



ISSN: 0976-3376

Available Online at <http://www.journalajst.com>

ASIAN JOURNAL OF  
SCIENCE AND TECHNOLOGY

Asian Journal of Science and Technology  
Vol. 10, Issue, 08, pp.10029-10034, August, 2019

## RESEARCH ARTICLE

### A CASE STUDY EXPLORING TEACHER EXPERIENCES IN A FLIPPED LEARNING

\*Mohammed Alwaqdani

School of Education, Curriculum and Instruction, Umm Al-Qura University, KSA

#### ARTICLE INFO

**Article History:**

Received 19<sup>th</sup> May, 2019  
Received in revised form  
24<sup>th</sup> June, 2019  
Accepted 07<sup>th</sup> July, 2019  
Published online 31<sup>st</sup> August, 2019

**Key words:**

Flipped classroom,  
Teaching methods,  
High school,  
Computer science.

#### ABSTRACT

The flipped classroom approach is an innovative pedagogical concept that allows the instructor to use various learning activities in the classroom. In this approach, the traditional concept of learning is reversed, and the learner-centred activities are encouraged in classrooms, whereas the lectures or the instructions are moved to the home environment via online instructional videos or other educational materials. This approach has been perceived as an effective incorporation of technology in education. However, there are limited studies about the effectiveness of this approach, especially in a high school context. This study used a qualitative case-study method to determine the impact of the flipped classroom approach on teacher experiences in computer science in high school in the Saudi Arabia educational context. The study focused on teacher experience. The impact of using the flipped classroom approach the teacher experience was investigated by employing two data methods; namely interview and observation. Although the teacher faced some challenges in the flipped classroom approach, the teacher was shown to have a good experience in this approach compared to the traditional classroom. The study also found that the flipped classroom approach is appropriate for teaching computer science. However, the teacher is requested to make an extra effort to produce instructional videos in order to meet the students' expectations. It is also equally important to think about designing the appropriate classroom activity to ensure the students would engage and participate in the classroom. Future study can consider the effect of the flipped classroom approach on a different subject.

**Citation:** Mohammed Alwaqdani. 2019. "A case study exploring teacher experiences in a Flipped Learning", *Asian Journal of Science and Technology*, 09, (05), 10029-10034

**Copyright © 2019, Mohammed Alwaqdani.** This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### INTRODUCTION

Flipped classroom approach is considered as one of the most notable outcomes following the recent breakthroughs in educational technology. Wiginton (2013) claimed that these educational technology innovations stimulated teachers to engage their students into a creative learning environment, thus promoting individualized, personalized learning and creativity. Bergman and Sams (2012) indicated that "Basically the concept of a flipped class is this; that which is traditionally done in class is now done at home; that which is traditionally done as homework is now completed in class". In the flipped classroom approach, the teacher creates an informative mini-video and uploaded to the Internet to allow students anytime, anywhere to watch the video (Wiginton, 2013). In addition, students are allowed to watch recorded lectures at home, and then the classroom time is used to engage them into active learning (Kellogg, 2009; Walter-Perez and Dong, 2012). As a teaching method, the notion of flipped classroom approach is

quite similar to the conventional approach, where all students are expected to prepare (reading textbook) for the classroom (Davies, 2013). However, a typical aspect of the flipped classroom approach is how technology is used to help students prepare for classroom activities. In addition, the flipped classroom approach is used by the teacher to ensure that the time of classroom is dedicated to support students to carry out any assignments and help them through the most challenging activities (Khan, 2012, cited in Davies, 2013). The students in flipped classroom approach will also be able to utilize the time of classroom to collaborate with peers to carry out the various activities. Moreover, the flipped classroom approach involves the use of an explicitly student-centred teaching methodology, which enables students to learn according to their own ability (Bergmann and Sams, 2012, p. 24). The flipped classroom approach has arisen as an effective approach on students' experience, especially in terms of improving students' engagement within the classroom (Sadik, 2015); increasing their motivation to learn (Davies et al., 2013) and encouraging their interaction in the classroom (Smith, 2015). The findings of previous studies are promising for the successful implementation of the flipped classroom approach (McLaughlin et al., 2013; Lemmer, 2013; Tune et al., 2013; Education, 2013; Murphree, 2014), but a limited number of studies have been carried out in a high school setting.

