MERITS OF THE TECHNOLOGY-ENHANCED FLIPPED CLASSROOM (TEFC) CONCEPT IN HIGHER EDUCATION

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ABSTRACT

Distance education hype has created a lot of speculation among educators on how it could facilitate and support formal learning, when the unprecedented global pandemic Covid-19 in early 2020 evidently highlighted the pressing need for this education method. Distance education is not a new phenomenon and the flipped classroom concept is also a well-researched method. However, there have been rather few studies about the applied flipped classroom approach with support of technology within the distance-learning paradigm. There were claims that suggest a variety of advantages for flipped classroom. This is while available publications were lacking the perspective of the primary beneficiary (the students), and focusing on the advantages of Technology-Enhanced Flipped Classroom (TEFC) in distance education, specially when it comes to such pandemic situations as Covid-19. This study contributes by critically exploring how distance students perceive the usefulness of the TEFC approach to support their studies, and perceive the benefits and limitations of this approach, compared with other means. The empirical data for this qualitative research was collected through semi-structured interviews that were preceded by a preliminary observational study. By the means of a thematic analysis, three major themes were identified that offered a broader insight into the students' perspective with regards to the benefits and challenges of the TEFC concept. The findings revealed that the discussion-based sessions in flipped classrooms enables or assisted students to foster the knowledge transfer and advance the ability to contribute in and influence on the discussion flow. This confirms the earlier claims concerning a positive perception of the flipped classroom concept in formal learning process. This research discovered that TEFC is a viable tool to support learning in a pandemic situation by empowering students and facilitating constructivism through communication and enhancement of cognitivism.

1. INTRODUCTION

The flipped classroom concept has created many thoughts among learners and teachers, when the focus was changed toward facilitating student engagement and active learning in formal education. The flipped classroom is not a new concept; however, the technology-enhanced flipped classroom (TEFC) gained increasing attention with the technological advancement of Information and Communication Technology (ICT) (Melzer, 2019; Olaniyi, 2020) or the Technology-Enhanced Learning (TEL) concept (Goodyear & Retalis, 2010). In early 2020, the global pandemic, Covid-19, created a need to seek for alternative educational methods that supported transformational learning concepts, while being compatible for online education. The TEFC is still a developing concept to contribute towards an improved overall learning and teaching experience and to get a standard setting in higher education (Baker, 2000; Noonoo, 2012; Altemueller & Lindquist, 2017), as an alternative in pandemic situations. Moreover, by emergence of TEL, it was argued that the focus in higher education was shifting from the teacher's knowledge towards active participation and engagement of the students (student-centered) to foster the development of competencies. This would allow students to excel in their respective educational path and increase employability upon graduation (Lundin, Rensfeldt, Hillman, Lantz-Andersson and Peterson, 2018). One of the main advantages of the flipped classroom was claimed that it improved students' engagement level (Abeysekera et al., 2015; Olaniyi, 2020).

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Transformational learning concepts such as peer-lecturing or inquiry-based learning have become the new norm in higher education (Majchrzak, Markus and Wareham, 2016). It has been a step towards reaching the goal of student participation and engagement (student-centered) by shifting away from lecture-based or traditional teaching (Majchrzak, et al., 2016). However, only some of these methods are suitable for an online distance education (as further claimed by Majchrzak, et al., 2016). Given the claim above, it is widely recognized that the relevance of educational transformation is imminent and that flipped classrooms can offer an alternative solution towards the challenging task to provide quality education, while trying to cope with the increased amount of students that attend the courses (Kim, Kim, Khera & Getman, 2014; Olaniyi, 2020). Furthermore, Kim et al. (2014) addressed that most of the existing studies have additional calls for research, which is one of the primary drivers for this research to fill in an identified knowledge gap with regards to the perception of flipped classrooms among distance learners.

There has been considerable research about flipped classrooms in higher education that provide a holistic view of its application within the existing educational theory as well as advantages that the flipped classroom concepts offers (Bishop and Verleger, 2013; McLaughlin, Roth, Glatt, Gharkholonarehe, Davidson, Griffin, Esserman and Mumper, 2014; O'Flaherty and Phillips, 2015; Melzer, 2019). However, there is a lack of research to examine the perception of the learners (students) in flipped classrooms (Davies et al., 2013; Mitchell, Petter and Harris, 2017). In addition, it is important to collect more qualitative data from students and analyze how they perceive the usefulness and possible challenges of flipped classrooms in order to complement the existing knowledge about the teachers' perspective on this topic (as argued by Davies, Dean & Ball, 2013; Zainuddin & Perera, 2019), which is the primary aim of this research. Moreover, by considering the current educational settings with respect to the pandemic of Covid-19 and the need of more effective distance teaching/learning for higher education, this research topic investigates how the flipped classroom concept in distance education would add value to this contemporary knowledge area.

