New Trends and Issues Proceedings on Humanities and Social Sciences

Volume 4, Issue 4 (2017) 150-158

ISSN 2421-8030
www.prosoc.eu

Selected Papers of 6th Cyprus International Conference on Educational Research (CYICER-2017), 04-06 May 2017, Acapulco Hotel and Resort Convention Center, North Cyprus.

Proposed flipped classroom model for high schools in developing countries

Philip Siaw Kissi [a]*, Department of Management Information System, Faculty of Engineering, Cyprus International University, North Cyprus.

Muesser Nat [b], Department of Management Information System, Faculty of Engineering, Cyprus International University, North Cyprus.

Adeleye Idowu [c], Department of Management Information System, Faculty of Engineering, Cyprus International University, North Cyprus.

Suggested Citation:

Kissi, S. P., Nat, M. & Idowu, A. (2017). Proposed flipped classroom model for high schools in developing countries. *New Trends and Issues Proceedings on Humanities and Social Sciences.* [Online]. 4(4), pp 150-158. Available from: www.prosoc.eu

Selection and peer review under responsibility of Assoc. Prof. Dr. Cigdem Hursen, Near East University

Abstract

Flipped classroom is an approach that uses technology-support instruction to deliver content pre-class in order to maximise student-centered learning and problem-solving skills during class time. The concept is emerging as a feasible approach and is having a positive impact on students learning outcomes and improves information retention. Some developed countries such as United States of America, China, Australia and Canada have implemented this instructional approach to reform their educational system. Despite the positive impact of the flipped classroom instruction, the challenge remains for many high school teachers in developing countries to embrace this new paradigm. This situation raises legitimate concerns that need to be addressed. Therefore, this paper examines the existing literature that offer evidence-based of flipped classroom implementation challenges and proposes a practical alternative model for high schools in the developing countries. The proposed model provides teachers and students who face difficulties concerning internet access, video production, and equipment costs with an easy strategy to adopt flipped classroom instructional method. This study contributes to the high school curriculum development in developing countries to integrate flipped classroom approach and enhance students' learning experiences.

Keywords: Flipped classroom model, high school, student-centered, developing countries.

* ADDRESS FOR CORRESPONDENCE: **Philip Siaw Kissi**, Department of Management Information System, Faculty of Engineering, Cyprus International University, North Cyprus.
E-mail address: mnat@ciu.edu.tr / Tel.: 0392 671 11 11

1. Introduction

Several studies have stressed the need for alternative pedagogy for high schools to improve students' learning outcome (Arum & Roksa, 2011; Lee, Cawthon & Dawson, 2013; Schoenfeld & Sloane, 2016). Students' ability to understand the content, solve problems and learning confidence all shaped by the method of teaching they receive in school (National Council of Mathematics Teachers [NCTM], 2000). Hence, it is essential for the teacher to use a proper teaching method that could resolve this problem.

Flipped classroom concept is emerging as pedagogical approach that is feasible and effective to address students' needs in our current generation (Davies, Dean & Ball, 2013; Vaughan, 2014; Mortensen & Nicholson, 2015) and has a positive impact on students' learning achievements (Tsai et al., 2016). In the flipped approach, student review learning materials involves formats such as audio, video and, PowerPoint presentation on a web-based platform before class, then go to class for in-class activities where homework, problem-solving exercises, and projects are deliberated to enrich student learning outcomes under teacher's assistance (Mousel, 2013; Pena & Rosson, 2014).

Many studies have stressed that students-centered method employed in a learning environment is very important (Agbatogun, 2014). Due to the introduction of flipped classroom, the student-centered approach in the classroom has become more feasible and achievable for some years now. This instructional method motivates and stimulates students in active learning (Hwang, et al., 2015). Students who are engaged in active learning and problem-solving are able to improve their performance (Chang, Hsiao & Barufaldi, 2006). Many studies have indicated that students in flipped classroom perform better than their peers in a normal lecture classroom (Kong, 2015; Sahin, Cavlazoglu & Zeytuncu, 2015).

Developed countries such as United States of America, China, Australia, and Canada implemented this approach to reform their educational system, due to advanced internet technology as well as modern digital technologies. Despite the positive impact of the flipped classroom model, the challenge remains that many high school teachers in developing countries, continue to depend on a lecture-based approach as a medium of the classroom instruction where students are expected to read textbooks after class for a better understanding of concepts. This approach of instruction has resulted in high school students' difficulty and misunderstanding of many classroom lessons such as core mathematics, integrated science, and biology (Stosic, 2015). Even though it may not be factual for all students and other content, traditional lecture method traps students into memorising and rehearsing of study material for the sole purpose of school examination.

