Journal of Inclusive Education
Vol.5, Issue 1, 2021, 57–74

Effectiveness of Braille Reading Training in Virtual Classroom due to Pandemic COVID-19 in Pakistan

Abdul Hamid[1]
Sarah Blake LaRose[2]

Abstract

Technology changes faster than many of us can keep up. Due to covid-19, progress in the utilization of technology is a significant component of Braille learning these days. The main purpose of this study was to explore the Effectiveness of Braille Reading Training in Virtual Classroom due to Pandemic COVID-19 in Pakistan. It also highlighted the impact of Covid 19 on Braille reading training and the problems of teachers and Braille learners in virtual Classes during Braille reading activities. This study used a qualitative design. The sampling technique used for this research was purposive sampling. The sample size consisted of nine Braille specialists who teach Braille in online classes in different universities of Pakistan. A semi-structured interview guide that comprises three themes was developed for this study. Thematic data analysis was used to analyze interview data. This study's findings highlighted that most participants have a great understanding and knowledge regarding traditional and online Braille reading training practices and activities. This study recommends that Information Communication Technology training sessions should be conducted for teachers, parents, Blind students as well as sighted students to know how digital Braille technology is better for communication and learning activities in the virtual classroom. The study also suggested that Braille Reading intervention strategies are necessary to overcome the Educational crisis created by the covid-19 pandemic situation in Pakistan.

***Keywords**:* braille reading, online classroom, visual impairment students, information communication technology

[1] PhD Scholar Special Education Allama Iqbal Open University, Islamabad. Corresponding Author's Email: a.hamid150gb@gmail.com
[2] Professor of Biblical Languages, Anderson University School of Ministry and Theology United States of America. Email: sjlarose@anderson.edu

Introduction

Virtual study classrooms and distance learning, as alternate telecommunication controlled teaching methods, have been progressing at an incredible speed. Virtual classrooms and distance learning, as substitute telecommunication controlled teaching procedures, have been developing at an adequate velocity. Virtual classrooms have been especially in utilization by entire divisions, along with primary and higher education as well as campsite teaching. Aditya, Nurhas et al. 2019 described that the developing fame of social and micro-teaching approaches encouraged by public social media channels example is YouTube and Twitter, and chief learning telecommunication dissemination portals like edX improved the enhanced acquirements of virtual methods of teaching. It is forecasted that the prominent utilization of virtual classrooms would enhance by a whopping 16.2% compounded annual growth rate by 2023. Basilaia and Kvavadze (2020) described that despite evidence to the contrary, virtual classrooms have not yet been accepted as a replacement for the preferred method of face-to-face teaching. People were forced to consider new methods; however, due to the impact of the COVID-19 pandemic, the whole population in many countries faced a mandatory lockdown. The present pandemic condition gave birth to the idea of virtual classrooms as a predominant technique of learning in ongoing times. Educational institutions, organizations, higher-level universities, and even worldwide associations and multidirectional bodies like the UNO, WHO, and G20 connected to the virtual model of teaching and telecommunications to empower learning. In such crucial circumstances, they moved towards organizations giving opportunities of virtual classroom channels and services like Blackboard, Desire2 Learn, Cisco, Microsoft, etc. The test requirements are different, some important parameters being bandwidth management, network traffic, server reaction time and the number of persons using the network at the same time. According to Cao, X. (2020) the first diagnosis of COVID-19 was made in December 2019. The World Health Organization confirmed a worldwide pandemic in March 2020. WHO published warnings because naturally, COVID-19 was transmittable. Bozkurt and Sharma (2020) As a precautionary

measure to avoid the transmission, globally all countries adopted the serious codes of conduct as full or part lockdowns, social distance actions and curfews. To decrease the infections rate among people, places such as markets, offices, educational institutions, houses of worship, and other gathering places where there was a high level of interaction among people, were shut down. According to reports Siegel, Miller et al. (2020) because of lockdown and social distancing activities greater than 1.5 billion school-aged children around the world, or 90 per cent, faced disruption in learning. In addition to the impact on our social, economic and political lives, the pandemic has shown emotional and psychological effects on individuals. As Gold, J. A., Wong, K. K., Szablewski, C. M., Patel, P. R., Rossow, J., Da Silva, J.,& Jackson, B. R. (2020) says in this time of crisis, how is it possible to continue educational activities when students are bound to their places they are isolated from classes, classmates and teachers?

