

Journal of Education & Social Sciences

ISSN: 2410-5767 (Online)

ISSN: 2414-8091 (Print)

Online Higher Education in Bangladesh: Challenges and Prospects

Affiliation:

Md Khaled Bin Chowdhury
BGC Trust University, Bangladesh.
Email: mdkhaledchowdhury@gmail.com

Fariza Binti Puteh Behak
Faculty of Major Language Studies, Universiti Sains Islam, Malaysia.



Manuscript Information

Submission Date: December 21, 2020

Reviews Completed: March 29, 2021

Acceptance Date: April 15, 2021

Publication Date: April 27, 2021

Citation in APA Style:

Chowdhury, M. K. B., & Behak, F. B. T. (2021). Online Higher Education in Bangladesh: Challenges and Prospects, *Journal of Education & Social Sciences*, 9(1), 54-74.

DOI: <https://doi.org/10.20547/jess0912109105>



Online Higher Education in Bangladesh: Challenges and Prospects

Md Khaled Bin Chowdhury *

Fariza Binti Puteh Behak †

Abstract: Online education has become a necessity during the recent Corona pandemic. It has been a popular medium of education in universities of many developed and developing countries around the world for a considerable period of time. This mode of education is now a necessity for higher education as well. But in Bangladesh it has not gained popularity for a number of reasons and a switch to it has always been seen as a challenge. This research investigates the challenges in implementing online higher education and prospects for this type of education for Bangladeshi universities. This research follows the qualitative method and depends on secondary data. The study finds out that in spite of a number of rational challenges in implementing online education, it offers a lot of prospects for Bangladeshi higher education for all time. It suggests that online education can be a good alternative of program delivery for universities of Bangladesh in view of a number of practical factors. It recommends that at least a specific percentage of courses in any program of universities may be offered online in the backdrop of challenges problems prevailing in universities and the prospects it will offer to our higher education providers.

Keywords: Online education; higher education; Bangladeshi universities; challenges of online education; prospects of online education.

Introduction

Using technology to teach mass people through distance education has started in Bangladesh in an institutional way only 25 years ago through the establishment of Bangladesh Open University. But it has not reached the mass population and not been accepted by common people in good faith. No other universities either public or private has been authorized by the University Grants Commission of Bangladesh (UGC), the regulatory body of Higher education to offer any online course in Bangladesh. So, when neither the regulatory body of higher education, i.e., UGC nor the Ministry of Education of Bangladesh is supportive of online education, the negative perception among people about online education is sure to pervade. The negative perception about full online education in Bangladesh accrues from a number of reasons, such as, no direct contact with teachers, low quality of education, cheating in the examinations, and so on. There are some challenges also in implementing online classes. They are the digital divide, lack of access to internet in the remote areas and devices to attend classes. On the other hand, the face-to-face education in Bangladeshi universities is also constrained by a number of practical

*BGC Trust University, Bangladesh. Email: mdkhaledchowdhury@gmail.com

†Faculty of Major Language Studies, Universiti Sains Islam, Malaysia.

problems, such as, crisis of seats in public universities, lack of classrooms and accommodation in students dormitories, high cost of face-to-face education, traffic jam in big cities and session jam due to political unrest.

In the backdrop of the problems associated with face-to-face education in Bangladeshi public universities, online education which has already gained popularity across the world and is being offered in a limited way by Bangladesh Open University as an effective method of education in universities, can be a viable solution for the Bangladeshi public universities. Hence, our study will try to investigate the effectiveness of online education as an alternative method of education for universities in view of the physical problems prevailing in universities and political and economic factors as well as any natural disasters. A discussion of the evolution of technology in higher education in the world as well as Bangladesh will be done in the following section.

What is Online Education?

Online education is a form of education where students use their home computers through the internet. Often online course programmes, which are conducted using digital technologies, are provided through the online learning platform of the host institution. To define simply, online education is digitally supported teaching-learning system that depends on the internet. (indiaeducation.net). In online education, students can attend classes through internet access. It can include audio, video, text, animations, virtual training environments and live chats with teachers. It's a rich learning environment with much more flexibility than a face-to-face classroom. If used to its full capability, online education can be more effective than pure face-to-face teaching. It can be active, fun and customized to fit almost anyone's schedule (indiaeducation.net).

As a form of distance learning, this method facilitates different types of learners to 'experience connectivity, convenience and interaction'. It is a rather feedback-oriented mode of distance learning, and makes use of the internet to connect students with learning material, as well as teachers and sometimes other students. This personal interaction is the outstanding advantage of this learning mode (indiaeducation.net). Different pacing patterns such as instructor-led, self-directed or self-paced, are available in online learning. In conformity with the traditional classroom model, many online courses are instructor-led. Self-directed learning is the most flexible type of pacing. Here students work independently, direct their education and manage their own progress. Self-paced learning offers students to have flexibility regarding time and place of learning(indiaeducation.net).

The present mode of online learning is advanced since learning can take place via the internet. Learning materials, video teaching through Skype, examinations administered and marked online by the teacher are the features of this mode of education. Learning can take place through digital devices like audio players and mobile phones. Online learning has come a long way to the current advanced model.

Although there are subtle differences between online and face-to-face education, the main difference between the two is that online education frees students from the usual obligations of on-campus education including driving to school, planning their schedule around classes, and being physically present for coursework. Whatever the differences,

the education methods and materials provided in online degree programs are often the same as those provided for on-campus programs(online-education.net).

Use of Virtual Learning Environment (VLE) in Higher Education World-wide

The use of computers in teaching and learning precedes the advent of the World Wide Web and the Internet ([Hoffman, 2016](#)), with developments such as, 'computer based learning' and 'computer assisted learning'. However, the Internet brought into being what is sometimes called 'web based instruction' and on other occasions 'online learning'. All of these attempts to bring ICT into the world of teaching and learning are now subsumed by the over-arching term 'e-learning' ([Littlejohn & Pegler, 2007](#)). Virtual Learning Environments are a development in e-learning. They are learning management systems which allow interaction between students and teachers in a 'closed environment' in order to facilitate learning. Their application has increased in the last few years and now some VLEs allow integration with other institutional information systems. Examples of VLEs include Blackboard, a commercial learning platform originating in the United States of America and Moodle, an open source learning platform originating in Australia. The advent of these VLEs in countries show the spread of e-learning as a learning and teaching platform.

