded in field notes in the two groups: taking notes, participating, listening to others, browsing social networks, and doing other things.

Quantitative data show that 86% of participants from the two groups, the flipped classroom and conventional groups, participate during classroom activities, whereas 21% of participants just listen to their peers without participating. It is important to mention that the quantitative data just referred to come from the survey, and some respondents selected two answer choices, as they did not always participate. A comparison of the two groups (flipped classroom group and conventional method group) reveals no notable differences between them, as the percentages of students who participated in classroom activities are 87% and 86%, respectively, and the percentages of students who just listened are 24% and 19%, respectively.

The survey also showed that 42% of participants in the flipped classroom group and 22% in the conventional group took notes during classroom activities. The percentage in the flipped classroom group is notably higher than that in the conventional group. These data, however, do not indicate whether this difference was a result of the use of the flipped classroom method, as this difference could also result from factors related to students themselves, the instructor, or the task types. The higher rate of note-taking in the flipped classroom may also be because for these students classroom activities provide their only face-to-face interaction with the instructor and peers. I am recommending that this difference should be studied in future research.

With regard to students doing unrelated activities during classroom activities, the survey shows that only small numbers of participants – about 4% – browse social media. This percentage holds across both groups. Chatting with others on topics not related to the lesson also seems to be uncommon in both groups: 10% in the flipped classroom and 7% in the conventional group. Figure

6.4 summarises the above findings about students' behaviours during classroom activities.

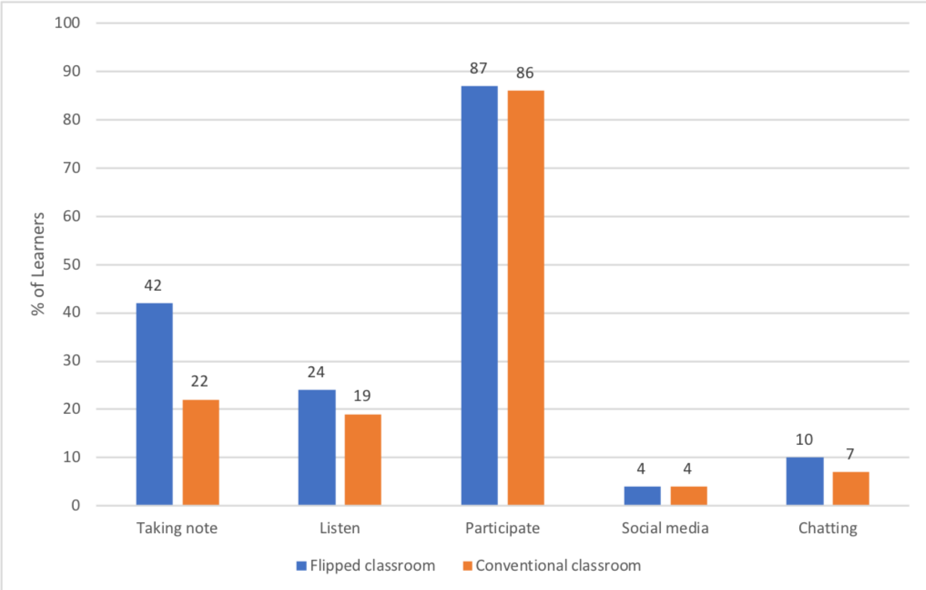


Figure 6-4: Students' habits during classroom activity.

6.5 Study routine outside the classroom

This section explores students' self-study habits. It is divided into three sections representing circumstances that students experience while studying: working on assignments, studying for examinations, and studying during times without examinations or assignments. These three circumstances were raised initially by students in the interviews. A large number of students were then surveyed to collect data on the amount of time students spend under these circumstances. I also gathered data from students' diaries, which had been collected at different points during the semester, including in the period before an examination, a week before an assignment was due, and during regular weeks to give indications of students' study habits in the three situations. The qualitative findings about students' approaches in the three circumstances are presented first in this section, and then the quantitative findings about how much time students spend studying in the two classroom groups are presented. Finally, the two groups are compared.

6.5.1 Working on assignments

This course featured three assignments: a presentation; a written report; and a project designing and developing teaching multimedia or a teaching aid for children. The first two assignments were group assignments; the third was an individual assignment.

To investigate students' approaches to group work, I gathered data from interviews and diaries. In all interviews that highlighted this matter, students from both groups described only one approach. The students divided the work into subtopics, and every member was responsible for one part. One student collected the work several days before it was due and organised and formatted it. It appeared that this approach lacked a group discussion about the assignment, as every student worked individually.

For all interviewees from both methods, WhatsApp groups were the main communication tools. WhatsApp was mostly used to distribute tasks or ask the group leader about when to submit work, but it was "rarely used for discussing [their] work together", according to one interviewee. Other interviewees mentioned that "some students asked general questions about the tasks but they did not discuss the details". One interviewee mentioned that she "only discussed [her] work with a friend of [hers] who is a member in the group.... But, it was not the case for all members".

By asking students, in the interview, if they would like to work as a group instead of work individually, most answers were "no". Students' explanations could be classified as social reasons, practical reasons, personal preferences, or because it was the common way among the students. Revealing examples of student quotations include the following: "I prefer to work individually", "I find it hard to work with people I don't know", "it is easier to work alone... as many opinions make it complicated", and "this way saves time".

Some interviewees complained that some group members did not do their part. A lack of communication outside the classroom played a vital role in this issue. An interviewee mentioned that "there are two girls we don't know how to reach them... We only have this course in common. They only appeared on presentation day asking us to let them present some slides. They were memorising their parts before presentation time".

The second source of data on this topics was students' diaries. Two assignments were cited in the diaries: the group presentation and the teaching aid or multimedia project. These diaries, however, did not include many details about the process of completing the assignments. Few diaries highlighted the first assignment (the presentation). Students mentioned that the main and only source for information was the internet, and they spent from 15 minutes to 1 hour researching the topic on the internet. Student diaries do not specify how long it took students to complete the assignments.

In those diaries that highlighted the assignment to develop a teaching aid or multimedia, students chose to create a teaching aid for kindergarten. They mentioned that manual work such as drawing, cutting, and attaching was enjoyable. The time spent on this assignment ranged from 1 to 2 hours, although one student mentioned that she had spent only 20 minutes on it.

The diaries also highlighted three aspects related to students chatting about the assignments: the tool used, the duration of the chat, and when the students chatted. Echoing the interview findings, students' diaries indicated that WhatsApp groups were the main medium for chatting about assignments. However, a number of students cited that they spoke with their peers face-to-face on campus. The diaries showed that the durations of the chats varied. Some lasted a short time (between 2 and 5 minutes), some lasted for a longer time (about one hour), and others were in between. The percentages of students in each of these duration categories were similar. However, other students did not specify a duration, as they used to chat at different times. One student explained that chat times were longer via WhatsApp because a sender "is unlikely to get immediate responses". With regard to when they chatted about assignments, a considerable number of students mentioned chatting while working on the assignment, although some chatted at other times. For the few diaries that cited face-to-face interaction, students did this before or after class time.

For all the observations discussed above, interviews and diaries from the two groups did not show notable differences in learners' approaches. However, this was expected, as the two groups have common assignments and rubrics for assessment.

6.5.2 Studying for examinations

This course included a midterm exam and a final examination. Marks for these examinations comprised 70% of total marks. To investigate this topic, I used data from students' diaries and from interviews based on students' experiences in the mid-term examination.

Analysing students' diaries and interviews revealed that most students in the flipped classroom group watched the videos before examinations, as study material. They had three approaches to using the videos. In the first approach, students preferred to study from video lectures. Some depended on them completely and did not use the book, while others used the book for quick reviews. These students mentioned that they found studying from videos to be useful and convenient. In the second approach, students preferred studying from the book. Some of these students used only the textbook, as they watched the video lectures before class. Other students rewatched some videos before an examination for purposes of review after they had finished the book. In the third approach, students used the two materials in parallel, watching the video lectures and reading the book at the same time. Analysis of Blackboard Learn reports support these previous findings. They show that about 48% of the students watched the videos before the midterm examination. This figure, however, is not necessarily accurate, as many students downloaded the video clips to their devices, and this could not be tracked.

In the conventional group, student diaries showed that the textbook was the main study material. However, some students also studied from MS PowerPoint slides as secondary learning material. Some interviewees read the slides before reading the book to have an overview before digging into details. Others used the slides for a final review after studying from the book.

The interviews provided further details about students' approach to studying. Students from both groups usually started one or two days before examination day, although two students mentioned that they started studying on the morning of examination day: "I started that morning. I skipped first class. I was on quiet corner until I finished on time before exam... I do this on some courses... I know I can finish in two hours". Students from the conventional class also mentioned that they focused mostly on information they had already highlighted in their book and on reading their notes at the same time.

A notable point mentioned by interviewees from the flipped classroom group was that students from the conventional classroom had asked them for video lectures and activity answer sheets to study from before examinations. However, this was not mentioned by any of the interviewees from the conventional class.

In comparing students from the two groups, the most notable difference in their approaches to studying was the use of the video lectures before examinations by students in the flipped classroom group. The availability of these videos gave students from the flipped classroom an advantage by serving as extra learning material.

6.5.3 Studying during regular weeks

This section presents students' self-study approaches when they did not have assignments or examinations. It is important to note that students in the flipped classroom group were expected to watch a video lecture before class time, which was not the case for students in the conventional group. In addition, it was recommended that students in both groups review the previous lesson by reading the textbook, but students did not see this as an obligation. As students' approaches to video lectures were the focus of Section 6.3 above, the focus here is on students' approaches to studying from other materials (mainly the textbook). The data used in this section are from students' diaries and interviews.

In their diaries, students wrote of using many learning materials, including reading from the textbook, searching on the internet, reviewing MS PowerPoint slides, communicating with peers, and – for the flipped classroom group –

watching video lectures. Apart from viewing video lectures, reading from the book was the dominant activity that students engaged in when studying. Students' diaries also show that most students, from both groups, read in their homes, although a considerable number of students cited other locations, such as the campus, on the bus while commuting, and in a café. Among flipped classroom students who cited this topic in their diaries, more read outside their homes than watched video lectures outside their home (40% and 19%, respectively). This difference seems interesting, as it indicates that reading offers more flexibility in terms of location.

With regard to students' habits of reading the textbook, students from the two methods, the flipped classroom and the conventional, acted differently. In the flipped classroom group, students read the previous lesson and spent an average of about 6 minutes reading, whereas students from the conventional class read both the previous lesson and the next lesson and spent an average of 13 minutes reading. Nevertheless, student diaries collected in the second half of the course, which is usually described as the "busy period", show that most students, from both groups, did not read.

In the interviews, students from both groups emphasised the tightness of their schedule in the second half of the semester, when they have examinations and assignments for other courses. This time is usually after the fifth week of the semester. Students mentioned that time management is difficult, as they have six to eight subjects that include one or two midterm examinations and quizzes. As a result, they prefer to study for these examinations rather than engaging in other learning activities. For some interviewees, personal circumstances made time management even harder. These personal circumstances included parenting, commuting from outside the city, and family duties.

From the above data, the only difference between the two groups appears to be that students from the flipped classroom read less than their peers in the conventional classroom. This could be a result of the existence of other learning material – the video lecture. However, as stated earlier in Section 6.3.6, a considerable number of students in the flipped classroom used the book while they watched the videos. This fact makes the comparison more complicated.

6.5.4 Comparing studying times

This section investigates how much time students in the two groups (flipped classroom group and conventional method group) spent on self-studying, then compares the groups. The data were gathered from a questionnaire answered by 334 students: 160 students from the flipped classroom group and 174 students from the conventional method group. The section addresses three cases. Case 1 covers time spent working on an assignment, case 2 is time spent when studying for an examination, and case 3 is time spent when students have no assignment or examination. These categories were based on data gathered in the student interviews.

Descriptive analysis

For the case in which students have assignments due (case 1), the survey shows that for students in the flipped classroom, the mean weekly studying time for this course was 1 hour and 14 minutes (M = 74.5, SD = 79). For the conventional method, the mean was similar: 1 hour and 24 minutes (M = 84, SD = 87). The median is 1 hour for both groups.

In the case of studying for a midterm examination (case 2), the mean weekly studying time in the flipped classroom was 3 hours and 42 minutes (M = 223, SD = 145). The mean weekly studying time in the conventional classroom was very close to that of the flipped classroom: 3 hours and 34 minutes (M = 215, SD = 120). The median for both groups is 3 hours.

In the case 3, when students do not have to submit an assignment or prepare for an examination, the survey shows that, in the flipped classroom, the mean weekly studying time was only about 18 minutes (M = 18, SD = 39). This is close to the mean time in the conventional classroom, which was about 25 minutes (M = 25, SD = 52). The median is 0 hours in both groups, which reflects those who did not study at all. Table 6.3 summarises these findings.

From the above, it is clear that the studying time does not differ much between the two groups of students. Students spent the most time studying when preparing for an examination, about 3 hours per week, whereas it was common that students did not study during regular weeks.

Table 6-3: Mean, median, maximum, and minimum values and standard deviations for the duration of self-study in minutes

		N	**Mean**	**Standard Deviation**	**Max**	**Min**	**Median**
Case 1	Flipped classroom	160	74.5	79.1	480	0	60
	Conventional	175	84.2	87.2	960	0	60
Case 2	Flipped classroom	162	223.1	144.5	960	30	180
	Conventional	173	214.5	119.5	600	0	180
Case 3	Flipped classroom	163	17.8	38.5	300	0	0
	Conventional	172	25	51.8	540	0	0

Testing normality

To test normality, six sets of weekly time data for the two groups in the three cases were tested both visually and with Shapiro-Wilk's tests ($p > .05$) (Bryman, 2012). First, the histograms, box plots, and normal Q-Q plots show that the data sets are non-normally distributed for both the flipped classroom group and the conventional class group, as illustrated in Figures 6.5 to 6.13. Secondly, Shapiro-Wilk's tests show that all *p*-values are 0 (see Table 6.4), which is less than .05, leading to a rejection of the null hypothesis that the data are normally distributed.

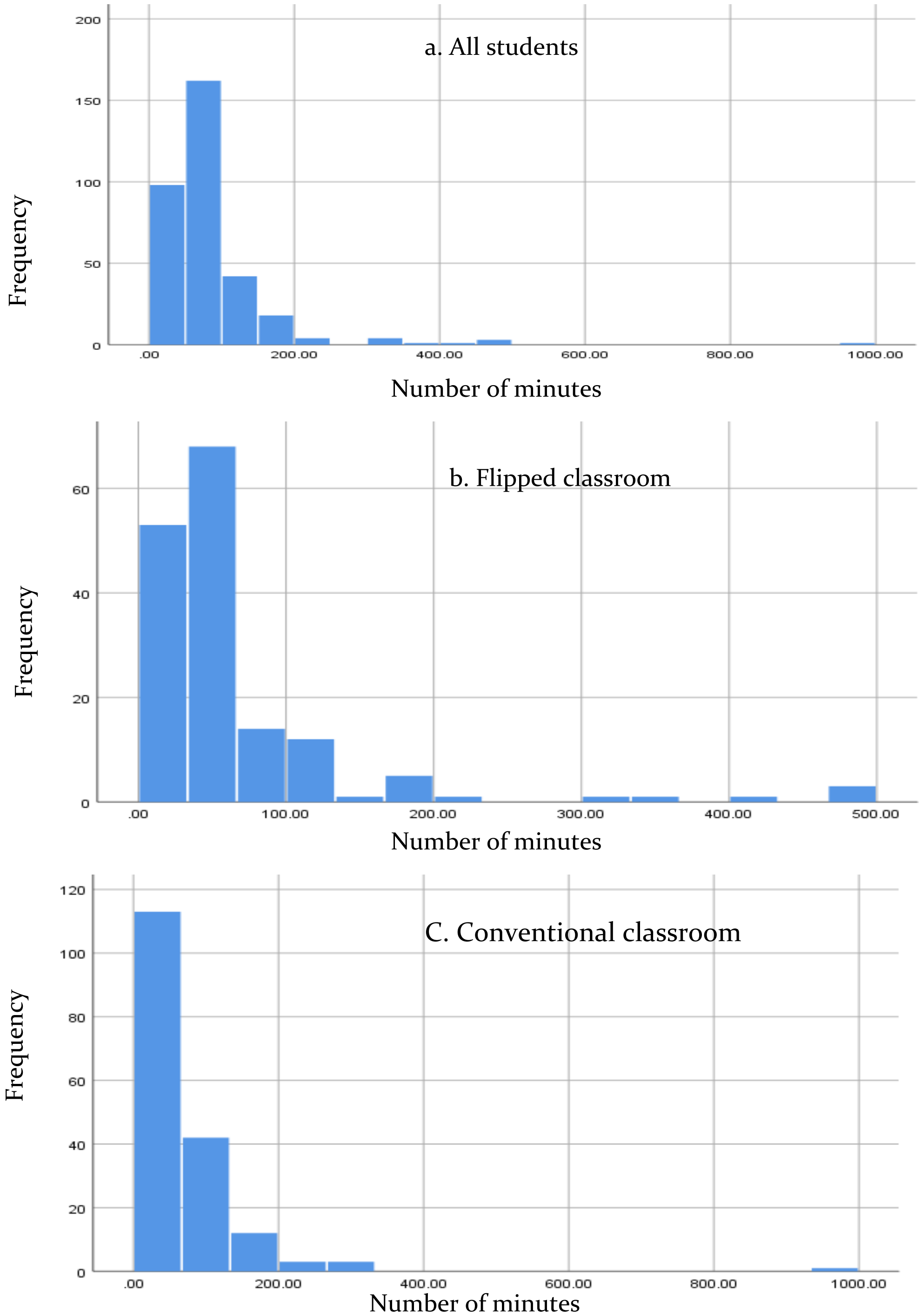


Figure 6-5: Histograms of case 1 data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.

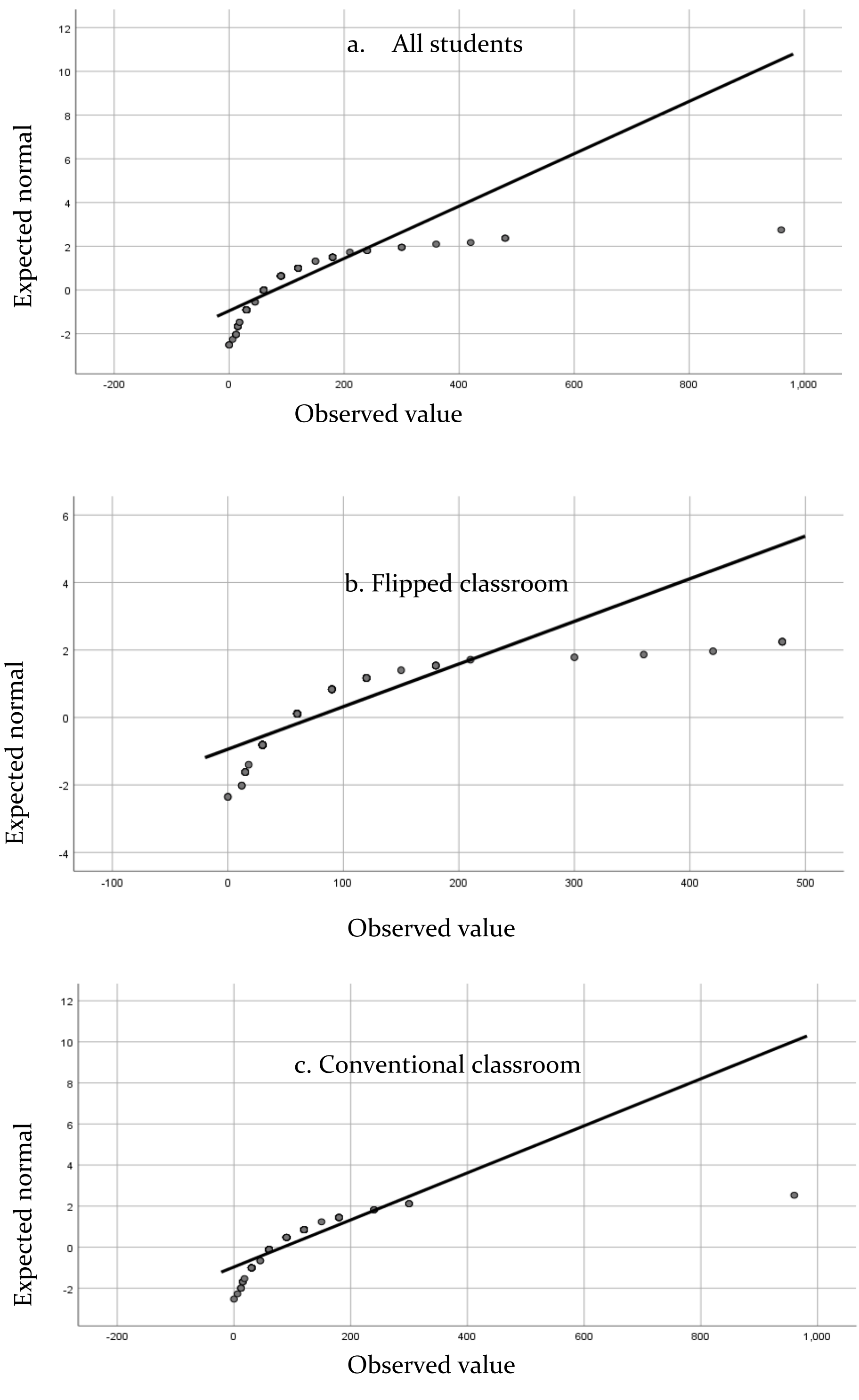
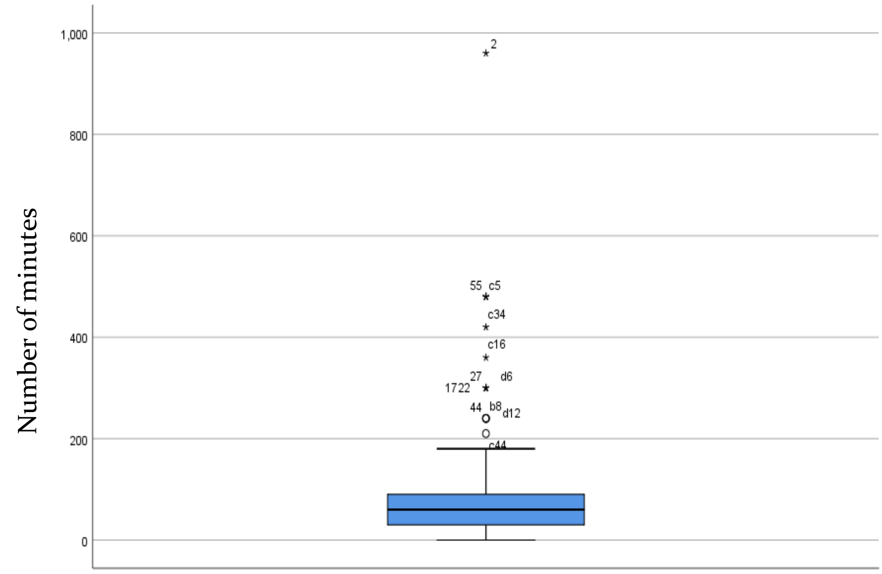
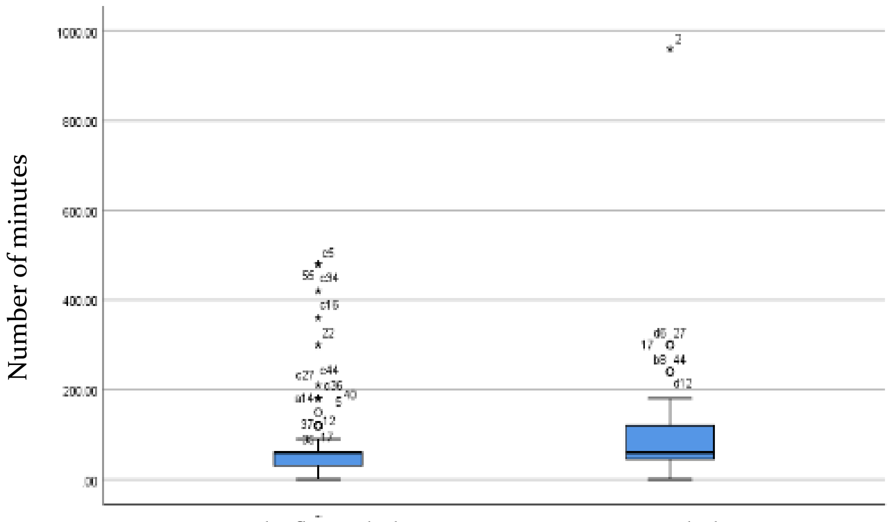


Figure 6-6: Normal Q-Q plots of case 1 data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.



a. All students



b. flipped classroom c. conventional classroom

Figure 6-7: Box plots of case 1 data for a) all students and b) the flipped classroom group and c) conventional classroom group.

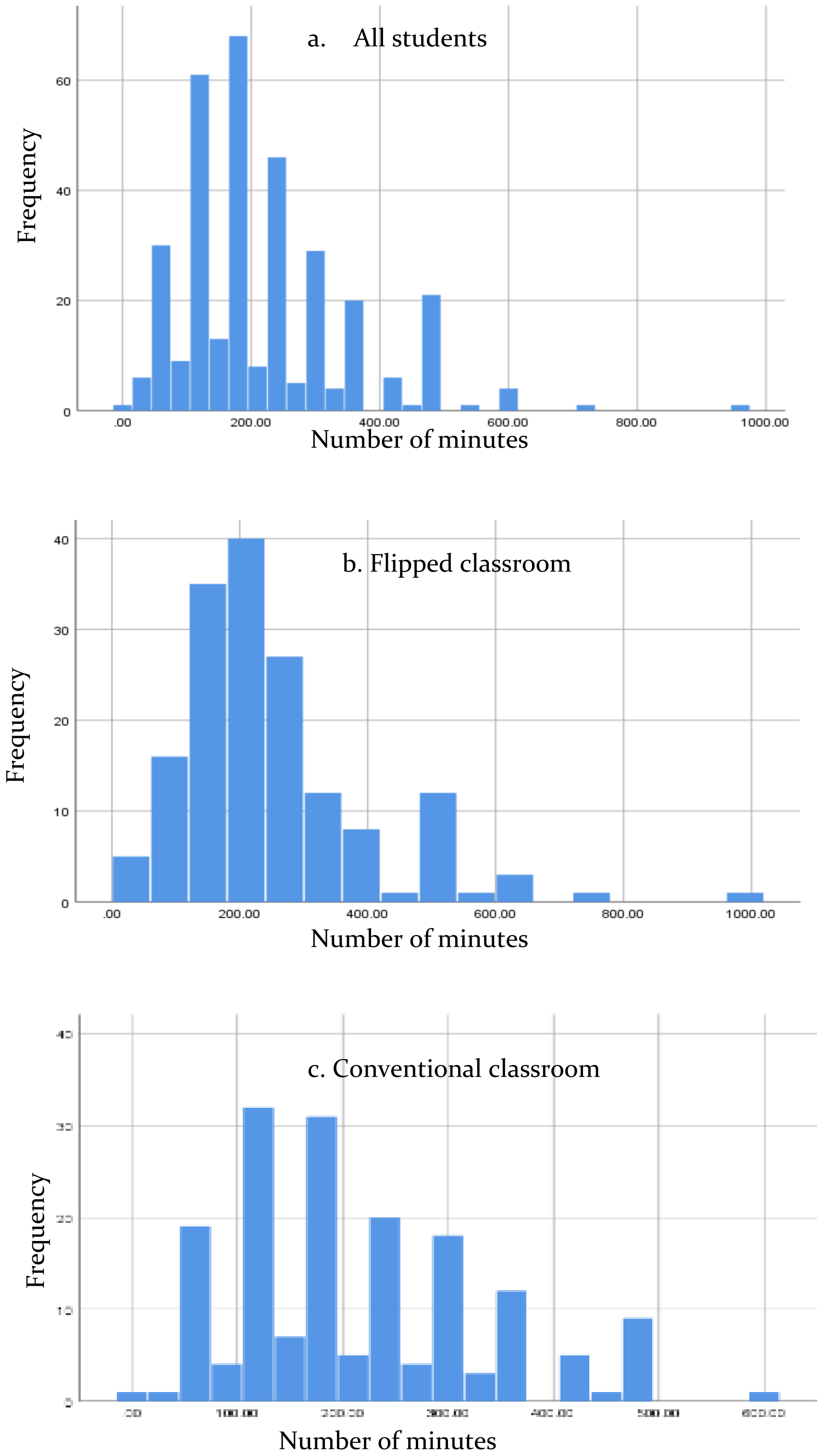


Figure 6-8: Histograms of case 2 data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.

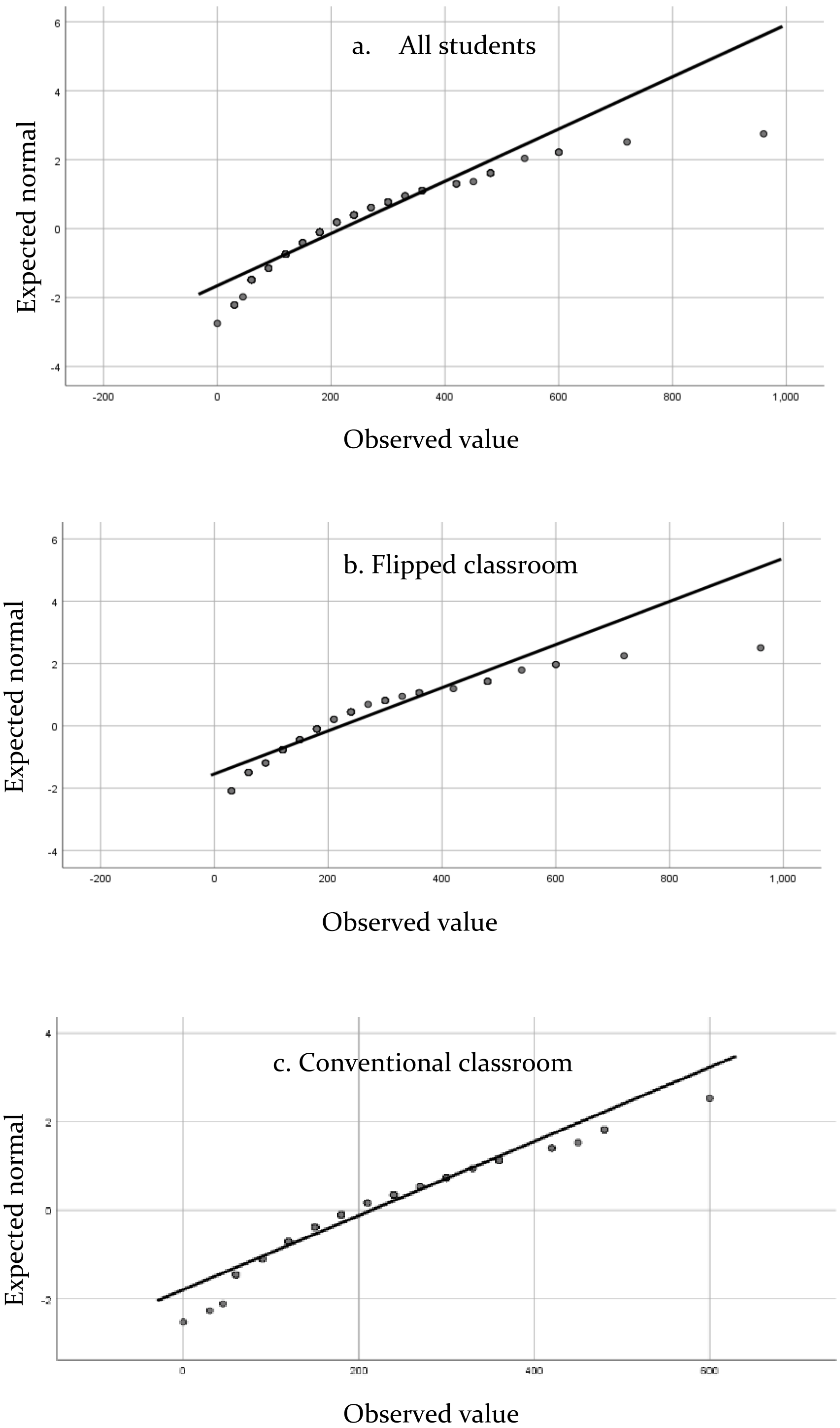


Figure 6-9: Normal Q-Q plots of case 2 data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.