The purpose of this research was hence to examine how distance-students perceive the flipped classroom concept, while simultaneously focusing on the demand to transform the methods of how education was relayed to the students. Therefore, the particular advantages and disadvantages of flipped classrooms were outlined, by interviewing distance students at Linnaeus University in Sweden. This research aims to close the identified knowledge gap and aims to analyze how distance-students perceive benefits and challenges with the flipped classroom concept as part of their educational journey as opposed to the traditional classroom teaching method. On this basis, the following research question was stated as a guide in this research:

> "How do distance-students in higher education perceive benefits and challenges with the technology-enhanced flipped classroom concept as part of their educational journey?"

To answer the preceding research question, there was a need to discuss the educational theories that provide context and set the base framework in order to systematically move from different interpretations of these theories towards different teaching methods, which include the flipped classroom concept. The collected data in the subsequent chapter will then be linked back to the theoretical framework and the review of existing literature (Fulton, 2012; Melzer, 2019) from this chapter in order to facilitate a versatile and reliable discussion that will advance the knowledge in the field of informatics with regards to flipped classrooms.

2. LITERATURE REVIEW

2.1. Flipped Classroom

Higher educational institutions are still struggling with engaging all enrolled students, and consequently, a significant number of students fail to develop sufficiently their competencies that are critical upon graduation (McLaughlin, Roth, Glatt, Gharkholonarehe, Davidson, Griffin, Esserman and Mumper, 2014; Li, Lai & Szeto, 2019). Complex reasoning, critical thinking, and written communication skills could be the core of most underdeveloped competences in higher education (McLaughlin et al., 2014), which according to Li et al. (2019) was still a valid claim. These concepts utilized a variety of

different methods that supported the underlying learning objectives of the student, whereas the flipped classroom concept started to get more traction in higher education institutions based on its merits to improve the personal learning outcomes for students by increasing active participation and engagement (Lundin et al., 2018; Olaniyi, 2020). In separate, but relatable studies regarding the effectiveness of flipped classrooms (Abeysekera & Dawson, 2015; Olaniyi, 2020), it is discussed that traditional learning is passive and not contemporary enough to address current educational needs and it does not foster the development of competencies.

There are studies that show advantages of the flipped classroom concept, which can contribute in an effort to enhance students' engagement and respectively improve the personal learning outcomes, while simultaneously managing the increased amount of students in a classroom (Bishop and Verleger, 2013; Zainuddin and Perera, 2019). Kim et al. (2014) claimed that flipped classroom offers the benefit of higher engagement levels and the major advantage that resources can be optimized and better allocated to tackle the arising issue of larger classrooms and transforming educational needs, which is further supported by the claim of Bond et al. (2020) in this regard. In addition to the anticipated benefits by applying the flipped classroom concept, the underlying methods were examined with the objective to identify how ICT can contribute in a learning effort (Davies, et al., 2013). Davies et al. (2013) also claim that a TEFC facilitates a better learning approach and that students acknowledged this approach as more engaging compared to a traditional learning environment, which was further supported by Majchrzak et al. (2016).

2.2. Online Distance Education

Online distance education can be described as an educational approach, wherein traditional face-to-face classroom teaching is replaced entirely by online classes through the support of ICT (Graham, 2006). The umbrella term of ICT-supported learning, or Technology-Enhanced Learning (TEL) – also referred to as other terms, such as computer-assisted instruction (CAI), computer-aided learning (CAL), networked/online learning that carry similar connotations – are specially concerned with situations in which technology is being used to facilitate or support learning (more details in Goodyear & Retalis, 2010). Even though, the distance learning approach has been part of TEL in the educational sector for quite long, there is still ambiguity about its place in higher education (Goodyear & Retalis, 2010; Havemann, Charles, Sherman, Rodgers, & Barros, 2019). In most cases, the virtual classroom is facilitated by a Learning Management System (LMS), which can be described as a learning platform that provides a forum for students and teachers to interact, communicate and initiate the knowledge transfer virtually (Dziuban, Graham, Moskal, Norberg & Sicilia, 2018).

Different studies (Garrison & Kanuka, 2004; Dziuban et al., 2018; Havemann et al., 2019; Hrastinski, 2019) claimed that distance learning has demonstrated the potentials to improve the efficiency and effectiveness of meaningful learning experiences. Hutchinson (2006) described that knowledge transfer and learning depend on the cultural context. The difference between distance education and traditional classroom teaching is that the student is further empowered to choose the place and time, through the use of ICT and LMS, which offer a higher degree of flexibility to accommodate personal needs and access the information and materials anytime, anywhere (Dziuban et al., 2018; Havemann et al., 2019; Hrastinski, 2019).