Many governments recognized the significance of e-learning and so they developed national strategies to incorporate e-learning in education ([Asgarkhani, 2004](#)). In their consultation document "Towards a Unified e-learning Strategy" in July 2003, the UK Government outlined their strategic view of e-learning for the country and pointed out that there is a scope for revolutionizing learning and teaching through e-learning. To that direction, universities around the world are using online mode of teaching to 'increase their student intake, quality of education and image' ([Asgarkhani, 2004](#)). A recent article in The Chronicle of Higher Education states that online learning methods have become common in recent years in elite universities – including many Ivy League schools in the US. They have begun to more substantially use the devices and techniques of digital learning (ICEF Monitor, 5 October, 2015). At present online education using VLEs is the culmination of the use of technology for teaching a greater number of people living at any place, at any time and at any age.

Bangladesh

Though online education has become widely popular across the world, Bangladesh is still lagging behind other countries. There is a conspicuous absence of online/blended/e-learning in Bangladeshi universities in spite of immense prospects here. The higher education scenario of Bangladesh together with the unemployment scenario will be discussed here to investigate the prospects and challenges of introducing online education in universities of Bangladesh in near future. If we want to discuss about the prospect of online education in Bangladeshi universities, it is important to know about the evolution of the integration of technology in education.

Technology Use in Bangladesh

Attempts have been made to make the use of technology popular at all levels of Bangladeshi education sector. There are multimedia classrooms in four thousand five hundred primary and thirty three thousand secondary and higher secondary level institutions. Twenty thousand computer labs have been set up. Thirty seven thousand teachers have been given training in Information and Computer Technology in the year 2017-18. Computer subject has been made compulsory in secondary and higher secondary levels.

Bangladesh ranks 5th in South Asia in using the Internet. 80 million people have internet access as of Dec'17. Access to Information (A 2 I), an Office under the Prime Minister's Office in cooperation with the British Council has opened a portal named 'Teacher's Window' for sharing the digital content among primary, high school and college level teachers. 1500 computer laboratories have been established in non-government colleges. Educational institutions have created their own websites. Web TV and Radio of Bangladesh Open University (BOU) run many Distance courses for the non- institutional students. So, efforts are there to integrate technology with education.

Use of Technology in Higher Education of Bangladesh

The education Policy, 2010 focused on upholding international standard in higher education, integration of technology to facilitate education, women education and vocational education' (Dutta & Islam, 2017). The reform of education is essential to make the university graduates skilled for the 21st century competitive job market. In the 21st century our graduates need to be not only skilled in technology, but also update them with the changing technology. So, now the necessity of Up-skilling, Re-skilling and Cross-skilling has been felt more than ever before. They are important not only to get jobs but also to retain them.

The integration of technology with teaching-learning is inevitable to improve the employability skills of the university graduates of Bangladesh as elsewhere in the world. It also leads to creativity and is exciting both for the teachers and learners. It imbues the learners with motivation, develops interpersonal, collaborative skills and ensures learning achievement and satisfaction. Online and Blended Learning method can help students develop these skills. Studies by Shea and Bidjerano (2010) at colleges across the United States, Russia, and Grenada respectively identified improved grades, lowered dropout rates, and increased probability of completing course of study as a result of blended learning. Pérez-Marín and Pascual-Nieto (2012)'s study reported greater satisfaction in blended strategies than a standard, online-only environment. Herloa (2015) found enhanced students learning and student-centered learning in a blended master's program.

It is imperative that Bangladeshi universities gradually switch to online education where the integration of technology will be its booster. Now there is a rising trend internationally among teachers to design online course materials and universities are increasingly offering Massively Open Online Courses (MOOCS) and what is more, developing them as a way of raising the institutional image. But Bangladeshi universities are lagging behind in the spree. As only a limited number of Bangladeshi young people can have

education owing to limited seats and inflexible timing system of traditional higher education, distance learning systems can be a solution to this problem. The rapid expansion of ICT in the country can open an avenue of hope for e-learning for the expansion of distance education (Al-Masum, Islam Chowdhury, et al., 2013) to cater to the burgeoning demand for higher education among the Bangladeshi young population.

Distance Education by Bangladeshi Universities

It is relevant to discuss the evolution of e-learning or distance learning in Bangladesh with emphasis on the contribution of Bangladesh Open University (BOU), the only provider of distance higher education and one of the world's biggest universities having above 500,000 students. Like National University, BOU was established in 1992 to facilitate higher education. Bangladesh Open University offers diploma, bachelor's, and master's programs, as well as non-formal programs through distance learning via 'audiocassettes, radio and TV broadcasts, and the internet'. BOU is planning to conduct all its courses online very soon. Being the only university to provide education in Bangladesh, the Open University plays an important role in reaching education to previously unaccessed populations in rural areas. Now we will have a look at the evolution of Bangladesh Open University.

In Bangladesh, e-learning was first started in the early 1960s. 200 radio receivers were distributed across the country, which created an Audio-Visual Cell (AVC), and later the Audio-Visual Education Centre (AVEC) in 1962. In 1978-1980, a pilot project called 'School Broadcasting Program (SBP)' was started. In 1983, the SBP and AVEC were combined to form the National Institute of Educational Media and Technology (NIEMT). In 1985, the Bangladesh Institute of Distance Education (BIDE) was established and NIEMT was merged with BIDE. In 1989, as a result of the request of the Government of Bangladesh, the Asian Development Bank (ADB) sent a mission to do the feasibility study of starting an university in Bangladesh which was run through a 'Technical assistance Project (TAP)' with the help of ADB. At last, Bangladesh Open University (BOU) was founded in 1992 by an Act promulgated in the Bangladesh National Parliament (Bangladesh Open University Act, Bangladesh Gazette, 1992). BIDE merged with it. BOU came under government budget later on.