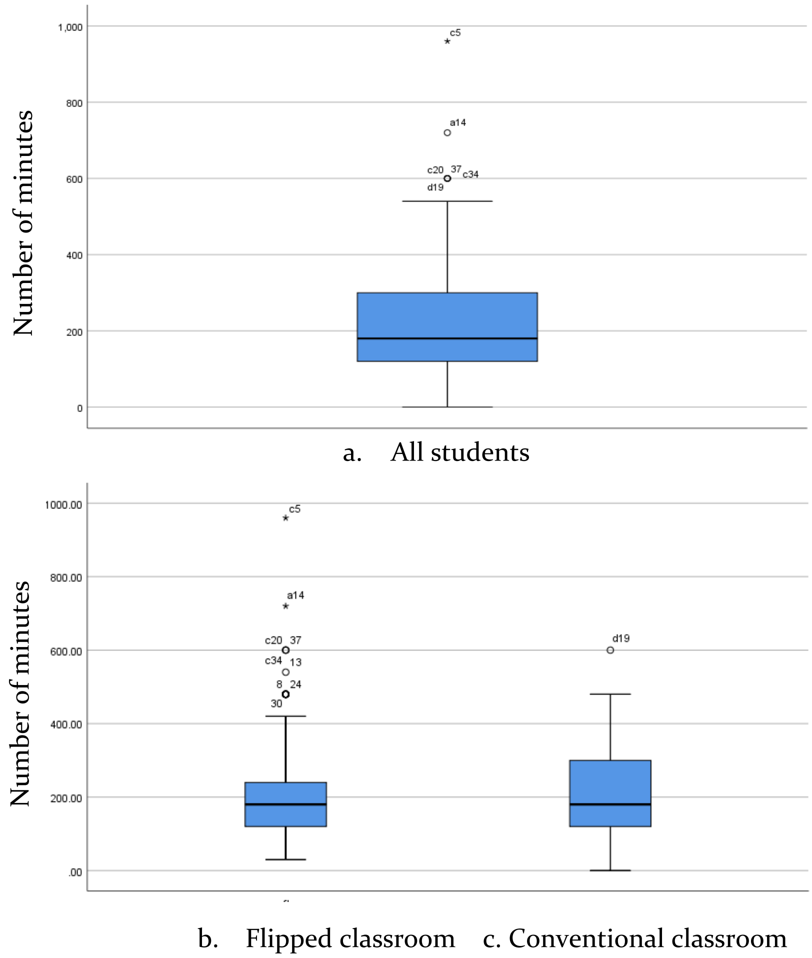


Figure 6-10: Box plots of case 2 data for a) all students and b) flipped classroom group and c) conventional classroom group.

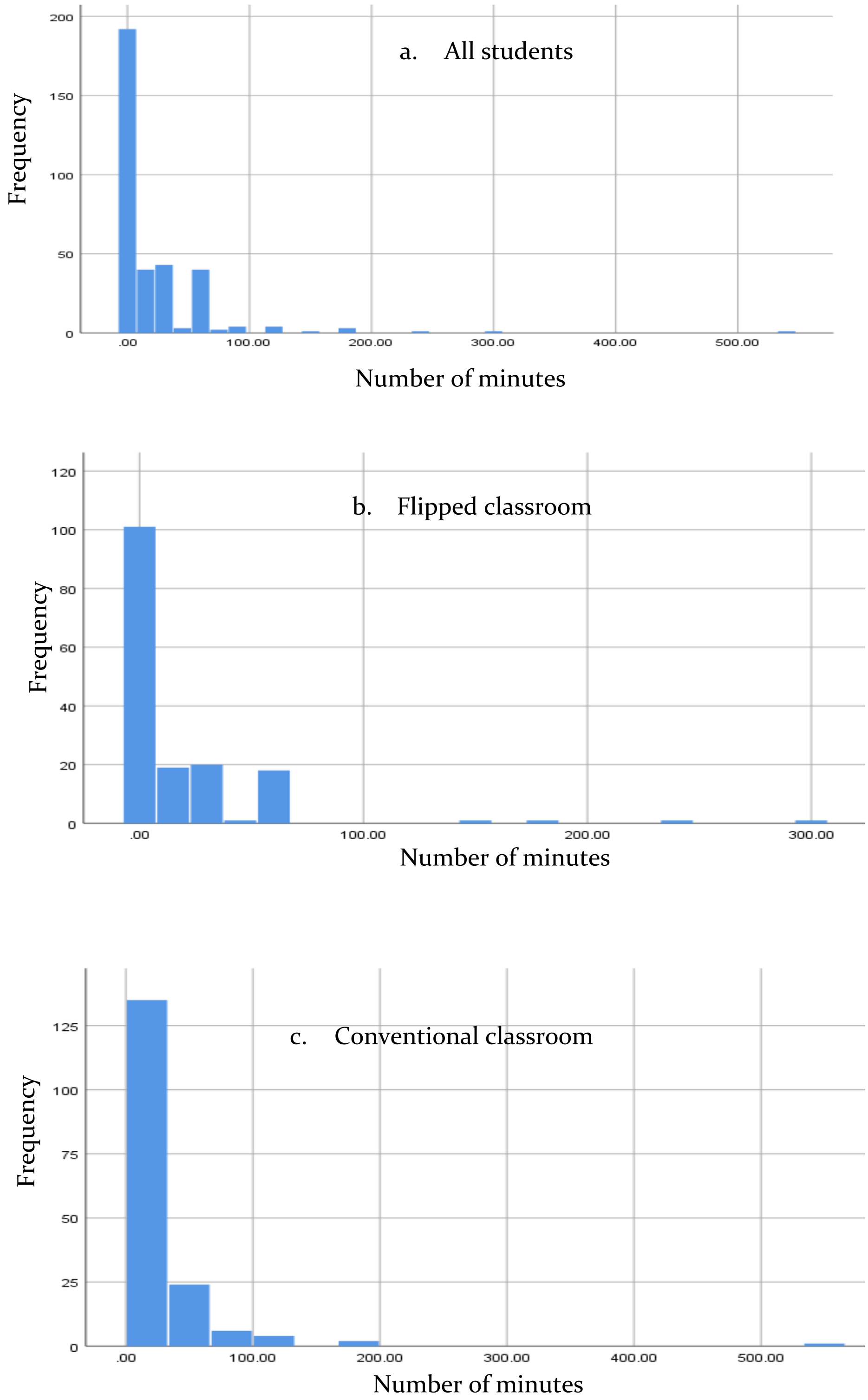


Figure 6-11: Histograms of case 3 data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.

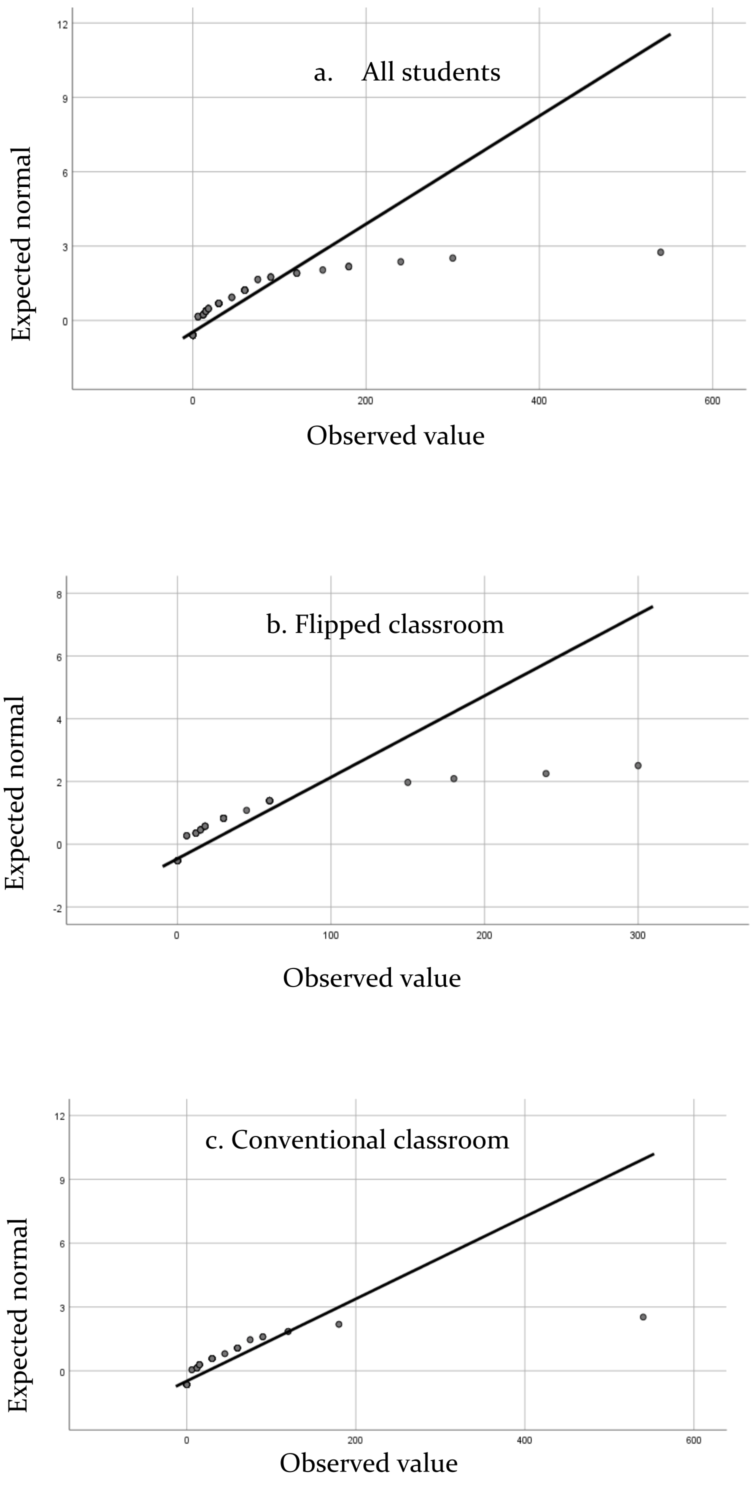
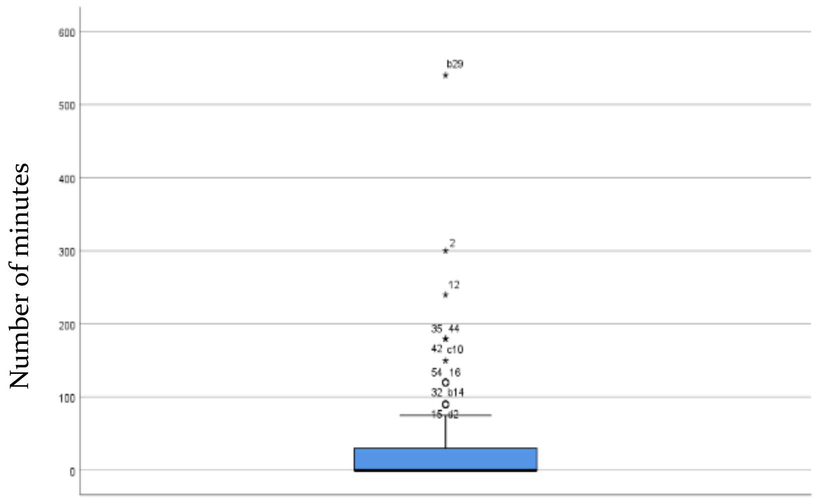
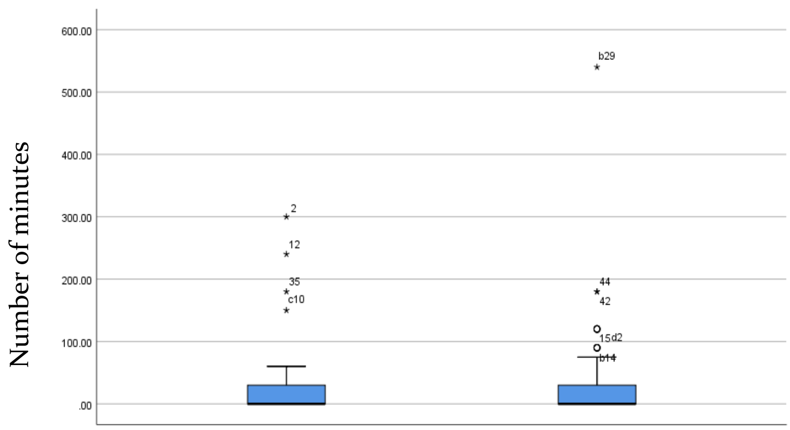


Figure 6-12: Normal Q-Q plots of case 3 data for a) all students, b) the flipped classroom group, and c) the conventional classroom group.



a. All students



b. Flipped classroom c. Conventional classroom

Figure 6-13: Box plots of case 3 data for a) all students and b) the flipped classroom group and c) conventional classroom group.

Table 6-4. Shapiro-Wilk's test results

	Method	Statistic	*Df*	Sig.
Case 1	Fl	.572	160	.000
	Co	.536	174	.000
Case 2	Fl	.853	162	.000
	Co	.938	173	.000
Case 3	Fl	.489	163	.000
	Co	.472	172	.000

Comparing the two groups

A Mann-Witney test was used to compare the weekly time spent in the two groups for the three cases. This non-parametric test was chosen for two reasons. First, the data set was non-normally distributed, so a non-parametric test is a suitable choice (Bryman, 2012). Second, a Mann-Witney test is analogical to the independent samples *t*-test, which compares two independent sets of data.

I ran Mann-Whitney *U* tests to compare the two groups (flipped classroom and conventional classroom). For case 1 (assignment), the difference in weekly study times between the flipped classroom group (mean rank = 155.77, $n = 160$) and the conventional method group (mean rank = 178.29, $n = 174$) was found to be statistically significant $U = 15{,}797$, $z = 2.22$, $p = .026$ ($< .05$). To quantify the size of the difference between the two groups, I used the effect size equation: *r*

$= z/\sqrt{N}$. The resulting *r* value is .121, which considered a small effect size using Cohen's (1988) criteria. This indicates that students in the conventional method group spent slightly more time studying than those in the flipped classroom group.

In case 2 (studying for the midterm examination), no significant difference was found between the weekly study times of the flipped classroom group (mean rank = 168.18, $n = 162$) and the conventional group (mean rank = 167.83, $n = 173$), $U = 13{,}984$, $z = -0.033$, $p = .97$ (> .05).

For case 3 (when students have neither assignments nor examinations), the test found no significant difference between the weekly study times of the flipped classroom group (mean rank = 159.04, $n = 163$) and the conventional method group (mean rank = 176.49, $n = 172$), $U = 15{,}478.5$, $z = 1.81$, $p = .07$ (> .05). It is clear that the time students spent studying did not differ much between the two methods. Figures 6.14, 6.15, and 6.16 illustrate the Mann-Whitney *U* tests for the three cases.

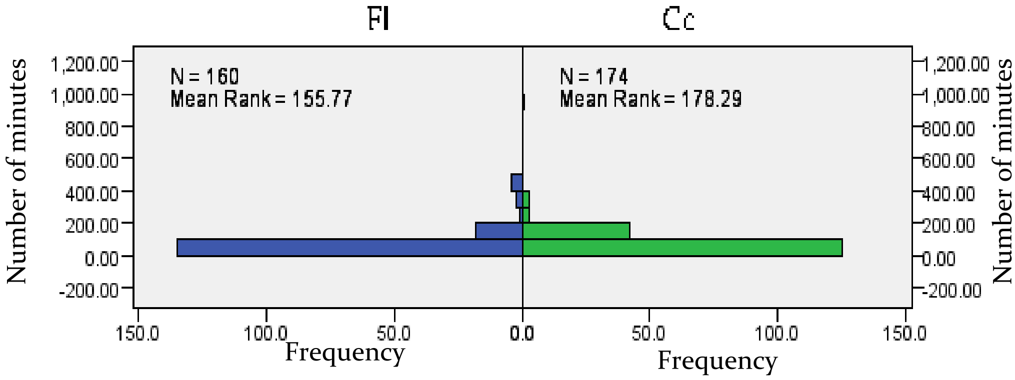


Figure 6-014: Independent-samples Mann-Whitney *U* test for case 1.

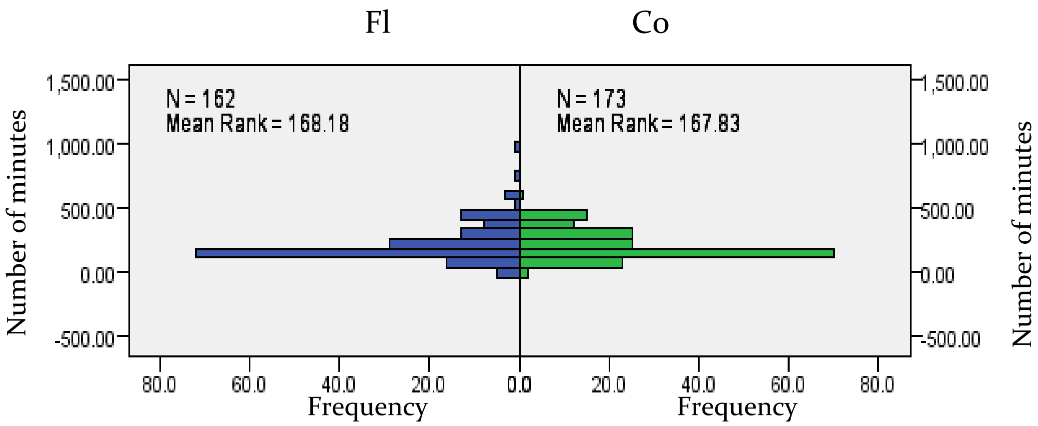


Figure 6-15: Independent-samples Mann-Whitney *U* test for case 2.

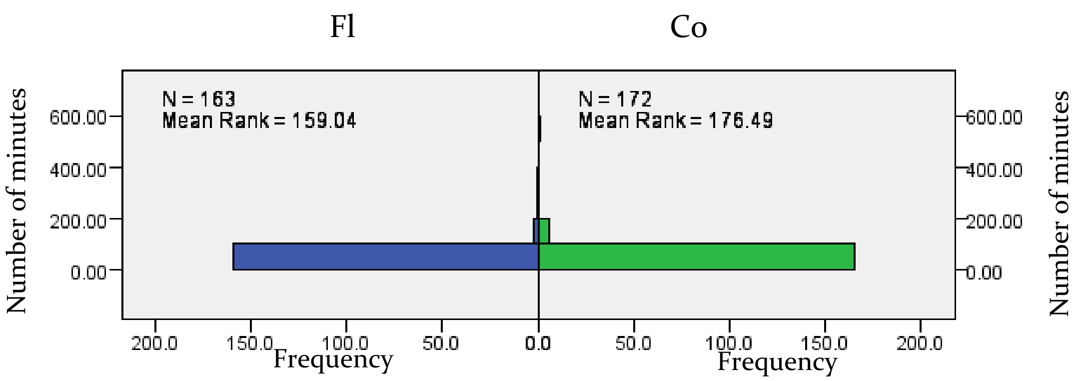


Figure 6-16: Independent-samples Mann-Whitney *U* test for case 3.

6.6 Chapter summary

This chapter presents the findings related to the second research question, which is concerned with differences between the two groups in students' use of time and their approaches to studying. This included identifying how students use their study time and habits in different situations and comparing these results for the flipped classroom group and the conventional method group, if applicable.

In terms of time allocated, the conventional method favoured student-instructor interaction, while the flipped classroom supported more time for peer interactions. The way the different methods were designed naturally led to different allocations of time to different types of interactions. However, the difference in self-study time between the two groups was slight.

The chapter also highlighted some of the study habits of students in the flipped classroom group. Unexpectedly, only 39.5% of the learners "always" watched the videos, and 32.5% of the students regularly failed to watch the videos. In addition, new video lectures released later in the semester tended to get fewer views than those released near the start of the semester. However, during examination periods, the vast majority of learners watched these videos, either again or for the first time. Most students watched the videos one day before class; however, the weekend before class appeared to be another prime time, with the peak viewing hours from 6 pm to 11 pm.

Students mostly watched the videos in their homes (in a quiet room) using a laptop. Those who watched the videos in public spaces, such as on campus or when commuting, used their smartphones. An unexpected finding was that a considerable number of learners preferred to listen without watching or to listen and then read the visual content at other times (from screenshots). During the video lectures, no more than one-half of the students took notes, although engaging in unrelated activities during lectures, such as browsing social media or chatting, was uncommon in both groups. Even though students in the conventional classroom had the opportunity to participate, only one-half of them did so.

During in-class activities, most students engaged in the group discussion to various extents, with two to three more active students in a group and two to four less active students. Some groups approached the in-class activities differently, as they distributed the tasks and then worked individually without group discussion. In terms of self-study habits, students in the flipped classroom group used the videos as a learning resource for examination preparation, and videos at times replaced the textbook as the primary study resource. Moreover, learners in the flipped classroom tended to spend less time than those in the conventional classroom reading the textbook. However, students in the two groups took similar approaches when working on assignments.

Some of these behaviors were influenced by factors related to the implementation of the flipped classroom which are presented in the following two chapters and discussed more fully in Chapter Nine.

CHAPTER SEVEN: RQ3 FINDINGS

STUDENT VIEWS OF THE FLIPPED CLASSROOM IMPLEMENTATION

7. 1 Introduction

This chapter presents results answering the third research question about factors that could affect the implementation of the flipped classroom method. The chapter focuses only on the flipped classroom group. The data are mainly from responses to questionnaire B, mentioned earlier in Chapter Four. This questionnaire was completed by 198 out of 234 students in the flipped classroom.

The questionnaire includes both closed-ended and open-ended questions. The closed-ended questions quantitatively investigate factors expected to impact the implementation of this method. The quantitative analysis also allowed me to categorise students' opinions according to their grades. This could indicate whether these factors correlate with academic achievement. The quantitative data also help clarify whether these factors influence a wide range of students in this context.

The open-ended questions are of three types. The four questions of the first type explore the factors behind the two main behaviours expected from students: watching the video lectures and participating in classroom activities.

These questions ask about the motivations that drive students to watch the videos and to participate in the in-class activities; they also ask about the obstacles that hindered them from doing so. The importance of these questions is that they investigate the two pillars of a flipped classroom.

The second type is general open questions about students' experiences. These four questions highlight, from the student's perspective, positive and negative factors influencing their decisions about watching the videos or participating in the activities. These questions stress other factors affecting the implementation directly or indirectly.

The third type of question is related to students' learning environments and norms. Data from these questions allowed me to investigate the influence of the context of this study. The qualitative data gathered from this questionnaire help identify the main factors affecting implementation of the flipped classroom and quantifying their frequency helps indicate which seem to have the greatest effect. Most participants answered the open-ended questions, although their responses were quite brief. These responses were categorised thematically.

The arrangement of the factors is based on the factors identified through the open-ended questions, as the fact that they were identified by the students themselves indicates their importance, whereas the closed-ended questions were predicted earlier to be examined in the survey. I used the data from the closed-ended questions to support those in the open-ended questions by providing additional quantitative explorations. I also used secondary sources of data such as participants' short comments in the survey, course documents, and researcher field notes to better understand the factors affecting implementation of the flipped classroom method.

This chapter is divided into three main sections: factors related to the video lectures, factors related to classroom activity, and factors related to the learning environment and norms. The first and second sections present the factors deduced from the first and second types of open-ended questions described above. The third section presents factors taken from questions of the third type.

7.2. Factors related to video lectures

The factors presented in this section are divided into three groups: factors motivating students to watch the videos, factors hindering students from watching the videos, and factors related to students' experiences with the videos.

It is important to emphasise that these factors related strongly to students' behaviours when dealing with the videos. These behaviours were discussed in detail in Chapter Six (Section 6.3). Knowing whether students watched the video lectures before class as per the guidelines seemed to be the main outcome on which the factors in this section were based. This section explores how often students watched the video lectures but from a different angle than that used in previous chapters. It then presents the three groups of factors determined from responses to the following questions and directives: *What motivated you to watch the video lecture? What impeded you from watching the video lecture? Give three things influencing your experience with video lectures positively and three things influencing your experience negatively.*

7.2.1 How often students watched the videos

As presented in Section 6.3.1, a 5-point Likert scale question asking how often students had watched the videos on time found that only 39.5% of the students always watched the videos, 28% watched them most of the time, 19% watched them sometimes, 11.5% rarely watched the videos, and 2% never watched them. It seems that these figures contradict with the purpose of using the videos in this course. Students skipping several video lectures was expected, but the fact that 32.5% of participants regularly failed to watch the videos is an issue that must be resolved. The next two sections highlight the factors behind this finding.

However, does the likelihood a student watched the videos vary with student achievement? Exploring this using students' grades revealed that students who got grades of A and D have similar behaviours when dealing with the videos, while students with Bs or Cs showed similarity. A lower percentage of students with an A or D always watched the videos, and a higher percentage "rarely watch the video", than those with Bs, and Cs. Moreover, 75% of the students who never watched the videos had an A or D. This trend could be predicted for those with a D but not for those with an A. Figure 7.1 provides more detail.

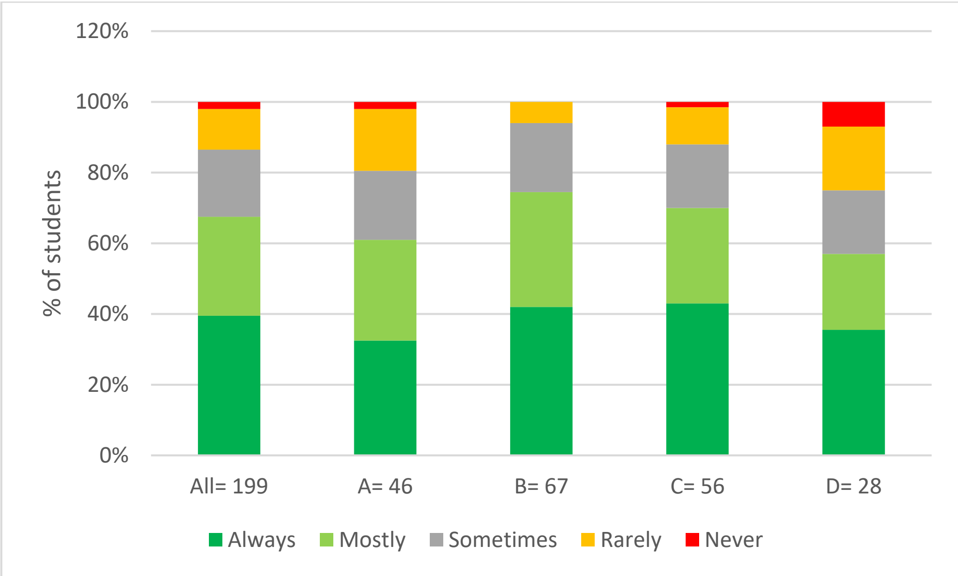


Figure 7-1: Percentages of students who watched the video lectures within grade groups.

7.2.2 Motivational factors

The factors students identified as motivating them to watch the videos fell into three categories: to learn from the video, to be able to participate in classroom activities, and to be registered as attending. The first motivation focuses on learning as a goal and dealing with the videos as a source of knowledge, whereas the second category focuses on the next phase of the flipped classroom, participating in classroom activities, as students seem to deal with videos as one part of a learning process. However, many students addressed these two motivations together. The third factor category, which was cited less frequently, could be considered an extrinsic motivational factor, as the student's desire was to avoid punishment. These factors are explored in greater detail below, and they are ordered based on their frequency.

Factor 1: Willingness to learn

The most frequently cited factor was to learn from the videos, as 126 participants (63.6%) mentioned this explicitly or implicitly, using a variety of terms to express the idea of learning. Some participants used the phrase "to learn" or "to understand", and other participants mentioned "preparing for the exam" as the reason for learning the content. Students also mentioned details about some learning actions related to watching the videos. These actions included writing down important points, identifying points that were not mentioned in the textbooks, and preparing questions about unclear points to ask the instructor later in the class. Other students mentioned characteristics of a video that helped them to learn efficiently, with higher quality and in less time: for example, "it is clearer", it "connects" and "summarises information", "it is short in length and saves time", and "it clarifies the course in simple way".

Factor 2: Ability to participate

This factor was reported by a total of 122 participants (61.6%) as driving them to watch the videos. Most of these participants articulated that clearly "to participate" (108 participants); these responses seem to emphasise the student's participation as an individual. However, other responses emphasised other group members, such as “to fully capture what is going in the discussions”, which was mentioned by five participants.

The instructors’ approach to motivate students to participate appears clearly in some responses: for example, students taught by Emily mentioned that they needed to be ready to participate, as the instructor could “ask any member of the group randomly”. Another participant said she watched “so I can answer and do not embarrass myself”. Several participants taught by Sarah said that they watched the videos to win the competition in the classroom activities.

Factor 3: Attendance registration

Attendance registration was mentioned by 35 students (17.6%) as a reason for watching the video lectures. Students in this course were told that watching a video lecture would be considered as attending a one-hour face-to-face lecture, and instructors would collect attendance online via Blackboard Learn reports. However, two participants mentioned that they watched the videos because it reflects “honesty” and because “it is part of course agreement”.

7.2.3 Hindering factors

Participants were asked to list one or more factors that hindered them from watching the videos. These factors fell into three categories: shortage of time, students’ self-regulation, and internet and technical problems. The first and the third factors were out of the students’ control, unlike the second factor, which related to the student herself who could have had a greater degree of control. These factors are explored in greater detail below, and they are ordered based on their frequency.

Factor 1: Shortage of time

The most frequently cited factor impeding students from watching the videos was shortage of time, as a total of 113 participants (57%) reported this factor. Most said the shortage of time was caused by examinations and assignments for other courses, whereas others mentioned that they were busy with life duties. It is important to note that in one semester students have an average of 17 hours of in-class time weekly for an average of eight courses.