\*Corresponding author: Mohammed Alwaqdani,  
School of Education, Curriculum and Instruction, Umm Al-Qura  
University, KSA.

Furthermore, the teacher in the flipped classroom approach faced a different experience as he is required to produce an instructional video and plan to use class-time for the activities to be effective. According to Caicco (2016), teachers face a number of challenges when implementing the flipped classroom approach due to the shift in their roles and the requirements of this approach. Although there are few studies about teacher experience in the flipped classroom, this approach can be seen as a valuable opportunity for teachers to provide a good learning practice for students (Flipped Learning Network, 2012). Using the flipped classroom approach to teach computer science was investigated in previous studies (Davies et al., 2013; Amresh et al., 2013; Gehringer and Peddycord, 2013 and Al-Zahrani, 2015; Johnson, 2012). These studies found that flipped classroom approach can be suitable and valuable to teach computer science as the teaching approach of computer science empowers the students to practise the concepts in the classroom (Crawford, 1999). However, the education in Saudi Arabia is still under the influence of the teacher-centred approach in the classroom although technology was introduced into schools during last decade and there are opportunities to use a variety of pedagogies.

Therefore, the flipped classroom approach has been a much discussed phenomenon among educators. It appears to be an effective approach that provides a good learning experience for students. In addition, the researcher is interested in finding out the impact of using this approach on teacher experiences in computer science subjects in the Saudi context, where teachers are still inclined to use the teacher-centred approach. The process of the flipped classroom approach has two phases; the first requires the delivery of the classroom material via an online video, which allows students to prepare for the classroom from home. The second is in-class, where the teacher is in charge of designing activities, which signifies that students have more time to interact and discuss with their peers and teacher. Thus, it is significant to understand the teachers' experience in relation to these two phases of the flipped classroom approach. The importance of this study lies in that teachers' experiences in the flipped computer science classroom in high schools have not been broadly studied. In addition, the study can encourage more future studies to explore more about the flipped classroom approach in a high school context, more specifically in Saudi Arabia where the flipped classroom approach is still unpopular.

**Literature review:** The flipped learning approach is a different experience for teachers compared to the direct instruction lecture, which does not seem to be challenging for them. These challenges might occur because the flipped classroom approach requires skills that differ from face-to-face lecturing. These skills include preparing the appropriate videos to cover classroom content, designing effective learning activities and engaging students in classroom activities (Brown, 2012). In addition, the role of teachers in flipped learning has to totally shift from "sage on the stage" into "guide on the side", where the teacher is a facilitator rather than an instructor (Strayer, 2009). Therefore, the implementation of the flipped learning approach might cause difficulties for some teachers. Furthermore, most educators may be thought the importance of flipped classroom approach is the recording video, however, the classroom activity is also important (Roach, 2014). In flipped classroom, the teacher is better situated to guide their students, as well as inspire and

help them deal with any challenging tasks; thus allowing them greater control over their own learning (Hamdan, 2014). Therefore, the flipped classroom approach necessitates making additional efforts on the part of the teacher by supplying the suitable materials and designing the various learning activities. However, in a survey done by the flipped network (2012) on 450 teachers incorporating the flipped classroom approach, it concluded that 99% of teachers will continue to use the flipped learning approach. This result seems to confirm the positive experience had by the teachers. Furthermore, 71% of the teachers put more than half of their instruction online, which goes to indicate that they felt comfortable and had the necessary skills to prepare online content for their students. In addition, teachers reported some improvement in terms of their students' performance and engagement. In this light, the teachers may prefer to continue using the flipped learning approach after noting the positive impacts of flipped learning on their students. However, studies on teachers' experience in the flipped classroom are rare due to the fact that the majority of studies have been focused on students' experience. In fact, Caicco (2016), who carried out the first academic study concerning teachers' experience, employed a qualitative method by using semi-structured interviews with teachers. The result of his study showed that teachers faced a number of difficulties to ensure all students prepare for classroom activities because of the inequitable access to online videos. In addition, teachers stated that using the flipped learning approach increased their workload. For example, creating a video added more work to their already busy schedules. In addition, teachers believed that the flipped classroom approach does not apply to every topic, especially the topics that are found lacking in "problem solving-type questions". However, the findings claimed that teachers found that flipped learning was a good experience due to the potential of flipped learning approach in terms of increasing students-teacher interaction and enhancing opportunities to meet the students' needs.