BOU's main objective is to "transform the country's vast human resources into an educated and trained work force by extending to them a wide range of academic programs both formal and non-formal by using different delivery technologies." (Bangladesh Gazette, 1992, monthly/1992-01-04). BOU provides tertiary education and vocational training in areas, like agriculture, business, education, arts, science, and technology. The BOU has 12 regional resource centers (RRCs), 80 local centers (LCs), and more than 1000 teaching centers (TCs) across the country (BOU, 2004). By 2002, BOU offered a total of 230 programs through two intake systems: Term-I (January-June) and Term-II (July-December) by distance learning. BOU mainly relies on the correspondence model- hard copy based delivery method. The non-print delivery technologies are used as a complementary to hard copy- based delivery (Al-Masum et al., 2013).

Present enrollment at BOU is more than half a million. This number is more than the

total number of students of all other universities in the country. In 1992, the number of students admitted were only five thousand. UGC in a report revealed that BOU education is better than that of all other public universities in Bangladesh considering issues like, expenses per student, male-female student and teacher-students ratios, and earning from own source.

Since its establishment, students were rapidly increasing at BOU, which indicates the high demand of online higher education and its acceptability in Bangladesh (T. Islam, 2011). Side by side, face-to-face teaching in the classroom allows more scope for interactions between learners and teachers in BOU. Therefore, it can be said that the scope for face-to-face teaching-learning is a kind of boost for the BOU students because they have a feeling of connectedness with their teachers.

Passing out rate of BOU is also satisfactory. The average pass rate of students in both the traditional public universities and BOU is also same (Annual report, University Grants Commission, 2010). BOU students come from variety of professions, from high-ranking government officials to lower-ranking workers, or unemployed young men and women or housewives. The number of students from village is more than the urban. Two major demerits of BOU are the use of inflexible media of e-learning and exorbitant delay in publishing results within the academic calendar.

Recent Corona Pandemic and Online Education by Universities

The recent Corona virus pandemic (COVID19) in 2020 could be an eye-opener for universities all over the world because this led to re-thinking of the necessity of online teaching mode by the universities in the time of need. Many universities around the world opted for full online mode of instruction to compensate for the losses of face-face classes. According to UNESCO, 91 percent of the world's current student population has been negatively impacted by nationwide closures of schools in attempts to contain the spread of Covid-19. This includes around 1.54 billion youth and children enrolled in schools and universities around the globe (UNESCO Report).

The US, Canada, Australia, China and India have already switched to the online mode to live up to this time of crisis. The US universities are leading the spree because it has gone for a massive scale online delivery. As reports of Covid-19 in the United States grew, University of Washington, Stanford University started to conduct classes online from the first week of March and others following their footprint. Many ed-tech experts and university management felt that these events could prompt colleges and universities to stop discriminating between online and face-to-face programs, and instead just design programs that could be offered during both good times and crises.

There is also apprehension that due to the pandemic, the universities will lose a considerable number of students. Studies predict that there could a 20% overall decline in the number of students enrolled in the institutions owing to economic crises, sick relatives, lost jobs, and lack of government support. BOSSA (Beijing Overseas Study Service Association), mentions that China, as the leading country attracting foreign students, will be quite affected by the epidemic, since "it has directly blocked between 40 to 60 percent of students from applying for university admissions or visas." A number of universities

are also beginning to consider the possibility that in-person classes may not resume until 2021. In the United States, some universities including Boston University have considered cancelling all in-person classes until January 2021, while continuing to conduct classes online.

Literature Review

There are a lot of research that highlight the efficacy of online education like the face-to-face one. [Brown \(2010\)](#) argued that social technology has increasingly ubiquitous access, ease of functionality, ease of use, and high flexibility, making them appealing as a learning tool to be adopted in higher education. Online learning through social technology has, therefore brought many positive impacts in education systems. They are- low cost of education, more comfortable learning environment. It is flexible and convenient because students can study on their leisure time and work at their peak energy either at any time, daytime, or at night, more concentration and interaction capability, enables the advancement of careers for it allows students to take online courses as they work, improvement of one's technical skills while trying to go through programs and learning management systems (LMS) ([Broadbent & Poon, 2015](#)). It allows students to share ideas, voice their issues, and grow diverse opinions freely.

Furthermore, online learning helps in the development of motivation, self-discipline, and initiative. These are real-world skills valued highly by the potential employers. The asynchronous nature of online learning offers a learner-spaced and timed study, and the incorporation of multimedia resources enriches the learning environment with relevant course materials which are hard to find in hard copy or which can be costly to buy in traditional learning ([Torrissi-Steele & Drew, 2013](#)). Another strength of online learning is its interactive nature, as found in the research conducted by [Torrissi-Steele and Drew \(2013\)](#). They argued that online learning facilitates free interaction between the teacher and the students; and among the students themselves. The study conducted by [Rapchak \(2018\)](#) also found online learning to be student-centered. Students can participate in any discussions freely at any time which develops their reflective and analytical ability, and that are hard to achieve in traditional education. According to the study, the use of interactive learning environments is supported by the literature of adult education. This is because it leads to critical thinking and self-direction among the students. Online learning offers creative teaching as put forward by [Cooper and Scriven \(2017\)](#), which facilitate this mode of learning among adults. Strengths of online learning can be categorized into four areas. These are ease of access, its flexibility, high interaction, and student engagement. Online learning offers greater time of flexibility, freedom, and convenience of working on their class work anytime anywhere.

Motivation for Online Education

Motivation is highly important in facilitating academic achievement and success. Scholars have also noted that motivation equally facilitates learning in the online environment.