Factor 2: Self-regulation

Self-regulation issues were stated by 70 participants (35%) as reasons for not watching the videos. These issues included forgetting, boredom, laziness, and carelessness about watching the videos. Forgetting was the most frequent condition among those mentioned above. A considerable number of student responses reveal that the early publishing of these videos is the reason students forget to watch them, although some students mentioned other reasons for forgetting, such as distractions or issues in time management. Boredom, laziness, or carelessness about watching the videos were addressed by 11% of the participants. These responses did not provide any further explanation.

Factor 3: Technical and internet problems

Technical problems were cited by 39 participants (19.7%) as an obstacle. The most common complaint was slow internet speed that prevented or delayed the downloading of the videos. Internet speed issues also caused frequent disruptions for some students who watched the videos online. Other technical problems were related to the University servers, as some students mentioned difficulties accessing Blackboard Learn or that they became distracted when the system was slow.

Other factors

Less common factors, which were mentioned by only eight participants (4%), were unexpected circumstances such as health conditions or life conditions. However, these conditions seemed to be temporary and more likely to happen also in the conventional setting. In addition, the video itself was a reason for not watching the video lectures for several students (4%). The reasons given here included students' negative attitude toward the usefulness of the video as learning material, the long duration of the video, or student discomfort with the poor sound quality. Although this group of factors hindered only about 4% of the students from watching the videos, these factors were cited by larger numbers of students when they addressed factors that negatively affected their experience, which are presented in the following section. The fact that students tended to cite these factors as having a negative impact rather than as being obstacles indicates that they could be less important than the other factors cited in this section.

7.2.4 Implementation factors

This section explores other factors related to the student experience with the video lectures during the implementation of the flipped classroom. As mentioned above, I used two sources of data to investigate these factors: responses to open-ended and closed-ended questions. However, all factors in this section were mentioned by participants in the open-ended questions, while some are also supported by quantitative data gathered from responses to the closed-ended questions. The quantitative exploration provides a clearer picture of the range of students affected by these factors. These factors were rated by participants on a 5-point Likert scale. For some factors, grade groups or other related components were used for further exploration.

In the open-ended questions, students were asked to write down at least three factors that influenced their experience positively and another three factors that influenced their experience negatively. Data analysis identified six main factors, some having a positive effect, and others having a negative effect. Some factors had a positive influence on some students but a negative influence on others. These factors are as follows: flexibility and comfort, time and effort, facilitating learning, enjoyment, quality of recording and visuals, and technical problems. These factors are presented below in greater detail, starting with those mentioned as positive factors, then moving to factors with varying effects, and ending with factors that negatively influenced students' experiences. These factors are ordered based on the frequency with which they were mentioned by students.

Factor 1: Flexibility and comfort

Flexibility and comfort was identified as a factor only in responses to the open-ended questions. Remarkably, this was the most cited factor, referred to in 179 comments. Such a large number of comments indicates the importance of this factor, even though there are no quantitative data from the questionnaire related to this factor.

Under this factor, students' responses focused on multiple advantages that positively affected their learning. These advantages are given below, ordered by frequency of appearance in participants' responses. First, the recorded video lectures could be watched at the student's preferred time and location. They also allowed the student to reopen the video when needed. Participants detailed their reasons for watching the videos again, which included reviewing them before examinations, finding a specific piece of information, and reviewing "complicated lessons", as one participant reported.

Another positive point was that students could watch the video lectures at their own pace, since they had the ability to pause and repeat the video. Other less frequently cited advantages were students' ability to watch the videos when missing a class and the ability to download the video files on their own devices.

Comfort was another benefit experienced when watching video lectures, as pointed out by 14 participants. One commented, "watching video lectures gave a psychological comfort, because I can choose the time that suits me". Other examples from students' responses were "listening to the lecture quietly" and "it gives freedom to watch it in any situation – while waking, in bed, alone, or with the family".

Factor 2: Time and effort

Among factors that positively affected students' experiences, 77 participants (39%) said that video lectures saved them time and effort and reduced learning time efficiently. In this regard three aspects were frequently mentioned in students' comments. The most often cited was that "the video lectures were intensive and to the point". The second was the brief duration of the videos, which was often addressed by comparing the videos to conventional lectures, which were usually longer. One student commented that "the time spent to deliver and explain the content was much shorter when using videos rather than regular lecture". The third aspect addressed by participants was that watching video lectures saved them effort and reduced their workload.

This finding supports the finding, presented in Section 6.2.2 above, that the lecture time in the flipped classroom was less than that in the conventional classroom. In the flipped classroom, there are 10 video lectures, and the average time of a lecture is about 17 minutes. The video lectures were sometimes divided into two clips. Table 7.1 provides details about the number of clips and the duration of each clip for the 10 video lectures.

Table 7-1: Number of clips and duration of video lectures

	Number of Clips	**Duration (min:sec)**
1	2	7 + 14 = 21
2	2	5:30 + 6:30 = 12
3	2	8:30 + 8:30 = 17
4	1	22
5	2	7 + 13:30 = 20:30
6	1	13
7	1	18
8	2	10 + 7:30 = 17:30
9	1	16:30
10	2	8 + 7 = 15

As students experienced videos of varying lengths, a question in the survey asked about the preferred length for videos. The survey shows that 36.7% of the participants thought that 5 to 10 minutes was the best length for each video clip. The exact same percentage believed that 10 to 15 minutes was the best duration, whereas 19% selected 15 to 20 minutes, and 3% preferred a duration longer than

20 minutes. An additional 4% of students believed that any duration was acceptable. It is clear that students favoured shorter videos, as two-thirds of participants preferred videos shorter than 15 minutes, whereas only 3% of the participants favoured videos longer than 20 minutes. As illustrated in Figure 7.2, one notable point is that participants who took this course in the first semester (most of whom had a science background) preferred longer videos (10–20 minutes) than their peers who took it in the second semester (most of whom had art backgrounds). This difference should be investigated in future research. With regard to the relationship of video length preference to student achievement, preferences did not vary notably among grade groups.

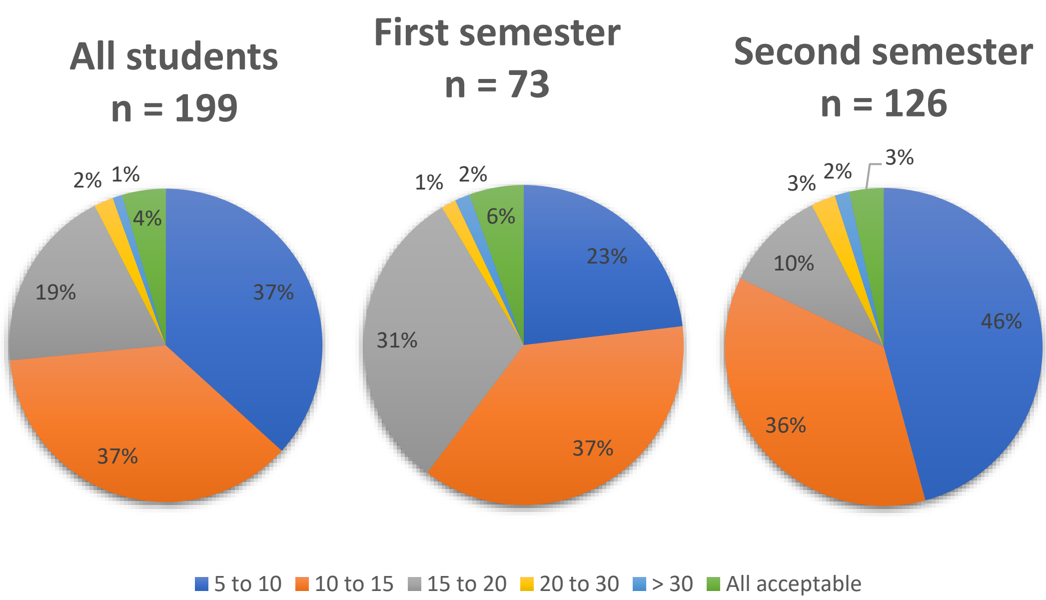


Figure 7-2: Preferred video length in minutes.

Factor 3: Learning from video content

This factor reflects the extent to which the video lectures facilitated student learning. It was mentioned by 136 participants (68.6%), 73 of whom (36.9%) believed that these videos helped them to learn and 53 of whom (26.7%) had the opposite point of view. This factor was also addressed in Section 7.2.2 as a motivation for watching the videos. In the setting of this course, 10 video lectures were designed and recorded by three instructors, one of whom was involved in the teaching of the course. These videos contain narrative MS PowerPoint slides with illustrations and examples.

Before I address participants' comments about learning from these videos, it is important to present a numerical exploration of how students rate these video lectures for their learning. A survey question asked students to rate the usefulness of these videos on a 5-point Likert scale, from 5 = *excellent* to 1 = *very poor.* In the survey results, 38.5% of participants rated the content of the videos excellent, 29% rated the content good, 23.5% rated it acceptable, 6% rated it poor, and 3% rated it very poor. It appeared that most participants (57.5%) found these video lectures useful, whereas only 9% did not.

Comparing students' ratings to their grade groups revealed some differences. The grade A group had the highest proportion of participants who rated the video content either excellent or very good (80%), whereas among all grade groups the grade C group had the lowest proportion of students who gave the video content these ratings (44%). Figure 7.3 shows how participants in each grade group rated the video lectures.

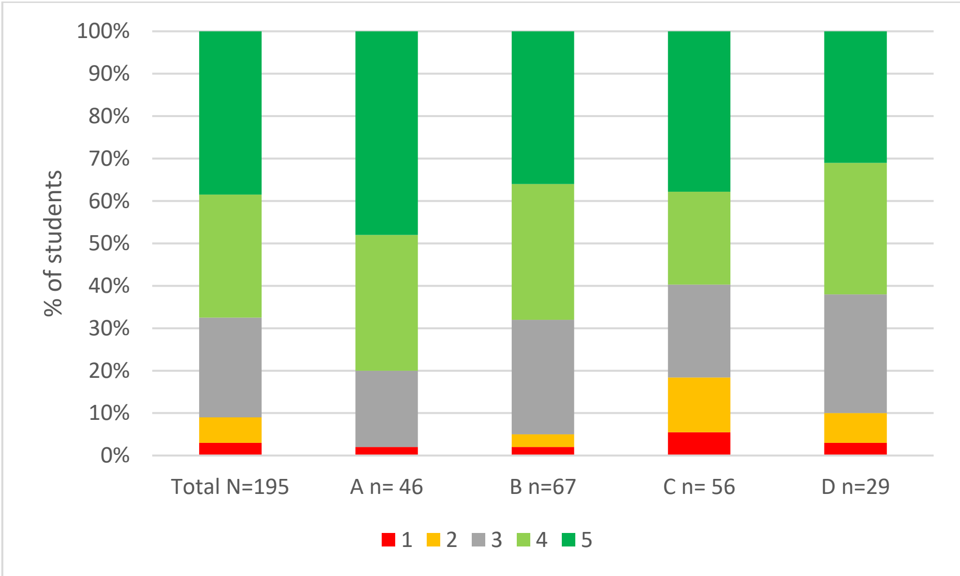


Figure 7-3: Usefulness of the video lectures by grade group.

The above results support the results in the open-ended question, where a higher number of participants found these videos useful for their learning, even though there is a difference between the survey result and the open-ended comments in the proportions of positive and negative views. Such a difference is expected, as not all participants chose to comment on this aspect in the open-ended question, or they commented about negative aspects, even though they found the videos acceptable overall. Therefore, the result from the closed-ended questions is a more accurate indicator of the range of participants affected by this factor, as the question was addressed to all participants directly.

Nevertheless, the open-ended questions revealed why some students believed that these videos influenced their learning, either positively or negatively. Among the positive comments, students focused mostly on how these videos helped them learn the content. About half of these comments declared clearly that the videos were an easier way to learn than the conventional lectures (34 participants). One participant commented that "it was easier, clearer, and easy to comprehend". Other participants listed features of the video lectures that helped them to learn: for example, "the content is clear and accurate"; "information was arranged in a logical order and simplified in mental maps"; "explanation was comprehensive" and "includes all important points"; "colours, pictures, charts, and sounds are used functionally in these videos"; "supported with examples"; and "it contained a detailed explanation, and highlighted the important points in the textbook". Other advantages were also mentioned, such as "it helped in preparing for the class activities, as it gives an overall understanding"; "it eases the procedure of taking notes"; and "it supports self-learning" and "takes into account individual differences".

Those participants who believed that the videos did not help in their learning primarily commented on two aspects: a lack of clarity and a gap between the video content and classroom activity, textbook, or examination questions. Around two-thirds of these comments referred to a lack of clarity of the video content. These comments could be categorised into four points. First, the explanation was not comprehensive enough to cover all topics, and some videos did not have enough explanation for the content presented on the slides. For this point, a number of students commented that "in some videos, the instructor just read the content in the slides" or "she just read instead of explaining". One student thought that "the length of the videos could be the reason" for not having enough explanation, but the same student stated that "the videos should not be long either". The second point was that the video content "did not relate to the life", as one participant commented, and it was "in need of more examples to ease understanding". Under the third point, some students faced difficulty understanding the language of the presenter. This problem was related to the presenter's pronunciation, as one participant commented "Occasionally, I can't understand because of the way she talks" and "she explains in a dialect I can't understand". The fourth and final point related to a lack of clarity was a lack of physical interaction. A student mentioned that "in a regular lecture, information could be absorbed in more than one way, unlike videos". Another participant noted that "there are no tangible samples", which used to be used in teaching some topics in this course. The first three points above are related to the content of videos, which can be improved. The fourth point, however, is related to the nature of the videos, and developing an interactive video requires professional resources.

The second group of comments was about the gap between the content of the videos and the classroom activity, the content of the textbook, or the examination questions. With regard to the relationship between videos and classroom activities, one student said: “We do not depend on videos in the activities; there is no direct link between the tasks and the video content”. However, this comment is contradicted by the fact that a large number of students do watch the video to participate, as presented in Section 7.2.2, and by the fact that not watching the videos hindered students from participating in activities, a topic discussed later in this chapter (see Section 7.3.3). This contradiction suggests that the opinion of those who commented about the gap between the videos and the activity was not common, and those students seek for “direct” relationships, which could be interpreted as tasks about remembering the exact content or maybe applying in similar cases.

Other participants commented on the video content’s relation to the textbook in terms of repetition, arrangement, or coverage. The following are examples of these comments: “the content of the video lecture is already in the textbook”; “the sequence of information was not following the same order as in the textbook”; and “the videos didn’t cover all the information in the textbook, which made me unsure about the important points”. Regarding the relation between the video content and examination questions, students commented that the videos did not help them to study for the examination, as they “did not give an impression about what questions may come up in the exam”, and “it is hard to identify the important points, unlike the normal classes”. These comments also contradict the results presented in the previous chapter (see Sections 6.3.2 and 6.5.2) indicating that students used the videos as study material for examinations. This contradiction also indicates that this was not a common issue for students, and those students who did comment on this were seeking for clues about examination questions.

Factor 4: Enjoyment

In the open-ended question about students' experience, participants highlighted some factors related to their feelings of joy or tedium. Tedium was a frequently mentioned factor; 35 participants (17.6%) cited it as negatively influencing their learning. On the other hand, there were no comments stating that the videos were enjoyable, although many students mentioned that they liked the videos because they helped change the routine and allowed students to experience a new method, or because they were less tedious than traditional lectures. This last item was mentioned by 23 participants (11.6%) as a positive factor in watching these videos.

A closed-ended question in the survey asked about the extent to which students enjoyed the video lectures. The survey revealed notable differences among students. Participants rated the videos from 5 (*very enjoyable*) to 1 (*not enjoyable at all*). The percentages of participants who selected each rating were 13%, 22.5%, 32%, 17%, 15.5%, respectively. In other words, 35.5% of participants found the videos enjoyable, 32.5% did not, and the remaining 32% chose the middle rating. These three responses were divided almost equally among participants.

In comparing this result with results presented just above about the usefulness of these videos, it appears that a considerable number of students found the content useful to learn from even though they did not enjoy it.

Comparing the levels of enjoyment of the content across grade groups, as illustrated in Figure 7.4, shows only small differences. However, the grade B group seemed to enjoy the videos the most (40% of participants), whereas the group grade C seemed to enjoy them the least, as 43% of these students did not enjoy the videos.

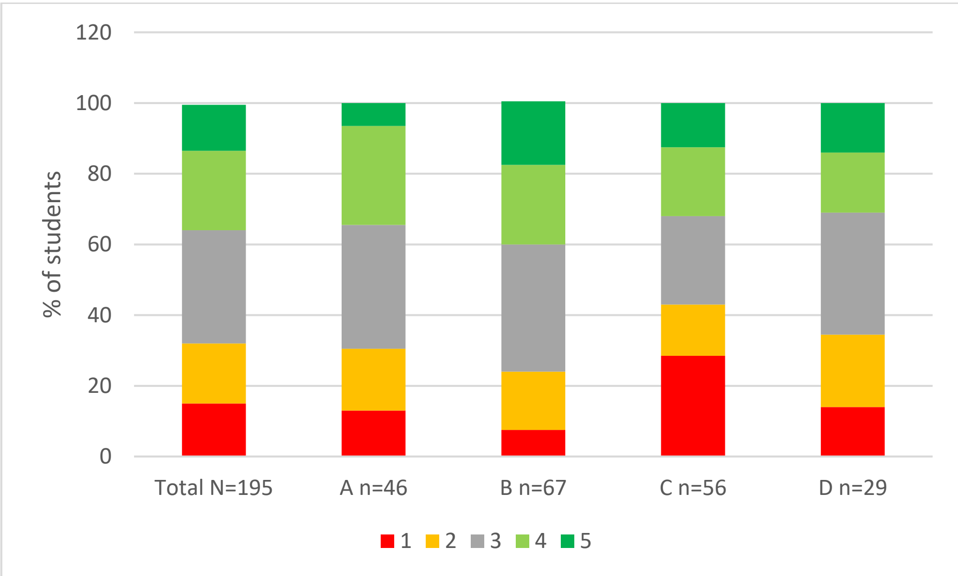


Figure 7-4: Enjoyment of the video lectures within grades' groups.

Analysing the comments of students who found it tedious to watch the recorded lectures revealed two main reasons: the length of the videos and the contents. The most commonly cited reason was "some video lectures were too long". Another reason, mentioned by fewer students, was summed up in the comment "the instructor was just reading the content in the slides". As a result, a number of participants declared that they did not listen to these videos with attention, and one participant mentioned that she did not watch the longer videos completely. However, some students simply described the video lectures as "boring" without providing clarification as to which aspects made them boring. It is important to note that most of the comments presenting this factor used the word "some" in describing video lectures as boring, which indicates that students may have had different opinions about different video lectures.

In contrast to these students is the group who thought that changing the learning routine made their experience of watching video lectures more enjoyable. These students found the videos enjoyable not necessarily for their own sake, but because the teaching method was new for them. This kind of enjoyment, however, can decrease over time as students become used to this method. A good example of a comment by such students was this: "no enjoyable lectures exist, but with such innovation a little joy was present". Other comments seemed to indicate students enjoyed the video lectures primarily in comparison to face-to-face lectures: for example, "watching the lectures as videos was better than the tedium of regular lecture".

Factor 5: Quality of recording and visuals

The quality of the recordings themselves and of the visuals in the videos were identified by a number of students as factors with a negative effect. A total of 46 students (23.2%) commented about the quality, with most of these comments (38) focused on the clarity of the sound.

Before I present results for how students rated the quality of the video lectures, it is essential I briefly discuss the process of recording these lectures. The videos were developed and recorded by a group of three instructors who had previously taught the course. They used basic recording equipment but no recording studio or professional assistant. The recording location usually was an instructor's office or a private room in an instructor's house. The software used was Echo360, which was provided by the University and linked with Blackboard Learn. The pieces of hardware used were a microphone, a microphone windshield, and a computer.

The questionnaire explored this issue with a closed-ended question asking students to rate the recording quality of these videos, followed by a question asking them to comment on the reasons for their answer choice. The available choices were *very good*, *acceptable*, and *poor*. Most survey respondents (65.3%) rated the quality of the video lectures as very good, about 30.7% thought the quality was acceptable, and the remaining 4% found the quality to be poor. Few participants provided explanatory comments. The most frequent comment was that the sound volume was low in some videos. Another one referred to distracting sounds in the background. A number of comments were more specific: "there was a knocking on a door in the 4^{th} lecture". These results indicate that even though the recording process was simple and had some quality issues, most students accepted the quality of the videos.

Analysing students' tolerance of video lecture quality across grade groups reveals slight differences among the groups. The grade C group seemed to be the least tolerant group in rating video quality, as only about 55% of students in this group rated the quality as very good, which is a smaller percentage than in the grade A, B, and D groups (64%, 71%, and 72%, respectively). Figure 7.5 illustrates the participants' quality ratings of the video lectures.

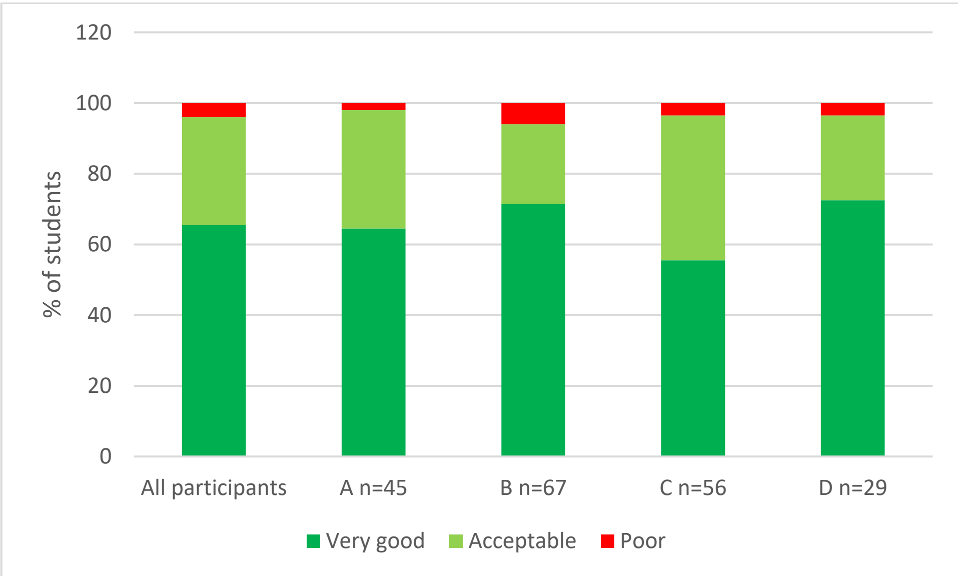


Figure 7-5: Student ratings of the quality of video lectures.

Even though few participants rated the videos as poor, 46 participants (23%) mentioned low quality as a factor in answering the question about negative experiences with video lectures. These comments mostly referred to the clarity of the sound (38 participants). Examples include the following: "sound volume was low", "the sound was not clear", and "there were distractions such as door knocking”. Some participants mentioned that this issue had “affected [their] concentration”. Several students commented on the speaker’s rhythm, as one instructor speaks quickly when she records. In the area of visual design quality, three students mentioned two issues: the videos contained few images and the font used was small.

Factor 6: Technical problems

Technical problems were mentioned by 45 participants (22.7%) in their answers to the question about their experience watching the videos. Technical problems were also cited as one of the factors that impeded students from watching videos, as discussed in Section 7.2.2.

This factor was also addressed in a question about how often students faced technical problems that affected them negatively, which was followed by an open-ended question asking them to describe the kind of problem they faced. The results show that 51.3% of students never faced technical problems, 22.6% rarely faced problems, 25% had them sometimes, and only two students regularly encountered technical problems. In other words, more than 25% of the students had been affected by technical problems in this setting. Few participants commented about the kind of problems they faced, and the comments that were provided mostly referred to internet problems, to the virtual learning environment (Blackboard Learn) “hanging”, or to problems downloading the videos. Figure 7.6 illustrates the percentages of students impacted by technical problems when watching the videos.

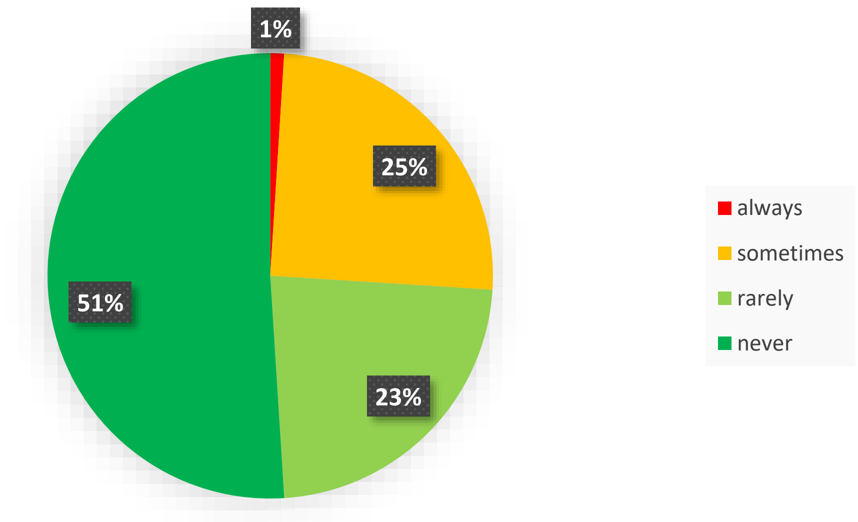


Figure 7-6: Frequency with which students were impacted by technical problems.

In response to the question about students' experiences with video lectures, students commented about three issues that affected their experiences negatively. These issues related to internet connections, the virtual learning environment, or a lack of technical knowledge. The issue mentioned most often was the internet connection, with participants mostly complaining about slow internet speeds and weak signals for mobile internet, which caused frequent disconnecting during the video lecture. A lack of internet access was also reported by several participants who did not often have internet access in their homes.

The second most common issue was problems playing the video lecture files on Blackboard Learn. Students' comments provided more details about this kind of issue: "the system was hanging sometimes" and "problem with downloading the video files, which happened occasionally [and which] required replaying the video from the beginning". The third issue related to technical knowledge, as some participants did not know how to download the video files on a personal computer (PC) or to a smartphone or iPad. Having this knowledge could help them avoid technical problems in the future.

7.3 Factors related to classroom activity

The factors presented in this section are divided into three groups: factors that motivated students to participate in the activity, factors that deterred students from participating, and factors related to students' experiences with the activity.

One important part of this section is knowing whether students participated in classroom activities as per guidelines. The answer to this question is the base for understanding the factors behind students' behaviour. After presenting data on how often students participated in the activities, this section presents the three groups of factors derived from answers to the following questions: *What motivated you to participate in the classroom activity? What impeded you from participating in the classroom activity? Give three things that influenced your* *experience with classroom activity positively and three things influencing your experience negatively.*

Before I discuss these factors, it is important that I give an overview of how classroom activities were conducted. Data from field notes showed that students usually completed about five to seven tasks during the face-to-face class. They worked in groups of four to seven members. The activities were designed to cover at least 70% of the lesson outcome. The tasks mostly required written responses after group discussion. Time was then allocated for students to discuss their conclusions with the instructor and the rest of the class. Each group was expected to submit a copy of their written responses before the next class.

7.3.1 How often students participated in classroom activity

The first aspect to discuss here is students' participation in class activities as indicated in the guidelines. The survey showed that about 60% of students said they always participate in class activities, 25% said they participate most of the time, 14% said they participate sometimes, 0.5% said they participate rarely, and 1% of students said they never participate in the class activity. Thus, the majority of students in this setting (85%) always or most of the time participated in class activities, whereas only 1.5% rarely or never participated. This result may be considered encouraging compared with the percentages of students who watched the videos always or most of the time (68%) presented in Section 7.2.1. The 17% difference between the two results may indicate that the fact of skipping watching the video lecture did not prevent some students from participating in the classroom activity.

How do these participation results vary when student achievement is considered? Breaking out this data by student grade group shows that high achievers (those in the grade A group) participated more than those in the grade B and C groups, as 93% of participants in the A group participated always or most of the time, whereas this figure for those in the grade B or C groups was about 83%. Grade D group had the lowest percentage participating always or most of the time (75%). Additionally, no student in the grade A or B groups participated rarely or never. Figure 7.7 provides more detail on this factor.

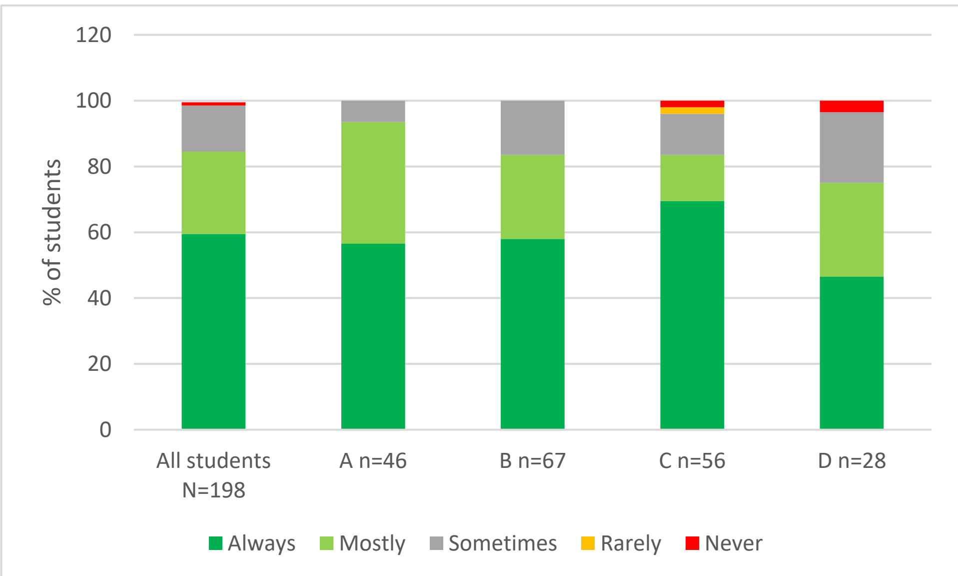


Figure 7-7: Percentage of students who participated in-class activities broken out by grade groups.

7.3.2 Motivational factors

Participants listed one or more factors that motivated them to participate in the classroom activity. Students' responses were categorised into four main factors: to learn from the activities, to get participation marks, to interact with other groups' members, and to experience a feeling of excitement. These motivations vary in their nature. The first motivation focuses on learning as a goal and dealing with the activity as a way of acquiring knowledge, whereas the second factor seems to be an extrinsic motivational factor. The third factor is social, whereas the last one is driven by a student's feelings. These factors are explored in greater detail below, and they are ordered based on their frequency. However, it was common that a student provided more than one motivation.