In a traditional learning experience, the teacher would hold a lecture in the form of one-way communication where information is passed to the students in order to increase their knowledge of a particular subject. Flipped classroom, on the other hand, is a method in which the students have the opportunity to study the material remotely (at their own pace) and reflect on the content and discuss about the topic critically in the discussion sessions (Baepler, Walker and Driessen, 2014). The traditional classroom method can be described with the following steps wherein the teacher instructs, students are encouraged to take notes accordingly, students follow guided instructions by the teacher, the teacher gives an assessment and students have homework to foster knowledge through repetition (Melzer, 2019). In contrast, Melzer (2019) describes that in the flipped classroom, the following process steps start with the teacher providing online guidance through an e-learning (LMS) platform, students can access the e-learning platform at their convenience to study the material independently from a remote location. Next, students will get the chance to attend a classroom with prior knowledge. Finally, the teacher and students discuss the particular topic, wherein each student has already acquired fundamental knowledge about the subject (Melzer, 2019).

2.3. Technology-Enhanced Flipped Classroom (TEFC)

In a distance education, the flipped classroom by the support of TEL and ICT is defined as a Technology-Enhanced Flipped Classroom (TEFC) concept. One TEFC session follows three stages that are delivered to the students (Mukherjee et al., 2017) as visualized in Figure 1. TEFC facilitates students to receive and access online information (pre-class) in order to get familiarized with the topic and take the acquired knowledge into the classroom sessions (during-class) and have a discussion with the teacher and peers (Abeysekera et al., 2015)(shown as stage 1 (pre-class) and 2 (during class) in Figure 1). Drawing back to the concept of TEL and use of ICT and LMS to facilitate the virtual flipped classroom, Mukherjee et al. (2017) discuss that teachers provide reading materials, videos, or tutorials on a particular subject in the pre-class stage, and create tasks/assignments about a specific topic in the post-class stage (shown as stage 3 in Figure 1). However, flipped classroom's teachers concur that the instructional videos that precede the physical contact class are not the differentiating factor on their own, rather how they are integrated into the overall approach and concept of the flipped classroom model (as discussed by Suhre, Winnips, de Boer, Valdivia & Beldhuis,2019).

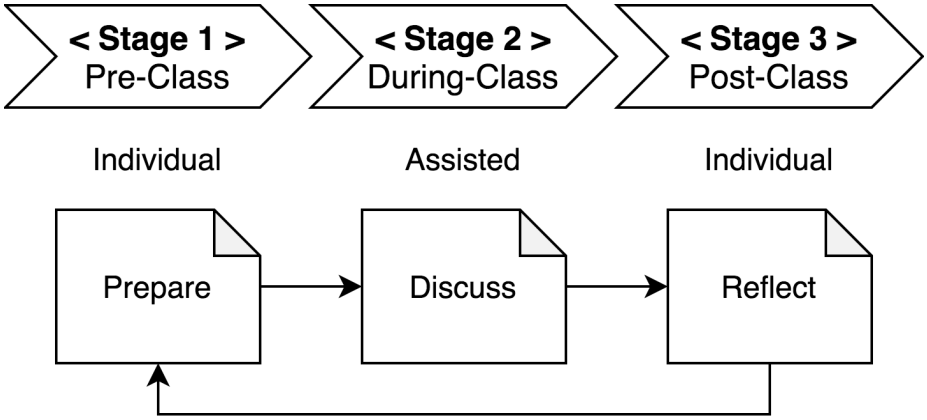

Figure 1. A simplified model of the TEFC

As illustrated in Figure 1, the pre-class stage is completed online from a remote location, wherein the student asynchronously receives particular instructions and materials on the given topic in order to acquire more knowledge (Mukherjee et al., 2017). The second stage of the flipped classroom model consists of a synchronous discussion in a virtual classroom. This part largely relates to the knowledge transfer amongst peers (as claimed by Piaget, 1976). Piaget (1976) described the education theory related to cognitive constructivism as active engagement amongst peers and knowledge creation through participation and argued that the students are at the center of the learning environment. The teacher acts here (in the second stage) as a facilitator who guides the discussion, wherein the discussion itself is student-centered and amongst peers who had time to read and reflect on the information (materials) they had received in the first stage of the model. The third stage is described as post-class, which consists of more practice and formative as well as a summative assessment, which is normally carried out asynchronously and online through LMSs (Mukherjee et al., 2017), but may also be presented synchronously at the end of the course as the final project presentation.