**Research Question:** What is the experience of computer science teacher regarding using the flipped approach in his classroom?

## MATERIALS AND METHODS

In this study, teacher experiences in the flipped and traditional classroom approaches have been the aim of the research investigation. To evaluate the impact of the flipped classroom approach on teacher experiences, a case study was chosen as the methodology of this research. Cohen et al. (2011) stated that in educational research, the case study approach has been extensively adopted. In such method, participants' lived experiences are accurately described (ibid). Similarly, Baxter and Jack (2008) asserted that through case study, it is possible to explore an issue within its own contextual setting. In addition, the research was carried out in a tangible environment; i.e. the classroom. As such, key participants, including teacher was able to provide the researcher with a unique opportunity to achieve the aim of the research study (Willig, 2013). It should also be pointed out that by using the case study approach, the researcher has access to a sample of real people in real situations. The design might be appropriate because the research is focused on teacher experience in the flipped learning approach. However, this research was carried out in a social context to enable the process of unveiling truth of a particular issue. For the researcher, the reality has a subjective element and is reliant on individuals.

The researcher examined the phenomenon through the participants' eyes, and he believes that reality has a multi-layered and intricate side, as stated by Cohen et al. (2011). In the light of this, this study adopts the anti-positivism paradigm (Willig, 2013) since the case study involves a realist approach. Nevertheless, it is assumed in this case study that the findings might not be taking place in a different setting.

**Data Collection:** This study used the qualitative method (interviews and observations) to investigate the experiences of teacher according to his teaching approach. In addition, one should point out the using a number of methods is a key feature of the case study for any researcher (Yin, 2013; Denscombe, 2003). The aim was to gain data that would be analysed using various descriptive and analytic approaches, which might enable the researcher to gain deeper insights into the participants' experiences. However, the researcher attempted to use multiple data tools given the significance of triangulation (Patton 2005). Therefore, the validity and reliability of this study can be enhanced through the use of evidence from various sources (Cohen et al., 2011). According to Yin (2013), any research endeavour is considered reliable when the researcher ensures the provision of evidence from multiple data

**Data Analysis:** The data of this study was analysed using the qualitative analysis approach. The researcher attempted to provide a descriptive narrative of two cases based on the taken field notes to capture the differences in teacher experiences in different classroom learning environments. After providing a descriptive narrative of two cases, there will be an evaluation aimed at summarising teacher experiences in both cases. In addition, the researcher transcribed the generated audio-recordings of the interviews. Thematic analysis was used to analyse the teacher interviews. Furthermore, using a thematic analysis was required from the researcher to apply the six phases according to Braun and Clarke (2006). In the first phase, the researcher attempted to familiarise himself with the data by reading and re-reading the data. The second phase involved generating initial codes by highlighting the relevant data to the research question. Then, the researcher used the categorisation of the different codes into potential themes. Next, the themes were reviewed, leading to the breaking down of some themes into subthemes, such as the themes on the students' experiences. Afterwards, the researcher named and defined each theme and subtheme related to the research questions. The final phase included writing up a report to explain each theme, using various quotations from the participants.

## RESULTS

### Observation Data

**The role of the teacher in both classrooms:** The teacher had time to provide three different activities in the flipped classroom. In addition, the teacher was flexible moving from one activity to another. He was interacting with students to help them during these activities even though he faced some obstacles encouraging the students in the traditional classroom to engage with the activity either before the lesson or after explaining the lesson. The main role of the teacher was to facilitate learning for students in the flipped classroom, which helped him to establish some kind of authority over the

classroom and to focus on the students' progress individually. For example, those with lower levels of participation were encouraged and helped by the teacher. However, in the traditional classroom, the teacher was merely transferring information and he faced some difficulties to keep the students focused during the lesson explanation. As mentioned, two students fell asleep and some students were chatting, which seemed to affect the lesson as the teacher on a few occasions lost control over the classroom. The teacher managed the time of the flipped classroom better than the traditional classroom with the time elapsing before managing to give a second activity and failing to even recapitulate the lesson. The reason is obvious as the teacher spent most of the time explaining the lesson. During the explanation, he also faced some problems in terms of students' behaviour and technical glitches that cause further nuisances and wasted the time used for the classroom. In both classes, it was noted that the teacher was not in full control with regards to the level of noise whilst his students were involved in the group discussion.