According to the Hirano and Murakami (2020), Kirigia, Muthuri et al. 2020, Tian, Xiong et al. (2020) The educational activities were given different names in different countries when the COVID-19 epidemic spread throughout the world. The names for these activities included distance education, e-learning, online learning and homeschooling. COVID-19 proved to be an international disaster for the whole world. According to Toquero 2020, Weinberger, Chen et al.(2020) the introduction of e-learning resulted in several impacts. The most crucial issue was its effect on higher education. Toquero (2020) define the adaptation of the e-learning system introduced huge variations in students' learning. It is necessary to consider the relationship between the use of e-learning and COVID-19. The utilization of e-learning is a reliable strategy to share learning topics.

According to Bozkurt, Jung et al. (2020) A hygienically healthy atmosphere for learning at all levels is required. Social acknowledgement begins when learners are given education about social problems, nowadays especially about health-related issues like COVID-19 in all universities. Prevention can be done only when we keep our surroundings well maintained, neat and clean. Previously done research on COVID-19 didn't point out the importance of these things at a higher level of education. The reason that such recommendations are necessary is that

misguidance in definitions would lead us to misguidance in routine exercises

According to Bozkurt, Jung et al. (2020) Distance education is an organized activity and its execution is based on theoretical and practical knowledge which is specified for the field and its nature. Conversely, emergency remote education is necessary to adopt in conditions of crisis with all sources that are present at this time, involving all may be offline or online. opposite to commonly known considerations, distance education does not specifically related to online education, but a variety of technologies utilized throughout its generations According to Jung, Jeon et al.(2019), Bozkurt & Jung et al. (2020) explain that because of the pragmatic nature of distance education, professionals can use working solutions for learners. Furthermore, this view "defends the view that the field should provide educational opportunities for those who are 'vulnerable to unequal developments'. (Bozkurt, Jung et al. 2020). Online education has a great potential to decrease the critical deficit of functional organization in the blind student. The commission on special students (2000) gave plentiful documentation of this deficit and recommended that difficulties be compare to slow student responses and geographic constraints assigned to it. Online education is a system of contribution programs to students in any geographic situation and of approaching the difficulty of low on-campus recruitments. Although the technology exists to offer concentrated course work on the web, teachers in advanced education need to deliberately assess online courses and the viability of online guidance for explicit components of work and make constant advancement in such courses.

According Hamid, A., Mohsin, M. S., & Khalid, M. N. (2019) The Braille first principle is based upon a cell that is composed of six points, arrange in two towers of three points each. Each Braille sign of the first principal or another symbol, such as a comma, is formed busing one or more of the point that consists in the Braille cell that fits under fingertips. According to Hamid, Jameel & Bakhsh, K. (2019) The origin of Braille is French and there is no Tactual signing is a usual average of communicating put-upon by the citizenry with both a sighted and visually impaired (see Deaf blindness), which is based on a voice communication or other

system of manual communication. Tactual beginners learn by feeling the instructor's finger and by working

Lin and Rugama (2016) through utilizing Braille, students with visual disabilities can utilize spelling, permitting them to recognize letters, numbers, punctuation marks, and arithmetic symbols. It is necessary to develop right finger and hand utilization when guiding a student in Braille. A distinctive group of students will utilize various kinds of hand motions paternally to read Braille. The highly practiced pattern is to use a scissor-type pattern, making movement of both hands at the same time. Soft finger touch is also critical for learners to gain. The development of assistive technologies positively changed the lives of people which are suffering from visual disabilities. Use of technologies such as audio books and screen readers are resulting in a decreased use of Braille and decreasing its significance benefit of online learning is giving approach to better higher education programs to students in diverse geographic regions. On the other hand, some learners which are living in rural areas may have less approach to the type of high-speed Internet access necessary to work in the online learning environment. For a learner receiving his or her first online course, learning to navigate the Blackboard (or WebCT, or Module, or campus) atmosphere while also struggling to study the course content may be a cause of discontentment or depression. Technology is developing more quickly than many of us can keep up with. In numerous ways it balances the playing field, while in other ways it familiarizes us with new approachable tasks. Expertness in the utilization of present technology is a significant part of Braille education nowadays. Without due consideration of the specialized tool, one determine, the beginning point in carrying out a declaration about what technology to approve or to acquire is to introduce any vital query. General technology: such as PC, smart phones and mobile phones, GPS systems, etc. When someone imagines modern technology from the viewpoint of persons with visual disabilities, one can imagine two widespread groupings: Assistive technology: tools made specially to help persons with visual disabilities or other disabilities, indulging everything from screen readers for visually disabled or screen magnifiers for computer users with less vision, video magnifiers and other equipment for reading and writing with low vision, to