The aim of this study is to examine existing literature that offer evidence-based of challenges of flipped classroom implementation and proposed practical alternative flipped classroom model for high schools in developing countries.

The rest of the paper discusses pertinent literature review based on the concept of flipped classroom, reported outcomes, and existing flipped classroom models. Further, critical analysis was made to find out the challenges of implementing this promising instructional approach and drawback of the existing models. Further, a useful proposed flipped classroom model was designed for high schools, followed by a conclusion and future studies.

2. Literature Review

2.1. Concept of flipped classroom

In 2008, Jonathan Bergmann and Aaron Sam, High School chemistry teachers in Colorado, were trying to find out how they can help their students who always absented themselves from class. They used their own money to prepare recording lessons and posted online for those students. It was revealed that even students who had not missed class watch the recorded lessons which enabled them to improve their understanding as well as their learning ability. Bergmann and Sam rethink how to use the class time which led to the concept of flipped classroom (Tucker, 2012; Enfield, 2013). The flipped classroom model is designed to increase active learning in knowledge acquisition and

construction. The philosophy behind the flipped classroom model is to maximise students' engagement with content and enhance teachers' contact time in order to improve their understanding (Rotellar & Cain, 2016).

In this 21st century, many educational reforms focus on how students are prepared to acquire higher-order or critical thinking skills in order to cope with the challenges in the continually changing society (Kong, 2014). Most teachers expect their students to be able to state, apply, analyse, evaluate and create a concept once the class is over.

As shown in figure 1, using flipped classroom strategy, students acquire lower-order skills of remembering and understanding as a result of learning teachers' pre-lesson materials such as online video, a web-based tutorial in the out-class. During in-class activities involving discussion, problem-solving, project learning, and debates, students also gain knowledge of high-order thinking skills such as applying, analysing, creating, and/or evaluating (Lai & Hwang, 2016).

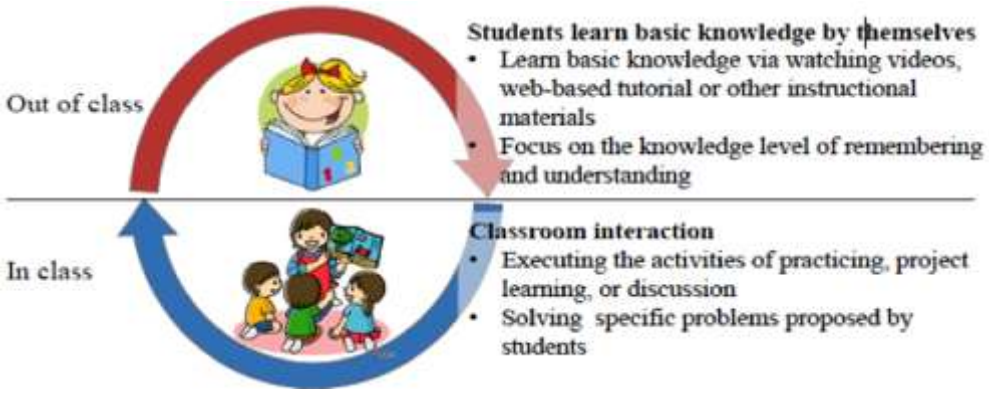

Figure 1. Concept of flipped classroom (Lai & Hwang, 2016)

2.2. Implementation of flipped classroom in high schools

Mousel (2015) in his study used 22 junior high school students in an international Baccalaureate Standard Level mathematics who received trigonometry lessons through flipped classroom model. The students were asked to complete a ten-item survey questionnaire regarding perceptions, attitudes, and beliefs of competency using both flipped classroom and the traditional method. He found out that the flipped classroom model generally has a positive effect on students' attitude and perceptions than the traditional approach.

Kong (2015) investigates the effect of flipped classroom instruction on students' critical thinking achievement. A sum of 124 junior high students exposed to the three-year trials of the teaching method where they were engaged in online pre-lesson and in-class group activities. He tested the students after the teaching trials and concluded that flipped classroom method promotes students competency in a critical thinking achievement.

Spilka and Manenova (2013) compared flipped classroom with educational screencasts and traditional method in upper primary schools. They conclude that there was no significant difference in achievement between pupils in flipped classroom and those in the traditional method. Bhagat, Chang and Chang (2016) examine the effect of flipped classroom and traditional method of teaching on 82 high school students mathematics achievement. They indicate that students in flipped classroom learning environment perform better than the counterpart in the traditional classroom.

