

Mathematics Teacher's Perceptions on Flipped Classroom towards the 21st Century Learning and Innovation Skills

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ABSTRACT

A Vast innovation has immersed in the field of education, including the learning-teaching process in the 21st-century. Therefore teachers should be aware of new technological teaching methods while addressing 21st-century competencies since they are the pioneers in guiding students towards the future of our nation. Among them, the flipped classroom approach (FC) is a popular pedagogical practice providing opportunities for students to encounter self-learning experiences in the technological era. The main purpose of this study was to find out the perceptions of the mathematic teacher about FC towards 21st-century skills. In order to collect data, the survey research design was used and the questionnaire was administrated to 244 mathematics teachers, from the Galle education division. Data were analyzed quantitatively by using SPSS (Version 25) software. It was revealed that 75.8% of the sample were in the view that the FC approach can monitor students' creativity when learning mathematics. In addition, 82.1% of teachers stated that FC can promote students' communicative skills and 75% stated that students acquire critical thinking skills by sharing knowledge with their peers through Smart Computing. Also, 81.7% of the teachers agreed that FC enhanced face-to-face discussions for actual collaborative applications for students. The findings also revealed that no statistically significant differences at ($\alpha \leq 0.05$) on the total degree of perceptions of FC towards the 21st-century skills due to gender since (0.125) is more than (0.05). On the other hand, many teachers (61.2%) disagreed that students become independent from the teacher in the flipped classroom, as students acquire a (a lot of data) large amount of information through technology and engage in critical thinking before entering the classroom. The study results demonstrated that the sample was well aware of the importance of the FC approach. However, weak internet connection, ignorance of social platforms, insufficient technological resources, negative attitudes of teachers and lack of teacher training were identified as barriers to implement the flipped classroom approach in Sri Lankan schools. Therefore, practice-oriented strategies should be used to improve mathematics teacher implementation of the flipped classroom approach in Sri Lanka.

INTRODUCTION

When addressing the competencies of the 21st century, every teacher should be aware of the new technological teaching methods as they are the pioneers in guiding the student towards the future of our nation (Tapscott, 2009; Sedere, 2016; UNESCO, 2016; Seidman et al., 2018). According to Hammond (2001) knowledge in an innovative world is changing vastly; the teacher must also play an important role in transmitting and modernizing knowledge of students. As stated by NCTE (1998) in Quality Concerns in Secondary Teacher Education,

“The teacher is the most important element in the educational field. It is the teacher who is mainly responsible for implementing the educational process at any stage and any time that suits”.

This statement shows that it is imperative to update the teacher's current knowledge and awareness on new trends in education as it is essential to secure the future of a nation. The importance of competent teachers to

the Sri Lankan school system cannot be overemphasized. It means that teachers in contemporary society need to be professionals with fully equipped with high academic standards and practical pedagogical skills.

Therefore, towards the globalized modern world, the role of the present teacher should be changed to enhance 21st century learning and innovative skills in students (Partnership for 21st Century Learning network, 2018). P21 frame work further emphasizes that some of the specific skills required to develop the learning and Innovation skills, are needed to equip students for the increasingly complex life and work contexts of today's world. They have recognized the main skills that students must have mainly the creativity, Innovative skills, Critical Thinking skills, Communicative and Collaboration skills in order to face the challenges in the 21st century. .

According to Irugalbandara, et al. (2020), new technological pedagogical practices offer different ways to interpret the practice of learning and innovative skills and practice in the 21st century. Therefore, teachers should focus on the paradigm of new teaching-learning methods to develop learning skills .

Among them, the flipped classroom approach is a popular educational practice in teaching core subject such as mathematics, to help learners develop 21st century skills (Muir and Geiger, 2016).

The flipped classroom approach has been encountered self-learning experiences in outside the classroom with technology and further discussions take place in the classroom with the teacher (Bergmann and Sams, 2012). Mustafa and Argün (2017) stated that flipped approach is trying to engage students in the autonomous learning for the learning and innovative skills in 21st century. Further Bergmann and Sams (2012); Baker(2013); Cockrum (2014) state that learners acquire content knowledge using technology outside the classroom and develop their information, communication and thinking skills and on the other hand, students develop interpersonal and collaborative skills with their peers through tasks in the classroom. Additionally, it has been discovered that learners are more engaged in lessons and become more creative learners after participating in and experiencing flipped instruction (Doman & Webb, 2015; Sakulprasertsri & Vibulphol, 2016 ; Amstelveen, 2019 ; Ling Cheng & Nian Chen,2020) have also emphasized the significance of the development of these skills in mathematics learning.

In light of the considerations as mentioned above, it is time to examine what the perceptions of Sri Lankan mathematics teachers of flipped classroom approach towards learning and innovation skills in students for 21st century .