Braille watches and Braille printers. There are numerous devices present for improving vision for reading print, and for approaching Braille and electronic resources. Guidelines to utilize tools like magnifiers and computers provided with software that sensitive to a human voice, or portable electronic Braille tools can also open up the world of education for persons suffering from visual disabilities. The objectives of the study are as follows:

1. To explore the Effectiveness of Braille Reading Training in Virtual Classroom due to Pandemic COVID-19 in Pakistan
2. To find out the impact of Covid 19 on Braille reading activities in a virtual classroom.
3. To explore the problems of teachers and Braille learners in Class during Braille reading activities.

The Questions of the study are as follows:

1. To what extent Braille reading training is effective in the virtual classrooms due to pandemic Covid 19 in Pakistan
2. Is Covid 19 affected Braille reading activities in a virtual classroom during this pandemic situation?
3. Which problems were faced by teachers and Braille learners in class during Braille reading activity due to this Pandemic situation in Pakistan

Research Methodology

Research Design

The researchers opted for qualitative research design according to the need of the research because research needed details Braille learning skills used during Braille Learning online session of students with visual impairment. The population of this study were universities Braille specialist Teachers working in the special education departments in public and private universities of Pakistan.

Procedure of the study

The expert teachers were the population. Nine teachers were selected through the purposive sampling technique. A semi-structured interview guide was developed and it was validated by the Braille specialist and assessment experts. The interviews were conducted through telephonic calls and responses were recorded by researchers personally. Collected data were analyzed through Microsoft excel with the help of open coding and make themes.

Sampling of this Study

The sampling of this study was the complete university Braille specialist working in the special education institutions in Pakistan. There are five universities that work with the visually impaired. The researchers collected data from the Braille experts of universities to know about the knowledge of Braille reading skills. The sample consisted of nine university Braille experts from Pakistan. All Braille experts had a degree of M.Phil in special education and Ph.D. scholar.

Instrument

A qualitative research design has been used within this research, and a semi-structured interview guide protocol has been used to collect data. The semi-structured interview guide was developed to explore the university Braille expert perception about Braille reading. The interview guide consisted of twelve open-ended questions and the interview guide was based on a literature review. Every participant answered every question when the interview started with them. The interview guide was also validated from the special education department experts.

Interview Guide for Teachers

Themes Sub Themes

Difference between virtual and traditional Braille reading training	1- According to you Braille reading training is important to students? 2- Is there any major difference in Braille reading training in the traditional and online classes? 3- Which method do you prefer for VI students? 4- Do students take an interest during virtual classrooms? 5- Online classroom Braille reading is effective or not for students? 6- How we can implement this system effectively?
Teaching methods of Braille reading training in the virtual classroom	7- Are you choosing different methods for the virtual classroom? 8- Which teaching methods do you prefer for both traditional and online classes? 9- Do students easily use an online login system for Braille reading?
Challenges face Teachers during virtual classroom	10- Which challenges do you face during online classes? 11- How can overcome these hurdles you face during online classes?

Data Collection Method

The researcher briefly described the aim of the study to participants before starting the interview. After that, the researchers conducted interviews with the University Braille specialists personally. The researcher guided the participants about the interview guide, after that researcher asked questions about the term Braille reading. The duration of each interview was about 30-35 minutes. In this particular research study, the semi-structured interview design was used to collect the data. The interview was recorded with the consent of the participants.