2.3. Flipped classroom models

The flipped classroom approach uses online instruction outside class period in order to increase students' engagement and learning during the in-class time (Mazur et al., 2015). Nat (2015) asserts that, in developing flipped class model, particularly in developing countries, it is important to include the needs of students and schools in selecting out-class and in-class activities. Nat (2015) further proposed a classroom model for the developing countries, which is shown in figure 2.

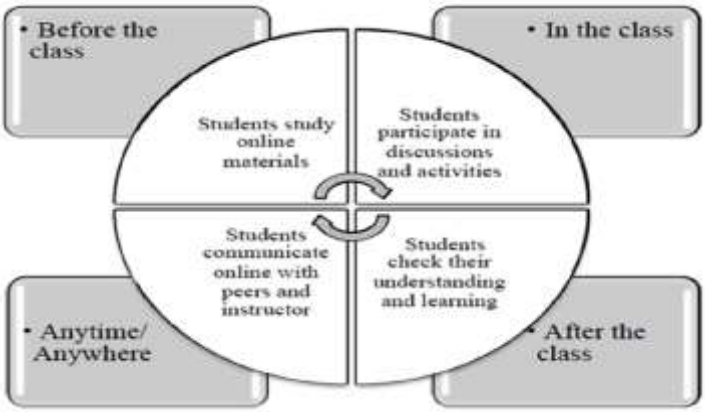

Figure 2. A flipped classroom model for developing universities (Nat, 2015)

This model has four dimensions (Before the class, in the class, anytime/anywhere, after the class). Students learn online materials anywhere before the class, participate in the interaction in the class, and check their understanding after class. Nat (2015) explains that this series of activities increase students' commitment and interest.

Lai and Hwang, (2016) designed self-regulated flipped classroom model learning process to engage students in self-learning activities as in figure 3. They suggested that the teacher should initially introduce the learning content, and followed by an explanation of self-regulated learning mode and then flipped classroom. In their proposed model, students read e-books and take quizzes, and their performances are sent to a database. The teacher then conducts in-class discussion according to students' misunderstandings in the out-class activities. After students encounter with both in-class and out-class activities, they are directed to complete self-evaluation test using self-regulated monitoring system.

Figure 3. Self-regulated flipped classroom model (Lai & Hwang, 2016)

3. Challenges of Flipped Classroom Implementation

There are many challenges for flipped classroom curriculum integration such as lack of technology, and poor monitoring of students' work at home, video production time and equipment costs, software for creating instructional podcasts (Tong, 2014; Yang, 2014; Yarbro et al., 2014; Lage, Platt & Treglia, 2000) but Internet access or online resource is a major problem when considering implementing flipped classroom instruction to support learning (Ginns & Ellis, 2007). Developed countries such as United States of America, Canada, United Kingdom, and Hong Kong, have internet access percentage at 102.7%, 82.9%, 106%, and 105.1% of the population respectively (Tong, 2014). The high rates of internet access enable successful implementation of flipped learning. In support, Ullman (2013) explains that Internet access is relevant for the student to watch online videos during the pre-class time.

However, the percentage point gap between internet access rates among developed countries compared to developing countries is 42.7% (Chinn & Fairlie, 2010). In addition, in spite of the increasing number of Internet support systems particularly in Africa, internet service access remains very low (Chavula et al., 2014). One can assert that most developing countries are not implementing flipped classroom instructions due to internet accessibility being perceived as the only way to conduct the flipped pre-class activities.

As indicated in the literature, Internet access is the factor to consider for the implementation of flipped classroom model since students are required to study online material at home before the in-class activities. None of the existing flipped classroom implementation models took this major challenge into consideration. For instance, Nat (2015) and Lai & Hwang (2016) suggested online learning as the only means for pre-class activities. One can assert that most developing countries are not implementing flipped classroom instructions due to Internet accessibility being perceived as the only way to conduct the flipped out-classes activities. In addition, the existing flipped classroom models were designed and applied in higher education. Therefore, it is important to design an alternative model for flipped classroom that does not uniquely depend on the online learning and higher education.

4. The Proposed Flipped Classroom Model

The proposed flipped classroom model for high schools for the developing countries considered other options with the lack of Internet accessibility, video production and equipment cost for pre-classroom. The model involved five sessions: Learning material preparation, Decision Making, Pre-class activities, In-class activities, and after class activities. Below is the detailed explanation.