**Interviews Data:** This part presents the interview findings in terms of the teacher's experience in relation to the flipped classroom approach and traditional learning. The section addresses three themes about the teacher's experience, as follows: 'video versus lecture', 'the role of the teacher in the classroom' and 'using the flipped classroom approach challenges'.

### Theme 1: video versus lecture

The teacher's experience in the flipped classroom approach differs from that in the traditional context in terms of the delivery of the lesson content. In the flipped case, the teacher provides a video using an online platform, as opposed to the lecture style where he often stands in front of the students to explain the content of the lesson. In the interview, the teacher emphasised the advantages of the video method when compared to the lecture. First, he stated that he faced a number of challenges when delivering the lecture. For example, he seemed to sometimes forget to mention a point or get easily distracted during the explanation, especially if a student started chatting or someone knocked on the door. In contrast, he explained how convenient it was for him to record the video from the comfort of his own home as no one would bother him even if he forgot to discuss or mention a point. He had the opportunity to record as many times until he was satisfied with the video. The second advantage, as the teacher stated below, refers to the fact that preparing a video is easier than preparing a lecture:

*Before each lecture, I have to read the book and write down notes, especially in terms of the computer terminology as this helps me during the lecture, otherwise I might forget some of them, but in the flipped classroom, I would prepare the video at the weekend and make sure it had to cover all aspects of the lesson before uploading it ... It is easier.*

In addition, the teacher argued that using videos meets the students' expectations and that the lecture method is not appropriate for today's generation. He asserted that:

*I know that students do not prefer the lecture style ... When I used the flipped classroom approach, they came to me to show them how to operate the video on their phones ...*

*They liked it because it is part of the digital generation ... Also, the interesting point was that in the other classrooms students asked me to use the video instead lecture because they'd heard about it.*

### **Theme 2: The role of the teacher in the classroom**

As known, the teacher generally plays a significant role in the classroom, but the role of teachers in the flipped classroom is quite distinctive and different from the traditional classroom. The teacher interviewed in this piece of research illustrated the difference of his role in both classrooms by stating that

*In the flipped classroom, I set up the activity and then move around in between groups ... I observe the students' discussion and try to be close to them when they need me ... I interact more with students to see how their learning is progressing.*

With regards to the lecture style, the teacher had a different view as he reported being concerned most about deliver the lecture within the lesson-time, which did not allow him to interact with his students. Similarly, the teacher pointed out that it was easier for him to motivate the students to learn in the flipped classroom than in the traditional classroom. According to him,

*It was more flexible to engage the students in group-discussion, and to draw their attention back to me whenever I wanted ... Also, I was able to focus on each student separately ... But in the traditional classroom, it was too difficult to attract the students' attention and I observed that students were too fast asleep or even disconnected altogether from the lesson, but as I did not want to stop the lesson, I chose to ignore them.*

Therefore, the role of the teacher was to facilitate learning in the flipped classroom, which allowed him to focus on the students' learning. However, it is worth to mention how the teacher was able to control the classrooms, which is reflected in the teacher's statement below:

*Controlling students in the traditional classroom is not easy and is time-consuming ... Also, if I give them an activity, they will soon start making noise ... It is quite the opposite of the flipped classroom because in the latter the classroom is under my control and I can manage the time of the classroom much better.*

### **Theme 3: Using the flipped approach challenges**

Although the above data shows that the teacher prefers using the flipped classroom approach, the teacher mentioned some challenges preventing the effective delivery of the flipped classroom approach. Recording the video was one of these challenges, especially in terms of the time spent on producing such videos and the actual length of the video. According to the teacher, creating a video can sometimes last more than five hours, which uses up so much of his time. He also indicated that by attempting to achieve a suitable video duration for his students, he sometimes had to re-record the video to be around the twenty-minutes mark. In fact, the teacher thought long videos would make his students lose interest. In addition, he stated that recording valuable content requires key multimedia skills and can last for hours, and it is not an easy process. As stated by the teacher,