Factor 1: Willingness to learn

The most frequently cited factor was willingness to learn, as 155 participants (78%) stated that this factor motivated their participation. However, they addressed this factor in four different ways. A number of participants explicitly mentioned that they participated "to learn" or "to achieve high grades"; others used terms indicating learning or mentioned aspects related to learning procedures. Comments like "to learn" or "to achieve high grades" were direct and short. However, with the other group of comments, students cited terms that could be at different levels in the SOLO taxonomy. The term "remembering information" or the phrase "to stick the information in the back of mind" was mentioned by 21 participants, the terms “understand” and “absorb” were mentioned by 39 participants, the term “applying” was mentioned by five participants, one participant used the term “analysing”, and one participant used the term “thinking”. The specific use of one of these terms may indicate how a student sees learning through activity. Most of the terms students used are in the lowest levels of the SOLO taxonomy.

The fourth group of comments, related to the learning process, includes learning from peers (22 participants) and getting feedback (9 participants). Examples of these comments include “sharing ideas”, “learning from other members in the group”, or “correcting the mistakes”. Students’ emphasis on these two aspects implies the importance of these aspects in the learning process in the flipped classroom. This emphasis also indicates that the activity provides such an opportunity for learning from the instructor or peers.

Factor 2: Getting participation marks

Getting participation marks was mentioned by 48 participants (24%). All those students mentioned this factor explicitly without further explanation. This factor seems important as, in this setting, 10% of the final grade was for participation in classroom activities. Reviewing the data from instructors’ records reveals that most students got the full mark, which was 10 out of 10, with a few students getting 9 out of 10. Assessment for this mark, however, was based not on observing students during the activity but on the final draft of the activity report students submitted after the session.

Factor 3: Group members

Interacting with group members was stated by 44 participants (22%). When describing this motivation, some emphasised how the participation of other group members motivated them to interact, whereas others emphasised their desire to engage with others. For example, comments included "I like to be a positive member in the group" and "I love to cooperate". However, one participant addressed an opposite case, saying that uncollaborative group members drove her to participate, as they increased her level of responsibility for finishing the task.

Factor 4: Excitement

The feeling of excitement was addressed by 27 participants (13.5%) as a motivator to participate in class activity. Students used terms such as "enthusiasm", "excitement", "fun", and "competition between groups during the class activity". It is notable that most of the students who said a feeling of excitement motivated them were from cohorts taught by Sarah, who tended to organise competitions between groups and give a prize to the winning group. This indicates that this feeling was related to another factor: the instructor's approach. The effect of instructor approach is discussed later in this chapter and the next chapter (see Sections 7.3.4 and 8.4.3).

Other factors

There were also other factors which appeared less commonly among students' responses. One of them related to the student's identity and was mentioned by 14 participants (about 7%). This factor can be described using the following extracts from students' comments: "to prove myself", "to show my abilities", and "to be able to add points and answer questions".

The last and least frequently cited factor, which was mentioned by nine participants (about 4.5%), was related to the instructor's approach. Most of these comments were from students in cohorts taught by Emily. About one-half of these nine students gave as a reason for participating the fact that "the teacher asks the one who doesn't participate", whereas the rest mentioned that they participated because the teacher encouraged them to do so. It appeared that these two groups of students saw the instructor's approach differently, as the former half had a sense of being under stress, whereas the latter group emphasised the term "encourage". Instructor approach is discussed later in this chapter and the next chapter (see Sections 7.3.4 and 8.4.3).

7.3.3 Hindering factors

Another question in the survey asked about factors that impeded students' participation in class activity. Before presenting these factors, it is important that I mention that about 41% of participants commented that they always participated in the group activity, and nothing impeded their participation. However, other participants mentioned one or more obstacles that kept them from participating. Most of these obstacles related to one of two main factors: the given task or not having watched the video lecture. The first of these factors could be out of a student's control, whereas the latter refers to a student responsibility, and students can exert a greater degree of control over it than over the first factor. There were also other factors related to student characteristics or the instructor's approach. The following paragraphs discuss these factors, which are ordered based on their frequency.

Factor 1: Activity tasks

The most commonly cited hindering factor was mentioned by 35 participants (18%). The tasks given to students can be obstacles to participation when students are unable to perform them. Under this factor participants mentioned reasons such as "I'm stuck", "I don't know the answer", "I don't understand a particular point", "I did not like this type of activity", or "it used unclear terms". However, students may also have faced difficulties when performing the activities because they did not watch the video lectures, a factor which is presented below.

Factor 2: Failing to watch a video lecture

Failing to watch the video lecture was cited by 30 participants (15%) as an obstacle to participation. Other participants, however, commented that "it was easy to participate even without watching the videos". The fact that the percentage of students who participated in activities was higher than the percentage who watched the video lectures (see Section 7.3.2) supports this comment. This factor is discussed further in the next chapter (see Section 8.4.1).

Other factors

Several other impeding factors were mentioned by small numbers of participants. One of these factors, which was reported by 23 participants (about 12%), was personal circumstances. Circumstances such as tiredness, headache, fatigue, idleness, laziness, hunger, feeling cold, or feeling sleepy seemed to affect the participation of some students.

Another factor, reported by 12 participants (6%), was psychological reasons. These include embarrassment, hesitation, fear, shyness, and difficulties adapting to group members. It is worth mentioning that most of these comments came from students taught by instructor Emily. This also indicates that an instructor's approach can affect student participation.

The last factor that discouraged participation, mentioned by seven participants (3.5%), was a lack of interaction among group members. However, as mentioned in Section 7.3.2, group member cooperation was considered a motivating factor for 22% of participants. Participants also mentioned factors such as tedium, preoccupation with something else such as studying for an examination during activity time, and an atmosphere that was noisy or too quiet.

7.3.4 Implementation factors

This section explores other factors related to student experiences with the classroom activities during implementation of the flipped classroom. As mentioned in the introduction to this chapter, I used two sources of data to investigate these factors: open-ended and closed-ended questions. However, all factors discussed in this section were mentioned by participants in responses to the open-ended questions, although some of these factors were explored in the closed-ended questions. In the open-ended questions, students were asked to write down at least three factors that affected their experience positively and another three factors that affected their experience negatively. Students' responses to these questions were categorised under main factor headings, and the frequency with which students mentioned these factors was considered. To develop a better understanding of these factors, where applicable I discuss the quantitative exploration of responses to the survey's closed-ended questions.

Participants rated these factors on 5-point Likert scales. For some factors, grade groups or other related aspects were used for further exploration.

Students' responses to the open questions could be grouped under five main factors, some having a positive influence, some having a negative influence, and some having an influence that varied among students. Before presenting these factors, it is important that I mention that 59 participants (about 30%) stated explicitly that there were no negative factors affecting their experience of classroom activities. The main factors included the ability of the activity to facilitate learning, enjoyment of the activity, duration of the activity, group members, and instructor support. Other factors mentioned by smaller numbers of participants are presented as well. All factors are presented below in greater detail, starting with those mentioned as positive factors, then moving to factors that could have either a positive or a negative effect depending on the student, and ending with factors that influenced students' experiences negatively. The order of these factors is based on the frequency with which they appeared.

Factor 1: Learning from classroom activity

The first and most frequently mentioned factor that had a positive effect on students' experiences was how the activity facilitated students' learning. A total of 251 comments were about this factor; 87% of these comments indicated that the activity was useful for students' learning, whereas 13% took the opposite point of view. Learning from a classroom activity was discussed in Section 7.3.2 as the most common factor motivating students to participate in the activity.

Before presenting students' comments about learning from the activities, it is beneficial to present numerical exploration about how students rated the usefulness of these activities for their learning. Students rated the activities from 5 = *very useful* to 1 = *not useful at all*. Students' views on this topic in the survey varied widely. The percentages of students who selected each of the values from 5 to 1 were as follows: 14%, 21%, 25.5%, 26.5%, and 13%. In other words, about 75% of participants were divided equally among the middle ratings, and the remaining 25% were divided between *very useful* and *not useful at all*. Investigating these responses by grade groups revealed no notable differences among the groups. Figure 7.8 illustrates students' ratings of the usefulness of classroom activities.

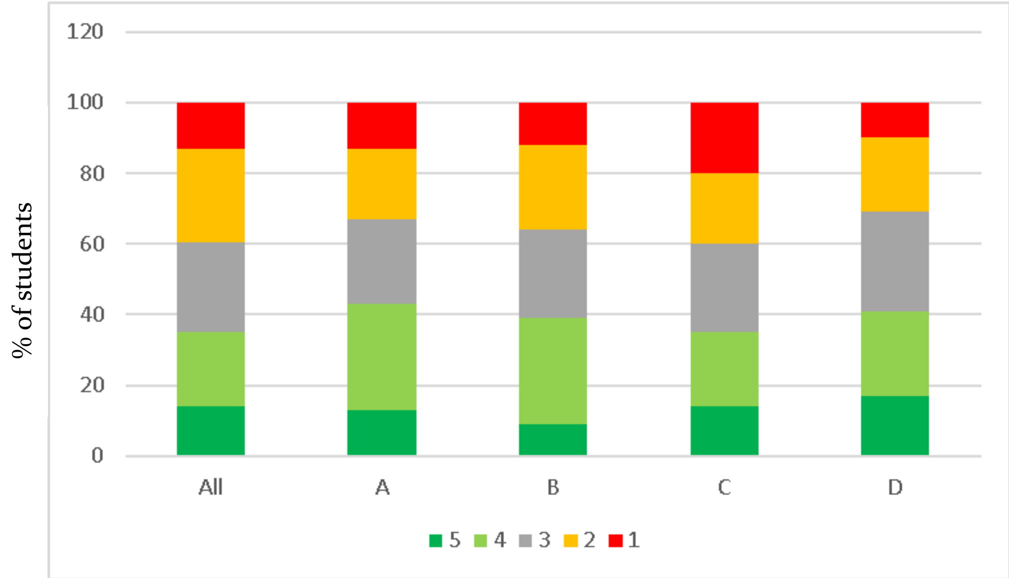


Figure 7-8: Students' ratings of the usefulness of the classroom activities by grade group.

In looking at students' comments in response to the open-ended questions about classroom activities, it is notable that the number of positive comments exceeded by far the number of negative comments, even though students were roughly equally split on whether or not the activities were useful. The value of qualitative data is that it allows us to dig into students' experiences in detail.

The positive comments could be divided into three main categories: the cognitive, the social, and examinations. In the first group of comments, participants used various terms to describe their learning, using terms related to "remembering", "understanding", and "applying". Most of these comments appeared to be in the low ranking of the SOLO taxonomy cognitive domain. With regard to remembering, 64 comments emphasised that these activities helped them to remember, preserve, retrieve, memorise, and increase acquisition of information. An additional 39 comments stated that these activities supported the student's understanding, helping the student to understand the lecture more deeply, clarifying vague concepts, explaining unclear points in video lectures, classifying information, and summarising the lesson. In addition, 11 comments emphasised that the activity helped them apply the theoretical content and develop practical experiences. On the other hand, only six participants mentioned that classroom activities also helped in self-learning, as they tried to find needed information and developed their own conclusion from the tasks instead of depending on the instructor. These comments could be considered to be in the higher levels of the taxonomy.

In terms of the social aspect, students commented on the advantages of interacting with their peers in group work (77 comments) and the advantages of interacting with the instructor (11 comments). They also noted that working in groups in classroom activities supported their learning in many ways: sharing views, exchanging experiences, discussing opinions, modifying ideas, and correcting erroneous information. In addition, words like collaboration, participation, and interaction were mentioned frequently in these comments in a positive way. The comments which highlighted the advantages of interacting with an instructor are: discussing the activities with the instructor helped to learn more; having constructive feedback and guidance, and helping to focus on the important points.

The third group of comments referred to the activities as helping students get higher marks in examinations, with nine participants pointing out that class activity was helpful because some examination questions were related to the activity to some degree.

Most comments presenting the opposite point of view about this factor criticised the kinds of tasks given in these activities (26 comments), and six comments criticised the notion of learning through activity. In the first group of comments, students mentioned that they were stuck on the tasks. Some believed that was because they had not watched the video lectures. Others believed that it involved issues of understanding the task, since some tasks were indirect; that the explanation of the tasks was insufficient; that the task was not related directly to the video content; or that the tasks were difficult to complete. Examples of participants' comments include "the video lecture is easy, and the activities are difficult and deep; sometimes I can't do it" and "the tasks are supposed to be one of the questions that come in exams; I don't like questions like what do you think about this or that". Those who commented on the notion of the activity seemed to generally have negative attitudes toward learning via classroom activity. Examples of these comments are "meaningless" and "I do not like it; the explanation is better than the activities".

Factor 2: Enjoying the activity

This factor was addressed by 49 participants (24%). A total of 39 participants (19% of all participants) mentioned that class activity was an interesting way to learn. However, 10 participants (5% of all participants) described classroom activities as tedious.

Before presenting students' comments about enjoying the classroom activities, I present numerical findings from a closed-ended question in the survey that asked students how enjoyable they found these activities. Students rated the activities from 5 = *very enjoyable* to 1 = *not enjoyable at all*. The percentages of students who selected each rating were 30.5%, 32.0%, 26.5%, 7.5%, and 3.5%, respectively. Thus, most students (62%) enjoyed the activity, whereas only 11% did not. Comparing these results with the ratings of the usefulness of the activities, presented above, showed that more learners enjoyed the activity than the number that found it useful (62% and 35%, respectively), which could indicate a considerable number of students enjoyed the activity even though they did not find it useful for their learning.

Comparing activity enjoyment ratings across grade groups showed that enjoyment was higher in the grade A and B groups (about 68% and 72%, respectively) than in the grade C and D groups (55% and 53%, respectively). The percentage of students who did not enjoy the activities was higher in the grade D group (20%) than in the other three grade groups. Figure 7.9 illustrates students' ratings of how enjoyable they found classroom activities broken down by grade group.

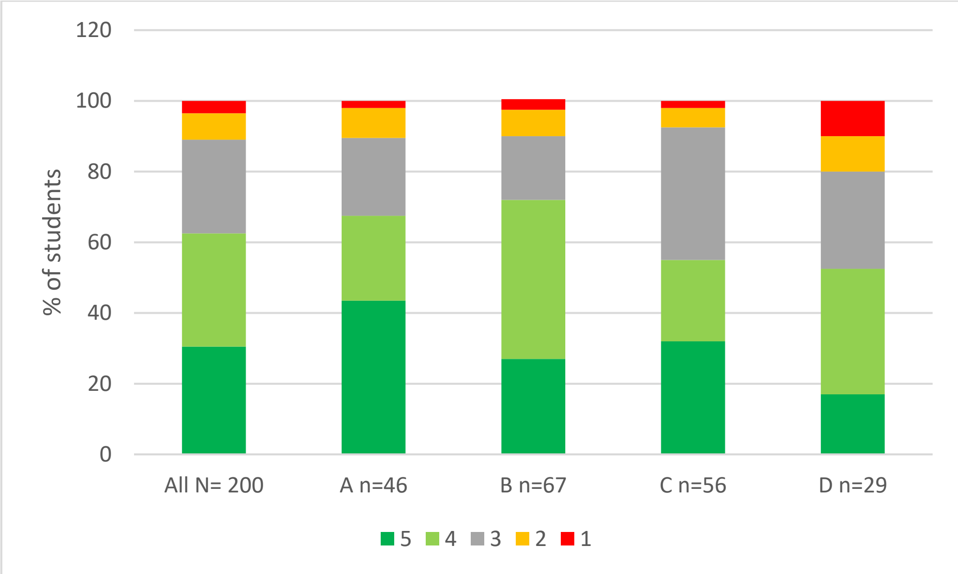


Figure 7-9: Students' ratings of how enjoyable they found classroom activities broken out by grade group.

Students' comments in response to the open-ended question included "the atmosphere evokes enthusiasm [as students] compete with other groups during the activity" and "it changed the monotony of the normal lecture". By contrast, 10 participants commented that the activities were "boring". Only three participants mentioned a reason for that which seemed related to the instructor's approach, saying they did not enjoy "the instructor's way of teaching" and "feeling stressful" because the instructor could "address a question to students randomly". It is important to mention that the negative comments were mostly from the cohort taught by Emily or Nancy, whereas the comments about enthusiasm and competition were from students taught by

Sarah. The instructor's approach is discussed further in this section as well as in the next chapter (Section 8.4.3).

Factor 3: Duration of activity

This factor was mentioned by 24 participants as having a negative effect on their experience in classroom activities. The duration of each task in the activity session is based on the task nature. Most tasks required written responses after group discussion. Students in a group usually spent between 5 and 15 minutes to arrive at a conclusion, then another 5 to 7 minutes to share the conclusions and discuss them with the instructor and other groups. The total class time is 100 minutes to complete about four to seven tasks. Most students who addressed this factor believed that the duration of tasks was too long. Some commented that one hour rather than two would be enough for all tasks. Only one participant found that the time for completing activities was too short.

Responses to a closed-ended question in the survey showed varied points of view. The choices for rating the activity duration were *long*, *appropriate*, and *short*. Some 19% of participants rated the duration as long, about 80% rated it as appropriate, and only 1.5% (three students) thought it was short. It is clear that most students found the duration was appropriate. This result does not contradict the responses to the open-ended questions, as 40 students found the activity long in the survey, whereas 32 students commented on the activity duration. However, the responses to the close-ended question do provide the views of the rest of the students.

Investigating this factor across grade groups showed that, with exception of the grade A group, there is some decrease in the percentage of students who found the activity duration long, as the percentage was the highest in the grade B group (24%) followed by the grade C group (20%) and the grade D group (11%). Moreover, 18% of those in the grade A group found the duration long. Figure 7.10 illustrates students' views about the activity duration.

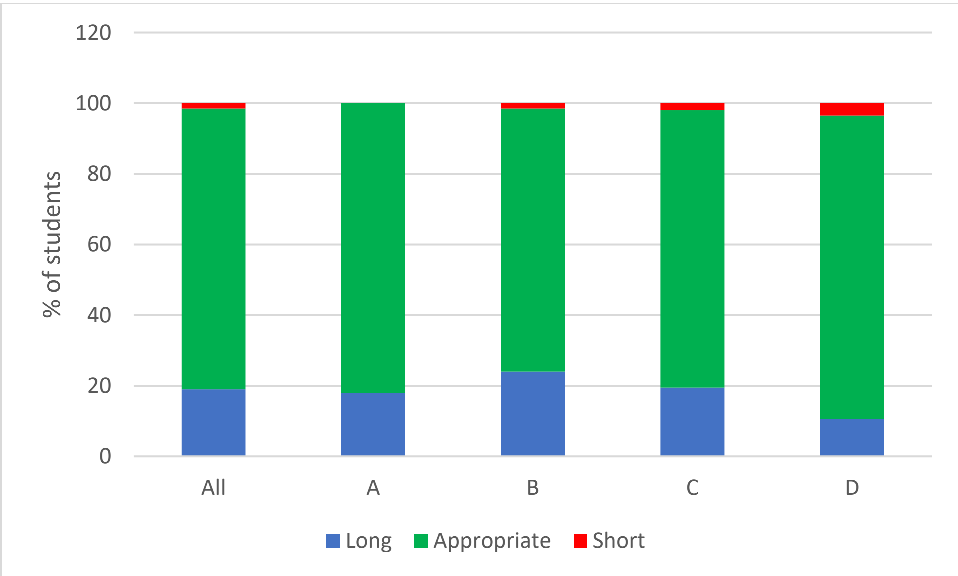


Figure 7-10: Students' views about the activity duration by grade group.

Factor 4: Group members

In response to an open-ended question, 23 participants (11%) addressed group members' cooperation as a factor that had a negative impact on their experience. This contrasts with an earlier result, presented in Section 7.3.2, in which 44 participants (22%) found that group members motivated them to participate. Moreover, in the previous analysis of students' learning from classroom activities, students made 77 comments about the advantages of learning from peers.

However, a closed-ended survey question asked students how helpful they found group members during class activities. Responses were on a 5-point Likert scale, with 5 = *very helpful* and 1 = *not helpful at all*. Roughly 72.4% of participants selected 5 or 4, indicating they found group members helpful. About 7.5% of participants selected the middle rating, and around 10% of students selected the two lowest ratings. These choices indicate group members' cooperation was not a problem for most students. This finding does not contradict the results from students' comments in the open-ended question, as the percentage of students who commented negatively about group members (11%) was about the same as the percentage who chose the low ratings in the closed-ended question (10%). The closed-ended question results, however, revealed the views of the rest of the students.

Investigating this factor across grade groups reveals that the grade A and D groups were similar and the grade B and C groups were similar. Students in the former two grade groups seemed to find group members more helpful than did those in the latter two groups. The percentages of students in the grade A and D groups who found group members helpful were 80.4% and 82%, respectively, whereas these percentages in the grade B and C groups were 69% and 64%, respectively. Figure 7.11 presents more details.

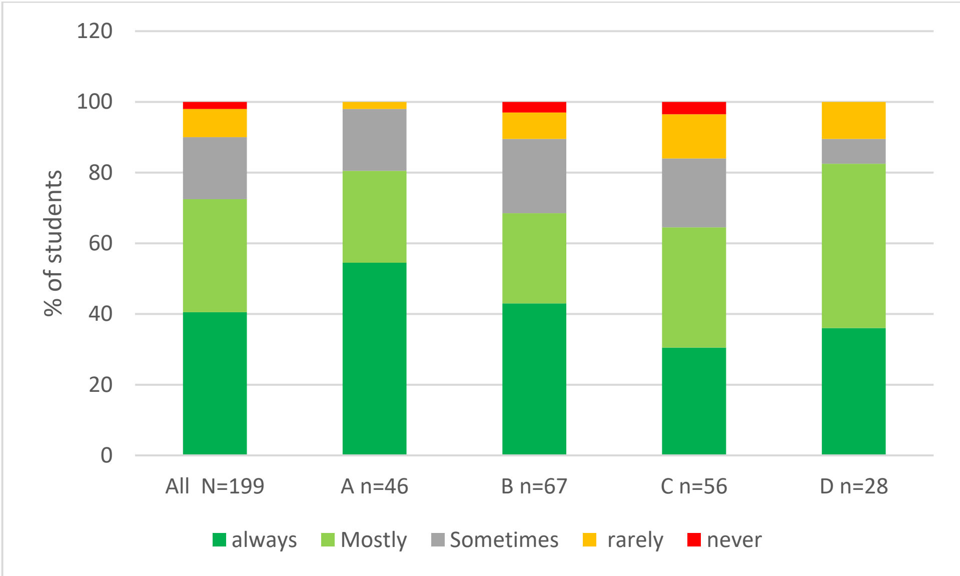


Figure 7-11: Students' view about group members by grade group.

Before I present students' opinions about their group members, it is beneficial to give a brief description of these groups. In this setting, the groups usually consisted of four to seven members, depending on the number of students in the cohort. The distribution of students was done by the instructor randomly or by the students themselves. The same group members worked together until the end of the course.

Students' positive comments about learning from peers were discussed earlier in this section. This paragraph presents students' comments about the negative influence of their group members. About half of these comments highlighted that the group members were inactive and on many occasions did not cooperate. The other half complained that one or two members dominated or controlled the group. Some students mentioned that the other group members relied on them to complete the tasks. Students also wrote of an issue with the distribution of group members or with the number of members in each group. They suggested that assignment of members by the instructor reduced interaction in the group. One participant from a group with three members commented that three members was not enough to complete the tasks.

Factor 5: Instructor

In this setting, there were three instructors who generally followed the same strategy in teaching. However, these instructors still each had different characteristics and different approaches to motivating students to participate. The strategy they followed started with answering students' questions in the first 10 minutes of the class, before starting the activities. After each task, they ran a class discussion, then commented on each group's conclusions. They also fielded individual questions at the end of class. It is important to note that two cohorts switched instructors in the middle of the course for administrative reasons.

A closed-ended question in the survey explored students' views about the support that they received from the instructor. Students rated the instructor using a 5-point Likert scale with 5 = *very helpful* and 1 = *not helpful at all*. A total of 80% of participants rated instructor support at 5 or 4, 12% selected the middle rate of 3, and 8% chose 2 or 1. It is clear that the support given in this setting was adequate for the majority of students.

Analysing students' opinions according to their level of achievement revealed similar results in the grade A and B groups and in the grade C and D groups. More students in the former two grade groups than in the latter two groups found the support from the instructor was sufficient. The percentages of students with positive opinions were 89% and 87% in the grade A and B groups, respectively, whereas these percentages in the grade C and D groups were 71% and 68%, respectively. Figure 7.12 illustrates more details.

It is also important to investigate how student ratings of this factor differed by instructor. An analysis found slight differences among the instructors' student groups. Students taught by Sarah rated their instructor as more supportive than did students taught by the other instructors, as 95% of students taught by Sarah had a positive opinion compared to 76% and 69%, respectively, of students taught by Emily or by Emily and Nancy. Figure 7.13 illustrates more details.

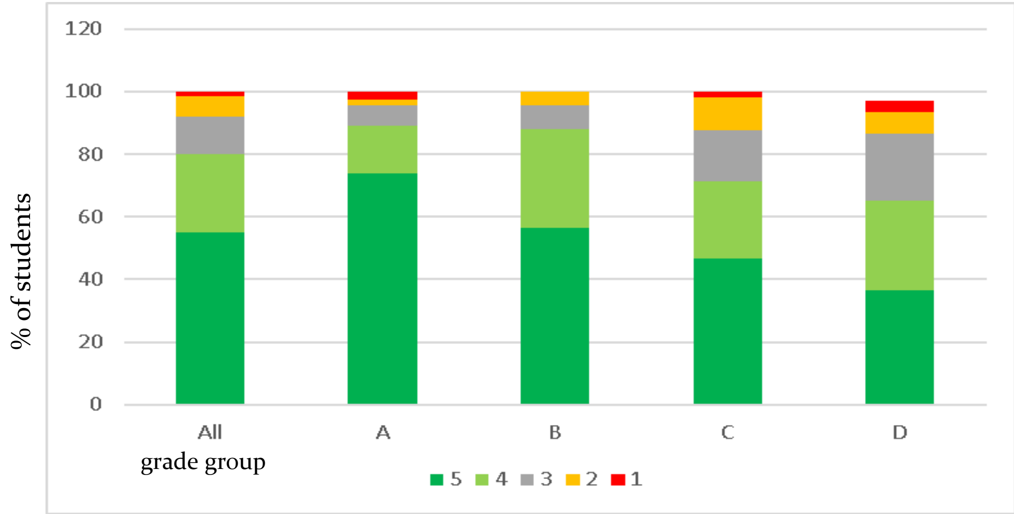


Figure 7-12: Participants' ratings of instructor support within grade groups.

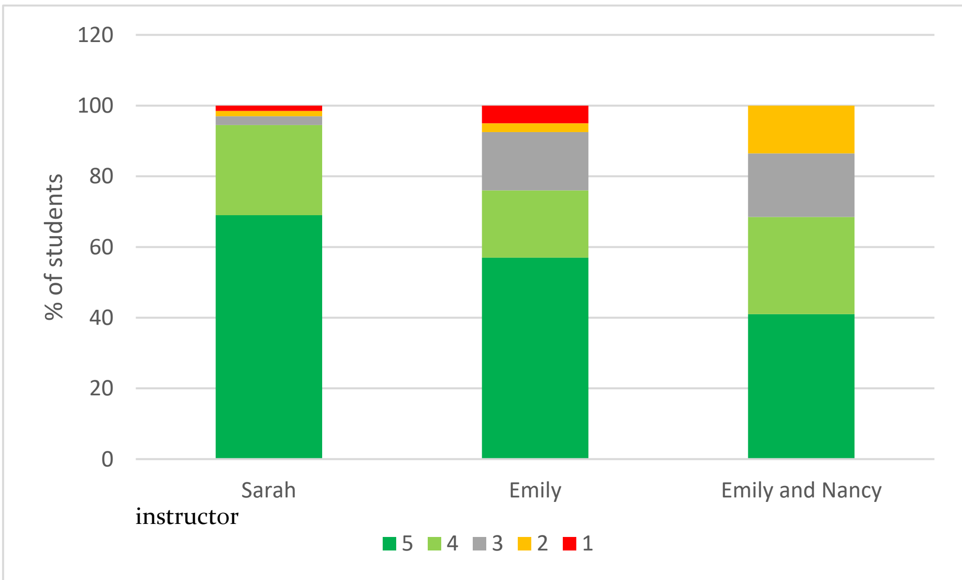


Figure 7-13: Participants' ratings of instructor support within instructors' groups.

Students' comments in response to the open-ended question included few negative comments about the instructors, which is consistent with the results reported above indicating that most students were satisfied with the support provided by their instructor. This factor was mentioned explicitly by only three participants, although it was mentioned implicitly in comments about other factors. The three explicit comments criticised the instructor for feedback given, for not reviewing the content of video lectures, and for the change of instructors in the middle of the course. The implicit comments varied by instructor. For example, some students taught by Sarah commented that the instructor encouraged them to participate, whereas some students taught by Emily was felt stressed because they were expected to be ready to answer any sudden question. One student criticised Nancy for not observing the group work, noting that she "did not know who is participating". From these comments we can conclude that the instructor's approach not only facilitated learning by giving needed assistance and explanations, it also encouraged students to learn, a topic raised earlier in the discussion of motivational and hindering factors presented in Sections 7.3.2 and 7.3.3.

Other factors

Other factors also affected students' experiences during the implementation of the classroom activity. These were mentioned by smaller numbers of students. For example, a social factor mentioned by five participants (2%) was related to the advantages of learning within a group. For instance, one student commented “I feel free to express my opinion within the group”, and another student said “I did not feel shy to talk with my group, unlike talking in front of the whole class”. Finally, one student mentioned that learning within a group “helps to develop social relations”.

Another factor mentioned by two students was related to the task worksheets. The first comments referred to the look of the worksheet: “it was not attractive”. The other student commented on the number of copies: “the number of copies was not enough, as multiple students need to share one sheet, and this is not convenient to read the task sometimes”.

7.4 Factors related to the learning environment

This section investigates factors related to learning environments and norms. First, it investigates factors related to students’ beliefs – that is, their views about their own role and the role of the instructor. Second, it investigates factors related to the learning environments in terms of classroom facilities, the digital environment, the learning management system, and technical problems. Third, it investigates factors related to the support outside classroom: university staff support and student community support. Each of these factors has been investigated using two tools: closed-ended questions to gather the opinions of students about this factor and open-ended questions to collect more insight about aspects related to this factor.

Factor 1: Changing roles of teacher and student

In this setting, students experienced changes in their roles and the role of the instructor, both of which differed from what they had been used to in previous courses. The questionnaire included a closed-ended question about students' acceptance of their new responsibilities and role. The question had a 5-point Likert scale on which students could identify the extent to which they accepted their new role. Among the students, 67% agreed that they accepted the new responsibilities. About 23.4% of students indicated a neutral view, and about 10% of students did not accept their role. Most students accepted the new role, which indicated that students' experiencing a change in their role was not a problem in this setting.

Exploring students' opinions related to their level of achievement finds similarities among the grade A, B, and C groups, as about 70% of students accepted their new responsibilities. This was a higher rate than that of the grade D group, among whom the percentage was 50%. Figure 7.14 shows more details.