In a number of studies on adults learning online, (Kim & Frick, 2011) found motivation to have high impacts on their success and others have found a positive correlation between student motivation and online student samples starting from high school students to community college students and to undergraduate students (Kim & Frick, 2011). The development and maintenance of a motivating online learning environment can be a challenging task for both teachers and course designers. Huett (2006) notes that high motivation is a requisite for the student-centered nature of the online education. Kim and Frick (2011) mentions poor levels of interaction as a problem in the online learning environment. On the other hand, others have discovered that instructional strategies appropriate for students in the face-to-face classroom do not always motivate the online students in the same level.

The social aspect of an online education increases motivation in adult learners, with Kim and Frick (2011) mentioning course interactivity as a strong factor of learner motivation in her studies of adults admitted in self-paced e-learning courses. During her research, Kim found two types of interaction between the learners and the teachers (including technical support staff) and interactions between the learner and the course, as responsible for increasing motivation through various engaging built-in features. Other strategies to enhance the social element of online classes to raise motivation in adults are group discussions, group or team work, and fostering “a supportive community of learners” (Bonk, 2002). By giving timely feedback and through a visible and supportive presence, teachers can also play a role in the social aspects of a class and thus increase student motivation.

In addition to course-related factors that affect learner motivation, several learner-related issues are also found to raise the motivation of adults in online education. For example, a study on adult learner perseverance in an online doctoral program by Ivankova (2002) found the following factors to have increased “students’ intrinsic motivation including their love for learning, the experience of learning in a new format, and viewing completion of the program as a personal challenge and a lifelong dream”. Styer (2007) found that ‘learner interest, the wish to acquire new knowledge, and the learners’ self-efficacy, or faith in their capability to succeed in a course, worked prominently in increasing their intrinsic motivation.

Kim and Frick (2011) investigated factors that impacted the motivation of adult students doing self-paced e-learning courses in both academic and workplace environments. Based on both qualitative and quantitative research methods, Kim found a “lack of motivation as the significant reason for learner attrition in online learning environments” (2005, p. 132). In other studies. Chyung and her co-researchers explored the impact of motivation on student retention in an online Master’s degree program having high rates of student dropout. To remove this problem, techniques from Keller (1987)’s ARCS model were used to raise interest in courses in the curriculum. As a result, the dropout percentage in the Master’s program got down from 44% to 22% within only three semesters (Chyung, Winiecki, & Fenner, 1998).

Recent Studies Comparing Learning Outcomes between Online and Face-to-face Learning

Online teaching produces the same academic success as face-to-face one, according to a study published during the recent global shift to online learning. A paper published in *Science Advances* compared the learning outcomes and satisfaction of students either taught fully online and blended learning or via face-to-face in two STEM courses at three universities in Russia.

The results, found that students taught fully online got the highest in their average scores in tests taken throughout the course. Those taught fully online scored, on average, 7.2 percentage points higher than the fully face-to-face and blended mode of learning. The STEM courses were offered by OpenEdu and established by eight universities to offer university courses online, while the course content, study materials and assessment were same for all students. The authors in this study investigated three distinct student outcomes: their average test score, their summative exam grade and the findings of a student satisfaction survey. The results in a nutshell indicated that the final test results of 325 students in the research were almost similar throughout the three teaching modes. Though the fully online students narrated lower levels of satisfaction from their courses, students doing the blended and in-person modes reported similar or even higher levels of satisfaction. "This is the strongest evidence to date that an average college student can learn just as much from a course online as on campus or with blended learning," according to Rene Kizilcec, assistant professor of information science at Cornell University and a co-author on the study. According to the paper, online education or blended learning make significant cost cuts: blended learning downsized the cost each student by 15 to 19 per cent, depending on the course, and online instruction cut the per-student cost down by 79 to 81 per cent, depending on the course.

Khalid, Jahan and Sobhan (2009) conducted a study on the e-preparedness of a private university students of Bangladesh. They found difference in the internet accessibility and e-preparedness across disciplines, socio-economic and previous academic background of the students. The engineering students and English medium school background students were found to be more ready for and comfortable with e-learning mode in the study. [Jony, Rahman, and Islam \(2017\)](#) show how a wiki-based (one of the ICT tools) reflection method following a regular existing face-to-face classroom activities develop deeper thinking levels of students in higher education. They show that this method could be used as a blended learning model to promote reflective and critical thinking.

The necessity of online education has been felt recently more than ever before during the Covid-19 pandemic. In addition to this situation, Bangladesh should go for online education for a number of practical reasons. The need for online education is far greater in Bangladesh in the face of the following realities: high rent of urban living for rural students, utter traffic congestion in the mega cities, and the social conservatism regarding women education. In developing countries like Bangladesh, the scope for higher education should not be limited to the affluent few because to develop the country the privilege of education should be open to all. It should not be confined to those only who can afford it only full time. Higher education should be open to all who want to pursue it. So, to

make higher education accessible to those who are doing part time job and part time education, online education may be a viable option. This study will have a positive impact on the higher education of Bangladesh by proposing online education as a viable option of higher education to those people who would be otherwise incapable of pursuing it for their betterment.

Methodology

This is a qualitative study that has been based on the secondary sources. The authors investigated a good number of articles and dissertations written on online education. Moreover, as the Covid-19 pandemic has necessitated the switch to online education around the whole world, a number of very recent articles and columns of the national and international newspapers have also been consulted.

Challenges of Online Education in General

While online learning offers a variety of benefits to learners and to institutions of higher education, there are several challenges such as, course development costs, student dropout rates, and teacher training (Radford, Bosanquet, Webster, & Blatchford, 2015), initial and ongoing expenses that are connected with online learning, including the cost of technology and the use of technological resources (Casement, 2013). Other costs may be employee costs and may range from the need to hire and train online instructional designers and instructors, as well as costs associated with support staff personnel for the courses. Inadequate training for online instructors can result in the misuse of technology and ineffective teaching practices in the online environment. Concern with quality of online courses is also a burning issue (Irvin, Hannum, de la Varre, Farmer, & Keane, 2012).