*After I create the video, I watch it to ensure the video has covered all lesson aspects ... So, sometimes, I record two, three or four times ... The reason for this is that I do not have the skill to explain while running a video as sometimes I take time on the explanation.*

However, determining the appropriate classroom activities proved to be a challenge for the teacher. In his words,

*It is difficult to provide good activities because I have to take into account three things ... Students' needs to ensure they will have engaged with the activity ... The time of the classroom and the relevance of the activity to the video content.*

Another challenge mentioned by the teacher is how to encourage the students to prepare for the classroom week in week out. He stated that the students were more engaged during the first three weeks, but in the following week, he observed that students were spending most of the time on explaining the content of the video to each other, which had an effect on his lesson plan and the students could not finish all activities that the teacher had planned to for them.

## **DISCUSSION**

In the current study, the teacher seems to have a positive experience in terms of using the flipped classroom approach, as shown in the findings. Providing an explanation of the lesson using the video affordance is the most preferable aspect of the flipped classroom approach for teachers, compared to teaching using the lecture style. This can be ascribed to the fact that the video can move the large component of the lesson out of class time and allow the teacher to provide the students with an opportunity to experience the concepts through classroom activities. According to Vaughan (2014), the teacher in the traditional classroom context may face a number of difficulties in order to cover all the content and to provide an activity for students that allows them to experience the content of the lesson. Using the traditional approach can be a challenge for computer teachers as they are required to teach the computer concepts and give students the opportunity to practise. According to Hubwieser (2012), the teacher of computer science may face a number of challenges when attempting to apply the suitable teaching method. Therefore, findings revealed that using the flipped classroom approach may enable the teacher of computer science to overcome this obstacle by possibly providing some valuable content through the video affordance and allowing the students to experience the computer concepts in classroom activities.

In addition, the data showed that creating videos to deliver the computer curriculum components is a more appropriate way than presenting a lecture where the teacher might face difficulty during his explanation, such as forgetting certain computer terminologies, which may damage his self-confidence. In this sense, the flipped classroom approach may help teachers who may not for example have the adequate lecturing skills or new teachers to create videos at their own pace and use the time of the classroom to interact with students. Furthermore, in the present research, the role of the teacher appears to change to be a facilitator rather than that of a mere transmitter of knowledge. The teacher perceives his role in the flipped classroom to be far easier than having to go through the content in the lecture method, which could prove

challenging in terms of attracting the students. Teachers also mentioned about the disadvantage of the lecture method in that the likelihood of providing activities may be limited due to the time spent on content explanation. During the lecture, there could be accidents experienced by the teacher, including students' behaviours or technology issues, which can have a negative effect on the class management, as observed in this study. As such, by relying on the flipped classroom approach, the teacher might be able to avoid these problems. In Saudi schools, the majority of teachers use the lecture method (Alrowais, 2014), which may not help in terms of building a rapport between the teacher and his students. The findings of the comparative account on both classroom approaches showed that the flipped classroom approach allows the teacher to be more interactive and engaging with students and to focus on the students on an individual basis, which was also observed. Therefore, this approach might promote the teacher-students' relationship and thus positively affect the educational process. The positive teacher-student relationship can lead to a sense of safety and security on the part of students in their classroom environments and provide scaffolding for their social and academic skills (Baker et al., 2008; O'Connor, Dearing, & Collins, 2011; Silver, Measelle, Armstrong, & Essex, 2005). The teacher's support for students in the classroom can positively influence their social and academic outcomes (Baker et al., 2008; O'Connor et al., 2011; Silver et al., 2005). In this light, flipped classroom seems to provide a rich environment for a much enhanced teacher-student relationship.

However, findings revealed that the teacher may encounter a number of challenges in his experience of using the flipped classroom approach. One of these challenges is the preparation of the instructional video, which requires time and effort on the part of the teacher. This was in fact noted when interviewing a teacher who argued that producing a video can add to the workload placed on him, especially in terms of the time spent preparing the video. This is supported by Caicco (2016) who claimed that using the flipped classroom approach can overwork teachers. The process of recording instructional videos seems to be time-consuming due to the need to ensure that the video provides a good explanation of the content and that the video is of a high quality. In the interview, the teacher explained that producing a twenty-minutes video needs more than five hours, which might be too much asking for him. Therefore, a teacher should have the ability to produce instructional videos before using the flipped classroom approach to avoid this kind of challenge. Another solution that could prove useful to overcome this challenge is the use of other teachers' videos, such as the Khan Academy; however, it might be too difficult in a country such as Saudi as there are not many instructional videos.