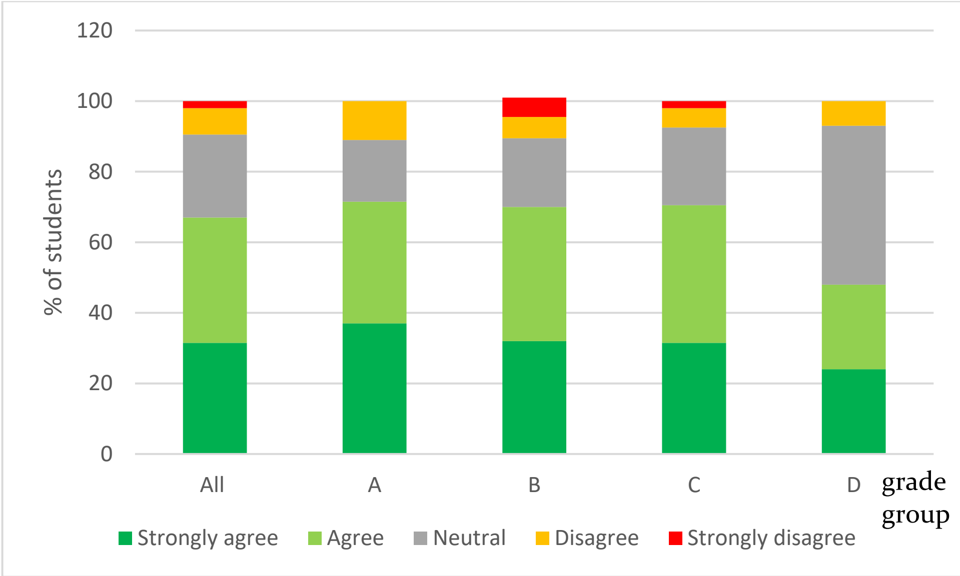


Figure 7-14: Students' acceptance of their new roles broken down by grade group.

With regard to the role of the instructor, in this setting, students had been used to having a face-to-face lecture, where the instructor explained most of the content. The notion of classroom activity was not new, but classroom activity usually happened in parallel with lectures. To investigate the extent to which students found this new role acceptable, a closed-ended question about the acceptance of the instructors' new responsibilities was included in the survey with a 5-point Likert scale. About 91% of students had a positive opinion about the role of the instructor, 8.6% had a neutral response, and only 1% had a negative opinion. The high level of acceptance of the instructors' new role indicates that shifting away from teacher-centred learning was not a problem in this setting. Exploring students' views according to their level of achievement revealed that selection of strongly agree was the highest among grade A group

(82%) and decreased with each successive grade group, reaching (62%) among those in the grade D group. Figure 7.15 shows more details.

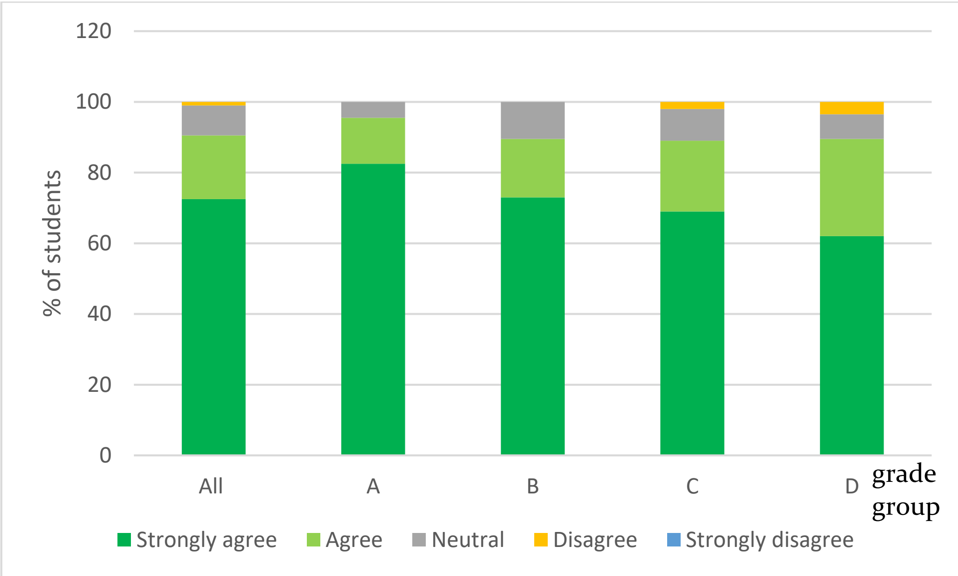


Figure 7-15: Students' acceptance of the instructor roles broken down by grade group

There were three open-ended questions about roles, which explored what students thought their role was, what they thought the instructor's role was, and how these roles supported or impeded their learning.

In response to the first question, about the student's role, 176 students provided short responses, and they addressed one or more roles. These responses can be divided into two types: the first identify the overall role, which is learning, and the second identify sub-roles for learning. In the first group of responses, terms such as "to learn", "to understand", and "achieving course objectives" were used repeatedly. Other terms also used were "to apply" and "to memorise". Other responses, mentioned by about 22% of participants, indicated that students are the centre of the learning process, using phrases such as "to search from different resources", "to be active, not passive", and "to be responsible for learning". At the other end of the spectrum were responses by 10 participants (5%) that described learning as receiving information, using phrases such as "listen to the lecture" and "receiving information".

In the second group of responses, 48 participants said their role is to watch the video lectures and participate in classroom activities. However, 64 participants emphasised participation without mentioning the video lectures, using terms like "collaborating", "interacting", and "discussing", which could indicate adoption of student-centred learning. However, no responses wrote of the student role as only involving watching video lectures. Activities such as summarising the video lectures, submitting homework, and studying for examinations were also mentioned.

The second question asked students what they saw as the role of the instructor. It was answered by 175 students with brief responses that mentioned one or more roles. Students varied in their understanding of the new role of the instructor, as for most of their studying life they were used to the traditional mode of learning; and they experienced a new role of instructor recently. Most student responses could be categorised into three roles: a role explaining and delivering information, a role giving guidance and support, and a role incorporating both of these other roles. Participants also mentioned roles involving evaluation and management of classroom activity.

The first group of views, believing that the role of instructor is to explain the content and deliver the information, were mentioned by 37 participants (21% of the participants). The terms “explaining content” and “delivering information” were mentioned 34 times. Other terms were used along with them, such as “site examples”, “connects information to reality”, and “stick information on our mind”. There were seven responses that seemed to dislike the new role of the instructor in this course, as they included negative ironic comments about the instructor’s role. Examples from these comments include “in this course, the teacher relaxed, and did nothing”, “she asks us, we answer, that’s all!”, and “we’re used to indoctrination and memorising since elementary school, as we learn more this way; I don’t like it when the teacher is not explaining”.

The second group of responses suggest that the role of the instructor is to give guidance and support. This role was mentioned by 68 students (39%). These students often mentioned terms such as “guidance”, “support”, “supervising”, “orientation”, “encouraging”, and “giving feedback”. Other roles that were addressed by smaller numbers of participants were facilitating learning, managing, and designing. Some of these students commented positively about the role of instructor in this course. Examples of these comments are “it is not for the teacher to explain everything and give it to the student” and “their role now is harder than before”.

The third group of students took a middle position: they tended to accept the role of the instructor as supporter and guider, but they still emphasised having the instructor explain if students needed it. This group included comments by 70 participants (40%). Most of these comments included the functions explaining when needed and answering students' questions. Other roles mentioned were reviewing what was explained in the video, summarising the video lecture, commenting on video content, and identifying important points. These comments indicate that those students still needed to hear from the instructor about the video lectures. One comment shows how a student wanted to have both explanations from the instructor and learning from activities: "she can explain the lesson in the form of activities and questions".

In responding to this question, participants also included two other roles: evaluation and management of classroom activity. The role of managing classroom activity was mentioned by 19 students. They expected the instructor to explain the activities to students, to discuss the activities, and to give the ideal answers for the questions in activities. The role of evaluation was mentioned by 14 students, who mostly referred to evaluation of students' understanding through activities. One comment was "to make sure that students had watched the lecture".

The third question asked students to explain how the division of labour supported or impeded their learning in this course. This question was answered by 139 students, mostly with short responses. Most respondents believed that both student and instructor roles supported their learning. Students commented often on the fact that it was helpful for students to be responsible for finding information and drawing conclusions. Students cited some advantages of the new role, such as developing the ability to think, gaining experience, increasing self-confidence, and being the focus of the educational process. Examples of these responses include “we used to have the teacher explain, but in this course we have to search for information, and this helped”; “information sticks in my mind, if I am looking for it”; and “it was good, not everything on student and not everything on the teacher”. About 13 participants, however, commented that the configuration of the roles used in the flipped classroom hindered their learning. Most of these comments referred to a need for the instructor to explain the content. They also cite other disadvantages, such as not understanding the content, the probability of getting incorrect information, and a greater load on the student. An example of a comment is this: “the role of the teacher to answer the questions is not enough, to communicate directly with the explanation”.

Factor 2: Classroom environment

The second part of this section investigates the learning environment, which includes both the actual learning environment in the classroom and the virtual learning environment (Blackboard Learn). In this setting, the five cohorts that used the flipped classroom experienced two main differences in the actual classrooms and their facilities. The first difference is the number of students in each cohort, which ranged between 32 and 59. The second difference is the classroom furniture type, as two types of classrooms were used: interactive classrooms and typical classrooms. In the first type, students sat around a table that could be adjusted to different shapes to support group work. The typical classroom contains student table armchairs, which are usually facing the front of the classroom. All classrooms are equipped with data projectors and have internet access. Table 7.2 gives details about classrooms.

Table 7-2: Classrooms types and number of students, within cohorts

Cohorts	FS1	FS2	FE1	FE2	FN1
Number of Students	32	47	59	54	58
Classroom Type	Interactive	Interactive	Interactive, and typical	Interactive	Interactive

A closed-ended question in the questionnaire asked students to rate the classroom facilities as *good*, *reasonable*, or *poor*. In the results, 49.7% of participants thought the classroom facilities were good, 47.7% rated them reasonable, and 2.6% rated the classroom facilities as poor. Having most students rate the classroom facilities as good or acceptable indicates that the classrooms were not a problem in this setting.

However, as one cohort experienced different classrooms, a further analysis of students' views was made across the different cohorts. The analysis showed that cohorts that had interactive classrooms rated them higher than the cohort that experienced a typical classroom. It is expected that this slight difference is due to the presence of interactive tables, as some participants commented about these in their responses. However, even with this difference, the general ratings seem acceptable for those who had a typical classroom. Figure 7.16 illustrates these findings.

Figure 7-16: Student ratings of classroom facilities by cohort.

An open-ended question in the survey asked students to provide three examples to explain how the classroom facilities supported or impeded their learning. About 195 students answered this question, mostly in very short responses. Students' responses covered three main areas: appliances and internet; groups and table arrangement; and the classroom atmosphere. Most of the comments were positive, but students did comment negatively about some drawbacks. Finally, 13 participants (6.5%) commented that "the classroom was normal" and its influence was limited.

First, 90 students (about 46% of participants) mentioned that necessary equipment was available and excellent, and few students reported problems with equipment or difficulties when dealing with it. About half of these 90 comments emphasised the availability of data projectors and the clarity of their displays, although about 10 students (from cohorts FS1 and FS2) reported difficulties using a data projector. The major issue, according to their comments, was that students' laptops feature HDMI ports which do not accept the DVI cables from the projectors.

Several comments highlighted other devices such as digital boards and speakers. These comments were split between remarking on the appropriate uses for them and noting that they were not working properly. A number of participants suggested providing computers for students instead of asking them to bring their own computers. With regard to the internet, several students mentioned that the network was slow or that they encountered difficulties accessing the university network.

The second aspect referred to the groups and the arrangement of tables, a subject mentioned by 86 students (44% of the participants). Most these comments pointed out that interactive tables were helpful. Those who had experienced both the conventional table arrangement and the interactive tables (cohort FE1) observed that the conventional classroom arrangement was inconvenient and negatively affected their interactions with group members.

The third aspect, classroom atmosphere, was mentioned by 38 students (19.5%). These students stressed factors that affect the comfort of their senses – feeling, hearing, and seeing – either positively or negatively. About one-half of these comments were about the room temperatures. Some students from cohorts FS1 and FS2 pointed out that the air-conditioning temperature was too low: for example, one student commented that "it was very cold; I was waiting for the end of class". But this was not the case for other cohorts, according to other comments.

Another issue mentioned was difficulty hearing other students or the instructor during the class discussion; however, this was an issue for only a few students. A student commented that it became noisy when all groups started the activity. There were also other positive comments about the classroom, such as comments noting the classroom was spacious, the chairs were comfortable, and the classroom colour was lovely.

Factor 3: Virtual learning environment

The virtual learning environment in this setting was Blackboard Learn, which was hosted by university services. The course page contained the course information, and the video lectures which were published every week. Students also submitted their assignments and received announcements via this platform.

The questionnaire explored students' views about their experience with the virtual learning environment, asking them to rate it as *good*, *reasonable*, or *poor*. About 72% of students found it good, 24.2% found it reasonable, and only 3% rated it poor. The high percentage of positive ratings indicates that this factor was not a problem in this setting. Figure 7.17 illustrates this finding.

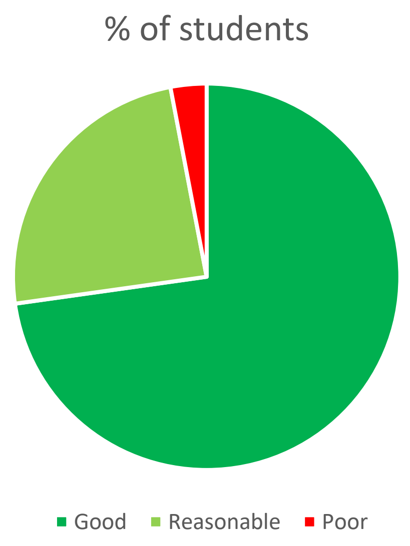


Figure 7-17: Students' ratings of the virtual learning environment.

Only 33 students gave their opinions about the virtual learning environment. About one-half of these comments were positive, and they emphasised the advantages of submitting homework and receiving announcements and praised the design of the course front page. The negative comments were about technical issues, which were mostly instances in which "the system was hanging" or access problems. Other comments highlighted how slow internet speeds made the virtual learning environment ineffective.

Factor 4: University staff support

The need for assistance outside the classroom includes university staff support and student community support. In investigating the need for university staff support, it was expected that students could need help from librarians and from IT-helpdesk staff. Thus, a question was included in the survey asking how often students needed assistance from university staff such as librarians, IT-helpdesk staff, or others. Responses indicated that 81% of participants never needed such assistance, whereas 9% of students needed it most of the time, and 9.5% needed it sometimes. These findings are illustrated in Figure 7.18.

In the comment section under this question, some participants stated that they had needed IT-helpdesk assistance for “Blackboard problems”. However, there were no comments about needing assistance from elsewhere in the university.

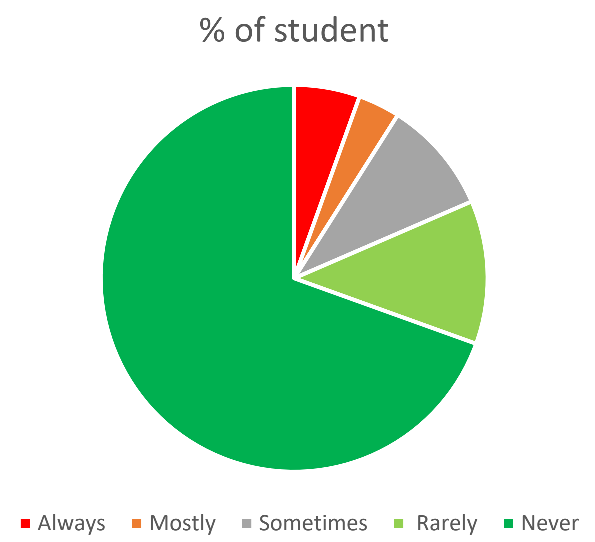


Figure 7-18: Students' need for assistance from university staff.

Factor 5: Community

It is important to investigate students' community because part of this course happened outside university campuses, as students watched the video lectures mostly at home, as was discussed in Chapter Six (Section 6.3.3). To investigate this factor, a question on the questionnaire asked students to rate the level of support for the use of the flipped classroom method from the people around the student (e.g., friends and family). Among respondents, 61% indicated that their community support their use of this method, 22.2% reported that their community had a neutral attitude, and 16.6% noted their community did not support their use of this method. It clear that for most students, community support was not an issue. Exploring students' responses according to their levels of achievement reveals lower levels of community support among the grade C and D groups than that reported by the higher achievers, as can be seen in the following percentages: C = 56%, D = 50%, A = 65%, and B = 69%. Figure 7.19 summarises this result.

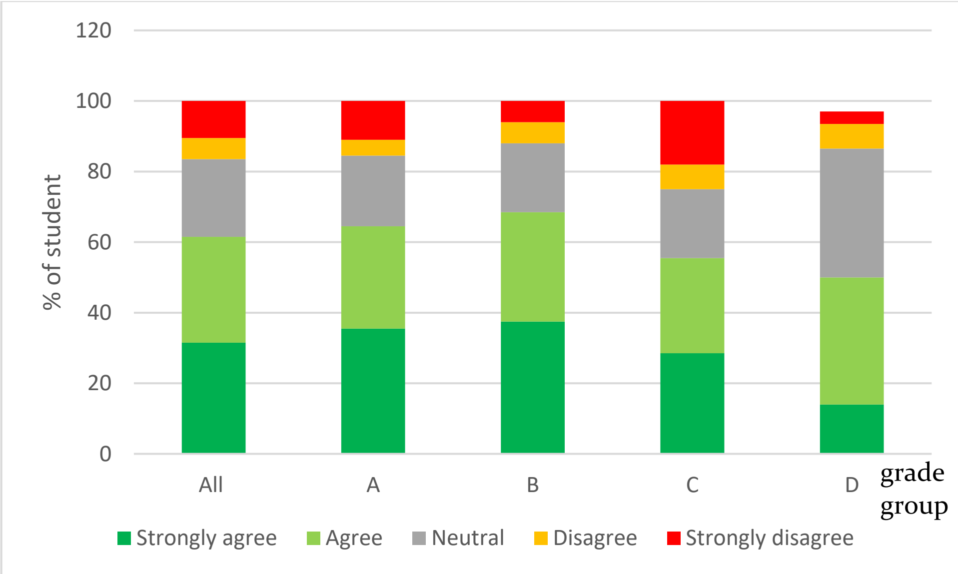


Figure 7-19: Community support for using flipped classroom within grade groups.

A total of 173 students answered an open-ended question that asked them to explain how the community (family, friends, or others) supported or impeded their learning in this course. Most of these responses were brief. Among these responses, about 47% of comments were categorised as positive, 28% as negative, and 25% as neutral responses. Most responses were about family members, although friends and peers were also addressed in several comments.

Among the neutral opinions, students had three different views about the influence of the community around them. Some thought that the people outside university did not always engage in the studying matters and did not have any effect on them. Others thought that the community around them had a neutral opinion. The last group emphasised that they did not care much about the community as it related to their course of study, and they did not let the community affect them.

A total of 71 students (41%) commented positively or negatively on matters of family influence. The positive comments (50%) emphasised two kinds of support: psychological support and providing the needed atmosphere. Psychological support included showing appreciation and acceptance and offering encouragement. In addition, some families were highly engaged: for example, a family member used to remind one student to watch the video lectures before class day. The following are other examples explaining different kinds of support: "my family encourages me to watch the lecture when I feel lazy and complain about it" and "my mother's friends are teachers, and they are impressed with the idea and will apply it".

In terms of providing the needed atmosphere, most comments referred to family helping to provide a quiet environment and the right atmosphere in which to watch the video lectures. Other comments indicated that the family also provided for physical needs such as a computer or private internet, "as sharing internet with the family would reduce the internet speed", a student commented. Another commenter said "they don't use the internet when I use it to increase internet speed".

As with comments about the positive influence of family, comments about the negative influence of family include two kinds of influence: receiving negative comments and not having the perfect atmosphere. Most negative comments of the first kind seemed to be a result of family members being annoyed by the idea of watching a video lecture at home. These comments were mostly about the student's being away from family and not sharing family activities or about the sound of the video lecture. An example of these comments is this: "my sisters always say: home is for rest not to work".

The absence of the perfect atmosphere was due to noise, family activities, domestic duties, or being disturbed by family members. Examples of such comments are these: "my daughter cries when I turn on the videos"; "I have my sisters and brother who make it very noisy at home"; and "when the family meet, they ask me to turn the video off".

Participants also commented on the psychological influence of their friends and peers in conventional cohorts. The influence of friends was positive, as they "accept" the idea and "love" it. However, in the comments about students' peers in the conventional class, 10 comments out of 11 showed a criticism and dislike of the flipped classroom.

Two students mentioned internet-providing companies as part of the larger community, as they were complaining about the quality of service provided and the low internet speed. They stressed that the poor service impeded their learning.

7.5 Chapter summary

This chapter presents the findings related to the third research question about the factors that could affect the implementation of the flipped classroom. The data were gathered using a questionnaire consisting of both open-ended and closed-ended questions.

The data analysis identified the main motivations that drove students to watch the videos and the obstacles that impeded them from watching. It appeared that students' willingness to learn and to be able to participate were the main drivers. A lack of time and self-regulation issues were the reasons students did not watch the videos. Technical problems and internet problems affected a considerable number of students as well. Nevertheless, most students participated without facing any obstacles, although failure to watch the videos and difficulties students faced in performing the tasks were the main obstacles.

In this chapter, students identified some factors that affected their experience, either positively or negatively. The flipped classroom reduced students' study time and gave them increased flexibility. Most students wrote of how this method helped them to learn; however, they focused on the lower levels of the SOLO taxonomy. The instructor's approach and students' peers seemed to affect students' experiences positively, but negative influences were also felt.

With regard to the learning environment, it appeared that both the classroom and the virtual learning environment were supportive of students' learning. Students' families have a positive influence for most participants, which is mostly in the form of encouragement and providing an adequate learning environment at home.

CHAPTER EIGHT: FINDINGS RELATIVE TO RQ3 (2); ANALYSIS OF STUDENT INTERVIEWS

8.1 Introduction

This chapter investigates the factors influencing the implementation of a flipped classroom in Saudi Arabian universities. Students' interviews and focus groups are the methods referred to in this chapter. Some of the factors presented here can be found in Chapter Seven as well, but this chapter explores them in more depth by focusing on the interviews that addressed those factors influencing students' experiences.

The factors under analysis were divided into three groups: general factors related to students' beliefs about the course, factors related to video lectures, and factors related to classroom activity. The first group included students' purpose, attitude, assessment, and learning materials along with the expected roles of the instructor and the nature of the course. These factors influenced the implementation of the flipped classroom, including the two phases of watching video lectures and then participating in the activities. These factors related to the course design and the educational norms in this setting, which were connected. The interviewees from the flipped classroom highlighted them. Students from the conventional group were also interviewed.

The second group of factors were related to the implementation of video lectures, which included flexibility and lack of interactivity in videos, video content and duration, video quality, technical problems, time shortage, and collecting attendance. The third group of factors were related to classroom activity and included not watching the videos, group members, instructor approach, learning from activity, duration of activities, number of tasks, clarity of given tasks and classroom furniture. For the second and third groups of factors, only students from the flipped classroom group were interviewed.

8.2 General factors influencing the implementation of a flipped classroom

8.2.1 Students' purposes

Students interviewed from both the conventional and flipped classrooms reported that their main goal in studying for this course was to pass it with a high grade. This appeared explicitly and implicitly in their answers. Among the interviewees who were asked directly about their main purpose, 28 out of 29 answered that their main goal was to achieve high grades in the range of A+ to B+, whereas one reported that she just wanted to pass the course. The importance of achieving high marks also occasionally appeared when interviewees highlighted the factors that, according to them, could affect getting good grades.

When asked about purposes other than academic achievement, some of the interviewees reported that what they learned in this course would be beneficial in their future career as a teacher. However, unlike the primary purpose of achieving high marks, this aim was not referred to at other times during the interviews, neither explicitly nor implicitly.

This led to an important question: did the method of teaching experienced in this course (flipped or conventional) help students to achieve their goal? To answer it, two questions were asked to the two groups: "Did this method help you achieve the grades you aimed for?" and "Do you think other students, who were taught through the other method, have a better chance of getting high marks?". For the first question, most answers from both groups showed students believed the teaching method they experienced helped them to achieve the grade they aimed for.

Concerning the second question, most of the answers were "no". In the flipped classroom group, however, nine out of 13 interviewees reported that they had the same chance as students with conventional teaching , whereas, in the conventional group, 14 out of 15 said that they had a better chance to get higher marks. The reasons behind these attitudes are related to how they saw assessments and instructor role, which is discussed later in this section. The most notable thing is their shared positive attitude to the way they were taught, regardless of the method.

When some students talked about other factors, they highlighted the importance of achieving high marks, as aiming for a high grade was a drive to watch the video lectures and participate in class activities. Conversely, this method also helped in achieving higher grades, as mentioned earlier. This two-way relationship indicated the importance of students' purpose in the implementation of a flipped classroom.

The following are some examples of students' answers related to this factor:

> "I watch the lecture every week and participate in the group .... I do this to pass and get a high mark". (from flipped classroom group)
>
> [Question: Do you think that this method helped you to get a high grade?] "Yes, of course; I can understand more from applying and from videos as well". (from flipped classroom group)

8.2.2 Student attitudes

Most interviewees from both groups were asked, "How do you feel about the method used in your classroom? Was it your first choice? Which method would you choose if you had the choice now?". Before presenting students' answers, it is important to note that, students from the flipped classroom experienced the flipped classroom method for the first time, although some of them had previous experience of online synchronised lectures. All are used to face-to-face lectures. Among interviewees from the conventional group, most had heard about the flipped classroom from other students; four interviewees had not.

Most answers indicated students had a positive attitude toward the method they experienced and would choose to learn using this method again. Most interviewed students from the flipped classroom group did not know about the method before registering in this cohort, although an announcement had been published that a particular cohort would use the flipped method. Nevertheless, these students developed a positive attitude during the course. Among those who got the announcement, some had expected the class to feature online synchronous lectures.

Students from the flipped classroom could be clustered into three groups according to their attitudes: some had a positive attitude towards the teaching method from the beginning, some developed a positive attitude eventually, and some had a negative attitude, which did not change. Most interviewees were in the first and the second groups, and only two in the third one. In this regard, no interviewees in the flipped classroom group showed a neutral attitude.

Interviewees from the conventional group received a brief description of the flipped classroom method before addressing the questions related to it. Most of thoses interviewees had a positive attitude toward the method that they were experiencing. Their attitudes toward the flipped classroom, however, fell into three groups: neutral attitude but still preferred the conventional method, negative attitude, and positive attitude. Only six interviewees out of 31 fell into this last group.

To further investigate this result, I asked additional questions. The main factors that determined students' attitudes toward learning methods were time, responsibility, flexibility, and lack of interaction, which affected the usefulness or comfort of interviewees' learning. Flexibility and lack of interaction were usually addressed together, and the two groups differed in the way they weighed their importance. Specifically, the flipped classroom group valued flexibility over interaction, while the opposite occurred in the conventional classroom. These two factors are discussed in detail in Section 8.3.1. Both groups shared the fear of excessive workload or new responsibilities, but students in the flipped classroom eventually adapted to the new responsibilities. Moreover, these students found that less face-to-face interaction saved them time.

Below are excerpts from the interviews:

> "I think our chance to get higher marks is higher than that of girls in flipped classroom … you can learn better when the teacher explains to you directly … I don't think that, no way would I be in that class" (from the conventional group).
>
> " At first, I was afraid and tense when they told us about the flipped classroom, as I felt that I would have to be responsible for everything, but then it became better; and, for the test, I remember the activities that were performed,

and I am no longer concerned about this course" (from the flipped classroom).

8.2.3 Assessment

As mentioned above, the main drive for studying is achieving high grades. However, 70% of the total marks come from examinations. This leads to another aspect relevant to this study, namely students' expectations of examination questions. It was common among students, in this study, to categorise examination questions into questions that measured remembering or understanding, which appeared explicitly and implicitly in students' answers. One interviewee also mentioned "applying" when talking about one of the examinations questions in the flipped classroom. However, when some interviewees were asked to categorise the examination questions, their answers differed between remembering or understanding, even though they had examinations in common, though both of these were considered to be in the lower levels in the SOLO taxonomy.

Interviewees from both groups believed that the method they had experienced had helped them to answer these kinds of question in the examination. Face-to-face time in both groups was the critical element for this matter. Concerning the conventional group, interviewees emphasised two aspects in which the face-to-face lecture aided: first, it eased studying for the examination, and reduced study time by instructors telling them what topics needed more focus and which ones could be ignored. Second, it helped them to predict examination questions and know the best answers for them.

Students' predictions of the examination questions, and the topics to focus on, was a result of interacting with the instructor, their comments, stress and voice tone, body language and, sometimes, direct questions from a student on whether a particular topic could be included in an examination. Interviewees also indicated that there were many things that they got from the instructors when they explained other things besides content. Here are some excerpts from the interviews:

> "It is easier to predict exam questions when a teacher explains .... You know, sometimes a teacher emphasises some points, repeat or tells an important point so that we can know" (conventional group).

> "When I began to study for the exam, I was confused; I didn't know what to study – it was all about activities, and it was not like a normal lecture .... I used to mark things that the teacher said in my book, but now I only mark the feedback that she is giving" (flipped classroom).

In the flipped classroom group, interviewees highlighted that in-class activity helped them answer examination question in many ways: first, being engaged with their peers in the activity helped them to remember information, understand content, and be able to apply it on other cases. This engagement included discussing the tasks with group members, searching for information and hearing examples and opinions from other students. Second, some tasks in classroom activity could result in examination questions, which gave them a chance to answer it correctly, as they had practised and been given feedback before. Third, interacting with the instructor provided them with the advantage of learning from her feedback, identifying important areas to focus on from the instructor's comments, and querying her directly about examination questions.

The third case seemed to apply to the conventional group, too. Nonetheless, the level of interaction with the instructor was not sufficient to predict examination questions for those in the flipped classroom compared to face-to-face lectures. The video lecture, however, did not give any indication about examination questions, unlike classroom activity. The following are excerpts from interviews:

> "I prefer to depend on the teachers' understanding to ensure I get the ideal answer .... I write all her words and examples down; she is the one who corrects and gives marks, so this would be safe" (flipped classroom).
>
> "I can remember the information and the examples that my colleagues come up with. My answers in the mid-exam were good; yes, the class activity helped me a lot" (flipped classroom).
>
> "I got a good mark on the exam .... It depends on the exam type .... Some teachers give exams based on

remembering information, and with others, questions depend on our understanding .... In this course, it was mostly about understanding" (flipped classroom).

8.2.4 Learning materials

In this setting, one textbook was used as the main resource, besides other learning tools, such as reading materials, video clips and websites, which were delivered to students occasionally. However, the flipped classroom group received additional materials, namely the video lectures and the activity sheets. When interviewees from the two groups talked about the materials that they used, it appeared that their choice was related to previous factors, as students seemed to focus on those learning materials that they believed would help them to achieve high grades.