4.1. Learning material preparation

High school stakeholders can use available learning materials and social environment to develop their own materials. For instance, they can create learning in short segments known as Microlearning for outside classroom activities using supported social media platforms. These social environments are actively used by students, free to use and do not require personal maintenance. Some common social media platforms and Micro learning content types they support are provided in Table 1. Preparing Micro learning for students' outside classroom activities could engage them with the subject matter and increases their knowledge retention.

Table 1. Some social media environment and Micro learning content they support adopted from Trowbridge, Waterbury and Sudbury (2017)

	Instagram	Snapchat	Twitter	Facebook
Function	Image, video, text annotations, tags, hashtags and good search ability	Image, video, drawn annotations. emoji; and limited text use	Images, videos, link. up to 140 characters of text, hashtags, good ability	Images, videos, links, short or long text, tagging and applications
Video Length	60 seconds maximum	10 seconds maximum	Recorded or live streamed	Live streamed
Complexity	Medium	High	Easy	Easy

High school teachers can also adopt free Open Education resources (OER) for the outside classroom activities. These resources have content such as Khan Academy, Wikibooks or Wikijunior, repositories with high-quality STEM content. For instance, ODUM library has OER for high schools with learning materials on different subject areas. The teachers can refer their students to these OER for pre-classroom activities.

Teachers have an option to use prepared learning materials for the flipped classroom video or graphics delivery such as YouTube, Wevideo, TedEd and Piktochart to minimise cost. Since some already prepared videos on specific lessons are sometimes difficult to retrieve for flipped classroom model, many teachers may decide to create their own quality lecture videos. It is important to find a less cost budget for video production. The most costly aspect of the video preparation is the equipment for filming and software for editing. However, teachers could use smartphones for the video preparation. These phones have a quality video filming and editing platform. This approach is cost-effective and could encourage more flipped classroom approach in high schools' curriculum.

Further, school management can buy low-cost video cameras in addition to those in the smartphones for the flipped classroom video production. Teachers can jointly use these video cameras to prepare a series of short videos according to the topics in the teaching syllabus. These prepared instructional content videos should be kept in the school library. The videos could be used subsequently whenever delivery of such content to reduce the cost of preparing another video.

4.2. Decision making

The instructor prepares the lesson plan by deciding on which medium to deliver the learning materials for students to learn during the pre-class activities. This decision should depend on the learning material available in school and at homes or communities. For example, social media platforms for Micro learning, OER, video preparation material, computers and Internet access in the school and the community.

4.3. Pre- class activities

The instructor has three options to store lecture videos or materials for the students. The instructor should use desktop computers in the school laboratory for students in the boarding school where they can visit during their own time, to learn the material before class. In addition, teachers' presentations can be stored on storage devices such as a digital optical disc and flash drive for students to access on TV in homes at their own time, as shown in figure 3. Students learning the materials before class gain a knowledge level of remembering and understanding of the concept learned. Further, school and community with a high level of internet access should consider the option of web-based online learning.

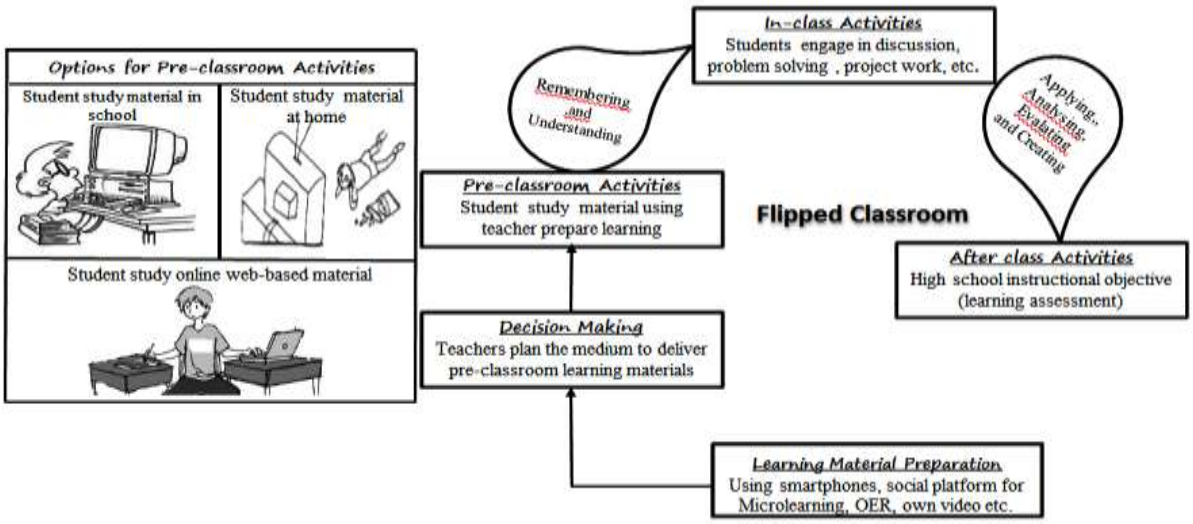

Figure 3. Structure of the flipped classroom model for high schools in developing countries

