

Equity in Mathematics Education under Distance Learning: Inputs for Transition to the Face to Face Modality

GILBERT ALERTA

Philippine Science High School-Caraga Region Campus

GRETCHEN MAE B. EMPUESTO

Caraga State University

Abstract

Equity in education has been a cause of great concern long before COVID-19 pandemic. Now, the switch to online learning has even more widened these educational gaps in access, opportunities, achievement, and outcomes. To address these concerns, there is a pressing need to tackle these growing gaps in education brought about by the COVID-19 from the perspective of an educator, administrator, and learner in order to identify opportunities and possible strategies to minimize these inequities.

A round-table discussion was organized and was participated in by administrators in education, educators, and learners. Experiences of the study participants showed that schools were definitely unprepared in the abrupt and forcible shift to distance learning because of resource limitation. Access to technological devices and stable internet connections are major barriers to equity in mathematics education. Study findings may serve as significant inputs to schools' transition to face-to-face modality.

Keywords: Inequity in education, Distance learning, Input to face-to-face transition

INTRODUCTION

Achieving equity in mathematics education at all levels has already been coupled with different challenges even before the COVID-19 pandemic (Jane Burke & Whitty, 2018). Unfortunately, learning disruptions have exacerbated pre-existing equity gaps and disparities in academic achievement because of the global educational crisis brought by the said pandemic (Goldberg, 2021). Ling and Nasri (2019) defined equity as a principle in education that ensures fair treatment and opportunity to every student in achieving their optimal abilities. This requires raising expectations for students' learning, developing effective methods of supporting the learning by all students, and providing students and teachers with the resources they need (NCTM, 2000).

Education has been widely acknowledged as a powerful tool in empowering citizens on skills necessary for development and innovation. For many, education is their route for quality and improved lives. But due to COVID-19 pandemic, the gap to accessing quality education has widened among the members in the lower class of the society as schools resorted to distance learning and teachers designed digital lessons. According to the Center for Public Education (2016), equality in education is achieved when students are all treated the same and have access to similar resources but equity in education is achieved when students are treated according to their needs and receive individualized resources for them to learn. As the use of technologies to teach students from homes became fundamental, children who were disadvantaged before COVID-19 are now even more faced with difficulties and challenges.

According to the National Council of Teachers of Mathematics (NCTM, 2000), all students regardless of their personal characteristics, backgrounds, or physical challenges, must have worthwhile opportunities to study mathematics. Equity does not mean that every student should receive identical instruction; instead, it requires accommodating differences to help all students learn mathematics by providing resources and support for all students. But as seen in many countries, there are many students who struggle to learn without being taught by teachers at school (Sahlberg, 2021). Some educators, staff, and learners experience additional challenges, such as lack of internet access, which affected their work productivity and contributed to exhaustion levels (Kruse et al., 2020; Dahiya et al., 2021). Research findings from Yilmaz et al. (2021), Hohfeld et al. (2017), and Yetkiner Özel et al. (2013) suggest that the issues of access to education and equitable learning opportunities root from the socioeconomic status of the students since access to technological devices such as computers, tablets, and television plays an inevitable role to accessing teaching and learning during remote instruction. In the research by Bandura (1977) and Alibakhshi et al. (2020), teacher self-efficacy can result in improved students' motivation and academic achievement. During the pandemic, educators have been under enormous pressure to make quick decisions in redesigning their courses, to learn to use new technological tools, and to invent creative ways of assessment with very limited resources (Bakker et al., 2021).

In either way, the pandemic has also brought significant lessons to the educational sector. Sahlberg (2020) asserted that one of the significant consequences of the COVID-19 pandemic is the quantum leap in school leadership to pursue education inspite of the terrible crisis. This study provides additional insights on the challenges and opportunities of distance learning through the experiences of mathematics educators and school administrators. Besides the information that this research offers, its findings may potentially serve as inputs in schools' transition to face-to-face learning.

METHODS

This study used a qualitative research approach and phenomenological research design where collected data are purely based on the experiences of the study participants. Focus Group Discussion (FGD) with representatives from secondary (4 participants) and higher education (2 participants) institutions was conducted at one setting. The responses of the participants to the series of guide questions were subjected to thematic analysis that led to the description of equity in mathematics education during the implementation of remote and blended learning.

RESULTS AND DISCUSSIONS

The remote and blended learning modality has definitely imprinted significant lessons in the country's educational landscape. Focusing on the equity in mathematics education, experiences of the study participants are dominated with challenges rather than opportunities. The discussions below are presented according to the questions raised during the round table discussions.

Question 1. What are the prevalent and observable inequities in education during the pandemic?