Data Analysis

After the data collection, thematic analysis was used for analyzing data. The thematic analysis was based on the three themes. Every theme includes six, three and two questions. Firstly, the researchers recorded all interviews and transcribed all recorded interviews into the English language. Secondly, the researchers used the thematic analysis with the help of software Microsoft excel with the help of open coding and making themes. Researchers prepared all themes with the help of open coding and draw the results. Based on results, researchers made discussion.

Results

Most of the participants discuss that Braille reading training is very necessary for students who become teachers of students with visual impairment. Due to reading proficiency, a teacher evaluates the homework assignments, exam papers and other activities of blind student's properly. Some participants stated that if a visually impaired student is unable to read at a functional reading pace using big print or low vision equipment, then Braille should be explored as a supplement to literacy. However, keep in mind that not all visually impaired pupils are suitable for Braille teaching. Not only iris necessary to possess cognitive skills and fundamental ideas, but is also necessary to possess finger sensitivity and fine motor coordination in order to maintain sustained contact and trace over the page in a methodical manner. One participant said that Braille reading training is not too important for visually impaired students. Online Braille training has no effect and positive impact in the future. Most of the participants purposed that there is a major difference in Braille reading training in the traditional and online classes. In a traditional class, the teacher observes all reading activities of Braille learners such as proper hand and finger position and also the movement of fingers of students on Braille text. But in online class student's Braille reading activity is not observed properly. The teacher only listens to students reading not seeing their hands and finger movements. Many poor vision students attempt to read Braille by sighting Braille text, which is a risky practice for their residual sight, but the instructor in an online

class does not watch sighted people reading Braille by sighting or visual cues. Few participants indicated that how Braille is taught, including the frequency and intensity of teaching is determined by a range of variables. Consider the student's age and if they have alternative literacy mediums available to them. The student's intellectual capacity will dictate whether functional Braille or conventional Braille should be the primary emphasis. According to one participant, it is a method of touch reading and writing for blind people in which raised dots to represent the alphabet, numbers. It enables blind persons to read, write, and communicate without the use of their eyes. Many of the participants discussed that they preferred the traditional Braille reading Method because they teach Master Level students who learn Braille for the first time like as nursery class visually impaired students. They feel many difficulties in learning Braille reading they cannot understand the distance of dots, cells, Braille lines from each other dots, cells and Braille lines. They feel difficulty in recognition of Braille contractions and abbreviations in Braille text. Due to many other Braille reading problems mostly preferred traditional Braille class. Few participants responded that Braille is a totally new subject for M.A special education students when they find it difficult for themselves they don’t show interest in a virtual class of Braille reading and avoid taking online Braille class. Most of the participants said that they are choosing different methods for a virtual classroom due covid-19. They used zoom, Google class, and What Sapp for teaching online Braille. They use the lecture method, demonstration method, activity method, enquiry method, problem solving technique, drill method etc. Few participants have a clear idea about different methods for teaching Braille in an online class. They only know different apps names but have no fully command of how to use them properly. Some participants elaborate that Lecture, demonstration, activity, drill and all other methods help the students in learning Braille. Almost all participants discussed that they face many challenges in an online class because they cannot check and observe their students work properly. Shortage of attendance, lack of interest, no proper concept formation of dots positions, cells positions, writing position of dots on Braille frame and Perkins Braille, of students, are bigger problems in an online class. Only two participants stated

that they feel challenges during traditional classes because students want more attention and time. They give extra time for better understating.

Discussion

The current COVID-19 pandemic and the national lockdown to mitigate the transmission of the virus pose many challenges, including Education access like Braille Reading, to the life of people living with visual disabilities according to the suggested sample of teachers, due to the Covid 19 situation, the current level of Braille reading in Braille learners is demanding new ways of teaching and learning. It is recommended that the Education crisis and the need for Braille Reading intervention strategies be consolidated into pandemic alleviation methods. According To the researcher's knowledge, this is the first study related to the Effectiveness of Braille Reading Training in Virtual Classroom in Pakistan during the pandemic among visually impaired students in Pakistan. All selected universities in the population in this study have no Braille specialist for teaching Braille to their students. All universities hired school teachers for teaching Braille to their students. The teachers had no expertise to teach Braille in the virtual classes. In the time of COVID 19, mitigation strategies referred to as remote learning is important that in reality, all universities systems are rolled out in pandemic situations as response teaching.