2.4. Connectivism in TEFC

There are different learning theories in connection to different educational methods. Most theories are based on three actors involved in education: the student, the teacher, and the educational institution (Garrison et al., 2004). Constructivism shifts the focus towards student-centered education as opposed to teacher-focused education (instructivism), and distance learning arguably grants the student more freedom to choose the location, the time, and the environment to study in (Hrastinski, 2019; Havemann et al., 2019). While constructivism educational theory encompasses distance-education in higher education (Jin et al, 2019), connectivism is an integral learning theory that relates to the usage of ICT in distance-

education (Goldie, 2016) and empowers TEFC. Goldie (2016) describes connectivism as a conceptual framework that interprets learning as a phenomenon influenced by technology and socialization, which in turn supports TEFC concept. Connectivism is interpreted as a supplementary learning theory that largely considers the technological aspect of learning theories (Goldie, 2016). Connectivism is a learning theory upon which knowledge is shared with the support of digital technologies, such as LMSs, video conferencing or messaging tools, or platforms that enable content creation and sharing, all as a support for the stages 1 and 3 in the TEFC process (in Figure 1).

3. METHODOLOGY

This research was based on a case study that was designed to commence with a preliminary non-participant observation and sought to collect qualitative data through online semi-structured interviews. The observation was aimed to get familiarized with the TEFC concept and was served in the process to develop relevant questions for the primary data collection, the interviews.

3.1 Flipped-Classroom Setup

The primary data collection's target group was distance-students that participated in a flipped classroom course at the Department of Informatics, at Linnaeus University (LNU), in Sweden. The course was an Internet of Things master level offered during the first year of the program only to Informatics students. The course was both theoretical and practical in nature with 25 distance students enrolled (35 in total including campus students). The aim was to collect qualitative data in order to gain students' perceptions towards TEFC concept compared to traditional teaching and learning.

Students taking this course were instructed before each class to: read the assigned materials (book chapters or research articles), watch an hour-long video recorded lecture, and prepare questions and comments for the class session. During each flipped-classroom session, the teacher would start with questions from the material to incite the discussion. Initially, students would start by answering the question posed by the teacher, but eventually the discussion would develop where students would debate each other with minimal teacher intervention. For each flipped-classroom session, students would gain 0 to 3 points depending on their activity and contribution during the session. This incentive motivated students to come prepared for the sessions. In total, during the course there were six flipped-classroom sessions, each lasting approximately two hours with a single break of 10-15 minutes. The students were divided into two groups, distance and campus, moderated separately by different teachers. Other activities in the course were seminars and workshops, which did not utilize the flipped-classroom approach.

3.2 Data Collection

In order to understand the classroom dynamic using the flipped-classroom approach, we start with observing the sessions. The non-participant observation helped to gain a more in-depth understanding of how the flipped classroom is applied in this course. Even though the observation did not collect data that directly contributed to the findings of the research, it was important to purposefully select relevant questions that were asked in the semi-structured interviews. The selected type of interviews offered the authors the opportunity to collect data that enabled them to gauge a general sentiment of the students towards the flipped classroom concept. Moreover, it enabled the authors to gain a more in-depth understanding of the usefulness and challenges as perceived by the students.

The participants were invited to participate in the voluntary interview and the first interview commenced shortly after the invitations were sent out. It was an open invitation through the students' LMS (Moodle), which facilitates asynchronous interactions and information access for all courses at LNU. The allocation of interview slots was given to the students that responded earlier to the invitation, but the interviews were conducted until a saturation was attained (Creswell & Creswell, 2017). The authors decisively did not send any targeted invitation to selected students in order to avoid any bias in the sampling and selection of participants for the data collection. Even though it could be considered a possible limitation that students were asked to respond voluntarily (Creswell & Creswell, 2017), since this method might reach only students that were more active and therefore their perception could be different from students that were deemed less active during the flipped classroom course.

For this paper, validity and reliability were ensured through the means of peer validation, and assistance from supervisors. Through these means, the applied research framework had been validated to ensure a higher degree of validity in addition to validation through established knowledge claims by existing publications. Other measures that were taken into account in order to achieve a higher degree of reliability and strengthen the research were a sufficient amount of participants for the data collection. Additionally, the participants were given a transcript of the recorded interview in order to confirm that the collected data was accurate.

With regards to data collection through conducting semi-structured interviews, ethical issues were taken into account (based on criteria discussed by Creswell & Creswell, 2017). While anonymity could not be granted to the interviewees (participants), they were guaranteed confidentiality and that participants' identity and personal data would not be disclosed at any point. Another consideration was stigmatization, which is referring to any accusations or judgments based on the response from the participants as in this study, no judgment or accusation was laid on the participants based on their responses. In the beginning of the interviews, the participants were given informed consent and were notified that the results of this study will only be used for scientific purposes specifically for the published master thesis and this follow up scientific paper. The participants were also informed that their participation in the interview is voluntary and that they have the option to refuse to answer the questions, or part thereof as well as terminate the interview at any point in time. Afterwards, the participants were given a transcript of the recorded interview in order to confirm that the collected data was accurate.