Brown (2012) stated that the teacher must create an appropriate video which can engage the students, which can be quite a challenge when using the flipped classroom approach. It seems that teachers need to be very skilful in order to produce good quality video content that will potentially attract students and engage them with the video. In this research, the teacher seemed to lack the appropriate skills as he recorded four videos in the same way based on integrating his voice on the slides. It may well be that over time, this would be less attractive for students who indicated in the interview that they would prefer the video to have more movement. In addition, the teacher expressed that his students engaged with the first

three video; then, he found it difficult to encourage them to watch the fourth video, which could be due to the quality of the video that no longer kept these students attracted to the video. Therefore, the video content should be aligned with the quality of the video watched by students, such as animation and high quality graphics, in order to meet their expectations. The importance of this point lies in the fact that if the students did not engage with the video, this would mean that they would come to the classroom unprepared, which is inconsistent with the objective of the flipped classroom approach. However, the most challenging task facing the teacher in the flipped classroom relates to how students can be involved in meaningful classroom activities that will potentially extend their knowledge of the course content (Vaughan, 2014), as this piece of research sought to ascertain. As such, the design of classroom activities appears to be a challenge for teachers in the flipped classroom approach. The reason could be ascribed to the lack of teacher experience in the use of the flipped classroom approach, including lack of expertise on the time management aspect for classroom activities. In other words, moving from teacher-centred to student-centred pedagogy may need more time to allow the teacher to gain the necessary experience to design the appropriate activities with educational content and which is suitable for the time of the classroom. According to Birkenkrahe and Kjellin (2015), teachers face a further challenge in the flipped classroom approach in terms of changing their teaching status and reconsidering how to teach the content. However, in the flipped classroom, the teacher allows the students to collaborate, discuss and interact with each other, which may have an effect on how the teacher manages the classroom. In the case of the present research, the teacher was observed in both classrooms as losing control due to the noise level in both classrooms when students were busy interacting with each other. It seems that control over the classroom depends on the teacher's personality and is not thus related to the teaching approach.

## Conclusion

The teacher in this study appeared to have a positive experience in the flipped classroom approach due to its potential to deliver the lesson materials in a comfortable and desirable setting, in comparison to the lecture presentation where he faced challenges during the explanation process. In addition, the teacher revealed that the flipped classroom approach was appropriate for teaching computer science due to the opportunity availed for students to practise what they have learnt and for the teacher to guide and assess students' progress with the classroom activities. However, recording an instructional video can cause workload for the teacher either because of the lack of skills or the time taken to produce a video. In addition, the teacher revealed that making a lesson plan and designing an activity for the classroom were among the challenges of the flipped classroom approach. Finally, this research investigated the impact of using the flipped classroom approach on the teacher experiences in the computer science subject in high school. This piece of work contributes to the current limited research conducted about the flipped classroom approach in computer science in a high school context.

## REFERENCES

- Al-Zahrani, A. M. 2015. *"From passive to active: The impact of the flipped classroom through social learning platforms*