After the pre-class learning, students are expected to remember and understand the material learned before the in-class activities. This can be achieved when students have proper access to the stored presentation.

4.4. In-class activity

In-class activities, students should be engaged in students–students and students-teacher discussion or interaction, problem-solving exercises, and project work. The teacher serves as a facilitator who controls the class activities. During these activities, it is expected that students acquire knowledge level of applying, creating, analysing and evaluation of new materials. This is possible when in-class activities are well-structured.

4.5. After class activities

Instructors should assess students' level of knowledge lower-order and higher-order thinking during post-class activities. This will enable the instructor to know whether high school instructional objectives are achieved. Students should be able to answer questions that demand lower-order and higher-order thinking.

The challenge of every teacher is to provide effective instruction that caters for the diversity of students' intellectual strength in the classroom. The above activities could offer a differentiated curriculum that could enable teachers to achieve this objective.

5. Conclusion and Future Studies

The proposed flipped classroom model provides solutions to some challenges of implementing flipped classroom such as lack of Internet or web access and video production cost. This may increase the use of flipped classroom instruction to reform instructional approach in high school education, where content will be taught to generate students' critical thinking but not conveying information to them.

The proposed model for the flipped classroom could enable teachers, particularly in developing countries to adopt flipped classroom pedagogy as an instructional approach. This emerging instructional strategy may increase students' learning management and problem-solving skills to

address their educational needs. The proposed approach can be used to support the development of teaching and learning in order to address students learning difficulties. Further, the study may help in designing appropriate school instruction curriculum.

This study is part of the ongoing experimental research, investigating the effectiveness of the proposed flipped classroom model for high schools against traditional-based lecture method in terms of student higher-order thinking application, and retention level.

Conflict of Interests

No conflict of interest in the study.

References

Agbatogun, A. O. (2014). Developing learners' second language communicative competence through active learning: clickers or communicative approach?. *Educational Technology & Society*, 17(2), 257-269.

Arum, R. & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses.* Chicago: University of Chicago Press.

Baepler, P., Walker, J. D. & Driessen, M. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. *Computers & Education*, *78,* 227-236.

Bhagat, K. K., Chang, C. N. & Chang, C. Y. (2016). *The impact of the flipped classroom on mathematics concept learning in high school. Educational Technology & Society, 19*(3), 134-142.

Chang, C. Y., Hsiao, C. H. & Barufaldi, J. P. (2006). Preferred–actual learning environment "spaces" and earth science outcomes in Taiwan. *Science Education*, *90*(3), 420-433.

Chavula, J., Feamster, N., Bagula, A. & Suleman, H. (2014). *Quantifying the effects of circuitous routes on the latency of intra-africa internet traffic: A study of research and education networks.* In *International Conference on e-Infrastructure and e-Services for Developing Countries* (pp. 64-73). US: Springer International Publishing.

Chinn, M. D. & Fairlie, R. W. (2010). ICT use in the developing world: An analysis of differences in computer and internet penetration. *Review of International Economics*, *18*(1), 153-167.

Davies, R. S., Dean, D. L. & Ball, N. (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

Enfield, J. (2013). Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students. *CSUN TechTrends*, *57*(6), 14-27.

Ginns, P. & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *The Internet and Higher Education, 10*(1), 53-64.

Hao, Y. & Lee, K. S. (2016). Teaching in flipped classrooms: Exploring pre-service teachers' concerns. *Computers in Human Behavior*, *57,* 250-260.

Hwang, G. J., Lai, C. L. & Wang, S. Y. (2015). Seamless flipped learning: A mobile technology-enhanced flipped classroom with effective learning strategies. *Journal of Computers in Education, 2*(4), 449-473.

Kong, S. C. (2015). An experience of a three-year study on the development of critical thinking skills in flipped secondary classrooms with pedagogical and technological support. *Computers & Education*, *89,* 16-31.