3.3 Data Analysis

The data analysis method for the collected data was thematic analysis, which is the most common form of data analysis for the qualitative research approach (based on the highly cited references, by Guest, MacQueen & Namey, 2011; Braun, Clarke, Hayfield & Terry, 2019). Thematic analysis is a linear process to examine the collected data in order to produce patterns, defined as themes or categories that can be used for data analysis before presenting the results of the research (Guest et al., 2011). Themes and categories are important to describe a phenomenon that is driven from a specific research question (Braun et al., 2019). In this research, the process to analyze the data was based on the model introduced by Braun et al. (2019), which offers a systematic and orderly approach in six individual phases, to effectively analyze and categorize the qualitative data (as illustrated in Figure 2). The identified themes and corresponding results based on these steps in the thematic analysis were presented in the two following chapters.

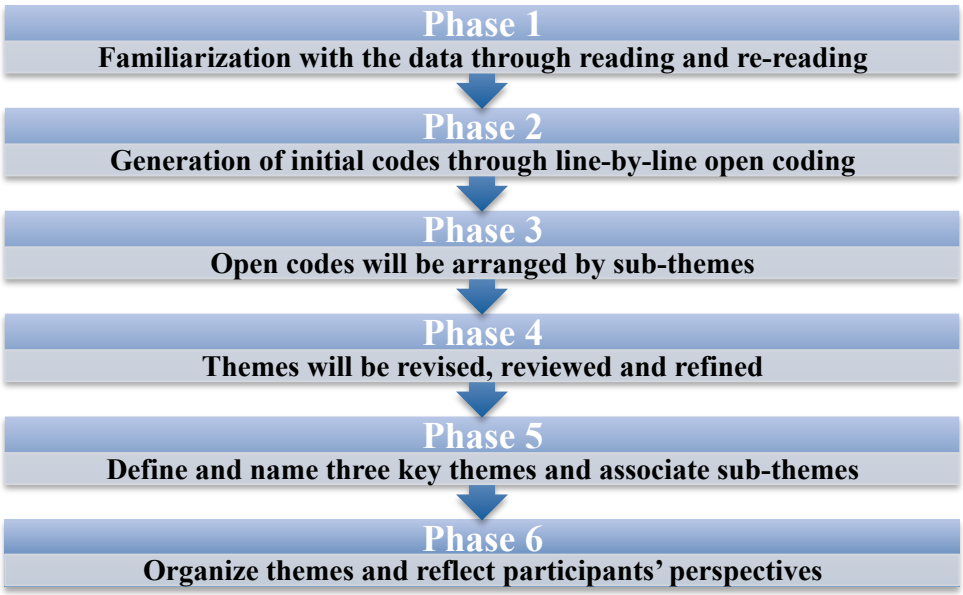

Figure 2. The six thematic analysis phases (adapted from Braun et al., 2019)

4. RESULTS AND ANALYSIS

It can be noted that the male to female ratio of the participants was 5:2 in favor of female participants. The physical location of these distance-students was within EU-countries and the exact location level was removed from the findings to guarantee full confidentiality of their identity. Additionally, the educational level suggests a mixed variety of educational backgrounds that range from graduates that possessed a Bachelor's degree (3 students), Master's degree (3), and Doctor of Philosophy (1). Furthermore, none of the participants was a tuition-paying student for their current Master's degree at Linnaeus University; henceforth this category will not be analyzed further as it did not offer any specific insights.

The thematic analysis revealed findings that allowed us to gain a closer look at how students perceived this teaching method as part of their distance-studies. The participants argued that the primary reason for the higher level of motivation was the conversation-based discussion that was the second stage of the flipped classroom concept. The discussion allowed them to actively contribute and influence the direction of the discussion. Another positive perception towards the flipped classroom concept was the ability to pause, rewind, re-watch the lecture-based concept that proceeded the discussion-based session, and was identified as the first stage of the flipped classroom. ICT arguably supported the gain in popularity of this teaching method and enabled participants to engage in an active discussion from a remote-location in the second stage of the flipped classroom as well as in the third and final stage of the flipped classroom, which was identified as another advantage of the flipped classroom concept.

Although the majority of findings reveal a generally positive perception of the flipped classroom, the participants addressed issues that can be considered a possible limitation or shortcoming. The participants commented that they preferred the flipped classroom teaching compared to traditional lecturing; primarily participants mentioned the preparation in advance (accessing the material in pre-class), as well as the discussion sessions (during class), as positive parts of TEFC. Participants mentioned that these means had a positive effect on achieving their personal learning outcomes and some mentioned that without the flipped classroom teaching, they would not be able to achieve the same learning outcomes and level of knowledge transfer. In particular, findings were mentioned that related to the ability to learn from peers, a higher motivation level to prepare for the class compared to traditional classroom teaching as well as the ability to actively contribute in the discussion and therefore influence and affect the learning outcomes of others.