Challenges of Online Education Faced by Learners

Though online learning education is enabling greater access to students and flexibility in the learning environment, it is not necessarily the appropriate choice for all students in a college or university setting. Online academic success is influenced by specific characteristics demonstrated by learners, including academic skills they bring to the course, technological proficiency, and the ability to work required of in online settings (James, Swan, & Daston, 2016). This may happen owing to factors such as lack of student academic skills, online course quality, the instructor's useful feedback to the student, and learner commitments outside of the college environment. Online courses require students to employ many developed non-academic skills such as time-management skills, staying organized, and seeking for help when needed. So, a substantial number of students perform less in many online courses than in face-to-face courses. A study of online courses found 45% drop out rate of online students in some colleges and universities whereas it was only 11% of in-person students due to the lack of support on the part of the institution (Ryan & Di Domenico, 2016).

Major Problems of Distance/Online Education in General in Bangladesh

There have been a number of researches on the challenges of e-learning, online education in Bangladesh. In spite of good prospects for online education in Bangladesh and the popularity of e-learning for expanding distance education in Bangladesh, there are a number of major problems at its implementation in the tertiary level in Bangladesh (Mahmud, 2010). Al-Masum and Chowdhury mention a number of problems in implementing online education at tertiary level in Bangladesh especially focusing on Bangladesh Open University, the only provider of online education in Bangladesh. They are- A. Lack of faculty expert in e-learning for distance education. A tendency toward the 'Conventionalization of the Distance Learning System' is observed sometimes. B. Access to ICT and device is very limited in Bangladesh because of economic constraints. C. Delay in production of e-learning materials and their proper delivery the students. D. Financial difficulties faced by parents; absence of infrastructure, such as electricity and telephone lines in many parts of the country; and lack of funds and other resources at universities to improve their computer laboratories. E. Higher research and evaluation activities are very limited in terms of quality e-learning for distance education at BOU. F. Lack of Government sponsorship for BOU in comparison with other public universities (Al-Masum et al., 2013).

Position of Bangladeshi Public Universities regarding Online Education

The condition of online education in Bangladesh can be gauged from the role of other public universities. After two months to the Covid-19 lockdown, only three public universities out of 45 told the Education Minister that they were conducting classes online. There is a strong resistance among public university teachers and authorities to switch to online teaching, let alone full online education during the pandemic. The negative perception about online education is reflected in the long standing allergy and chronic lack of preparation by Bangladeshi universities in offering any online programs. Both the preparation and practice are very insignificant to mention. Though many Bangladeshi universities, especially some of the bigger private ones use several learning management platforms to replace traditional classroom based pedagogy, that facilities are inadequate. Their activities are confined to just uploading lecture, videos and submitting assignments. But except a few ones, the rate of other private universities adopting this online platform during normal time is very insignificant. Even one of the two key providers of higher education, the National University which controls and monitors the public and private colleges of the country having approximately 1.8 million students does not have any fully online degree programs at this time.

Four million tertiary students in Bangladesh in over 5,000 institutions including public and private universities, affiliated colleges, and professional institutions are in shutdown for a long time. The 46 public universities, with an enrolment of some 600,000 students, have not offered online or other forms of distance education, with the sole exception of Shahjalal University of Science and Technology (SUST) in Sylhet and Bangabandhu Digital University. Most universities and colleges are also not equipped with the hardware and internet connection to offer lessons online. Universities especially the private ones

had to conduct instruction through online mode. But there was a total disastrous failure on the part of the public universities in switching to the online mode owing to the absence of institutional preparedness as well as any national strategy to tackle this crisis by the UGC and the Ministry of Education.

University Grants Commission's Role

The role of University Grants Commission of Bangladesh is debatable in this case. UGC lacks the determination and consistency of decision as to the implementation of online teaching during the corona pandemic. On March 23, the University Grants Commission (UGC) had requested all universities to start teaching online for Corona pandemic. However, contradicting its earlier standpoint of switching to complete online education, the UGC later on ordered private universities to stop all assessment and admission activities until further notification. Moreover, the commission has deemed the practice of online education and admission as being "unethical" because currently many families would not be able to bear the cost of the admission and for many students to take online examinations would be difficult. At a critical time like this, want of consensus and communication between the private universities and the UGC has indicated that our education system is lacking a clear way ahead that is crucial to lead students towards the right destination. UGC attributes their indecision regarding online education to the technological and digital divide of the country.

Technological Divide

Although the shift to virtual classes has been smooth for most universities in the developed countries with basic technological infrastructure in place to this end, it has stood out to be a daunting task in our country where there is no previous experience in teaching online. A huge number of students from economically backward families are without access to a smart device or internet connection. As a result, this could also make the already existing inequalities in access to education more wide.

Ikbāl and Shama (2020) conducted a survey among 83 university professors and 695 students from the private and public university. The survey shows that less than one-third have a computer, and slightly more than 1% of the students had neither a computer nor a smart phone, without which any online class is impossible for them. 34% indicated that they have access to mobile data only, while 63% indicated that they have access to broadband. 78% of the students responded that they consider the price of data to be too high, and a staggering 92% would like to have cheaper data and desired government intervention. From among the teachers, 60% indicated that their university at present does not have sufficient technical support for successful online classes. That is why, over 78% of the professors indicated that they were willing to use free video solutions such as Facebook Live or WhatsApp to deliver their classes. Faculty opinion also shows the digital divide. 73 percent teachers thought students do not have sufficient technological resources to participate in online courses. So, this issue is a strong impediment to online education for Bangladeshi universities.

People's Perceptions Regarding Online Education

The perception of teachers and students regarding the usefulness of online education during Covid-19 is also not positive. A survey conducted by a private organization named Biotech shows that only 23 percent students want to attend online classes. Again 82 percent students think that online classes are not as effective as face-to-face classes. Many teachers while interviewed said that it is possible to take online classes in subjects like, business and humanities but difficult to take classes in Science and Engineering. So, we see that teachers and students, let alone common people have a negative perception about online education.