- on higher education students' creative thinking." *British Journal of Educational Technology* 46(6): 1133-1148.
- ALRowais, A. S. (2014). "The impact of flipped learning on achievement and attitudes in higher education." *International Journal for Cross-Disciplinary Subjects in Education* 4(1): 1914-1921.
- Al-Harbi, S.S. and Alshumaimeri, Y.A. 2016. *The Flipped Classroom Impact in Grammar Class on EFL Saudi Secondary School Students' Performances and Attitudes*. *English Language Teaching* 9(10), pp.60-80.
- Amresh, A., Carberry, A.R. and Femiani, J., 2013, October. *Evaluating the effectiveness of flipped classrooms for teaching CSI*. In 2013 IEEE Frontiers in Education Conference (FIE) (pp. 733-735). IEEE.
- Bergmann, J. and A. Sams (2012). *Flip your classroom: Reach every student in every class every day*, *International Society for Technology in Education*.
- Bishop, J. and M. Verleger 2013. *Testing the flipped classroom with model-eliciting activities and video lectures in a mid-level undergraduate engineering course*. *Frontiers in Education Conference, 2013 IEEE, IEEE*.
- Blatchford, P., Bassett, P. and Brown, P., 2011. *Examining the effect of class size on classroom engagement and teacher-pupil interaction: Differences in relation to pupil prior attainment and primary vs. secondary schools*. *Learning and Instruction*, 21(6), pp.715-730.
- Brahimi, T. and Sarirete, A. 2015. *Learning outside the classroom through MOOCs*. *Computers in Human Behavior* 51, pp.604-609.
- Carey, W.B., Crocker, A.C., Elias, E.R., Feldman, H.M. and Coleman, W.L. 2009. *Developmental-Behavioral Pediatrics E-Book*. Elsevier Health Sciences.
- Creswell, J. W. 2011. *Designing and conducting mixed methods research*. Los Angeles, Calif. ; London, Los Angeles, Calif. ; London : SAGE.
- Davies, R. S., et al. 2013. "Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course." *Educational Technology Research and Development* 61(4): 563-580.
- De Giusti, A.E. 2018. *Computer Science-CACIC 2017: 23rd Argentine Congress, La Plata, Argentina, October 9-13, 2017, Revised Selected Papers*. Springer.
- Edmonds, W.A. and Kennedy, T.D. 2012. *An Applied Reference Guide to Research Designs: Quantitative, Qualitative, and Mixed Methods: Quantitative, Qualitative, and Mixed Methods*. London: SAGE.
- Graziano, K. J. and J. D. Hall (2017). *Flipping Math in a Secondary Classroom*. Society for Information Technology & Teacher Education International Conference 2017. Austin, TX, United States, Association for the Advancement of Computing in Education (AACE).
- Flick, U. 2011. *Introducing Research Methodology: A Beginner's Guide to Doing a Research Project*. London: SAGE.
- Gunter, G.A. and Gunter, R.E. 2014. *Teachers discovering computers: Integrating technology in a changing world*. Cengage Learning.
- Jefferies, A. and Cubric, M. 2015. *ECEL2015-14th European Conference on e-Learning: ECEI2015*. Academic Conferences and publishing limited.
- Johnson, L.W., 2012. *Effect of the flipped classroom model on a secondary computer applications course: Student and teacher perceptions, questions and student achievement* (Doctoral dissertation, University of Louisville).
- Keengwe and Jared. 2014. *Promoting Active Learning through the Flipped Classroom Model*. IGI Global.
- Khanova, J., Roth, M.T., Rodgers, J.E. and McLaughlin, J.E., 2015. Student experiences across multiple flipped courses in a single curriculum. *Medical Education*, 49(10), pp.1038-1048.
- King, N. and Horrocks, C. 2010. *Interviews in Qualitative Research*. London: SAGE.
- Kukla, A. 2013. *Social constructivism and the philosophy of science*. Routledge.
- McCallum, S., Schultz, J., Sellke, K. and Spartz, J. 2015. An Examination of the Flipped Classroom Approach on College Student Academic Involvement. *International Journal of Teaching and Learning in Higher Education* 27(1), pp.42-55.
- Mitchell, M. and Jolley, J. 2012. *Research Design Explained*. Boston: Cengage Learning.
- Moore, A.J., Gillett, M.R. and Steele, M.D., 2014. Fostering student engagement with the flip. *Mathematics teacher*, 107(6), pp.420-425.
- Remenyi, D. 2012. *Field Methods for Academic Research: Interviews, Focus Groups and Questionnaires*. Academic Conferences Limited.
- Sajid, M. R., Laheji, A. F., Abothenain, F., Salam, Y., AlJayar, D. and Obeidat, A. 2016. Can blended learning and the flipped classroom improve student learning and satisfaction in Saudi Arabia?. *International journal of medical education* 7, pp. 281.
- Sams, A. and Bergmann, J. 2012. *Flip your classroom: Reach every student in every class every day*. *International Society for Technology in Education/ISTE*.
- Vaismoradi, M., Jones, J., Turunen, H. and Snelgrove, S., 2016. Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice* 6(5), pp.100.

\*\*\*\*\*