Furthermore, one participant stated that benchmarking their knowledge to others gave an interesting insight into one's own ability and level of knowledge by listening to a peer discussion. While participants agreed that the discussion was the valuable part of the flipped classroom, which is based on fundamental knowledge that had been acquired ahead of the discussion-based class, not all comments were made related to a positive perception of the flipped classroom. These comments were made related to the initial hurdle to speak up by not knowing each other as well as the requirement of a quiet learning environment at home to grasp the knowledge on their own, if the participant wants to actively participate in the discussion. Consequently, students who don't have the opportunity of learning in the pre-class stage, see that as a limitation that they are not able to actively participate in the discussion and not always being clear about what the others discuss about, during-class phase.

Nevertheless, the participants also stated limitations that affected their sentimental involvement in the flipped classroom course. The limitations and challenges are related to less flexibility in a noisy environment in the during-class stage. The participant commented that in order to actively engage and involve in the flipped classroom, it needs a quiet environment with no distractions and background noises, otherwise it is impossible to contribute, as it would disrupt the communication flow of others. Another limitation that was stated was the initial hesitation from participants to involve in the discussion. One participant made a claim that described several limitations of the flipped classroom, as follows:

> "It needs several sessions; it takes time to build the base and therefore you need a series of meetings [...]; people need to know each other and feel comfortable [...]".

This key finding of the empirical data collection was not mentioned in any scientific publications, even though Piaget (1976) claimed in a related manner that constructivism theory requires a certain degree of trust amongst the participants. In another study about distance learning and online education,

Dziuban et al. (2018) claimed that the lack of socialization in distance learning could be a potential factor that affects the students learning outcomes.

Participants perceived different communication patterns based on the stage of the flipped classroom and the corresponding party they communicate with. Findings related to peer interaction (student-student or peer-to-peer interaction) and student-teacher interaction, revealed two types of key communication; the one-way communication and two-way communication. The analyzed findings have shown that the claim by Piaget (1976), mentioned above, is still valid; however, each stage of the TEFC entailed a different communication style and pattern, which was described by the participants in this study. The participants stated that the peer interaction during the pre-class is non-existent. This was similarly argued by Mukherjee et al. (2017) that the first stage of the flipped classroom serves for the topic orientation, and interaction amongst students is limited during this stage. Similarly, the participants stated that communication with the teacher is passive during the first stage and mostly relates to pre-recorded lectures through the use of LMS (Moodle in this research).

The result shows that the communication in the second stage, during-class, is mostly peer interaction and communication; the teacher remained in a passive role for the most part of the discussion. Some of the participants stated that the discussion amongst peers was enriching and assisted them to advance their knowledge (as similarly claimed by Piaget, 1976; Abeysekera et al., 2015; Olaniyi, 2020). However, it was also stated by the participants that the initial sessions were less interactive and students needed to overcome an initial barrier to achieve active communication amongst peers. This could be explained with the claim made by Hutchison (2006) who argued that constructivism learning depends on the cultural context and initial hesitation and reservation could be caused by the underlying fact of cultural differences and not knowing the opinion of the others yet. The communication in the third stage was perceived (by the respondents) as non-existent between student and teacher and limited between students (peers) as it mostly related to the post-class assignments that were carried out as mandatory group assignments.

As a result of the analysis, participants argued that ICT played a critical role to provide an effective learning environment for the participants. It can be considered as the enabler for the flipped classroom concept for distance students. It was a prerequisite that the video conferencing application Zoom was used for the during-class stage of the flipped classroom and the participants perceived Zoom as beneficial to their learning based on the ease of use and no barriers connecting to the class and with their peers. For content sharing students mentioned the following items; Google Suites applications were utilized and the participants stated that Google Slides, Google Documents, Google Drive, and Google Hangout were used due to the ability to access them easily from any remote location.

> "It [Google Suites] gives the possibility to work wherever you are and whenever you have the time since we are distance-students [...]

Lastly, the Learning Management System that was used in this flipped classroom course was Moodle and students stated that it was utilized only to access recorded lectures for the pre-class and to submit assignments after the post-class. Melzer (2019) claimed that LMS is intended to offer a one-stop solution for students and teachers alike and enable them to access information and communicate on the same platform, though none of the participants preferred to communicate through the LMS platform with peers or the teacher. Based on the participants' comments that Zoom and Google Suites is utilized due to its ease of use and remote access, it could offer a possible explanation as to why Moodle is not utilized for that same purpose. Fulton (2012) and Melzer (2019) both described the facilitation of LMS as convenient to use and easy to access platform to connect students. It facilitates to initiate the knowledge transfer, however, based on the findings that none of the students preferred to use Moodle for communication purposes could suggest that this particular LMS lacked particular elements that would make it more convenient and easy to use for communication.