Prospects for Online Higher Education in Bangladesh

After investigating the challenges of online higher education, it is necessary to explore the prospects of it in Bangladeshi tertiary education sector. Against the challenges, a good number of opportunities are there to gradually switch to online higher education. A ground for online higher education has already been prepared by a number of facilitating factors in the socio-economic and technological arenas prevailing in Bangladesh.

The acceptability of online education has already been established through a number of factors. The pandemic Covid-19 has made all feel the importance of online education as a temporary solution. Most of the private universities have switched to online education within a week or two of the onset of lockdown owing to Corona pandemic. A number of public universities have also switched to this mode of education. The role of a public university Bangabandhu Digital University (BDU) can be discussed here regarding the practice of online education in Bangladeshi higher education. In order to develop online education to its fullest, this specialized university has also established the country's first Institute for Online and Distance Learning (IODL). It started its academic activities from March 2019. Of late, a SWOT analysis has been conducted by the university. The study shows that around 90 percent of the students attended classes online regularly during pandemic. The university's customized and well facilitated Learning Management System, Virtual Machine (VM) for all students and faculties will help to save the students from session jam. The success of BDU can be an eye opener for others. There is a huge scope for online education in Bangladeshi higher education scenario considering the current development of digital literacy and facilities too.

Digitalization Movement of the Government

Bangladesh is currently connected to the information super-highway through submarine cables, which will add a new spin in the expansion of Internet and other electronic communications. More than 20 million mobile phone users throughout the country reflect the real phenomenon of quick acceptance of modern ICT by the people. But the full potential of the ICT infrastructure is yet to be exploited by the Bangladeshi higher education institutions. It is expected that the current improvement of the ICT infrastructure of Bangladesh should be utilized to promote e-learning for distance education at the tertiary level in

Bangladesh. This is in accordance with the vision of “Digital Bangladesh” of Bangladesh Government by 2021 to create a knowledge-based society that realizes the power of e-learning for all the people in the country (Al-Masum et al., 2013). Recently the private mobile phone operators have also reduced the price of internet data and started offering various cheap internet packages that has helped the students in doing classes online with cheaper data.

Scope for Education for All

The scope for higher education for students irrespective of affluent or insolvent is facilitated by the online education. Young people who want to pursue higher education and carry on employment at the same time, can have a good opportunity for higher education through online programs. Moreover, the scope for developing soft skills may also be expanded through online education. But the tradition-bound University Grants Commission of Bangladesh is still reluctant to allow any other university than BOU to offer any degree programs in cyber space. Though we dream of a Digital Bangladesh, a digitalization of higher education is not noticeably done.

Response to Emergency

Online education is an alternative to face-to-face education during natural calamities which helps to survive the emergency. But, we do not have any emergency plan for education. The fact that at present there is no Emergency Response Plan to address any emergency in higher education has been exposed during the Covid-19 pandemic. The existing Bangladesh Emergency Response Plan 2014 and SOD merely tell about steps for ‘flood, cyclones or earthquakes’. But, the disaster caused by the pandemic has made the nation ponder over new measures. Long-term social distancing, self-isolation have necessitated migrating to the online teaching platform as an inevitable step. Countries such as Syria, Sri Lanka, Afghanistan and the Philippines have switched to distance learning to handle war-time contingency. New emergency like climate change or other formats may necessitate remote education. But there is no emergency plan at present for the education delivery during any natural calamity. There is neither strong and effective directives nor decision from the policy making and regulatory bodies of higher education as to the offering of online education during the pandemic. There is no fully online Learning Management System(LMS) operating at present in any public universities. It indicates our lack of preparedness and grudge against this widely recognized mode of education.

Online Education by the Private Universities

The preparedness of the private universities in Bangladesh except a few conducting online education is also not satisfactory. A few leading private universities have limited activities in delivery of education online. American International University of Bangladesh AIUB has now gone fully virtual with its classes with the licensed MS TEAMS App. ULAB has been using a learning management system (LMS), Moodle, since Spring 2014. Initially,

the faculty members used the= platform as a supplementary support to teaching and not as an alternative to classroom or face-to-face classes. Most of the private universities have switched to online education with their limited resources. So, there are examples of online education being offered by most private universities in Bangladesh during this pandemic.

Need for Skill Enhancement of Graduates

The need for online education in universities can be justified for the fact that in online education use of technology helps to make the students technologically skilled that develops their employment potentials. We think that integration of technology with teaching-learning is inevitable to improve the employability skills of the university graduates of Bangladesh as elsewhere in the world. It also leads to creativity and is exciting both for the teachers and learners. It imbues the learners with motivation, develops interpersonal, collaborative skills and ensures learning achievement and satisfaction. Online education with the integration of technology with education can help students develop these skills. As in other Asian countries, in the traditional teacher-centred education system of Bangladesh, teachers' role is to provide knowledge. But, now the necessity of interactive education with the use of technology has been felt more than ever before. Soft skills such as interpersonal skill and technological skills are nourished and practiced through different exploratory learning activities of the flipped model which will lead to self-discovery. So, it is expected that through online education Bangladeshi university graduates will be able to acquire the necessary employability skills.

Emerging Needs for Higher Education

Bangladesh has seen a huge rise in university enrolment over the last decade or so. Total tertiary enrolment has nearly tripled since 2000 and that was over two million students in 2012. But even with that growth, overall enrolment ratios are quite low, to the point that only 13.23% of college-age students were enrolled in higher education in 2012, as compared to 24.80% in India or 26.70% in China for that same year. The overall enrolment growth since 2000, however, is an important sign of rapid rise in demand for higher education (ICEF Monitor, 5 October, 2015). Looking ahead, the British Council considers Bangladesh – along with Nigeria, the Philippines, Turkey, and Ethiopia as the emerging economies with the greatest forecast of growth in tertiary enrolment for the next decade. Domestic tertiary enrolment is expected to rise by another 700,000 students through 2022, indicating that the total number enrolled in higher education will stand at three million by that point (ICEF Monitor, 5 October, 2015). This huge increase in number of students cannot be accommodated by the existing number of higher education institutions. That demand may be partially fulfilled by the online mode of education.