From the experiences of a secondary school teacher, it was revealed that inequities in mathematics education are very evident during the pandemic primarily because of resource limitations. Significant number of students do not have access to stable internet connection particularly those who are situated in far flung areas. This situation is confirmed in the study of (Bernardo, 2020) where it was found out that the majority of Filipino learners are from economically challenged families and securing technological learning aids is a huge issue. The tackled scenario portrays the learning gaps between those who have the wireless learning resources than those who barely rely on the printed materials that are physically delivered by the teachers (Dangle and Sumaoang, 2020).

Another source of inequities was the non-exposure of students to field and immersion activities where they are supposed to experience the applications of mathematics in the real-world setting. The pandemic has forcibly closed the doors for learning outside the classroom. In effect, expectations in the curriculum are far from the actual happenings.

Secondary school teachers also encountered gaps on the poor extent of students' participation towards study as evidenced by the poor submission of class requirements. Mental health issues are also intervening the learning process under the remote and blended learning which is brought by the longer period of home isolation and limited social interaction with peers.

In higher education, the participating professors have experienced very limited learning experiences due to heterogeneous capabilities of students towards remote and blended learning. Huge amount of time is spent on the adjustment to the heterogenous demands of students because of resource needs and problems. In support, one the the HEI representatives said;

“We are not really prepared for remote and blended learning because it is unexpected and everyone is on serious adjustment. One of the crucial issues so far is the availability and access to learning resources by both instructors and students”.

The limitation to resources is further worsened by the fact that lesser collaborations with external parties hindered research outputs and in effect have resulted in poor extension and production. Without the helping hand of external partners, exchange of ideas and sharing of resources were also limited. As a result, learning outcomes are also affected.

The experiences of educators from the secondary and tertiary educational institutions have revealed the reality about the sources of inequities in mathematics education during the pandemic. While remote and blended learning is the optimal solution to address the pandemic-driven educational crisis, almost all sectors are unfortunately unprepared to such drastic changes. Resource limitation in terms of learning aids (internet connectivity) and social mobility are viewed as challenging areas that lead to unequal access to quality education among the learners.

Question 2. What are the possible opportunities ahead as a result of these inequities?

The participants cited some of the challenges encountered in their implementation of distance learning. Schools can no longer stand on their own without domestic support as students cannot physically attend classes. Learning packs have to be prepared by the teachers which demand professional expertise in writing and in the use of technology which are not possessed by all the teachers. The parents have become the main player in the implementation of the learning packs, hence, the learning of their children. Because there is risk not only on physical health but as well as on mental health, some educators have compromised their principles as teachers in compassion for the students due to the situation. Elimination of some competencies becomes inevitable for the purpose of protecting the students from stress and burn-out from online classes. Preparation of digital lessons required more of the teachers' time than ever before. When it comes to the assessment of students' learning, it is no longer as critical and accurate as before due to challenges in its implementation which resulted in grade inflation, that is, giving students a higher grade than deserved.

With these upfront challenges, opportunities arise to improve the implementation and delivery of instruction. The data available on the impact of the pandemic to the education system of the Philippines will serve as stepping stones on the implementation of blended learning post pandemic as no one knows of the possibility of another pandemic. Based on the feedback of educators, intensifying training for teachers on blended learning and enhancing the learning materials should be a regular program in the education sector. Non-tech savvy teachers realized that change is required in order to meet the demands of this digital age. Schools must now invest in improving infrastructure fit for online learning and teaching which includes better internet connectivity and appropriate gadgets for the students as the teachers have integrated educational technologies in teaching and learning. As a result of the strict implementation of health protocols, mental health of both students and teachers were challenged because of isolated learning from home. The rise of mental health issues in school has served as a force on the execution of comprehensive mental health programs as a necessity in any school that requires employing mental health experts apart from the guidance counselors. Traditional assessments are no longer appropriate and effective in measuring the students' learning in distance learning. This issue has awakened discussions on innovative assessment strategies which should not be limited to pen-and-paper tests in the classroom setting only.

Question 3. What did you learn from the COVID experience that you could apply to ensure equity and benefit students going forward post-COVID?

Learnings in the implementation and delivery of instruction during the pandemic vary from one teacher to another but the total learning experience of the students which includes but not limited to assessment, content knowledge, and resources still remains to be the priority of education. Digital fluency and literacy must be imposed and leveraged among the teachers regardless of age and background. Preparedness plays an important role in succeeding crucibles in education where the learning of students is at stake. The total school experience on different teaching and learning scenarios in the post pandemic era must be reimaged but still in parallel with the institutional goals and objectives. One professor said that traditionally, he does not like noise in the classroom, but now in his virtual classroom he prefers noise through comments and reactions in the chat box. As he pointed out, adaptability is one key factor for a teacher to succeed in whatever challenges in the teaching and learning environment. Engaging the students in online classes is another challenge for every teacher. But based on the experience of one professor, teachers' compassion and passion to student's learning will keep the students motivated and engaged in their own learning.