Both groups tended to focus on textbooks and mostly ignored the extra reading materials. Interviewees mentioned that they watched some of the video clips when they had some spare time. The common reason mentioned behind ignoring the extra materials was that they were not useful for examinations, unlike the textbook. Conversely, in the flipped classroom, the use of video lectures and activity sheets appeared to be popular for examination preparation. Interestingly, students from the conventional class asked for these materials before the examination, which indicates that such materials appeared to be useful in learning and academic achievement.

The importance of the video lectures as a learning tool was evident when interviewees from the flipped classroom talked about their approach to studying for an examination. Most of them used these videos in parallel with the textbook, and two of them completely depended on these videos, as they did not even have a textbook, while another two mentioned that they watched them only before class. Internet search was used for presentations and reports, and an interviewee mentioned that, during video lectures, Googling unclear points helped her to cope with the absence of the instructor. Here are some excerpts from the interviews:

> "I don't use any extra learning materials" (flipped classroom).
>
> "I read the extra reading, if I like it" (conventional class).
>
> "It was beneficial for them [the conventional group]; they asked for it [the videos], I sent them and photocopied the activity" (flipped classroom).

8.2.5 Students' views about the instructor's role

A commonly expected instructor role that appeared in the two groups was explanation. To investigate this further, a question was addressed about the extent to which students needed the instructor to explain the content.

Starting with the conventional group, most interviewed students believed that an instructor had to explain most of the content, whereas some reported that an instructor should at least explain difficult topics. This belief appeared to affect students' attitude toward flipped classroom, as explaining the content appeared to be less viable than in conventional classrooms. In the flipped classroom group, some interviewees had the same belief regarding the need for an instructor, whereas others appeared to accept the idea of self-learning. However, those who felt the need for an instructor initially eventually accepted it while experiencing it.

The belief of the instructor role affected not only students' attitudes but also the content that they studied for the examination in both groups. In the conventional group, interviewees reported that only the content explained in face-to-face lectures needed to be learned. In the case of the flipped classroom, many students shared the same belief, as they needed to learn both what was covered in the recorded lectures and during in-class activity. Furthermore, some interviewees expected instructors to highlight the content be studied, and one of the instructors in this setting did so.

Students' understanding of the instructors' role had developed over several years, as many interviewees stated. However, a student from the flipped classroom reported that "having less direct explanation from the instructor", "self-study" and "learning from activity" helped them be at the centre of the learning process, develop their thinking and achieve profound understanding. Here are examples of students' comments:

"The doctor must explain everything; why is she is here, then?" (conventional class).

"The role of the doctor is to explain at least difficult topics, but she needs to tell us about the topics that we need to study on our own" (flipped classroom).

"I have to study and understand by myself, especially now that I am at university; teachers are not responsible for everything; I have to read, or I would be careless" (flipped classroom).

8.2.6 Nature of the course

The interviewed students seemed to see this course as an easy course. Some of them described its content as interesting, practical, containing common knowledge related to life experience and including content repeated from previous subjects. Many interviewed students from the flipped classroom group did not mind having videos instead of face-to-face lectures, as most of the topics were easy to understand. Some had different views about the possibility of using this method in more complicated subjects that required interacting with the instructor while she explained and for which they needed to ask questions such as "Why?" or "How?".

Students cited examples of difficult subjects where a flipped classroom approach would be challenging for them: psychology, computer programming, and mathematics. However, other interviewees, who accepted using this method for difficult subjects, opted to apply it to mathematics, as flipping a mathematics course would provide them with advantages such as allowing them to understand at their pace, having better visibility than the whiteboard, and saving them time, as copying from the board was a time-consuming task. Furthermore, this latter set of students appreciated having quality time to practice in class and getting feedback.

A good example of students' comments is the following:

> "This is an easy subject; I don't mind having a video, but I could not think of studying something difficult by watching videos: it would not work; I need the teacher explaining in front of me".

8.3 Factors related to video lectures

8.3.1 Flexibility and lack of interaction

Flexibility and a lack of interaction were two factors that seem to determine students' attitudes towards a flipped classroom, as mentioned in Section 8.2.2. Both groups weighed the advantage of flexibility against the disadvantage of the lack of interaction in video lectures. The flipped classroom group emphasised the flexibility of the videos in making interactions with instructors and peers possible during classroom activity, while the conventional group felt that lack of interaction would affect their learning. Hence, this latter group valued face-to-face lectures over the flexibility of video lectures. The following paragraphs illustrate these findings in further detail.

Flexibility was the factor cited most often by students from the flipped classroom, and it positively influenced their learning in three ways. First, it helped them learn at their own pace, as they could pause and repeat parts of the video. Second, flexibility in time and location enabled them to choose when and where they were most focused and ready to learn. Third, it allowed them to re-watch the videos before the examination. The following quotes illustrate how this feature helped students learn the content:

> "It is good to stop the video to think or to do some search for specific terms which are not so clear .... Stopping the video lets me write my note better" (flipped classroom).
>
> "In class time, especially if it is afternoon lectures, I feel very tired, and I can't focus; in recorded lectures, I attend the lecture when I am in the mood" (flipped classroom).
>
> "I downloaded all lecture on my device; I watched them again before the exam" (flipped classroom).
>
> "I missed watching some recorded lectures; I was busy, for example; I watched the fourth and the fifth together" (flipped classroom).
>
> "It is better to attend lessons in a quiet place: it's more and more beneficial" (flipped classroom).

Many students addressed the issue of lack of interaction frequently, as it caused discomfort by denying them the ability to ask questions, discuss content, and view teachers' body language. Concerning the inability to ask questions, students mentioned that they were not affected by the lack of interaction during videos as long as they could interact with the teacher and other students later in class. They resolved their queries either by trying to find the answer themselves or by writing down questions to ask later. However, the inability to ask questions immediately was an issue for some interviewees, as they said they were likely to forget questions or to hesitate to ask them when attending class. Several students suggested having live online lectures to avoid this issue, but others disagreed with this suggestion, as it eliminated the advantage of flexibility.

To investigate whether students in the conventional group faced a similar issue with queries, they were asked how often they asked questions during face-to-face lectures. For most of these interviewees, asking questions during lectures appeared to be essential, either by posing questions themselves or by listening when other students who shared the same problem asked questions. As for when students asked their questions, all agreed that it depended on the instructor's approach. Again, some students preferred to postpone their questions to the end of the lecture, whereas others preferred to ask immediately. However, some students noted that they never asked questions, as they did not need to, did not like to do it in front of classmates, or considered students' questions during classes to be a distraction and a waste of their time, since most of the addressed issues were clear to them.

As regards discussion of content, some students expressed a need for it, but others considered discussion during classroom activities to be sufficient. A frequent suggestion from flipped classroom interviewees was to establish an online discussion board along with the video lecture to overcome the issue of lack of interaction without jeopardising flexibility. This idea was rejected by other interviewees who preferred immediate interaction. The issue of content discussion was not raised by students from the conventional class.

Regarding the third aspect – body language – interviewees considered it to be a crucial element to get their attention. It is important to note that recorded videos contained only a narrative MS PowerPoint presentation with the voice of the instructor, whose face was not included for cultural reasons. A question about this matter was addressed in the focus groups. All interviewees' answers showed respect for the choice not to record the instructor's face, even though the views about its influence on learning diverged. Some mentioned that seeing the instructor's body language would make a difference because facial expression was essential for them to observe, whereas others found it unnecessary to see the instructor's face, as the visual content in the slides was enough. Nevertheless, interviewees in the conventional group emphasised the importance of the instructor's body language during face-to-face lectures, noting that it helped to keep their attention and enhanced remembering.

The following are examples of excerpts from the interviews related to these issues.

> "Yes, of course, I have questions sometimes ... I pause the video and read from the book; I could also google it; I don't think it is a problem at all" (flipped classroom).
>
> "I wrote down my questions on my notebook, the teacher always asked at the beginning of the class if anyone had a question ... Yes, she answered my questions, and sometimes I did not need to ask because other students asked" (flipped classroom).
>
> "To be honest, I don't like recorded lectures at all; if it's video, it will not attract me no matter what; if the teacher was in front of me, that would convince me more, and the information would be stuck in my mind" (flipped classroom).
>
> "I really remember the doctor's body language when she said, 'Pay attention to this', or the tone of her voice when she changed it .... It may be better, but it's our culture, and I respect that" (flipped classroom).
>
> "First of all, I like discussions very much; I missed this thing. It has had an effect on me .... Online discussion is not like face-to-face discussion; it is not immediate; if you address a point, no one replies; you need to check every time" (flipped classroom).

8.3.2 Video content and duration

Video content and duration were usually addressed together, as most interviewed students seemed to prefer brief videos with useful content. In this regard, three elements were addressed: the best video length, the effectiveness of video content assessed against its duration, and tedium.

Most students favoured short videos, as long videos would cause tedium and attention loss. Specifically, most of them preferred videos of less than 20 minutes, whereas two interviewees argued that longer videos offered more explanation and examples. Students also differed on either preferring a continuous lecture, as the ideas would be connected, or a lecture divided into two parts or more to enhance attention.

The following are examples of interviews excerpts:

> "As long the video is not so long, it is better to be one clip … so I don't lose the chain of thought" (flipped classroom).
>
> "After 20 minutes, my brain would stop working. More than this: I really cannot follow" (flipped classroom).

However, the most debatable point was how to balance duration with the content that could best fit short videos. Students argued that brief videos would be enough if the content was well designed based on three features: being brief and concentrated, summarising and linking pieces of information, and, above all, including examples. Students thought that these features were included in the videos to different extents, yet there was room for improvement. They also criticise some of the recorded lectures in which the instructor read content directly from the textbook. Another point mentioned here is the importance of having visual illustration for remembering, understanding, linking ideas and staying focused.

The third aspect that interviewees highlighted was becoming bored when watching the videos. Interviewees linked this aspect with long videos or uninteresting content. They mentioned a specific video lecture which included written information read by the instructor, and they described it as "too boring". As a result of the monotony, some interviewees did not watch the videos to the end or became involved in something else instead of concentrating.

For students from the conventional group, it appeared that the instructor's style was the main cause of boredom. Students taught by different instructors reported different levels of boredom. In general, they enjoyed lectures by funny instructors or those who digressed and side-tracked. Some interviewees who experienced video lectures and face-to-face lectures with the same instructor[1] noticed a remarkable difference in her style, "as she [was] very funny, and we

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1 A cohort in the conventional group had a video lecture as the face-to-face lecture was cancelled.

enjoyed her face-to-face lecture, whereas, her video lecture was very boring". The following excerpt examples support these observations:

> "I think the second recorded lecture was brief and full of examples and pictures. I understood everything; I don't have to study it again. But the one with Dr … was just reading from the book; it was not good at all".
>
> "The focus should be on basics and headlines, the detail is already in the book, it is good to have links between the topics, to understand branch and roots … and I like it when she gives examples".
>
> "Recorded video lecture, as if I'm reading the book. I just feel the doctor is just reading a book and ask us to watch".

8.3.3 Video quality

As mentioned earlier, the videos were a narrative MS PowerPoint recorded through basic equipment. Interviewees addressed a number of recording issues on these videos, which were the same issues cited in the open-ended question (presented in Section 7.2.4). However, the interviews show that these complaints referred to three videos; two of them had a low-volume voice, whereas the third one had noise and distractions. Furthermore, the quality of the videos did not impede watching them; however, it affected watching them smoothly. For some interviewees, these issues were not a concern at all. A student, for example, noted the following:

"During that recorded lecture, I remember the knock on the door, and Athan [calling for prayers]; I swear those simple things are implanted in the brain, because you hear them, and it helps to remember".

8.3.4 Technical problems

As mentioned in Section 7.2.4, a considerable number of participants faced technical problems, which were investigated by asking them about what kind of trouble they met and how these affected their learning. Interviewees shared the same three issues: poor internet connection, technical problems in the virtual learning environment, and lack of specific technical knowledge.

The first and most frequent issues were slow-speed internet or frequent disconnections, which caused discomfort and distraction, increased the time needed to watch a lecture, and was sometimes a reason for not watching it at all. All the interviewees who raised this problem were using mobile data (3G or 4G), and they had a poor connection in the area where they lived. Students were facing the same issue with on-campus internet, which was very slow, and the network from the mobile provider was also poor. The computers in the library were very limited, hence not easy to get. This problem appeared to be related to the infrastructure, and it seriously hindered the implementation of the flipped classroom.

For the second issue, interviewees addressed two kinds of problems with the virtual learning system (i.e. Blackboard Learn) and, sometimes, the video files.

As regards the former, students mentioned that the system was suspended twice, including the day before class time. This particular problem had a highly negative effect on the implementation of the flipped classroom, as it prevented students from watching the video lecture on time. Furthermore, an interviewee mentioned having trouble signing in the system in the first period of the semesters. However, this was a temporary issue which was quickly fixed by the university IT-support.

Regarding the latter issue, a frequent problem with video files were sudden and frequent stops, which required restarting the videos. This problem appeared on Learn Blackboard reports, as students sometimes accessed videos up to 23 times. Another issue addressed was that only a voice could be heard; however, this happened once and was solved. With regard to solving such problems, students commonly shared them with their peers or tried to adapt rather than seeking help from the IT help desk.

Concerning the third aspect, one of the main issues with technical knowledge was not knowing how to download the video files on their devices. This piece of knowledge was essential to prevent previously mentioned problems, such as slow internet speed and frequent distractions, or to help students watch videos at their convenient time. This issue was more evident in some cohorts than others. Some interviewees argued that they learned how to download videos either from their peers or by themselves, whereas instructors had no role in this matter.

Some of the issues, such as slow speed internet, were in fact out of educators' control, whereas others were temporary and could be solved by the IT staff. However, a simple issue such as not knowing how to download a video needed more attention from educators. Moreover, the peers' role in solving technical issues should be supported.

The following are some examples taken from students' interviews.

> "The university internet is not easy to use; I only use it for texting; it is slow, especially after 10 am".
>
> "I do not trust the internet; it could be slow or hanging; this is stressful".
>
> "One time, I had a problem with Blackboard … I know there is IT help, but I never contacted them [IT help]. [Why?] It is not a big deal; I have to search for their email and write email; long process".

8.3.5 Shortage of time

As illustrated in Section 7.2.3, the most common reason for not watching the recorded lecture was shortage of time. Many of the interviewees claimed that they did not watch the video during the examination weeks – namely, between week 5 and week 8 – because they were busy studying for other subjects. Some students complained about shortage of time due to assignments or other school tasks. Interviewees mentioned that they had seven to nine courses concurrently each semester, including two or three assignments, quizzes and one or two midterm examinations for each course. This plan was suggested by the school administration to enable students to graduate in four years, but students considered this number of courses to be a high workload. This factor seems to be especially important, as it prevented most students from watching the videos before class. However, interviewees mentioned that they watched the videos after class when they had free time. Another reason for a lack of time was a busy personal and social life.

The following excerpts are examples from the interviews:

> "We got very busy during exams weeks; we have priorities ... I can manage my time with assignments, but for sure not with exams".
>
> "I have a one-year-old daughter; she doesn't let me watch the videos; as soon I open the laptop, she gets angry and cries; it is hard to do anything when she is around".

8.3.6 Attendance monitoring

In this setting, students were told that attendance would be collected from Blackboard reports. However, the effect of this rule varied among interviewed students. For some interviewees, the taking of attendance was one of the primary reasons they watched the videos. When they did not intend to watch a video for some reason, they performed the trick of opening the video file without watching the video.

Conversely, other interviewees did not take this attendance rule as sacred, as they believed that it was purely meant to encourage students to watch the videos. Moreover, the instructors' behaviour indicated that they did not collect attendance from the reports. Both groups of students, regardless of whether they believed in the rule or not, would not watch the videos unless they had an internal motivation to do so.

The following are some example quotations from the interviews:

> "If I don't watch, I just play the video and leave it working while studying for the exam [examination for another subject]"
>
> "I watch the recorded lectures to understand; so, I can participate in activities, nothing else. I can open it [the video file] and leave, it is not in my intention, and I do not think that she [the instructor] ever looked at blackboard reports".

8.4 Factors related to classroom activity

8.4.1 Not watching the videos

This factor was identified earlier as an obstacle to participation for some students (see Section 7.3.3). Specifically, interviewees were asked how not watching video lectures affected their performance in classroom activity. Their response varied: many students mentioned that not watching the videos affected their ability to participate in the activity, as they lacked the knowledge that qualified them to do so; others mentioned that it influenced the quality of their participation and their confidence to participate, but they still had something to add during the activity; and others said that their participation was not affected by not watching the videos, as the topics in the activities were related to life, and they had previous knowledge and opinions. However, some interviewees mentioned that they would learn from group members and instructors' feedback and comments during activity even though they did not watch video lectures.

Nevertheless, students who claimed to always watch the videos complained about the group members who did not watch them because they had a limited role when trying to participate. Furthermore, they wasted the group members' time and effort when explaining the video content to them. Finally, they affected the dynamic of the group, as the group seemed to depend on only one or two members.

The following are some examples from the interviews:

> "I don't think not watching the videos would be a problem, I sometimes come to class without watching the lecture, and I participate .... Most of the activity is about life experiences, and I can come up with many examples and answers".
>
> "Yes, of course, how can I participate without attending, how can I know the answers, I need to open the book to find the answer; actually, I do watch them all the time, but some

> group members don't, they don't participate, when they do their answers, they are not that good… shallow, you know, I can tell if they watched or not".

8.4.2 Group members

This factor was identified in Chapter 7 as a motivator to participate in classroom activities and watch the video lectures (see Sections 7.2.2 and 7.3.2). However, students were also asked about their experiences working with groups. Most answers indicated that group members were supportive and that the group atmosphere encouraged participation. Interviewees cited many advantages to working with a group, such as opportunities to learn from their peers, discuss their own views, and hear different opinions. They also said groups enhanced remembering, corrected mistakes, and helped them finish more quickly. One interviewee mentioned that having a leader in the group helped the group work better and encouraged all members to participate. The group members themselves arranged to have a leader in a group. Another student mentioned that group members participated more when the instructor was nearby.

However, some interviewees mentioned problems such as passive members, intransigence, reliance on some members, or distractions from a group member. Intransigence, unlike the problem of passive members, seemed not to be a common issue, as only one interviewee mentioned it. Interviewees also mentioned several personal, psychological, and social elements that caused them discomfort when they shared opinions. The main ones were shyness, fear of being mistaken, or a dislike for group members. These elements were either related to the student or influenced by the surrounding environment.

In terms of the influence of the surrounding environment, students indicated the instructor's approach or the lack of harmony among group members as reasons for not participating. Issues related to the instructor's approach are illustrated in detail in Section 8.4.3. A lack of harmony among group members was mentioned in interviews both explicitly and implicitly. When interviewed students talked positively about harmony, they described group members as "my friends". However, some interviewees criticised the fact that groups were randomly divided by instructors. Leaving students free to choose their own groups would have helped them be more engaged and removed psychological barriers. Another issue was the distraction caused by group members who digressed on side topics, an issue which was more common when group members did not know each other beforehand. An interviewee mentioned that she felt it would be impolite to end these kinds of conversations, even though she was uncomfortable carrying them on during classroom activity.

Another aspect that influenced participation was group size, which, in this setting, was, on average, between five and seven members. A student argued that it was more challenging to engage with a large number of group members. Conversely, another interviewee complained that her group consisted of only three members.

The following are excerpts from the interviews:

> "We don't fit together".
>
> "Sometimes we have the same answer, but they [other group members] express it better, they have a good choice of words".
>
> "I don't like the method of dividing; she [the instructor] has done it randomly; I want to work with my friends, I know them better .... I participate, but I don't feel comfortable; I don't like those girls .... I just don't like them".

8.4.3 Instructor's approach

The instructor's approach was identified as a motivator or, in some cases, an obstacle to participation in classroom activities, as illustrated in Chapter 7 (see Sections 7.3.2 and 7.3.3). Specifically, the interviews highlighted how the different instructors' approaches to motivating students hindered or supported student participation in the activities and student learning in general. In this setting, three instructors were involved. One of the instructors, Sarah, organised competitions between groups in which groups collected points to win a prize. Interviewees from the cohorts taught by Sarah stated that the desire to win the competition was one of the reasons for participation. Their comments about the activities included terms such as "enthusiasm" and "fun".

The second instructor, Emily, according to interviewees, was observant and had a good memory. She remembered students' names and who was participating. She surprised students by naming any member of the group to present the conclusion of an activity and asked questions of students who were not participating. Furthermore, she discussed every detail with students, engaging with them during the activity more often than other instructors.

Her approach drove students to be prepared, even though they were under stress. When I asked students whether they would have participated if the instructor had given them a choice to do so, some replied affirmatively, whereas others said they would have joined the discussion within their group but would not have bothered to elaborate or share conclusions with the instructor and other groups.

Interviewees described the third instructor, Nancy, as kind, quiet and knowledgeable. She provided them with interesting information and referred them to external resources. In her class, students have freedom to decide whether to present their conclusion and they were less stressed. However, they tended to communicate less than students in other classes, and Nancy's approach during activities was viewed as less engaging than the approaches of other instructors.

Some interviewees experienced having this course with both Emily and Nancy and were thus able to compare their approaches. Most of these students preferred Emily's approach; however, a significant number were happy with Nancy's. The former argued that Emily's approach had more energy, as the instructor was quite active, moved between groups, and encouraged all students to participate. Furthermore, group members communicated better, and they all participated. By contrast, in Nancy's group some members depended on others to do the tasks, and some who did not participate busied themselves with something not related to the activity, such as studying other subjects.

Interviewees also mentioned that they got better feedback from Emily, who discussed all points with them, whereas Nancy merely gave a general comment at the end of an activity or made no comment. Furthermore, with Nancy, students felt task duration was too long, which was not the case when doing activities with Emily. Hence, they found Emily's approach more beneficial to their learning, even though it contained an element of stress.

Those who preferred Nancy's approach did so because they felt more relaxed during her class than in Emily's. Specifically, Emily's class caused anxiety for these students because they needed to be ready all the time and feared making mistakes. Furthermore, Nancy provided them with interesting information, referred them to external resources, and gave them the assistance that they needed.

The following are examples from students' interviews:

> "Ms Emily asks students randomly, I need to be prepared, or I would be embarrassed in front of my classmates ... She is also good on remembering names, suddenly she may ask (Student's name....), 'Please, answer!'" (the participant was taught by Emily and Nancy).

> “It was fun at the beginning, when there was competition between groups, giving point to each group” (the participant was taught by Sarah).
>
> “Sometimes Emily explains a thing if she finds that we have difficulty with it, like, today she explained the difference between instructional technology and educational technology” (the participant was taught by Emily and Nancy).

8.4.4 Learning from classroom activities

As illustrated in relation to assessment in Section 8.2.3, students mainly focused on the lower levels of the SOLO taxonomy, such as remembering, understanding, or applying. Many interviewees indicated that classroom activity helped them in these three levels. Actions that helped them to remember included discussing information with group members, having peers comment on a topic, finding information by themselves, and writing the answers and the conclusion in the worksheet. Actions that helped them understand included asking their peers for explanations, listening to peers’ views, getting more examples from actual life, summarising their conclusions to write them down, drawing mind maps, and applying the task. For applying, the actions included practising application tasks, getting instant feedback from peers and the instructor, and observing and imitating peers. Nevertheless, one interviewee claimed that these activities were not beneficial for learning; having the answer sheets with ideal answers or conclusions was enough, and there was "no need for doing them in class".

At the beginning of the course, students were allowed to use the textbook during the activity, and most groups were in fact using the books, although to different extents. This rule changed in the second half of the course: students were no longer allowed to use them, which, according to the interviews, positively impacted students' participation during the activity and the way they were learning.

Interviewees mentioned six benefits from not using textbooks during classroom activities. First, using the textbook limited students' interactions, as they tended to return to the book to check their answers instead of discussing the answers with group members. Second, it limited their desire to think, as they directly started to search for answers in the book rather than trying to use their experience and knowledge. Third, it limited their creativity, as most students came to similar conclusions, since they referred to the same resource. Fourth, using the textbook increased student boredom, as the activity turned into a process of finding answers instead of creating them. Fifth, it decreased students' motivation to watch video lectures, as the lectures' importance as a primary source of information tended to be overshadowed by the fact that students could find the needed information directly during the tasks. Finally, using textbooks during classroom activities reduced students' chances of remembering, as they “just cop[ied] and paste[d] information”, which “[led] to forgetting it quickly”.

Although the interviewed students reacted positively to the new rule, some of them still used the book to check for the needed information, especially if they had not watched the video lecture, although they did so less frequently than they had at the beginning of the semester.

8.4.5 Duration of activities and number of tasks

Students had different opinions about the optimal number of given tasks and their duration. The number of tasks in this setting was usually between five and seven, five to 15 minutes were allocated to each task, and another seven minutes to discussing the conclusions with the instructor and other groups.

Concerning the number of tasks, interviewees’ emphasis was on whether the content of the lectures was covered in the activities, and they, mostly, believed that this aspect was fulfilled in this setting. Students’ opinions about the time allocated for tasks varied, as some found it suitable whereas others found it longer than needed. The latter students mentioned that they finished the tasks several minutes before the end of the allocated time. During these several minutes, some students started to perform the next task, others chatted with group members, and one student mentioned that she “just wait[ed]”. However, none of the interviewed students found that the time allotted to a task was too short.

This difference depended on both instructors' and students' approach during the activity. Concerning the instructor's approach, most of those who found the duration long were in a cohort taught by instructor Nancy, whereas most of those with Emily found it appropriate. This could be attributed to the finding presented in Section 8.4.3, namely that Emily was more engaging with students during the activity. Students taught by Sarah found the duration of a task appropriate; however, they mentioned that the instructor tended to reduce the allocated time; hence, they felt they spent less time doing the activities than their peers in other cohorts.

Concerning students' approaches to the activities, some groups divided the tasks into parts, and members worked individually to finish the task quickly. This finding was presented in Chapter Six, relative to students' behaviour during the activities (see Section 6.4.1).

8.4.6 Clarity of tasks and worksheets

When interviewees were talking about difficulties impeding their participation in the activity, three of them mentioned issues related to the clarity of assigned tasks and issues with the worksheet. To illustrate, in some cases, the instructor did not explain in detail what the students should do, and students found it hard to ask the instructor and preferred to ask their peers for clarification. For example, a student said:

"When we have to design an educational software for the math lesson, I know Gerlach and Ely model, but I don't know how to write a design in the paper, how to format … I wait until someone asks about it … because I don' like to ask".

Regarding the worksheet, an interviewee reported not being able to see it. In this setting, each group shared one or two copies that included the tasks and the allocated time for each task. Each group included five to seven students, who mostly shared the tasks verbally. However, some tasks included visuals or sentences to be analysed. The interviewee mentioned that she found it hard to participate when sharing one sheet and "to ask group members for the sheet every time". Even though this issue was mentioned by one interviewee, many students were affected by the shortage of copies. The font size also was an issue, as students would have preferred larger fonts.

8.4.7 Classroom furniture

The course took place in two kinds of classrooms: an interactive and a standard one. Most interviewed students from the flipped classroom group used the former. However, some interviewees experienced both. When they compared them, the majority found the interactive classroom more convenient for participation and interaction with group members. However, they also thought that they could organise themselves with the standard room by moving the chair to face each other when possible.

However, interviewees from the conventional group, who used a typical classroom for the activities, mentioned some drawbacks. With classic seat arrangements, it was hard for members at the edge to participate, as they could not hear or see all members, or to share the task sheet with them. Furthermore, they were psychological consequences for some group members, as one interviewee mentioned that she felt neglected because she “was facing another member’s back, who was looking at the rest of the group members”.

Interviewees from the flipped classroom also commented about the difference in the atmosphere of the two classrooms: those with interactive tables were neater and quieter. Moving chairs in traditional classrooms made the room look messy and unorganised. Another aspect was that having a suitable distance between groups in the interactive classroom helped to reduce distractions from the other group’s noise, which was not the case in the traditional classroom.

8.5 Chapter summary

This chapter presented the second part of the findings related to the third research question. Specifically, it explored through student interviews and focus groups the factors that affected the implementation of the flipped classroom. The data analysis identified new factors and clarified those presented in Chapter Seven.

Students mainly aimed to achieve higher marks, which drove them to focus on the content expected in the examination questions, which was the main assessment method in this setting. Both groups – flipped classroom and conventional classroom – had a positive attitude toward the teaching method that they experienced, as they found it useful for achieving the marks they aimed for. In the flipped classroom, students initially found the experience of the new roles of student and teacher to be controversial; however, students eventually adapted. Students' descriptions of their learning indicate that they used the lower levels of the SOLO taxonomy, as their focus was on remembering or understanding.

The data analysis identified the following factors affecting the implementation of the flipped classroom in this setting: video content, quality, and duration; technical problems; classroom activities in terms of task type and interaction between peers or with the instructor; and the effect of classroom furniture. The interviews also explored whether not allowing students to use the textbook during the activity improved students' learning.

CHAPTER NINE: DISCUSSION AND RECOMMENDATIONS

9.1 Introduction

In this chapter, I discuss the key findings related to the implementation of the flipped classroom in a Saudi Arabian university in terms of its effectiveness, students' behaviours, and factors affecting implementation. The chapter discusses the overall outcomes by assembling the pieces of the research findings before drawing conclusions.

I begin by discussing the findings from Chapter Five, obtained from quantitative data collected via questionnaires and finals marks. These were used to answer the first research question about the differences in students' attitudes and acquisition of knowledge across the two groups.

Then I discuss some of the findings relative to the second research question about the differences between the two groups in the use of time and the approach to studying. Data were obtained from field notes, questionnaires, learners' diaries, Blackboard Learn reports, and interviews.

After that, I discuss the findings presented in Chapters Seven and Eight on those factors that influence the implementation of a flipped classroom in general. Data were collected from students in the flipped classroom group through qualitative methods (open-ended surveys and interviews) and quantitative methods (learners' surveys).

In Sections 9.5 to 9.8, I discuss how these factors influenced students' behaviours, covering four main topics. These sections discuss findings relative to both the second and the third research questions. First, I discuss factors that have the greatest influence on students' attitudes. Second, I discuss the main behavioural issues affecting the implementation of video lectures and classroom activities, which include students' motivations and the obstacles to successful implementation. Commonly observed behaviours related to the implementation of video lectures are discussed in detail. After that, I discuss the factors that have the greatest effect on students' adoption of a strategic-surface approach to learning.

Based on the discussion of these factors, I then evaluate the implementation of the flipped classroom in this setting. Each part includes additional interpretations of the findings and is connected to the existing literature presented in Chapters Two and Three.

After discussing the main findings related to the research questions, I present the research's contributions to knowledge, its limitations and implications, and recommendations for future research. I then provide concluding remarks.