Crisis of Seats in Public Higher Education Institutes

Seats in Bangladesh's best public universities are so scarce that approximately 95 percent of higher-secondary graduates cannot find place in these institutions; 17 applicants con-

tested for one seat in these universities in 2015. About 95 per cent students having Higher Secondary Certificate (HSC) and equivalent certificates in the year 2015 won't be able to get admitted to 32 public universities for seat crisis. On an average, a little more than 17 admission seekers had to compete for one seat in the 32 universities, excluding the National University and the Bangladesh Open University. To cite the University Grants Commission (UGC) estimate, 37 public universities including National University and Bangladesh Open University had 521,184 seats in 2015-2016 academic year. In addition to that, there are 83 private universities having around 3,00,000 seats.

This huge increase in number of students cannot be accommodated by the existing number of higher education institutions. In Bangladesh higher education institutions cannot accommodate more than 15-20 percent of aspirant students. Online programs allow people who might not normally be able to get a degree to attend a renowned institution probably due to their financial condition or a limited amount of seats or due to lack of infrastructure of the university. We will engage more students in future with these limited resources. So, the point of limited seats in public universities is raised here which can be removed to a large extent through online program at university level. That demand may be partially fulfilled by the online mode and blended mode of education. As only a few Bangladeshi young people can have education owing to limited seats and inflexible timing system of traditional higher education, distance and open learning systems can be a solution to this problem (Al-Masum et al., 2013).

Session Jam and the Need for Online/ Blended Education

Session jam in Bangladeshi public universities resulting from political unrest and delay in results publication is a crucial problem. Students of the public universities with session jam need seven or eight years to do their four-year graduation program. According to the University Grants Commission, session jams are acute in Comilla University, Rajshahi University, Jahangirnagar University, Islami University and National University. The financial consequences of session jam are huge. Sarkar and Hossain (2016)'s empirical study shows that for session jam a huge amount of additional money is wasted both by the parents and the government for a student to complete graduation and post graduation. Their statistics shows that for session jam per student additional cost was highest (BDT 230,801) in engineering universities, followed by agricultural universities (BDT 211,846), general universities (BDT 209,794), and science & technology universities (BDT 179,293). To show in percentage, general universities consumed 25.77 percent, agricultural universities 13.86 percent, engineering universities 23.84 percent, and science & technology universities 21.68 percent additional cost due to session jam (Sarkar & Hossain, 2016).

Traffic Jam in Big Cities

The city-dwellers of Bangladesh is encumbered with regular menace of traffic jam. Around 5.00 million working hours are being wasted every day for traffic jam that incur an average financial loss of TAKA 370 billion every year. MCCI & CMILT (2010) revealed that

traffic jam was liable for the loss of people's 8.15 million working hours, 40 per cent of it are business hours. Again, another study of Dhaka Transport Coordination Board (DTCB) found that against the speed capacity of 40 kilometers per hour (kph), motorized vehicles can move in the city up to average 5 kph ([Chakraborty, 2010](#)). This creates a mental pressure on the city commuters, leading to diseases, creating impatience, combative mind, frustration, mental unrest and affects work efficiency and enthusiasm. As a deterrent to reduce the congestion, it is essential to arrest the flow of people to the Dhaka City. So, if people get employment, health and education facility at their own area, the movement of people to Dhaka will dramatically reduce ([Chakraborty, 2010](#)).

Lack of Space for Classes and Accommodation in Student Dormitory

We think that the major physical problems in Bangladeshi Universities, i.e. the lack of space and accommodation for holding classes and accommodating in the dormitories of the institutions may be solved to a large extent by online education. Students doing online education would not need to come to cities for attending classes and stay there. For even those who live in cities, traffic congestion also wastes a lot of time of the city commuters. Students waste a lot of time on the crammed city streets to attend classes. So, online education would help to solve this problem of time, space and cost.

Education and Job Simultaneously

The comparatively cheaper cost of online education can also be a motivator for the financially strained people of Bangladesh who aspire for higher education. In Bangladesh many young people are pursuing higher education while being employed. That is, a huge number of them are pursuing both job and education. For them online education can be a lucrative alternative in their pursuit of higher education keeping their jobs intact. In the light of the above studies, it can be assumed that online or blended education will open up the opportunities of higher education to a huge number of aspiring Bangladeshi young people by not jeopardizing their studies while keeping their job. It will fulfill their dream of higher education keeping their income and employment intact. That will have a positive impact on reducing the dropout rate in higher education. In Bangladesh the scope of education loan for students either from public or private sources is scarce. So, if they can pursue their higher studies with their job simultaneously, it will fulfill their expectations. The UGC and the Ministry of Education may consider permitting some renowned public and private universities to introduce blended online education in a number of programs and courses at least.

Reduction in Dropout at Tertiary Level

The university dropout is now an important issue in many countries, including Bangladesh since it is the wastage of taxpayers' money. Research categorizes the reasons for students dropping out into three types: social, economic and educational. A student can drop out due to financial difficulties or family related or personal problems. [Hossain \(2016\)](#)

did a qualitative study on the causes of student dropout at university level students in Bangladesh. This study confirms early marriage of girls, sexual harassment and illegal pregnancy, their household role, and lack of recognition for the need for their education etc. for girls' dropout. Additionally dropout of the male students happens mainly for the failure in examination; besides home-sickness, economic inability to perform academic tasks, brain drain, students' politics, drug addiction and other issues. Though the dropout rate at primary and secondary education has been slightly reduced at primary and secondary level by initiative of Bangladesh Government, at tertiary level the rate is alarming. The dropout at primary level is around 50 percent. Up to graduation total dropout rate is more than 90 percent. The case of Institute of Business Administration (IBA) of University of Dhaka, as the pioneer of Master of Business Administration program is a good example. It admits 200 students each batch but out of them only about 125 students passed out in 2013, with a dropout rate of 37.5% (M. N. Islam & Pavel, 2011).