All traditional learning and teaching strategies we turned a variety of remote learning modalities such as paper-based homework sheets, radio, TV, mobile phones, text messages, and the internet, both instructor-directed and self-paced. Online teaching and learning modify some of how learners interact with material and other people. Properly designed and supported online courses may give participants beneficial and adaptable learning methods that not only promote educational progress but also help to organize learners' responses to online learning. E_ educators who work in the absence of face to face interaction such as raising hands or loud conversation of their students will need to develop an exceptional understanding of the Braille Reading Training in Virtual Classroom: how the contents of teacher's selection will

serve as proof of students intentions for learning, how the teacher will distribute resources, and how the teacher will guide his students throughout the Braille Learning teaching process. Braille is the sole method of instruction available for those who are blind. According to Baker, L., Green, S., & Falecki, D. (2017) individuals with impaired eyesight may benefit from raised dots of Braille, extra-large print formats, and magnification. Redeveloped embossed signs are a format of Braille that modifies the Braille dots by altering their size, enlarging of print, to make them easier to see for those with low vision. Enlarged printed materials are a fully rescale score that can be magnified using a photocopy machine, a computer screen, or a tablet equipped with a general or specific magnification instrument. According to the studies related to Braille reading their findings, their writers, scientists, organizations, and instructors identify many Braille devices that have been used as helpful for students' literacy of Braille reading. The most beneficial of them is the Braille display or refreshable Braille display, which provides easy access for completing tasks, provides a linear approach to data, and enables the recording and storage of talks for future use (Ladner and Palumbi 2012). According to Berrier, S., Tetzlaff, M., Ludwig, M., & Meyer, G. (2015) Individual’s teaching experience, a refreshable Braille display may be added to the Deaf blind Communicator and Smartphone's, and students may demonstrate written text using the Communicator's display Braille. The ability to read is necessary for performing/completing ordinary tasks, ranging from recognizing household items to read written instructions, credentials, and rules, and is associated with emotions of self-competence and independence in those who are visually impaired. Issues related to readings are a frequent reason for referring people with less vision for recurring services. Braille, a tactile method of reading and writing, provides a non-visual substitute to print for persons who have permanent and variable visual difficulties or who have a progressive degradation of their visual condition. Braille reading activates the soma to the sensory cortex, which is responsible for tactile consciousness, and the motor cortex, which is responsible for fine finger and hand movements. It closely resembles visual reading, the cognitive processes of memory, sustained attention, data processing, and comprehension. Tactile

information is sensed by a variety of peripheral touch receptors that communicate with the central nervous system through the distal pads of the fingers. When a reader gently move their fingers over a Braille sheet, the accumulated information leads to the capacity to recognize Braille characters (Lisberger and Thach 2013).

Moore (2016) Digital tools that are content-free, like spreadsheets, graph software, and computer algebra systems, technologies that only loosely associated with particular curricular settings but well-suited for Braille studies. Candidates in lower and higher secondary schools often make use of these technologies. In lower and upper secondary school, a developing trend in Braille education is for instructors to create short instructional movies on certain subjects, which learners read at home. This teaching strategy alters the usual classroom environment by offering educational materials outside of the classroom. Through this strategy, Students see lectures and participate in online conversations. In this approach, learning is seen as a common dynamic rather than a purely individual process.

Radford and Bloch (2012) the benefits of refreshable Braille displays over synthetic speech include instant access to information, the ability to examine the format, spacing, and spelling of text, and the fact that they are silent. Ernst, Swan et al. (2017) Braille screens enable a person taking a note and document storing. Additionally, persons with visual impaired may use a personal digital assistant (PDA) connected to a computer as a Braille display or speech synthesizer. These devices provide access to information without the work associated with learning Braille but may result in a requirement for interest in developing Braille reading proficiency. Another impediment to Braille learning is the fact that reading is a learned skill because Braille is challenging and time consuming.