Based on the introduced results and preliminary analysis, three main themes were identified, which formed the structure of the subsequent discussion of this paper. Namely, the three themes were identified as (1) sentimental involvement, (2) flipped classroom design, and (3) participants perception as visualized in Figure 3 below.

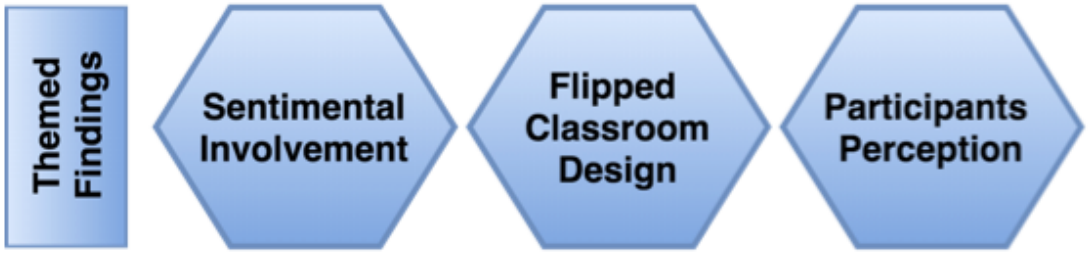

Figure 3. Themed Main Findings

The findings revealed that the general sentiment towards this teaching method was positive and the participants stated that they would prefer the flipped classroom concept compared to a traditional lecture-based classrooms. Furthermore, the students claimed that the flipped classroom concept had a positive effect on their learning and helped them to maintain a higher level of motivation and drive throughout the duration of the course compared to lecture-based classrooms, wherein the students were the passive recipient of information.

5. DISCUSSION

It was initially stated that the higher education sector was transforming. In particular the methods of how education was delivered to students, which was largely driven by the increasing size of participants in the physical classroom. This was paired with the need to improve the methods of how educational content was delivered to students in higher education. One method that was analyzed in order to fulfill these requirements to support the educational transformation was the technology-enhanced flipped classroom concept. The method is part of the constructivism educational theory that focuses on the students as the center of the learning environment. This contemporary learning method was comprehensively supported by Information and Communication Technologies and can be carried out for campus-based students, distance-students, or a mix of both groups.

5.1. Sentimental involvement

Badia and Iglesias (2019) claimed in a more recent study that participants of the flipped classroom are more invested and motivated to participate. Though this study did not specifically ask the participants to provide a point of comparison, the participants stated that they have a higher level of motivation and engagement, which suggested that the flipped classroom bears an advantage of sentimental involvement compared to other methods. Similarly, the participants commented that the content is presented more appealing through the means of discussion with peers, which is identical to what Piaget (1976) claimed in his initial argument about cognitive constructivism theory.

Furthermore, the participants stated that the option to actively contribute, higher motivation to prepare in advance and the added benefit to learning from others are comparable to the claim from Badia et al. (2019) who argue that participants in flipped classroom courses have a higher degree of involvement and motivation compared to a traditional classroom, where a teacher would hold a lecture.

5.2. Flipped classroom design and stages

It can be stated that based on the initial argument of Piaget (1976) with regards to cognitive constructivism and the associated characteristics, the participants confirmed that the knowledge transfer through discussion-based sessions helped them to achieve better learning outcomes. Moreover, it was perceived as beneficial in their learning experience as initially claimed through another study by Badia et al. (2019). The classroom design was perceived similarly to the design of Mukherjee et al. (2017), though the participants could not clearly identify the post-class stage of the flipped classroom. Instead the findings revealed that the discussion in the second stage was the most beneficial factor in advancing their knowledge, which was positively influenced by the pre-reading material from stage one.

The students were required to study the material in advance for the discussion lead to a higher motivation to learn, which was perceived as positive. While the communication was claimed as an active two-way communication amongst peers during the discussion, a shortcoming was the initial hurdle to

speak out and it took few sessions to overcome that barrier and achieve a pleasant study environment, which could be culturally related according to Hutchison (2006). Furthermore, the stages (shown in figure 1) in the flipped classroom were viewed as repetitive rather than a linear view. The phases of (1) preparation, (2) discussion and (3) reflection are recurring stages that reflect a series of flipped classroom sessions in order to maximize the knowledge transfer of students.

The participants were asked to describe the flipped classroom course based on their own experience and to provide a direct comparison between their experience and the theoretical models that were shown to them during the interview. The theoretical model claimed by Mukherjee et al. (2017) described three individual stages of the flipped classroom, starting from pre-class with a fundamental topic orientation. The second stage was labeled as during-class, which referred to the discussion amongst peers that was facilitated by a teacher. The last stage was considered as post-class, which referred to performance assessment [by the teacher], practice [of the course content] and feedback (Mukherjee et al., 2017). All participants fully recognized the second stage, during class, of the theoretical model and concurred that it involved the active discussion amongst students that was guided and facilitated by the teacher. The first stage was perceived by the majority of participants similarly with the theoretical model, which refers to topic orientation during pre-class. The participants described this stage as independent learning in advance of the second stage of the flipped classroom. Particularly, the participants liked the option to pause, rewind and re-watch the content, which was described by Mukherjee et al. (2017) as a primary advantage for students that seek flexibility with their education.