9.2 Differences in achievements and attitudes

The findings in Chapter Five indicate no significant difference in marks between the two groups, flipped classroom and conventional class, as also found by Jensen, Kummer, and Godoy (2015) in the US, and Sajid et al. (2016) in Saudi Arabia, though not in other local studies, where significant differences were found (Alnuhayt, 2018; Abdelshaheed, 2017; AlJaser, 2017; Alsowat, 2016; Al-Rowais, 2014; Al-Hebaishi, 2018; Abdel-Fattah, 2017; Albujedy, 2018; and Alru'sa, 2018). Student marks are only part of the picture of academic success, which also includes "academic achievement, attainment of learning objectives, acquisition of desired skills and competencies, satisfaction, persistence, and post-college performance" (York, Gibson and Rankin, 2015, p5). It was thus necessary to analyse findings in depth to make claims that go beyond marks. For example, it was useful to follow Kay and MacDonald's (2019) suggestion that focusing on in-class activities and instruction methods may be more important than designing pre-class learning materials.

The attitudinal components of academic success, indeed, formed an aspect of RQ1, and some differences between the two groups emerged, including differences in students' attitudes to in-class activities and instruction methods. As expected, those who experienced the flipped classroom were more positively inclined towards it. A closer investigation showed that they were also more positive about its two components: video lectures and classroom activities. The conventional method, with its key element of the face-to-face lecture, was more acceptable to the group experiencing conventional teaching. Hence, experiencing flipped classroom may influence attitudes towards the approach and its components, as well as students' attitudes towards conventional methods. There was also a difference in students' willingness to keep using the same method in the future, again favouring the flipped classroom, this time from both groups. The reasons behind students' attitude toward the teaching method were covered in interviews discussed in Section 9.5.

Concerning enjoyment, ease and usefulness, the main difference for the learners was in ease to learn, which influenced attitudes towards both methods. A particularly important feature of this was the combination of video lectures and classroom activities. Classroom activities ameliorated problems associated with difficulties in learning from the video lectures – a point also covered in the interviews discussed in Chapter Eight.

Indeed, the common element for the two groups was classroom activity, although this differed in terms of tasks' type, duration, and number. Nonetheless, attitudes toward classroom activities were more similar than they were for other measured elements.

The current study's findings are consistent with some previous studies on marks and attitude (e.g. Sajid et al., 2016) but inconsistent with many others, such as those of Alnuhayt (2018), Abdelshaheed (2017); Alsowat (2016); AlJaser (2017); Al-Rowais (2014); Al-Hebaishi (2018); Abdel-Fattah (2017); Albujedy (2018) and Alru'sa (2018). The first three studies mentioned differences both in marks and learners' attitudes, with much higher percentages of learners considering the flipped classroom enjoyable and useful (90% – 94% as opposed to 60% – 64% in the current study). Although there is no clear correlation between marks and attitude, the differences suggest that it might be an avenue worthy of exploration.

This research differs from the reviewed studies in its attention to the components of both the conventional and the flipped classroom, including a question about face-to-face lectures. A deeper analysis of all of the components can be found in the following sections, which demonstrate that final marks are not the only indicators of academic success.

9.3 Differences in time spent studying and students' approaches to it

Concerning RQ2, this study showed some differences and similarites between flipped classroom and conventional classroom students in both the time they spent on studying and in their approach to it. For the former, the main outcome when comparing the two groups was a difference in allocated classroom time, but there was no significant difference in self-study time outside the classroom. This outcome indicates students did not differ in their use of time when they had control over their own time regardless of the method.

I turn now to discuss the differences and similarities in time spent inside and outside the classroom. The findings indicated that the conventional group, when in the classroom, spent more time in lectures (33%), as well as student-instructor interaction (23%) than that in the flipped classroom group, whereas in the flipped classroom the peer interaction time exceeded that of the conventional method by 30%. As might be expected, the way the different methods were set up naturally led to varying allocations of time to different types of interaction. Therefore, the conventional method favoured student-instructor interaction, while the flipped classroom supported more peer interactions.

When considering the outcome of RQ1 – namely, that there is no difference between the two methods in terms of students' academic achievement – these findings would support Baepler et al.'s (2004) conclusions that learning outcomes in a flipped classroom show no worsening, even though face-to-face instruction time was reduced by 66%. However, the results also indicate that the increase in peer interaction did not make any difference in students' final marks.

Conversely, the two groups showed no significant differences in self-study time, which includes working on assignments, studying for an examination and time slots in which students have no examinations nor assignments to submit.

Specifically, there was no extra workload for those in the flipped classroom group, which is inconsistent with the previously mentioned results of Braun et al. (2014), who found that studying time was increased by 14% more than expected. This difference could be due to the fact that students were acting differently, as a higher number had watched the videos beforehand in Braun et al., whereas in this study a relatively high number decided to lower their workload by attending the classroom without preparation. This issue is discussed later in this chapter (see Section 9.6.1).

I turn now to discuss differences in students' approach between the flipped classroom and conventional class. In the case under study, there were no notable differences in students' behaviours when participating in in-class activity or when doing their assignments. The similarity of students' approaches here is understandable, as in-class activity was presented in the same way, and the assignments were the same for both groups. However, the availability of videos caused differences in two situations in which videos interfered with the role of the textbook. The first situation was when students were studying for examinations: students in the flipped classroom used the videos as the primary study material or in parallel with the textbook, whereas the conventional group which mainly depended on the textbook. Second, because they had already watched the recorded video lectures, students in the flipped classroom tended to read less from the textbook than those in the conventional class before regular classes.

These differences are likely due to the fact that many students preferred videos over text, although the extent to which students used the videos ranged from using them as a substitute for the text to using them as a secondary resource. This assumption is supported by Abdelshaheed (2017), who found that most Saudi students (93%) found the book useless in the flipped classroom (mean = 4.45, *SD* = 0.93). The advantages of videos over text might be the reason; for instance, videos are more engaging and impressive, and they grab the attention more than text (Shekhar et al., 2017; Robinson, and Stubberud, 2012), which points to the need for increasing video resources, since students in the conventional group also showed interest in using them. There are other behaviours that students' approach when dealing with this new method, which can be seen in the discussion in Section 9.6 concerning the factors that influence students' behaviours when dealing with video lectures.

9.4 Factors influencing learners' experience of the flipped classroom

The present research identifies many factors that influence students' experiences with a flipped classroom, which is the topic queried by RQ3. These factors were identified using several methods, such as surveys, open-ended questions, closed-ended questions, and interviews. I had expected that the importance of the identified factors would vary by factor. However, evaluating the significance of these factors was complicated, as there was no direct data confirming how students ranked the factors' importance. I tried to suggest their value based on two elements: how each factor influenced students and the number of students influenced by it.

For the first element, the factors students suggested in response to the open-ended question seemed to matter to them more than those factors I had suggested in the close-ended questions. Furthermore, two kinds of open-ended questions were presented in the surveys. The first asked about factors that motivated students to watch video lectures or participate in classroom activities or factors that kept students from doing these things. The motivating factors included students' desire to learn, interact with their peers, or get participation marks. The main obstacles to participation in activities were not watching the videos or the nature of the classroom activity task itself. The second kind of open-ended questions asked about factors that affected students' experience positively or negatively, such as by offering flexibility or comfort or by saving students' time and effort, or issues such as the quality of the recording.

The factors deduced from questions of the first kind, which were about motivations and obstacles of watching the videos or participating in the activities, were more likely to have an influence on the implementation of the flipped classroom, as they had a direct impact on the two pillars of this method: namely, watching the video lectures and participating in the activities. The factors deduced from questions of the second kind identified various factors that could affect students' comfort. Particularly in questions of this kind, students were asked to mention three elements in responding to each question, which meant that students might have mentioned less critical factors. Moreover, some of the factors stated were seen as positive by some students and negative by others.

The second indicator I used to evaluate the importance of each factor was the number of students affected by it. For this aspect, the frequency of addressing these factors was the main index. For most factors, some close-ended questions helped to identify which students were affected. For example, attendance registration appeared to be less critical than the student's willingness to learn and participate in the activities. Likewise, students' willingness to learn from the activities appeared more significant than getting participation marks, which indicates that learning was the main driver, regardless of whether the student adopted a strategic or a surface approach to learning.

Another group of factors were identified in the interviews, which included students' purpose of achieving high grades and their prediction of the examination questions. It was difficult to evaluate these factors using the criteria mentioned above because of the nature of the interviews, especially given the limited sample and the possible influence of the interviewer. Nonetheless, the importance of these factors could be linked to the degree of their impact on the interviewees as well as to their effects on other factors.

I also assessed other factors in the survey; however, they did not fit to the first suggested criterion. These factors included accepting the new roles of instructor and students, university staff assisting with IT help, the outside community, the physical classroom environment and the virtual environment. However, students' answers to the interviews' opened-ended and closed-ended questions revealed that some of these factors needed to be considered to fully understand the influence of the learning environment and the context. Most of these factors are thoroughly discussed in the following sections. However, I list the remaining factors in Table 9-1; the literature review, Chapter 2, discussed the influence of these factors in other studies.

Table 9-1: Factors influencing the implementation of a flipped classroom

Factors related to video lectures	
Duration of the videos	Farley, Risko and Kingstone (2013), Simonson (2017), Hsieh (2017), Roehling (2018), Heijstra and Sigurðardóttir (2018), Enfield (2013), Khanova et al. (2015) and Slemmons et al. (2018).
Video content	Khanova et al. (2015) and Enfield (2013).
Tedium	Heijstra and Sigurðardóttir (2018), Khanova J et al. (2015), Apedoe et al. (2017), Alnuhayt (2018) and Alsowat (2016).

Recording quality	Crawford and Senecal (2017), Roehling (2018) and Khanova et al. (2015).
Factors related to classroom activity	
Usefulness of the tasks	Schwarzenberg et al. (2018), Prince (2004), AlJaser (2017); Wolff and Chan (2016), Panuwatwanich (2017), Roehling (2018), and Hsieh (2017).
Enjoyment	Khanova et al. (2015), Mutch et al. *(2017),* Apedoe et al. (2017) and Abdelshaheed (2017).
Group members	Bergmann and Sams (2013), Nederveld and Berge (2015), Roehling (2018), Black (2017) and Strayer (2012).
Instructor	Roehling (2018), Hsieh (2017), Schwarzenberg et al. (2018), Razek and Coyner (2014), and Enfield (2013).
Classroom furniture	O'Flaherty and Phillips (2015), Roehling (2018), Alelaiwi et al. (2015), Ahmad et al. (2017), Alcoholise (2007), Alharthi (2018), Kutbi and Hashim (2017), Al-Rowais (2014), Guardino and Fullerton (2010), and Lei (2010).

9.5 Students' attitude towards the flipped classroom

The findings related to RQ1 showed that most students had a positive attitude toward the flipped classroom. This is an encouraging finding, as students' beliefs about the value of the method that they were experiencing motivated them to be more engaged in their learning (Liaw, Huang, and Chen, 2007; Mutch et al. 2017). The qualitative data throw light on several factors that impacted students' attitudes. The most important of these factors is the belief that this method helped them to achieve their goals. However, both groups shared this belief about the method that they experienced, even though the findings for the first research question found no correlation between achievement and the flipped classroom. This might be attributed to the fact that students prefer to keep with what they know. According to Saklofske et al. (2012, p312), "This kind of conservatism resists change because of an admixture of comfortable familiarity with the way things are, complacency, and fear of the unknown and untried". Hence, experiencing such a method is likely to create a positive attitude towards it, if it is implemented well. Educators should not be concerned about students' resistance at the beginning, as they will adapt to it eventually, but they should help students to adapt to speed up the process.

However, several factors were raised by students: flexibility, lack of interaction with the instructor, and accepting the change of roles. These three factors concern the first phase of the flipped classroom – namely, the video lecture – which supports the findings related to the first research question: replacing face-to-face lectures with video influences students' attitude toward the flipped classroom more than having in-class activities.

The factor of flexibility provides benefits such as allowing students to learn at their own pace, comfort with time and location, and the ability to watch the videos again later, especially before an examination. This factor was widely highlighted in the literature, as in Davies et al. (2013); Enfield (2013); Butt (2014); Bergmann and Sams (2015); Carbaugh and Doubet (2016); Roehling (2018); and, in the Saudi context, Sajid et al. (2016); Abdelshaheed (2017); and Aboraya and Alket (2016). However, while this factor has the most positive impact on students' attitude, it is also associated with self-regulation issues. Students experience a transition from scheduled lectures with obligatory attendance to a new more flexible way of working. This change may be uncomfortable for students and may require them to work on their time-management skills. The issue of self-regulation is discussed in Section 9.6.3 as an obstacle to watching videos.

The second factor is lack of interaction with the instructor during the video lectures. This factor also was identified in other qualitative, and quantitative data of studies conducted in the Saudi context (Al-Rowais, 2014; Al-Hebaishi, 2018; Aboraya and Alket, 2016; Abdelshaheed, 2017; Zain-Alabdeen, 2017). Moreover, Alubthne (2018) found that, because of the lack of interaction, Saudi students prefer other kinds of online learning over learning via videos.

However, the ability to interact with the instructor during the second phase of the flipped classroom – classroom activities – appeared to be a reason for students' tolerance of the lack of interaction in the first phase. This outcome supports the finding of a survey conducted by Zain-Alabdeen (2017) that more than half of students (60%) believed that the flipped classroom method offered sufficient time for interaction with the instructor. Regarding interacting with peers, it appeared that its importance was limited in my study, as was also found in another local study (Alubthne, 2018).

The third factor was accepting the new roles. Specifically, students experienced some changes in their roles and the role of the instructor, which differed from what students had been used to in previous courses or the courses they were taking concurrently. This change is an extra load on them. A common belief was that the role of the instructor is to explain the content, which was developed over long years of traditional teaching in the education system. However, the quantitative findings showed that the vast majority of the students agreed that the new role of the instructor helped them in their learning (90.5 %) – only 1% were of the opposite opinion – whereas the qualitative findings indicated that many students thought explaining and delivering information was still a required role for instructors. It is not easy to give a firm reason for this difference in the outcome; however, some students may find the instructor explaining the content in the videos is enough.

In this setting, participants were familiar with the notion of class activity, but the activity usually happened in parallel with lectures. Experiencing the flipped classroom gave students a new experience in being more responsible for their learning. It was encouraging to find that the percentage of students who believed that they were the centre of the learning process was greater than the percentage who believed that their role was just to receive information (22% and 5%, respectively). However, even if only 5% of the students explicitly did not accept the new roles, most students' views about the new roles were not clear. This issue was mentioned by Roehling (2018) and O'Flaherty and Phillips (2015). However, Young et al. (2014) and Mason, Shuman and Cook (2013) showed that students appeared to adapt to new roles eventually; the present research found this was the case for a considerable number of students.

After discussing the three negative factors that influenced students' attitude, it is important to discuss solutions that reduce the influence of these factors. To avoid the issue of lack of interaction, it is possible to go with a suggestion of a student in this research study to use an online discussion platform to accompany the videos. This was, also, suggested by Al-Hebaishi (2018). However, this might not be an ideal solution because of the risk of slow answers in such platforms, according to the opinion of another learner. The issue of students' difficulty in accepting the new roles seems to be a result of conservatism; as suggested earlier, it is expected to eventually decline as students and teachers practise the new roles more often. However, educators should raise students' awareness about the new roles to encourage them to adapt to them.

In conclusion, considering which factors can improve students' attitudes toward the flipped classroom can enhance the implementation of this method. However, other factors affecting the implementation of the flipped classroom should also be considered, which are discussed in the following sections.

9.6 Factors related to video lectures

In addressing the findings related to RQ2 and RQ3 in this section, I discuss important behaviours observed when students deal with video lectures in the flipped classroom and the factors behind these behaviours. I discuss six main points here, starting with behavioural issues with watching the video lectures and the factors behind these issues, including motivations and obstacles. The common behaviour of watching the videos before examinations is discussed after that. Then, I discuss the common students' habits while watching the videos.

9.6.1 Behavioural issues with watching video lectures

The study identified two main issues related to watching the videos. Starting by addressing the frequency of video-watching by the students, only about 40% of students always watched the videos, while around one-third did not watch them regularly. This issue was also found in previous studies, such as Reidsema et al. (2017) and Butt (2014). In other studies, however, such as Braun et al. (2014) and Enfield (2013), the effect of this issue is less pronounced than in the present study, as about 80% of students watched the videos regularly. Furthermore, the watching trend showed a decrease in the number of views over time. This finding is supported by Heijstra and Sigurdardottir (2018), even though the attendance in Heijstra, and Sigurðardóttir' study is higher than that in this study. Indeed, it could be acceptable to skip watching several video lectures, but the proportion of students who regularly did not watch the videos was high, which is a problem that needs to be resolved.

The second issue identified is that students sometimes played the videos without paying attention to them. This issue includes behaviours such as playing a video just to be registered as in attendance without intending to watch it or losing attention due to boredom or distraction. The findings related to RQ3 indicate a number of factors that might explain this behaviour. Specifically, the external motivation to be registered as in attendance drove some students to trick the system by opening the video files without actually watching them.

Another cause was tedium, linked to the content or the length of the videos. Becoming distracted while watching the videos could also be linked to living with family.

9.6.2 Motivations to watch video lectures

The third research question attempted to understand what hindered students from watching videos and what motivated them to do so. The motivations were willingness to learn, being able to participate in the activity and registering attendance. However, when considering the low proportion of students who watched the videos as per guideline, this fact indicates that these motivations were not enough for many students.

The first motivation – willingness to learn – motivated students to watch the videos before examinations because they wanted to obtain high marks. Furthermore, the third motivation, attendance registration, did not apply perfectly, as students could play the video without watching it or without paying attention. However, ability to participate, which is the second motivation, was perfectly applied to about 40% of students, but there is still a need to motivate the remaining students to watch the videos.

To obtain satisfactory results, educators need to create other motivations, such as designing an engaging content, as addressed in other settings by Reidsema et al. (2017) and Enfield (2013), or trying to encourage students to watch videos by quizzing students on the video content, as addressed in Abdelshaheed (2017) and Enfield (2013).

9.6.3 Obstacles to watching video lectures

Exploring the obstacles that impede students from watching the video lectures is paramount to solving the issue of not watching videos. In the case under study, students mentioned four factors: shortage of time due to study load, students' self-regulation issues, technical problems, and tedium.

The first obstacle (shortage of time due to the study workload of other subjects) was assessed by Braun et al. (2014), Wilson (2017) and in a local study conducted by Zain-Alabdeen (2017). This issue is not a result of implementing the flipped classroom but of workload of other subjects. It is not surprising to have such issues as most students have a high studying load – an average of eight courses – and the workload increases during the period of examinations and assignment submission.

Studying is the students' main responsibility, and no students, in the present study, reported having a part-time job, as working during university is not common in the Saudi culture. Still, domestic responsibilities such as motherhood were reported by small a number of students. The high study load explains the decrease of the trend of watching the videos, as students prioritised studying for an examination of another course over watching the videos.

One point to highlight is that a lack of time did not affect students to the same extent, but it depended on time-management skills and students' perceptions of free time. Moreover, shortage of time does not necessarily hinder students from studying. According to Ackerman and Gross (2003), the academic performance of students with less free time is higher than that of students with more free time.

The second factor encompasses self-regulation issues such as forgetfulness, laziness and carelessness, which was addressed by Apedoe et al. (2017), and in a local study by Abdelshaheed (2017). This factor can be understood when considering that, for students used to having scheduled lectures with obligatory attendance, a new flexible experience may be uncomfortable and require greater responsibility with time-management skills. In such a flexible learning environment, the importance of students' self-regulation skills, including time management, appeared to be highly demanding; thus they may need help gaining these skills.

The third factor that impeded students from watching videos was technical problems. The results indicate that more than 25% of the students were affected, which needs more attention. This issue was addressed by Roehling (2018) and O'Flaherty and Phillips (2015). Moreover, the percentage of students affected (about 32%) in Enfield (2013) was higher than that seen in the current study. The data showed problems with internet speed (which was the most common issue) and the digital learning environment (Blackboard Learn) and a lack of technical knowledge – in particular, knowledge about downloading video files.

The last obstacle to discuss here is tedium, which impacted attention when watching the videos, ranging between students' losing attention and them not watching these videos. Nevertheless, a considerable number of participants found the videos useful even though they did not enjoy them. This factor was addressed by Heijstra and Sigurðardóttir (2018) and Khanova et al. (2015). However, other local studies, such as Apedoe et al. (2017), Alnuhayt (2018) and Alsowat (2016), showed that a high proportion of students enjoyed videos, which contradicts my study, where only one-third found them enjoyable. However, tedium has a strong relationship with both the content of the video and the duration.

After discussing the main obstacles that prevented students from watching the videos, it is important to consider solutions to decrease their impact. Issues such as internet speed outside the campus cannot be controlled; however, improving the internet network inside the campus may reduce this issue. Furthermore, before flipping a course, course designers should evaluate the overall programme, as other subjects' requirements might conflict with the implementation of a flipped classroom. Course designers should also improve video design to create shorter and more enjoyable videos, and they should consider methods to increase students' motivation, and offer a guidance for time-management to overcome their self-regulation issues.

Furthermore, some simple actions can make a difference in reducing technical issues, such as introducing services provided by IT staff and encouraging students to use it and explaining how to download a video to watch it on different devices. Still, students should take their share of responsibilities by working on time-management skills.

9.6.4 Technical problems

Technical problems are one of the main factors that are explored when implementing e-learning. However, the outcomes of this study show some differences from findings from local studies. I discuss these differences, as well as the similarities, in detail in this section.

Recent and older local studies showed that accessing internet and technology is a common issue with e-learning (Alhabeeb and Rowley, 2018; Alubthne et al., 2018; Mutambik et al., 2018; Alharthi, 2018; Bates, Almekdash, and Gilchrest-Dunnam 2017; Al-Harbi, K., 2011; and Selim, 2007). However, accessing the technology was not the main student concern in my study. This outcome is consistent with the latest survey conducted by the Communication and Information Technology Commission in Saudi Arabia (2015) that about 97.9% of undergraduate students use the internet, about 87% of households have internet access and 85% have a computer device.

However, internet speed and poor internet connection, especially mobile internet, were a concern in this setting, which is, also, consistent with the findings of the latest Communication and Information Technology Commission survey in Saudi Arabia (2015), that for mobile internet users, around 39% of participants face issues with their service providers. However, Robertson, Soopramanien and Fildes (2007) and Al-Harbi (2011) argue that internet speed has limited influence on adoption of e-learning but it does make the learning experience less enjoyable.

Another unexpected finding is that students did not seek help from the IT help desk, and they instead either shared their problems with their peers or tried to adapt to them. Local studies, such as Alubthne et al. (2018) and Kutbi and Hashim (2017), found that lack of technical support is a main issue with e-learning; however, this was not the case here, as support was available, but students did not ask for that.

Concerning technical knowledge and skills, this issue has been highlighted by other authors, such as Agarwal and Prasad (1999) and Arbaugh and Duray (2002). Students in this setting had sufficient technical skills, although they at times missed a piece of technical knowledge that could easily be learned by providing them with small technical guidelines to avoid possible discomfort.

9.6.5 Watching videos before examinations

The findings indicate that students tended to watch videos for examination preparation, sometimes for the first time, as also argued by Heijstra and Sigurðardóttir (2018), which may relate to students' preference for videos over text. Specifically, the data show that many students re-watched the videos before the examination. However, a considerable number of students watched the videos for the first time before examinations, which indicates that cramming to watch them before an examination is common among the students, as confirmed by many local studies, such as Alrefaai, AbdulRab and Islam (2013), Alsaqri, Alkwiese and Dayrit (2018), and Alzahrani, Soo Park and Tekian (2018). The issue of students' time-management skills is highlighted relative to RQ3 on factors that affect flipped classroom implementation.

The ability to watch the videos again for examination preparation is one advantage of the flipped classroom. Nevertheless, cramming to watch the videos before an examination changes the role of the video from providing knowledge students need to participate in the in-class activities to serving as extra studying material for the examination. This use of videos had unintended consequences in this setting, as it raised two points: its impact on implementing the classroom activity, and on the students' adoption of a strategic approach to learning, with video becoming merely instrumental to passing tests. These consequences were identified when answering RQ3 and are discussed in Sections 9.7 and 9.8.

9.6.6 Students' habits in watching video lectures

This study also identified students' common approach to video lectures. Students favoured watching videos after 6 p.m. on the day before class or on the weekend, no matter how early the videos were published. However, when students were busy with assignments or examinations, many of those who watched the videos did that a few hours before class time. They mostly used a laptop to watch the videos at home in a quiet room. However, those who needed to watch them outside, on-campus or on public transport mostly used their smartphones.

I do not intend to evaluate these habits or suggest ways to reshape them; however, considering these facts about students' habits may help instructors to design and implement a flipped classroom that better serves their needs. For example, educators should ensure that the videos are available for students before weekends, as this period appeared to be preferable. Additionally, it would be more effective to design a video that suits a laptop screen when it is difficult to make it suitable for both PC and a smartphone.

Interestingly, the data reveal that some students only listen to the videos and take screenshots. This action may be due to students' preferences for listening or reading, or it may be a way for them to adapt to situations such as commuting. Therefore, designers should take this behaviour into consideration by focusing on verbal performance instead of concentrating on visuals only.

The investigation of findings related to RQ3 showed that the learning environment led students to study at home rather than on campus. Specifically, a lack of computers, poor internet network, and limited operating hours forced students to study at home. A question can be asked as to whether culture has a direct or indirect influence on shaping this behaviour, especially Saudi culture, where it is likely that individuals of university age live in the family home and are expected to show obedience to their parents (Long, 2005). Nonetheless, according to Al-Saggaf (2004), this tendency has recently started to weaken. However, results of studies in the same culture showed different outcomes, which in one case were consistent with the finding of the present study (Alrefaai, AbdulRab, and Islam, 2013), whereas Baothman et al. (2018) spotted a different outcome, as one-half of the students preferred to use the library or a specifically assigned place on campus. This variation might be due to differences in the infrastructure since the campus in the current study suffered from a lack of computers and poor internet service. However, when considering the subject of the course, Alrefaai, AbdulRab, and Islam, 2013, revealing that students share the same habits, when the course is in the same field, i.e. humanities, whereas Baothman et al.'s (2018) study was with a medical course.

I also investigated how much time was spent watching videos. Students mostly spent the same time as video duration, although a considerable number of students spent more or less time. Furthermore, some students tended to watch the videos twice or more. The results of this study differ from those of Braun et al. (2014), who found that the amount of time that students spent on videos was higher than expected (30%). However, according to Heijstra and Sigurðardóttir (2018), students tended not to watch the full videos, and the percentage reached 47% of the students at the end of the semester. Their result is consistent with the findings of this study.

Watching only part of the videos is thus a problem that needs to be solved, as discussed earlier in the motivations and obstacles section. However, the usefulness of encouraging students to spend more time on videos is questioned by Martin et al. (2018), who argue that re-watching a video lecture does not improve memorising but rather increases mind wandering. Still, encouraging students to spend extra time taking notes or reflecting on videos would be beneficial.

Figure 9.1 summarises students' behaviours relative to video lectures and the factors behind those behaviours, and it precedes a discussion of students' behaviour in the second phase of the flipped classroom, that is in-class activity.

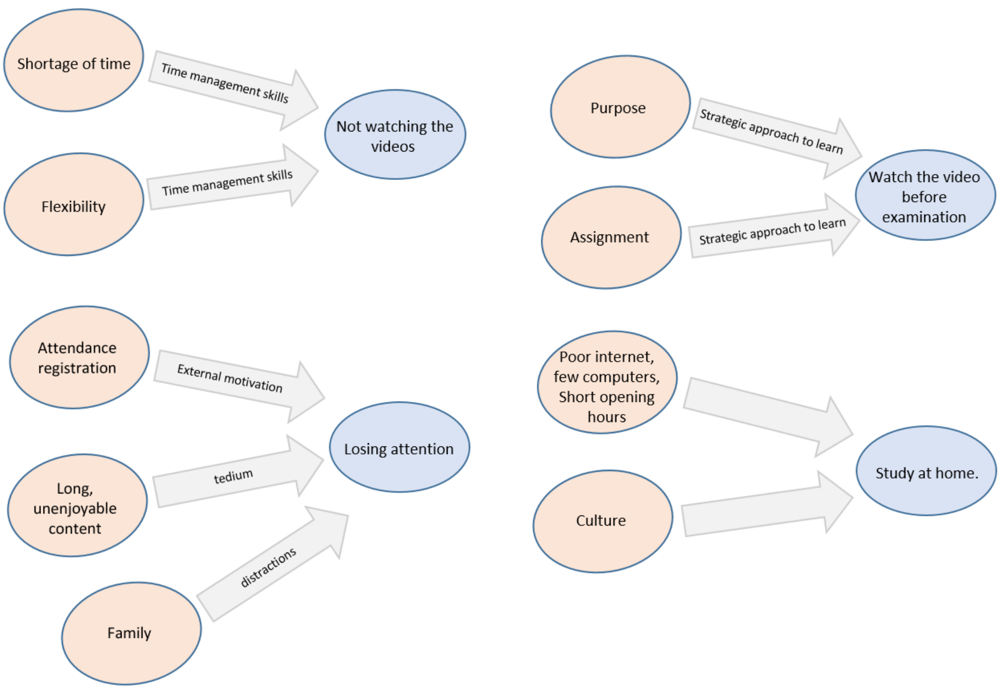

Figure 9-1 Factors influencing students' behaviours with video lectures

9.7 Factors related to classroom activity

9.7.1 Behavioural issues with in-class activity

According to the survey results, students' level of participation was as expected. Most students participated, and those who did not or who just listened to their peers were few. However, students' roles in the group varied, and some were more active than others. These differences were particularly evident when some of the group members had not watched the videos. The issue of participation without having watched the videos was raised by Johnson (2012) and Reidsema et al. (2017). According to the latter, the influence of this factor is limited, as videos can be watched after class, and what counts the most is students' deep engagement in real problem-solving.

Unlike Reidsema et al.'s (2017) argument, this study indicates that not watching the videos influenced the quality of students' participation negatively. The group members tended to discuss or explain the basics to other group members instead of getting involved in tasks that boosted higher-order thinking skills. Having to gain information during the activity goes against students adopting a deep approach, as their background knowledge should be sufficient to start with, and this cannot be attained without watching the videos. A surface approach to learning during in-class activity was also evident in students' descriptions, as it included the two lower levels of the structure of observed learning outcome (SOLO) taxonomy, uni-structural and multi-structural. This outcome is discussed in Section 9.8.

9.7.2 Motivations to engage in the activity

The motivating factors for participating in classroom activity included students' willingness to learn and get participation marks, interaction with group members, and the instructor's approach to motivating them. Many students participated in the activity; hence, these motivations worked well in encouraging them to participate, yet not in raising the quality of their participation. For example, even though students adopted a surface approach, they got full marks. Hence, the ease of achieving participation marks led to low-quality participation from those who were motivated by participation marks only. Social motivations such as interacting with peers or engaging in the competition run by the instructor enhanced the quality of the participation only if the overall learning environment and the course design supported high-order thinking skills. According to O'Neill (2015), the course design should involve the social dimension of learning, including peer learning as well as approaches to encourage creativity and innovation.