Braille reading is much harder to learn than written language, and visually impaired youngsters often learn to read behind their sighted peers. Darning Braille reading, students with visual impairment faced many obstacles like lack of experience in Braille learning materials, a scarcity of accessible learning resources, a perceived lack of purpose in studying Braille reading, and a lack of intention. These considerations demonstrate that Braille reading

and writing tools must both teach Braille effectively and handle the difficulties and motivational barriers associated with the Braille learning process. The competence and enthusiasm of the instructor, as well as the learning environment, are critical components of success in educating kids with Visual Impairment. Moreover, there may be a knowledge gap regarding new technologies and the ability to incorporate new teaching aids into the instructional arrangement. The complexity of the pictorial form does not provide clear evidence to support the creation of academic experiences in Braille, as well as the correct rehabilitation of visually impaired Braille learning.

Recommendations:

After showing the results of the study, it is recommended that new apps and seminars be held for teachers who teach visually impaired students. Inspecial education departments of universities, Braille expert teachers must be hired. ICT training sessions should be conducted for teachers, parents, Blind students as well as sighted students to know how digital Braille technology is use in the classroom for better communication.

References

Aditya, B. R., Nurhas, I., & Pawlowski, J. (2019, April). Towards successful implementation of a virtual classroom for vocational higher education in Indonesia. In *International Workshop on Learning Technology for Education in Cloud* (pp. 151-161). Springer, Cham.

Baker, L., Green, S., & Falecki, D. (2017). Positive early childhood education: Expanding the reach of positive psychology into early childhood. *European Journal of Applied Positive Psychology*, *1*(8), 1-12.

Bakker, A. and D. Wagner (2020). "Pandemic: lessons for today and tomorrow?" *Educational Studies in Mathematics104*(1): 1-4.

Basilaia, G. and D. Kvavadze (2020). "Transition to online education in schools during a SARS-CoV-2 coronavirus (COVID-19) pandemic in Georgia." *Pedagogical Research5*(4).

Berrier, S., (2015). Improved appearance rendering for photogrammetrically acquired 3D models. 2015 Digital Heritage, IEEE.

Bozkurt, A., (2020). "A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis." *Asian Journal of Distance Education 15*(1): 1-126.

Bozkurt, A. and R. C. Sharma (2020). "Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic." *Asian Journal of Distance Education 15*(1): i-vi.

Cao, X. (2020). "COVID-19: immunopathology and its implications for therapy." *Nature reviews immunology 20*(5): 269-270.

Cervera, et al. (2019). "Semantic inhibition and dementia severity in Alzheimer’s disease."

D'Andrea, W., et al. (2012). "Understanding interpersonal trauma in children: Why we need a developmentally appropriate trauma diagnosis." *American Journal of Orthopsychiatry 82*(2): 187.

Erduran, S. (2020). Science Education in the Era of a Pandemic, Springer.

Erin, E. M., et al. (2006). "The effects of a monoclonal antibody directed against tumor necrosis factor-α in asthma." *American journal of respiratory and critical care medicine 174*(7): 753-762.

Ernst, M., et al. (2017). "Typhlex: Exploring deformable input for blind users controlling a mobile screen reader." *IEEE Pervasive Computing 16*(4): 28-35.

Gold, J. A., et al. (2020). "Characteristics and clinical outcomes of adult patients hospitalized with COVID-19—Georgia, March 2020." *Morbidity and Mortality Weekly Report 69*(18): 545.

Hamid, A., Ahmed, H. N., & Khan, A. M. A Study on Learning Methods for Holy Quran In Reading Braille Skills.

Hamid, A., Jameel, H. T., & Bakhsh, K. (2019). A Comparison of Tactile And Visual Methods Of Training On The Braille Reading Skills Of The Sighted LearnERS. *Research Journal of Education AWKUM, Volume No. III*, 12-18.

Hamid, A., Mohsin, M. S., & Khalid, M. N. (2019). Effectiveness of Urdu reading braille characters with the help of tactile and visual clues. *Journal of Research in Psychology*, *1*(1), 16-20.