CONCLUSIONS

Based on the major findings presented, this study concludes that the extent of inequities in mathematics education seemingly increased during the pandemic. Limitation to educational resources such as devices and stable internet connection is a prime cause of inequities in both secondary and higher education. The experiences of the study participants exposed that the educational system was not prepared for the COVID-19 pandemic and implied the need to take actions on the learning loss during the use of distance education before promoting the learners to higher grade or year level.

REFERENCES

1. Alibakhshi, G., Nikdel, F., & Labbafi, A. (2020). Exploring the consequences of teachers' self-efficacy: a case of teachers of English as a foreign language. *Asian-Pacific Journal of Second and Foreign Language Education*, 5(1). <https://doi.org/10.1186/s40862-020-00102-1>
2. Bakker, A., Cai, J., & Zenger, L. (2021). Future themes of mathematics education research: an international survey before and during the pandemic. *Educational Studies in Mathematics*, 107(1), 1-24.
3. Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, 84(2).
4. Bernardo, J. (2020, July 30). Modular Learning most preferred parents: DepEd. ABS-CBN News. <https://news.abs-cbn.com/news/07/30/20/modular-learning-most-preferred-by-parentsdepd>
5. Center for Public Education. (2016). Educational equity: What does it mean? How do we know when we reach it? Reach Brief. http://www.centerforpubliceducation.org/system/files/Equity%20Symposium_0.pdf
6. Dahiya, S., Rokanas, L. N., Singh, S., Yang, M., & Peha, J. M. (2021). Lessons from Internet Use and Performance During Covid-19. *Journal of Information Policy*, 11, 202–221. <https://doi.org/10.5325/jinfopoli.11.2021.0202>
7. Dangle, Y. R. P., & Sumaoang J.D. (2020). The implementation of modular distance learning in the Philippine secondary public schools. *3rd International Conference on Advanced Research in Teaching and Education*. Retrieved from <https://www.dpublication.com/abstract-of-3rd-icate/27-427>
8. Goldberg, S. B. (2021). Education in a pandemic: the disparate impacts of COVID-19 on America's students. USA: Department of Education.
9. Hohlfeld, T. N., Ritzhaupt, A. D., Dawson, K., & Wilson, M. L. (2017). An examination of seven years of technology integration in Florida schools: Through the lens of the Levels of Digital Divide in Schools. *Computers & Education*, 113, 135-161.
10. Jane Burke, P., & Whitty, G. (2018). Equity Issues in Teaching and Teacher Education. *Peabody Journal of Education*, 93(3), 272–284. <https://doi.org/10.1080/0161956x.2018.1449800>
11. Kruse, S. D., Hackmann, D. G., & Lindle, J. C. (2020, December). Academic leadership during a pandemic: department heads leading with a focus on equity. In *Frontiers in Education* (Vol. 5, p. 614641). Frontiers Media SA.
12. Ling, T., & Nasri, N. M. (2019). A Systematic Review: Issues on Equity in Education. *Creative Education*, 10(12), 3163–3174. <https://doi.org/10.4236/ce.2019.1012240>
13. Luke, A., Woods, A., & Weir, K. (Eds.). (2012). *Curriculum, Syllabus Design and Equity: A Primer and Model* (1st ed.). Routledge. <https://doi.org/10.4324/9780203833452>
14. National Council of Teachers of Mathematics (NCTM), & N. (2000). *Principles and Standards for School Mathematics: An Overview* (3rd ed.). National Council of Teachers of Mathematics.

15. Sahlberg, P. (2020). Will the pandemic change schools?. *Journal of Professional Capital and Community*.
16. Sahlberg, P. (2021). Does the pandemic help us make education more equitable?. *Educational Research for Policy and Practice*, 20(1), 11-18.
17. Yetkiner Özel, Z. E., Özel, S., & Thompson, B. (2013). SES-related mathematics achievement gap in Turkey compared to European Union countries. *Education and Science*, 38(170), 179–193.
18. Yılmaz, Z., Gülbağcı Dede, H., Sears, R., & Yıldız Nielsen, S. (2021). Are we all in this together?: mathematics teachers' perspectives on equity in remote instruction during pandemic. *Educational Studies in Mathematics*, 108(1), 307-331.