Objectives of the research

This study was undertaken to:

1. To find out the perceptions of mathematics teachers in the Flipped classroom approach regarding the 21st century Learning and Innovative skills
2. To identify the opportunities available for the mathematics teachers to enhance experience in Flipped classroom teaching approaches.

METHODOLOGY

This study is a descriptive study based on the two-phase mixed method. In the first phase (quantitative phase) Likert scale questionnaire were used to find out the mathematic teachers' perceptions of the flipped classroom approach towards the digital literacy skills in students. In the second phase, a face-to-face interview was conducted with randomly selected 10 mathematics teachers from the sample. The use of these tools enabled the researcher to validate the study results and get more reliable findings. A focus group interview was conducted with randomly selected 10 mathematics teachers to triangulate the data obtained

from the questionnaire.

Attitude scale survey questionnaire were administrated to 244 mathematics teachers from secondary schools in Galle zonal educational division .

Table 1:Sample of the teachers

Type of school	Number of teachers		Total
	Male	Female	
1AB	31	97	128
1C	22	48	70
Type 2	31	15	46
Total	84	160	244

The quantitative data collected through the questionnaire were analyzed using the Statistical Package for the Social Sciences (SPSS :version 25). Means, frequencies, standard deviations, t-tests for independent samples, and One-Way Analysis of Variance (ANOVA) were used to find out descriptive statistical analysis.

RESULTS AND DISCUSSION

The result showed that the majority of the teachers of the sample was in the view that the FC approach can monitor student creativity when learning the mathematics. Also, most (78.3%) teachers agreed that the flipped classroom approach enables students to build knowledge outside the classroom and most (82.1%) agreed that students can communicate their ideas with each other using multiple media and technologies. Findings also revealed that there were no statistically significant differences in teacher perceptions due to gender in imparting communication skills through FC. But regarding t-test for sample, teachers’ perceptions due to type of school shown in Table 1 indicated there is significant differences at ($\alpha \leq 0.05$) on the total degree of perceptions between teachers’ perceptions of flipped classroom due to type of school since (0.0025) is less than (0.05).

Table1 : T-test for Independent Samples of Teachers’ Perceptions of in imparting communication skills through flipped classroom due type of school

<i>Teachers’ Perceptions Towards Flipped Classroom (FC)</i>	Type of School	N	Mean	S. D	T	Sig.*
Total	1AB	128	3.81	0.50	-0.491	0.0025
	1C	70	3.80	0.46		
	2	46	3.47			

The results of the interview revealed that the teachers working in 1AB school had more positive perceptions about the flipped classroom approach than other schools because of the availability of technological resources in the school.

Apart from that, most of the teachers agreed that the flipped classroom is suitable for students to acquire critical thinking before entering the class, which enables them to share knowledge with their peers. But many teachers (61.2%) disagreed that students become independent from the teacher in the flipped classroom, as students acquire a (a lot of data)large amount of information through technology and engage

in critical thinking before entering the classroom. In exploring the reasons for this perception, the interview revealed that teachers in Sri Lanka still prioritize teaching over learning in the classroom. Furthermore, they stated that teachers need to control the prior knowledge acquired by students before entering the classroom through the Internet and computer applications. The findings show that most of the sample indicated flipped classroom can enhance collaboration with teachers and students during the class sessions as well as 75.5% of teachers agree that acquired information can be shared collaboratively among students through digital literacy.

According to the interview results with teachers, it revealed that in FC students can access online learning at any time at autonomously and their own pace from any popular online service and online video sites. Most teachers point out that students can easily follow a variety of online learning by clicking on links on social media, which is very convenient and flexible, and as a result, a lot of data can be generated in a flipped classroom.

The results of the study revealed the importance of having the knowledge of technology, computers, social media and related resources to implement flipped classrooms. However, it was revealed that weak internet connection, lack of knowledge in social platforms, limited resources, insufficient technological tools, minimal support from the administration of the school management and lack of teacher training make discouraged to implement the flipped classroom in Sri Lankan schools.

CONCLUSIONS AND RECOMMENDATIONS

The study results demonstrated that the sample was well aware of the importance of the FC approach. By changing the perceptions of the teachers, the concern about the lack of technology can be reoriented and simple learning management systems, worksheets, or a study guide can be introduced as alternative suggestions. Therefore, appropriate strategies should be developed to improve teacher training in the flipped classroom. Therefore, practice-oriented strategies should be used to improve mathematics teacher implementation in Sri Lanka