Hirano, T. and M. Murakami (2020). "COVID-19: a new virus, but a familiar receptor and cytokine release syndrome." *Immunity52*(5): 731-733.

Ichsan, I. Z., Rahmayanti, H., Purwanto, A., Sigit, D. V., Singh, C. K. S., & Babu, R. U. M. (2020). HOTS-AEP-COVID-19: Students knowledge and digital worksheet of ILMIZI environmental learning model. *International Journal of Advanced Science and Technology*, *29*(6), 5231-5241.Jung, E. H., et al. (2019). "Efficient, stable and scalable perovskite solar cells using poly (3-hexylthiophene)." Nature567(7749): 511-515.

Kirigia, J. M., Muthuri, R. N. D. K., Nkanata, L. H. K., & Muthuri, N. G. (2020). The Present Value of Human Life Losses Associated with Coronavirus Disease in Africa.Ladner, J. T. and S. R. Palumbi (2012). "Extensive sympatry, cryptic diversity and introgression throughout the geographic distribution of two coral species complexes." *Molecular Ecology 21*(9): 2224-2238.

Lin, R. F. and A. D. Rugama (2016). "Graphical message transmission using the monotonic vibration function of a smart phone." *Ergonomics 59*(2): 235-248.

Lisberger, S. G. and W. Thach (2013). "The cerebellum." Principles of Neural Science: 960-981.

Makarius, E. E. and M. Srinivasan (2017). "Addressing skills mismatch: Utilizing talent supply chain management to enhance collaboration between companies and talent suppliers." *Business Horizons 60*(4): 495-505.

Millar, T., et al. (1997). "The UMIST database for astrochemistry 1995." *Astronomy and Astrophysics Supplement Series 121*(1): 139-185.

Moore, J. (2016). Injustice: The Social Bases of Obedience and Revolt: The Social Bases of Obedience and Revolt, Routledge.

Nahar, L., et al. (2019). "“Bangla Braille learning application” in smartphones for visually impaired students in Bangladesh." Interactive Learning Environments: 1-14.

Radford, S. K. and P. H. Bloch (2012). "Grief, commiseration, and consumption following the death of a celebrity." *Journal of Consumer Culture12*(2): 137-155.

Setiawan, A. R. (2020). "Scientific literacy worksheets for distance learning in the topic of Coronavirus 2019 (COVID-19)." EdArXiv. DOI: https://doi. org/10.35542/osf. io/swjmk.

Siegel, R. L., et al. (2020). "Colorectal cancer statistics, 2020." CA: *A Cancer Journal For Clinicians70*(3): 145-164.

Tian, S., et al. (2020). "Pathological study of the 2019 novel coronavirus disease (COVID-19) through postmortem core biopsies." *Modern Pathology 33*(6): 1007-1014.

Toquero, C. M. (2020). "Challenges and Opportunities for Higher Education Amid the COVID-19 Pandemic: The Philippine Context." *Pedagogical Research 5*(4).

Wang, R. and M. Estelle (2014). "Diversity and specificity: auxin perception and signaling through the TIR1/AFB pathway." *Current opinion in plant biology 21*: 51-58.

Webster, M. and F. A. Sundberg (2020). "Nature and significance of intraspecific variation in the early Cambrian oryctocephalid trilobite Oryctocephalites palmeri Sundberg and McCollum, 1997." *Journal of Paleontology 94*(1): 70-98.

Weinberger, D. M., et al. (2020). "Estimation of excess deaths associated with the COVID-19 pandemic in the United States, March to May 2020." *JAMA Internal Medicine 180*(10): 1336-1344.

Yadav, R. K. and B. Vermani (2012). "Computer and Information Technology assisted applications." *International Journal of Scientific Engineering and Technology 1*(2): 203-208.

Citation of the Article:

Hamid, A., LaRose, S. B., (2021). Effectiveness of braille reading training in virtual classroom due to pandemic COVID-19 in Pakistan *Journal of Inclusive Education, 5*(1), 57-74

Received on: 3rd June 2021
Revised on: 8th December 2021
Accepted on: 9th December 2021