While there is a consensus between the literature and participants on the first and second stages of the flipped classroom, most of the participants did not recognize the third stage of the flipped classroom. The aspect of practice as described by Mukherjee et al. (2017) was confirmed by participants through the means of group projects that were implemented as deliverables for the flipped classroom course. However, none of the participants agreed with the assessment aspect or performance evaluation that was described by Mukherjee et al. (2017). In a related study, Valdehita, Plata and Merodio (2017) claimed that assessment of student performance in distance-education needs to occur in regular patterns and not only at the end of the program [course], which could be an explanation why the participants failed to recognize this aspect in the third stage of the model.

5.3. Participants' experience of TEFC

The learning experience in this context refers to any subjective and peculiar experience perceived by the participants about the TEFC. Havemann, et al. (2019) argued that the primary advantage of the ICT-based flipped classroom concept (or TEFC) improved learning outcomes for the students, which was also confirmed by participants in this study. Through the means of the semi-structured interview, it allowed identifying that the claimed improvement of learning outcomes for students is mostly related to the means of discussion that is taking place through ICT in the virtual classroom, which represents the second stage of the flipped classroom. Another finding that could possibly share more insight into the claim of Havemann et al. (2019) was the fact that students were allowed to study the material in advance in order to prepare basis, which is fundamental to the discussion stage according to the participants. TEFC allowed the participants to pause, rewind, and re-watch the material in the pre-class stage (stage 1) in order to prepare for the discussions in the during-class stage (stage 2) at their own pace, which sequentially positively affects students learning outcomes, based on students own perceptions.

Hrastinski (2019) argued that social constructivism seeks to absorb knowledge gained from more knowledgeable peers and merge it with one's own belief in order to absorb more information and respectively increase the knowledge. The participants' comments with regard to the claim of Hrastinski (2019) confirmed that instant feedback from others helped them to achieve their learning goals and foster the knowledge transfer, while others stated that once they overcame the initial barrier to know each other, the virtual discussion of the flipped classroom was the most beneficial factor in their learning experience.

6. CONCLUSIONS AND FUTURE WORK

The ability to actively influence the outcome of the discussion and to benefit from the opinion of others was claimed by the participants as an advantage of the flipped classroom, which is the basis for cognitive constructivism learning, though there were shortcomings that were identified and addressed in

this paper. It was claimed that the flipped classroom concept would not offer value to the participants if it were arranged as a single session or limited series. Instead, participants claimed that the flipped classroom concept requires a series of meetings, wherein the initial meetings were perceived as more passive due to the fact that participants were still overcoming the initial barrier to actively communicate while getting to know each other and build a level of trust that enabled a more open discussion.

Moreover, another limitation of the flipped classroom that was identified was the ability to actively contribute within a noisy environment. The participants described themselves as relatively active contributors in the discussion-based sessions and appreciated the ability to join these sessions from remote locations, though it was addressed that the ability to contribute actively requires a quiet environment with no surrounding external noises as it would disturb own learning and disrupt the discussion of others, as claimed by the participants.

The findings pertaining to the initial research question allowed answering the research question that the participants generally have a positive perception towards the flipped classroom concept and the research identified several advantages and presented the usefulness of how students perceived this method of teaching. Nevertheless, there were shortcomings that need to be taken into account when considering this method of teaching as it would not be recommended for a one-off session or limited series of sessions.

Furthermore, another main finding was that the students need to be made aware that a quiet and suitable work environment would be required in order to actively engage in the during-class discussion. The constructivism educational theory identified the students in the center of the learning environment. The findings of this study agreed with the claim, however, that the importance of the teacher as a guide and facilitator of the discussion was again highlighted. In particular, at the early stage of the flipped classroom, the teacher was needed to spark the dialogue. As the course progressed, the during-class discussions matured over time and the involvement of the teacher as facilitator was less needed.

Based on the empirical findings of this research as well as the conclusions that were drawn, it would add additional value to expand the scope of this study to include participants from different educational backgrounds in order to validate the results on a larger scale. Another perspective that would add value could be to conduct quantitative study. This study would help to quantify the findings of the participants on how the flipped classroom helped them to attain a higher level of motivation and drive throughout the study. Furthermore, it could investigate how it assisted them to achieve the learning outcomes through the discussion-based knowledge transfer of the flipped classroom.

AUTHOR CONTRIBUTIONS

K.F., N.A. and M.F. contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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