To solve this issue, attention should be shifted from incentivising participation to improving participation quality. This cannot be done by adopting the earlier mentioned motivations; it requires improving the overall course design, including the assessment method and tasks that support higher-order thinking skills (Roehling, 2018; Hsieh, 2017; Panuwatwanich, 2017; Schwarzenberg et al., 2018; Wolff and Chan, 2016).

The data identified two main approaches instructors took to motivating students to participate: organising competitions between the groups and randomly questioning individuals. Students were excited by the former and made anxious by the latter. However, the data indicate that the first approach seems more successful at encouraging participation, as a higher proportion of students reported this approach as motivating compared with the second approach, which seemed to influence participation negatively based on embarrassment and fear. This result differs from what was reported by Enfield (2013), who investigated the second approach. Most students in Enfield's study found that this second approach was effective in encouraging participation (88.5%), whereas only 11.4% found it not to be effective. However, enhancing the quality of students' engagement with activities will not work without removing the obstacles that hinder that engagement.

9.7.3 Obstacles to participation

When participating in classroom activity, most students did not complain of any obstacles impeding their participation. However, not watching the video lectures impacted it negatively. Before discussing the influence of this factor, it is important to mention that the ability to participate was the second most cited factor motivating students to watch the videos. However, the findings show that the percentage of students who watched the videos was notably lower than that of those who participated in classroom activity. This difference may indicate that skipping watching the video lectures did not prevent some students from participating in classroom activity. This assumption is supported by qualitative data confirming that students were able to participate even though they did not watch the video lecture.

However, as mentioned earlier, the quality of students' participation was negatively affected by missing the videos, a finding seconded by Johnson (2012). Furthermore, this effect impacted the other group members, as they had to spend time clarifying and explaining instead of engaging with the core of the tasks. However, Reidsema et al. (2017) found that the effect of not watching the videos in advance was limited when students were deeply engaged in real problem-solving, and the authors argued that students could watch the videos after class if they had not done so before. Based on the findings from the present study, I disagree with this argument, as problem-solving requires prior knowledge that can be gained from the video lectures. According to Khanova et al. (2015), there is a need to bridge the gap between the acquisition of knowledge from the video lecture and the activities during class time.

Another factor that reduces students' engagement is using the textbook during an activity. Six disadvantages of using the textbook were identified in this setting, as it limited students' interaction with peers, their desire to think, and their creativity, in addition to increasing their feeling of tedium and reducing their motivation to watch video lectures and reducing the chance of remembering the activity content. As a result, learners should be asked to avoid using other resources even when they did not watch the video.

Classroom furniture appeared to influence a limited number of students. The seat arrangement in rows impeded those on the side from participating, especially with group members of five or more. This factor was highlighted by Watters (2014), Guardino and Fullerton (2010) and Haas (2006).

This discussion of obstacles to participation makes clear that the main one is related to the first phase of a flipped classroom: video lectures. The solution is to turn the discussion back to the motivations for and obstacles to watching the videos, discussed earlier. However, the other obstacles are easily resolved, even with limited resources – for example, setting a rule to prevent using books as much as possible; allowing enough time to rearrange the seats. Although these are simple actions, some educators may not recognise their impact.

9.8 Students' approach to learning

The investigation of students' purposes, assessments, and behaviours demonstrated that students adopted a strategic approach to learning. The findings indicated that the goal of most students under investigation was to achieve high grades, and they believed that the flipped classroom method helped them to achieve the grade that they aimed for. Moreover, this goal, among others, motivated them to watch video lectures and participate in classroom activities. This finding is supported by the fact that many students tended to cram to watch or re-watch the videos before an examination, as discussed earlier in this chapter. The qualitative data also revealed students' emphasis on the usefulness of the videos for examinations.

The focus on examinations implies a strategic approach to learning; as students depend on the assessment method to use the needed techniques to achieve high grades, either a deep-learning approach or a surface-learning approach would be used when needed (Tsingos, Bosnic and Smith 2015). Therefore, a question can be raised about whether the assessments in this setting supported a deep-learning approach. In this setting, 70% of the total mark was from examinations. The fact that examinations weigh by far more than other assignments raised student's attention to the prediction of examination questions.

When students need to predict examination questions, they focus on remembering and understanding, which belong to the lower levels of SOLO taxonomy – the uni-structural and multi-structural levels. According to Biggs and Tang (2011), at the uni-structural level, the student can memorise, identify, and quote, and at the multi-structural level the student can classify, describe, and discuss. Students' focus on the lower levels of the SOLO taxonomy implies that the surface-learning approach was common among students in this setting.

This assumption was also based on students' comments on many occasions (interviews and open-ended questions); for example, they predicted that some tasks could reappear as examination questions, they found that engagement with peers helped in remembering, understanding, and applying the content in other circumstances, and they believed that interacting with instructors helped in knowing what areas needed more focus and the best answers for predicted questions. This was confirmed by their description of their learning through classroom activity. Specifically, students linked learning from the activity with possible examination questions. Moreover, the third motivational factor, participation marks, supports this assumption, as the motivation for a deep approach to learning should be internal, unlike the external motivation of the participation marks.

Adopting a strategic-surface approach in flipped classrooms is inconsistent with AlJaser's (2017), Wolff and Chan's (2016), and Panuwatwanich's (2017) arguments that the flipped classroom boosts a deep-learning approach. Hence, the implementation of a flipped classroom does not necessarily lead to a deep approach to learning.

An important question here is why students in this setting adopted a surface approach to learning. The above discussion indicates that students' opinions about the assessment have a significant influence in their decision to adopt strategic learning. However, this study did not investigate the curriculum in general, including the content, the assessments and the activity, which are hypothesised to have a great influence on adopting a surface approach to learning. Furthermore, the assumption that students adopt a strategic surface-learning approach was driven by qualitative data collected from students about their experience rather than a response to a question planned in advance. Therefore, this hypothesis needs further research to confirm which factors influence the adoption of a deep or surface approach in the flipped classroom.

9.9 An evaluation of the implementation of factors

Having discussed the main factors affecting the success of the implementation of the flipped classroom and the implications of those factors, in this section I evaluate the implementation of this method based on students rating the factors in the surveys. However, it is important to note that this evaluation does not indicate the extent of the impact of these factors. Moreover, some factors were not included in the survey, which does not mean that they have no influence in this setting. The focus of this discussion is on those factors which were given lower ratings by students.

In this setting, most explored factors were implemented in an acceptable way for the majority of students. However, the following factors gained negative evaluations from a considerable number of students: the usefulness of the classroom activity tasks and enjoying the content of videos. For these two factors, the proportion was lower than expected, as about one-third of the students had negative opinions about them, whereas only one-third had positive opinions, and the remaining had a neutral opinion.

Technical problems and accepting the students' new role also received a negative rating by students. For the first, more than 25% of the students were affected by a technical problem. This proportion is considered high, as it likely hindering students from watching the videos. For the second, about two-thirds accepted the new role at the end of the course, though notably lower than the rating of other factors, such as the instructors' role.

The usefulness of the tasks in classroom activity and accepting the new roles are factors linked to adopting a surface approach to learning due to students' belief that their role is just receiving information. This role makes it difficult to reach a higher level of SOLO taxonomy, where learners can theorise, hypothesize or reflect. Adopting a deep approach to learning might be even harder when students do not place much value on the activities that they are doing, which decreases their engagement with learning.

The other two issues related to video lectures – boring content and technical problems –might have an indirect relationship with adopting a surface approach. Both factors could prevent students from watching the videos before class, which influences their preparation in the activity. However, in order to approach learning in a deep way, the background knowledge should be sufficient to start with, which cannot be attained without watching the videos.

Having discussed the findings for the three research questions and having tried to integrate the outcomes of this study with the related evidence from the literature review, in the following sections I discuss narrowing the gap in the knowledge about the flipped classroom method in Saudi Arabia and improving the practice of this method.

9.10 Contributions to knowledge

9.10.1 Empirical contribution

The empirical contribution of this study includes three main aspects. First, choosing the context of Saudi Arabia supported one of the aims of this research study, which was to contribute to the development of the higher education sector in the country. In this context, there are a limited number of studies investigating the flipped classroom. Therefore, evidence from a university in Saudi Arabia is a valuable contribution to the existing literature. Furthermore, most of the existing studies were conducted within the fields of health and medicine, computer studies, and English language. Evidence from the field of teachers' education has expanded the subjects explored by the literature.

To date, most studies in Saudi Arabia have focused on exploring learners' achievement and attitude. I instead provide more in-depth investigation about the factors that affect learners' experience. Identifying the factors that are significant in the Saudi context is consistent with the encouragement of the

Ministry of Education in Saudi Arabia to implement this method among Saudi universities. Recently, universities, have offered training for staff to implement flipped classrooms; however, such workshops are not enough to achieve better implementation of this method. This study helps to fill this gap.

Second, I aimed to compare the flipped classroom and the conventional method. Most reviewed studies that did such a comparison defined the conventional method as the use of face-to-face lectures. However, in the current study, the element of in-class activities was also an essential part of the conventional method, as activities have been widely used with face-to-face lectures in higher education in recent years.

Third, I presented original empirical results for each research question. Many works have examined students' attitudes toward the flipped classroom, but this study's first research question investigated not only that but also their attitudes toward each of the components of the flipped classroom and the conventional method, which are video lectures, face-to-face lectures, and in-class activities. This provides a better understanding of the factors that most determined learners' attitudes.

The outcomes related to the second research question contribute to the existing literature about students' use of time and approach to studying. Previous literature has focused on limited aspects of this topic, which this study investigated in more detail. I provide evidence about the actual teaching time inside and outside the classroom. Additionally, I investigated learners' behaviours while they studied outside the classroom by asking the questions how, when, where, by what means, and for how long. A deep understanding of students' approaches may help in enhancing the design of flipped classrooms.

The third question provided an in-depth investigation of the factors that influence the learners' experience of a flipped classroom. In the Saudi Arabian context, this investigation fills this gap, as the reviewed studies have not yet explored this topic. The findings of this study can help to create a full picture of what is currently happening in this context. Furthermore, these findings highlight some aspects in need of further investigation.

9.10.2 Methodological contribution

Even though some studies have explored the flipped classroom in the context of Saudi Arabia, they mostly are case studies or used a quasi-experimental design to assess learners' perceptions of the usefulness of this method. In these studies, the data gathering methods were mostly quantitative and relied on marks or surveys. I offered another methodological design by using the mixed-method approach to generate a holistic view of the results.

The complexity of studying learners' use of time required multiple types of methods to assemble a comprehensive view of all aspects in different situations. Therefore, I used eight different tools to collect the necessary data. These tools were designed for collecting different kinds of data that supported each other. The triangulation of these methods enhanced the reliability and validity of the results. The use of such a large number of integrated methods has not been implemented in previous literature.

Another strength of this study compared to those in the Saudi context is that it had the advantage of exploring this method with three different instructors which made it possible to investigate this variable with an acceptable degree of control. Furthermore, having three instructors resulted in having a high number of participants, which is a further strength of the findings.

9.11 Limitations

Although a great effort was made to achieve reliable and valid findings for this research, the study encountered some limitations that need to be considered in future research investigating this topic.

The first limitation is related to the design of this study. In this study, I aim to investigate the effectiveness of the flipped classroom method compared to the conventional method. However, it was difficult to control all variables to identify a generalisable causal relation. Random distribution of the two groups of methods and conducting pre-tests were missing in this design. As a result, the research was undertaken as a pre-experimental study instead of using an experimental design.

When designing this study, I attempt to control the conditions as much as possible, as the two groups of learners were taking the same course, were taught by the same instructors and had common assignments and examinations. However, the setting allowed participants from the two groups to communicate with each other. Consequently, confounding crosstalk occurred between the two groups. This limitation appeared in the data, as some students in the conventional group asked for the videos from friends in the flipped classroom group.

Another limitation is related to the subjectivity of the findings. As this study includes qualitative data, the researcher's experience or personal values may have led to subjectivity in interpreting them. To reduce such influence, factors that participants declared explicitly were considered first, and data on implicit points were used merely as additional support for the explicit ones. Concerning participants, some seemed to be more conservative than they might otherwise have been when providing their opinions, especially when talking about instructors, as they knew that I had previously worked with those instructors. However, I assured all participants of confidentiality on several occasions.

There are two limitations related to the culture in Saudi Arabia. First, because of the single-gender education system in Saudi Arabia, the participants in the current study were exclusively females. Second, the data were collected in Arabic, whereas English is the language of this thesis. The mother tongue of all participants was Arabic, and most of them cannot speak English. However, quotes representing all themes and subthemes were translated. Furthermore, comprehensive samples of the interviews' transcripts were translated to be reviewed. However, there is a possibility that literal translation did not reflect the intended meaning. Therefore, much time and effort were taken to ensure accurate translation.

The data collecting tools have some issues, which were acknowledged in Chapter 4. However, it will be beneficial to summarise these issues here. Three questionnaires were used in this study. Such a number could potentially cause fatigue amongst the participants. To overcome this issue, the questionnaires were distributed at different times; however, in some cases, filling all three at once was the only choice. Another issue is that the questionnaires were self-reported, which may be acceptable in Questionnaire A and Questionnaire B about learners' attitudes and their perspectives on the implementation of the flipped classroom. However, self-reporting may have affected the accuracy of the data collected with Questionnaire C, which estimated learners' study times in different conditions.

The other tool used in this setting was students' diaries. Even though a large number of diaries were collected, the open space for written journals was ignored by most students. Another issue was that the diaries were filled weekly, a time interval which may have affected the accuracy of data due to the chance of forgetting.

Concerning classroom observation, the classes were not video recorded for cultural reasons. There was a need to count and categorise learners' answers promptly. As a result, human error was likely to happen, especially when observing learners' interaction during group discussion. To minimise such errors, pilot observation was conducted to increase my skills in handling classroom observation efficiently. Another issue is that the actual presence of the researcher might potentially have led learners to behave differently. However, to encourage students to act comfortably, they were assured that their behaviours as individuals would not be evaluated, nor would it influence their participation marks.

9.12 Implications, recommendations, and future research

The outcomes of the current study have the potential to contribute to the knowledge and practice of improving teaching methods in higher education, especially in Saudi Arabia. One of the main conclusions is that students' achievement does not necessarily improve as a result of using the flipped classroom method. Nevertheless, using this method does not negatively affect achievement. However, students' attitudes showed a statistically significant difference in favour of the flipped classroom method. This result may encourage wider use of this method in higher education, as it is effective in other aspects, such as in reducing teaching time and the use of classrooms. Furthermore, the fact that learners' attitudes toward this method were positive may raise educators' confidence in implementing this method, as learners adapt to it eventually.

The question may be raised as to whether this method fosters a deep-learning approach. The qualitative data in this study did not indicate that a flipped classroom is necessarily associated with a deep-learning approach. Even though this indication needs further research, it may shift educators' focus from simply implementing the flipped classroom to properly designing it. Furthermore, it is essential to consider other factors associated with implementing such a method, which could support or hinder a deep-learning approach. This study recognised some of these factors, which are assessments, learners' beliefs about the aim of their learning and their beliefs about their own role and the instructor's role.

One of the main outcomes of this study is detailed findings on learners' studying habits in the flipped classroom. This rich information can be used by instructional designers as a guide to enhance the design of the flipped classroom to fit learners' needs. Furthermore, investigating students' behaviour led to the identification of some problems that affect the implementation of this method, which had to be considered when designing it. Specifically, the main issue identified in this study is that the trend of watching videos decreased over time; however, the study identified the reasons behind this behaviour and suggested possible solutions which can be examined in future research. Another example of identified studying habits is learners' use of videos as a substitute for the textbook when preparing for examinations; understanding such behaviour may increase the attention to the content of these videos and how to design them to fit their new role.

The current study investigated several factors that influenced the learners' experience. These findings provide a better understanding of the implementation of the flipped classroom in similar contexts. It is recommended that educators in higher education in Saudi Arabia consider these factors. Identifying them may facilitate a successful implementation by either reinforcing some factors or solving issues with others to ensure an effective and comfortable learning experience. Furthermore, these findings may be considered in practice in other contexts, especially those that share the same culture. Another advantage of identifying these factors is that it grants policymakers the ability to make appropriate improvements, particularly with issues related to regulations and infrastructure.

Based on the implications discussed above, the following are offered as practical recommendations for a successful flipped classroom:

- The course should be designed to support a deep approach to learning and should particularly consider using a variety of assessment methods that shift students' focus from memorisation to analysis and creation.

- Students should be encouraged to adjust their beliefs about their own role and that of the instructor to help them accept student-centred learning.
- Instructors should consider factors that may directly influence the implementation of a flipped classroom, such as designing and developing short, comprehensive and enjoyable videos and meaningful activities that support higher order thinking.
- Instructors should consider indirect factors that could influence the implementation, such as sufficient numbers of copies of the tasks, the availability of technical information and how students arrange themselves during in-class activities.
- Instructors should find creative ways to motivate students to watch the videos before class.
- It is important to consider the students' workload and overall programme.
- Instructors should encourage students to improve their time management skills.
- Policy makers should do their part by improving technology and its infrastructure. Also, they could encourage instructors to use the flipped classroom and give them more autonomy to design a curriculum and choose the applicable assessment methods that support a deep approach to learning.

Future research

For further investigation, empirical research into the following is recommended:

- This study investigated the use of the flipped classroom in Saudi Arabia. The method was applied to the subject of educational technology in a college of education in the Eastern Province. Outcomes may differ in other fields or contexts; hence, investigations should be expanded to cover other subjects and provinces in the country. Furthermore, the current study is based on the experience of female learners only, which calls for conducting further research on male experiences or on whether gender differences play a part.
- The qualitative outcomes of this research indicate that the flipped classroom does not necessarily help to make students more likely to engage in a deep-learning approach. However, further research is required to ascertain the relationship between these two variables using an experimental setting. Furthermore, I suggest investigating how the curriculum generally supports a deep approach when implementing a flipped classroom, or whether more challenging assessment could boost a deeper learning approach than that seen with the conventional method.
- Exploring students' use of time helped to identify some issues that need consideration in future research. One of the main problems is the trend

toward decreased watching of video lectures as the term progresses. Further research should assess the impact of this behaviour, suggest solutions, and test them.

- As the motivations in this setting appeared to be not sufficient for learners to watch the videos, I suggest investigating the suggestions, addressed earlier in the discussion, to compel students to watch the videos – for example, by having them complete tasks related to the videos' content or take online quizzes after watching or by other methods to ensure that students demonstrate knowledge from the last video.
- This study explored the factors that influenced the implementation of the flipped classroom. Learners paid more attention to some of these factors than to others. I recommend investigating the effect of these factors in other control settings.
- Exploration of the impacts of flipped-classroom implementation in this study was based on the perceptions of learners. However, even though students were in a position to evaluate their experience, I recommended also collecting data on teachers' perceptions.

9.13 Concluding remarks

In this chapter, I discussed the main research findings and suggested implications and recommendations for further research. The analysis and discussion indicate that there was no significant difference in marks between the two groups. Nonetheless, the flipped classroom did not seem to impede learning, and it did appear to be efficient in reducing teaching time and the use of classrooms, as it reduced the time spent learning inside the classroom.

The study showed that differences seen between the two groups did not affect students' marks. For example, the greater amount of student–instructor interaction in the conventional method indicates that this interaction did not make a difference in students' final marks. This assumption also applies to the increase in peer interactions in the flipped classroom. The similarity in final marks may be due to students' approaches being quite instrumental in passing examinations, and this method would not have a substantial impact on such approaches. The outcomes also indicate that even with the use of the flipped classroom, students adopted a strategic-surface approach to learning, which may be due to the curriculum – especially the assessment method.

Regarding learners' attitudes, some differences between the two groups emerged, and those who experienced the flipped classroom were more positively inclined to it. What determines students' attitudes is the ability to interact with the instructor during the second phase of the flipped classroom (i.e. the in-class activities). Moreover, experiencing the flipped classroom may raise a positive attitude toward it.

The flipped classroom did not appear to increase the study workload. In terms of study time, students in both groups had similar approaches. However, the availability of videos in the flipped classroom interfered with the role of the textbook.

Implementing the flipped classroom resulted in students cramming to watch the videos before an examination instead of watching them as instructed. Such behaviour impacted the quality of students' participation in the in-class activities, where students appeared to focus on the two lower levels of the SOLO taxonomy. To resolve this issue, obstacles preventing learners from watching the videos should be removed by fixing technical problems and providing better video designs. More importantly, however, students need to overcome their self-regulation issues, or there will be a need to compel them to watch the videos by using classroom rules, such as assigning tasks to be submitted before class time.

A key conclusion of this study is that even though I highly recommend broadening the use of the flipped classroom, there is great need to consider the factors that impact the success of its implementation. All factors related to the course design should be given more attention to support students to adopt deep learning approaches. These factors include assessments, video design, activity design, students' beliefs, classroom rules, and the learning environment.

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APPENDICES:

Appendix 1: Translation of questionnaire (A): Student's attitude

Name: Cohort: Method:

Rate each item on a scale of 1–5 by marking the box in the appropriate column.

	Item	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
1	Changing to a new learning approach is inconvenient.					
2	I like the teaching method that I experienced.					
3	I am enthusiastic about taking future classes that use this teaching method.					
Attitude toward video lectures						
4	Watching video lectures before class is an enjoyable way to learn in this course.					
5	It is easy to learn from recorded lectures.					
6	Watching video lectures before class is a useful way to learn in this course.					
Attitude toward face-to-face lectures						
7	Attending face-to-face lectures is an enjoyable way to learn in this course.					
8	It is easy to learn by attending face-to-face lectures.					

9	Attending face-to-face lectures is a useful way to learn in this course.					
Attitude toward classroom activities						
10	Engaging in class activities is an enjoyable way to learn in this course.					
11	It is easy to learn by engaging in classroom activities.					
12	Engaging in class activities is a useful way to learn in this course.					
Attitude toward combining video lectures and class activities, as in flipped classroom.						
13	Combining video lectures and class activities is an enjoyable way to learn in this course.					
14	It is easy to learn by combining video lectures and class activities.					
15	Combining video lectures and class activities is a useful way to learn in this course.					

Appendix 2: Translation of questionnaire (B): Implementation of the flipped classroom

Name: Cohort: Teaching method:

For questions 1–4, rate each item on a scale of 1–5 by marking the appropriate number on the line. 5 means very much, and 1 means not at all.

To what extent did you find the following learning materials helpful to you in learning the course content?

1- The content of the video lectures.

Not helpful ______ ______ ______ ______ → Very helpful

2- The tasks in the class activities.

Not helpful ______ ______ ______ ______ → Very helpful

3- How enjoyable did you find the content of the video lectures?

Not enjoyable ______ ______ ______ ______ → Very enjoyable

4- To what extent did you enjoy the tasks in the class activities?

Not enjoyable ______ ______ ______ ______ → Very enjoyable

5- How would you rate the quality of the video lectures?

- □ Very good
- □ Acceptable
- □ Poor

6- How would you rate the duration of the videos for the given content?

- □ Long
- □ Appropriate
- □ Short

7- While watching the videos, did you face technical issues that negatively affected your learning? Please specify if any.

- □ Always
- □ Sometimes
- □ Rarely
- □ Never

Comments:

8- Did you find the pre-class materials were available for a sufficient length of time before class?

- □ Always
- □ Sometimes
- □ Rarely
- □ Never

Comments:

9- How would you rate the duration of class activities for the given tasks?

- □ Long
- □ Appropriate
- □ Short

Comments:

10- List three things that positively influence your experience with video lectures and three things that negatively influence your experience with video lectures.

11- List three things that positively influence your experience with class activities and three things that negatively influence your experience with class activities.

12- How would you rate the classroom facilities?
- □ Good
- □ Reasonable
- □ Poor

Comments:………………………………………………………………………

13- How would you rate the Blackboard learning system?
- □ Good
- □ Reasonable
- □ Poor

Comments:…………………………………………………………………………

14- Explain how the class facilities or the Blackboard learning system supports or impedes your learning. Give three examples.

Rate each item on a scale of 1–5 by marking the box in the appropriate column.

		Never	Rarely	Sometimes	Most of the time	Always
15	I watch the video lectures before class as per the guidelines.					
16	I participate in class activities as per the guidelines.					
17- What motivates you to watch the video lectures?						
18- What impedes you from watching the video lectures?						

19- What motivates you to participate in the classroom activities?
20- What impedes you from participating in the classroom activities?

Community						
Rate each item on a scale of 1–5 by marking the box in the appropriate column.						
	Item	Never	Rarely	Sometimes	Mostly	Always
21	The instructor provides sufficient support.					
22	My classmates are supportive during class activities.					
23	I have needed librarians or IT helpdesk staff to provide support.					
24	The people around me (friends, family, etc.) provide support for my flipped classroom work.					
25- Explain how your community supports your use of the flipped classroom. Give three examples. 26- Explain how your community impedes your use of the flipped classroom. Give three examples.						

Roles						
27- What do you think the role of the instructor is?						
28- What do you think your role in this course is?						
Rate each item on a scale of 1–5 by marking the box in the appropriate column.						
	Item	Never	Rarely	Sometimes	Mostly	Always
29	I accept my responsibility as a student in the flipped classroom.					
30	I accept the role the instructor has in the flipped classroom.					
31- Explain how the division of labour supports or impedes your learning in this course.						

Appendix 3: Translation of questionnaire (C): Student's use of time (flipped classroom)

Name: Cohort: Teaching method:

1- How many hours per week do you spend studying in the following situations?

For the first assignment	For the mid-term exam	When no assignment or exam is coming up

In the following questions you can choose more than one choice.

2- What do you do while watching the video lecture? You can choose more than one

- o Take notes
- o Just watch
- o Browse social networks
- o In the car
- o Do other things. ……………………….

3- What do you do during classroom activities?

- o Participate in the activities
- o Take notes
- o Just listen
- o Browse social networks
- o Talk about topics not related to the activity
- o Do other things …….

4- What do you do during self-study time?

- o Take notes
- o Just read
- o Re-watch video lectures
- o Browse social networks
- o Sit with family
- o Do other things …….

Appendix 4: Translation of questionnaire (C): Student's use of time (conventional class)

Name: Cohort: Teaching method:

1- How many hours per week do you spend studying in the following situations?

For the first assignment	For the mid-term exam	When no assignment or exam is coming up

In the following questions you can choose more than one choice.

2- What do you do during face-to-face lectures?

- Take notes
- Participate
- Just listen
- Browse social networks
- In the car
- Do other things ……………….

3- What do you do during classroom activities?

- Participate in the activities
- Take notes
- Just listen
- Browse social networks
- Talk about topics not related to the activity
- Do other things ………………….

4- What do you do during self-study time?

- Take notes
- Just read
- Browse social networks
- Sit with family
- Do other things …….

Appendix 5: Diary Form

<u>Diary Form</u>

Name: Cohort: Teaching method:

Date:

	Watching videos	Reading (textbook or other reading materials)	Direct conversation about the course content or conversation via digital media (Twitter, WhatsApp, etc.)
When?			
Where?			
For how long?			
What media did you use?			
What else did you do while you were engaged in these course activities?			

Tell more about your experience this week (feeling, obstacles, reasons, general thoughts).

Appendix 6: Classroom observation form

Date: Lesson:

Instructor: Cohort: Teaching method:

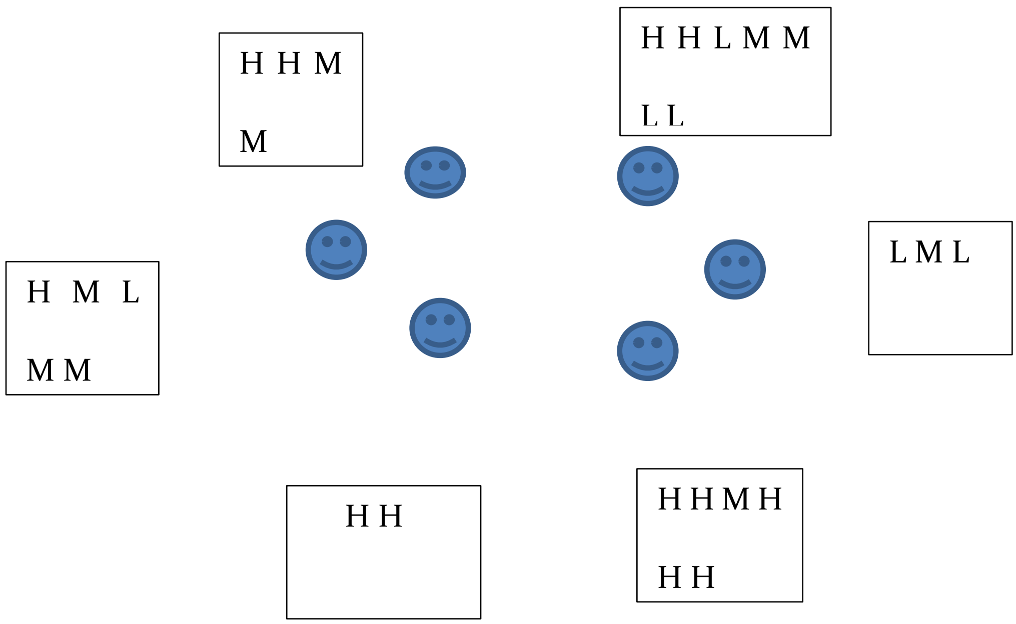
Timeline	Action	Notes

Appendix 7: Illustration of student observation field notes (in classroom activities)

Duration: Number of group members:

1- Counting and categorising student participation:

H = high level of participation M = medium level of participation L = low level of participation



2- Comments:

Appendix 8: English translation of informed consent

I am Athary Almuhanna, a PhD student at University of Edinburgh. I am researching the use of flipped classroom at the [University's name]

I would like to thank you for agreeing to participate in this study. This form details the purpose of this study, a description of the involvement required and your rights as a participant.

The purpose of this study is:

• This study investigates the effectiveness of using the flipped classroom approach at The University of Dammam in Saudi Arabia. It will examine and compare two groups: the group who learn through a flipped classroom approach, and the one who use a conventional classroom model. The aim is to investigate three main aspects: students' learning, their attitude toward their learning and their use of study time. In addition, this research will explore implementation of the flipped classroom approach to identify factors affecting students' learning and their time use.

The methods that will be used to meet this purpose include:

- Three questionnaires.
- Data from class tests.
- Diaries.
- Classroom observation.
- Interviews.

You are encouraged to ask questions or raise concerns at any time about the nature of the study or the methods I am using. Please contact me at any time at the e-mail address.

All data collected will be limited to this use or other research-related usage and all records will be kept confidential in the secure possession of the researcher. The data you will provide are not be used to evaluate your performance by me or affect your grades. Your grades in class tests will be analysed in this study.

The interviews will be audio recorded to help me accurately capture your insights in your own words. The recordings will only be heard by me for the purpose of this study. If you feel uncomfortable with the recorder, you may ask that it be turned off at any time.

You also have the right to withdraw from the study at any time. In the event you choose to withdraw from the study all information you provide will be destroyed and omitted from the analysing.

Your name and identifying information will not be associated with any part of the written report of the research. All of your information and responses will be kept confidential.

By signing this consent form I certify that I ______________________________ agree to the terms of this agreement.