Kong, S. C. (2014). Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practising flipped classroom strategy. *Computers & Education*, *78,* 160-173.

Koo, C. L., Demps, E. L., Farris, C., Bowman, J. D., Panahi, L. & Boyle, P. (2016). Impact of flipped classroom design on student performance and perceptions in a pharmacotherapy course. *American Journal of Pharmaceutical Education, 80*(2), 33

Lage, M., Platt, G. & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education, 31*(1), 30-43.

Lai, C. L. & Hwang, G. J. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education, 100,* 126-140.

Lee, B., Cawthon, S. & Dawson, K. (2013). Elementary and secondary teacher self-efficacy for teaching and pedagogical conceptual change in a drama-based professional development program. *Teaching and Teacher Education, 30,* 84-98.

Love, B., Hodge, A., Grandgenett, N. & Swift, A. W. (2014). Student learning and perceptions in a flipped linear algebra course. *International Journal of Mathematical Education in Science and Technology, 45*(3), 317-324

Mazur, A. D., Brown, B. & Jacobsen, M. (2015). Learning designs using flipped classroom instruction conception d'apprentissage à l'aide de l'instruction en classe inverse. *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*, *41*(2), 45- 62.

Mortensen, C. J. & Nicholson, A. M. (2015). The flipped classroom stimulates greater learning and is a modern 21st century approach to teaching today's undergraduates. *Journal of Animal Science, 93*(7), 3722-3731.

Mousel, A. (2013). *Flipping the high school mathematics classroom. studies in teaching research digest*. Retrieved from http://files.eric.ed.gov/fulltext/ED543854.pdf#page=64 on 2 January 2017.

Nat, M. (2015). A flipped classroom model for developing universities in developing countries. *In Global Learn*, *1,* 597-604.

National Council of Mathematics Teachers. (2000). *Principles and standards for school mathematics. Reston*, VA: National Council of Teachers of Mathematics.

Pena, J. & Rosson, M. B. (2014). An investigation of design features for inverted classroom support technology. *Edulearn14 Proceedings*, *1,* 6271-6280.

Rotellar, C. & Cain, J. (2016). Research, perspectives, and recommendations on implementing the flipped classroom. *American Journal of Pharmaceutical Education*, *80*(2), 34-43.

Sahin, A., Cavlazoglu, B. & Zeytuncu, Y. E. (2015). Flipping a college calculus course: A case study. *Educational Technology & Society*, 18(3), 142-152.

Schoenfeld, A. H. & Sloane, A. H. (Eds.). (2016). *Mathematical thinking and problem solving*. London: Routledge.

Spilka, R. & Manenova, M. (2013). *Screencasts as web-based learning method for math students on upper primary school.* In M. Margenstern, K. Psarris & D. Mandic (Eds.), *Proceedings of 4th European Conference of Computer Science* (ECCS 13) (pp. 246-250). Paris, France: North Atlantic University Union.

Stosic, L. (2015). The importance of educational technology in teaching. *International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE)*, 3(1), 111-118.

Tong, T. (2014). *Exploring the flipped classroom in a Hong Kong secondary school* (Unpublished Master Thesis). Hong Kong, University of Hong Kong, Pokfulam.

Trowbridge, S., Waterbury, C. & Sudbury, L. (2017). *Learning in bursts: Microlearning with Social Media.* London: Routledge.

EDUCAUSE Review. (2017). Retrieved from http://er.educause.edu/articles/2017/4/learning-in-bursts-microlearning-with-social-media on 29 April 2017.

Tsai, C. W., Shen, P. D., Chiang, Y. C. & Lin, C. H. (2016). How to solve students' problems in a flipped classroom: A quasi-experimental approach. *Universal Access in the Information Society, 1,* 1-9.

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

Ullman, E. (2013). Tips to help flip your classroom: Teachers offer their strategies for making the most out of the flipped classroom model. *ASCD Education Update*, *55*(2), 1-5.

Vaughan, M. (2014). Flipping the learning: An investigation into the use of the flipped classroom model in an introductory teaching course. *Education Research and Perspectives (Online*), *41*(25), 25-41.

Yang, J. (2014). Implementing the flipped classroom in elementary and secondary schools in China. *Advances in Social Science, Education, and Humanities Research, 14*, 159-161.

Yarbro, J., Arfstrom, K., McKnight, K. & McKnight, P. (2014). *Extension of a review of flipped learnin*g. Retrieved fromhttp://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/Extension%20of%20FLipped%20Learning%20Lit%20Review%20June%202014 on 1 May 2017.