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REFERENCES

1. Agus, S., Budi, , Sumardi (2020) . Universal Journal of Educational Research 8(11): 5513-5528, Development of 21st Century Skills in Mathematics Learning with STEAMin MTsNegeri2Wonogiri Retreved from <http://www.hrpub.org> DOI: 10.13189/ujer.2020.081155.
2. Amstelveen, R. (2019). Flipping a college mathematics classroom: an action research project. *Inf. Technol.* 24, 1337–1350. doi: 10.1007/s10639-018-9834-z
3. Baker, J. (2013). Talent development as adaption: The role of educational and learning capital. In S. Phillipson, H. Stoeger, & A. Ziegler (Eds.), *Exceptionality in East-Asia: Explorations in the Actiotope model of giftedness* (pp. 18-39). London: Routledge.
4. Bergmann, J., and Sams, (2012). Flip Your Classroom: Reach Every Student in Every Class Every Day (pp. 120-190). *Creative Education*. Washington DC: International Society for Technology in Education. Retrieved from <https://www.scirp.org/journal/ce>.
5. Cockrum, T. (2014). Flipping your English class: To reach all learners strategies and lesson plans. New York: Routledge.
6. Creswell, J.W., Creswell, JD. (2018). Research Design. Fifth Ed. Los Sage Publication.

7. Darling-Hammond, (2001). The challenge of staffing our schools. *Educational Leadership*, 58(8), 12-17. Darling-Hammond, L. (Ed.). (2005).
8. Dede, C. (2010). Comparing frameworks for 21st century skills. In J. Bellance, & R. Brandt (Eds.), *21st century skills: Rethinking how students learn* (pp. 51-76). Bloomington, IN: Solution Tree Press. Retrieved from [https://www.scirp.org/\(S\(i43dyn45teexjx455qlt3d2q\)\)/reference/ReferencesPapers.aspx?ReferenceID=538239](https://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/ReferencesPapers.aspx?ReferenceID=538239)
9. Doman, E., & Webb, M. (2015). Benefits of flipping an EFL classroom in Macao. In E. Doman (Ed.), *Reframing English education in Asia* (pp. 16–34). Salt Lake City, UT: American Academic Press
10. Irugalbandara, A. I., & Campbell, M. (2020). A new strategy for Sri Lankan drama education. *Research in Drama Education: The Journal of Applied Theatre and Performance*, 25(2), 256-262. doi: 10.1080/13569783.2020.1730173
11. Ling, C. and Nian, C.(2020). Effect of the flipped classroom on the mathematics performance of middle school students. *Article in Educational Technology Research and Development* February 2020 Retrieved from <https://www.researchgate.net/publication/339397724>
12. Partnership for 21st Century Learning. (2009). Framework for 21st Century Learning. Retrieved from P21 Partnership for 21st Century Learning: P21.org
13. Partnership for 21st Century Learning (2015), P21 Framework Definitions. Retrieved from http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logpdf
14. Sakulprasertsri, K., & Vibulphol, J. (2016). Effects of an English instruction using the flipped learning approach on English oral communication ability and motivation in English learning of upper secondary school students. *Journal of Education Studies*, 44(3), 29-45
15. Sedera, U. M. (2016). Educational reforms beyond Kannangara for 21st Century. Dr. C.W.W. Kannangara memorial lecture. 27, 1-45.
16. Seidman E, Kim S and Raza M, (2018). Assessment of pedagogical practices and processes in low and middle income countries: Findings from secondary school classrooms in Uganda. *Teaching and Teacher Education* 71: 283–296.
17. Steve, W. and Kaurb, A. (2017). The Perceptions of Teachers and Students on a 21st Century Mathematics Instructional Model. *International Electronic Journal of Mathematics Education*. e-ISSN: 1306-3030. 2017, VOL. 12, NO. 2, 193-215
18. Tapscott, D. (2009) . Innovating the 21st-Century University: It’s Time! *EDUCAUSE Review*, 45, no. 1 (January/February 2010): 16-29 Retrieved from <https://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazine>
19. Muir , T. and Geiger, V. (2016). The affordances of using a Flipped classroom approach in the teaching of mathematics: a case study of a grade 10 mathematics class. *Educational Research Journal*. 28, 149–171 (2016). Retrieved from <https://doi.org/10.1007/s13394-015-0165-8>
20. Mustafa, Ç.and Argün, G. (2017). An Innovative Learning Model in Digital Age: Flipped Classroom. *Journal of Education and Training Studies*. Vol. 5, No. 11; November 2017 ISSN 2324-805X E-ISSN 2324-8068 Published by Reframe Publishing URL: Retrieved from <http://jets.redfame.com>. doi:10.11114/jets.v5i11.2322
21. National Council Teacher of Mathematics(1998) Available through the Eisenhower National Clearinghouse Retrieved from menc.org/reform/journals/ENC2280/nf_280dtocl.htm
22. UNESCO (2016) Measures of Quality through Classroom Observation for the Sustainable Development Goals: Lessons from Low-and-Middle-Income Countries. Paris: UNESCO
23. Ziling Xu and Yeli Shi(2018) Application of Constructivist Theory in Flipped Classroom Take College English Teaching as a Case Study. ISSN 1799-2591 *Theory and Practice in Language Studies*, Vol. 8, No. 7, pp. 880-887, July2018.DOI: Retrieved from <http://dx.doi.org/10.17507/tpls.0807.2>