University Ranking and Online Education

Dhaka University and public medical colleges of Bangladesh attracted a handsome number of international students in the 1980s and 1990s. But, none of them now has any international students. None of the Bangladeshi universities are in the top 500 of World University Ranking for a couple of decades. Having international students is an important criterion of world ranking. The percentage of international students in Dhaka University, the top public university of Bangladesh is 0% whereas, for example, Monash University has 39 percent international students. Monash secured 75th position in world ranking in 2018 whereas Dhaka University is in the range of 1000+. So, to attract foreign students, beside addressing other quality issues offering online programs may be a good initiative. The University of Liverpool's record number of over 12,000 alumni and 8000 students from 160 countries in its graduate programs justifies the claim that online education can be a viable option for having international students. Study abroad students have to go through a number of financial and personal problem different from domestic students, such as 'appropriate housing, employment limitations, integration into the campus and local community, and lack of support' (Calder et al., 2016). Online students in international programs are free from these problems.

It is assumed that student number will increase 2-10 times if universities can offer online courses within the current setup. No educated young people will remain unemployed, thousands of job will be created domestically and abroad; quality of education, graduate research, publications, research funding and university ranking will improve. Competitive environment for teachers and universities will be created by online version of education. Most importantly, higher education option will be available for everyone irrespective of age, sex, location, financial condition if online education can be offered by the leading public universities of Bangladesh. So, if the government might have reservation about the quality of the providers of online programs, some renowned universities can be permitted to offer online and blended programs.

Recommendations

Of course, there might be concern about the quality of online education to be offered by some universities. But there are ways to address the problems. Online assessment system might be another issue. The major challenge regarding online program by universities might be the issue of plagiarism and cheating in the examinations. So, the current testing system needs to be changed. Pen and paper based testing system will not be suitable for the proposed online programs. In this connection, the pertinent question might be 'does the present testing that relies completely on rote-learning really assess the originality and creativity of the students?' So, instead of pen and paper based exam, the submission of coursework and other creative ways of online assessment can be a viable solution to this problem. Universities must use Plagiarism Checker software to check cheating in the course works submitted by students. Even if the pen and paper-based testing is to remain, it may be held at the institutions in the presence of teachers.

It is time the UGC and the Ministry of Education came forward with a timely decision about online education. The negative perception of the people as well as the policy-makers must go away. The introduction of online education might pose a number of challenges which can be solved. We can seek support and advice from other countries where online higher education is a very popular and common medium of education. If the UGC and the Ministry of Education are skeptical about the quality of online education, they can be selective in giving permission to the degree providers. Regarding the lack of digital device and internet access, it can be said that government should provide laptop or smart phone and internet facilities to the students at subsidized price.

Conclusion

Online education has a number of problems and challenges in a developing country like Bangladesh. But the prospects it offers to higher education much outweigh the challenges. The challenges that have been mentioned here are related with perceptions, quality of education, digital divide, inequitable access to devices and internet. But the opportunities it will create such as, low cost of higher education, reduction in session jam, traffic jam and accommodation crisis in classroom and dormitories and most importantly access of higher education to all, are much more beneficial for the higher education and hence, deserve more attention from the policy makers. The ground for online higher education has already been prepared by a number of conducive factors and measures such as digitalization of Bangladesh, initiative by the Government to accept the 4th Industrial Revolution and most importantly, the easy access of people to internet and smart gadgets. The issues of quality of education, online assessment type, curriculum redesign and teacher training can be addressed through expert opinions and planning. Measures should be taken to remove the problems associated with the online education. Then the door of access to higher education will be open for all, irrespective of age, gender and financial status. The image and status of our universities will also improve in course of time given other issues of quality of higher education are also properly addressed.

References

- Al-Masum, A., Islam Chowdhury, S., et al. (2013). E-learning for expanding distance education in tertiary level in Bangladesh: Problems and progress.
- Asgarkhani, M. (2004). The need for a strategic foundation for digital learning and knowledge management solutions. *Electronic Journal of E-learning*, 2(1), 31–42.
- Bonk, C. J. (2002). *Online training in an online world*. CourseShare. com Bloomington, IN.
- Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education*, 27, 1–13.
- Brown, S. (2010). From vles to learning webs: the implications of web 2.0 for learning and teaching. *Interactive Learning Environments*, 18(1), 1–10.
- Calder, M. J., Richter, S., Mao, Y., Kovacs Burns, K., Mogale, R. S., & Danko, M. (2016). International students attending Canadian universities: Their experiences with housing, finances, and other issues. *Canadian Journal of Higher Education*, 46(2), 92–110.
- Casement, W. (2013). Will online learning lower the price of college?. *Journal of College Admission*, 220, 14–18.
- Chakraborty, S. (2010). Traffic congestion in Dhaka city and its economic impact. *Traffic congestion in Dhaka city: Its impact on business and some remedial measures*.
- Chyung, Y., Winiecki, D. J., & Fenner, J. A. (1998). A case study: Increase enrollment by reducing dropout rates in adult distance education.
- Cooper, T., & Scriven, R. (2017). Communities of inquiry in curriculum approach to online learning: Strengths and limitations in context. *Australasian Journal of Educational Technology*, 33(4).
- Dutta, B., & Islam, K. M. (2017). Responsiveness of higher education to changing job market demand in Bangladesh. *Higher Education for the Future*, 4(1), 60–81.
- Herloa, D. (2015). Improving efficiency of learning in education master programs, by blended learning. *Procedia-Social and Behavioral Sciences*, 191, 1304–1309.
- Hoffman, D. D. (2016). *Considering the crossroads of distance education: The experiences of instructors as they transitioned to online or blended courses*. Utah State University.
- Hossain, B. S. (2016). Dropout at tertiary education in bangladesh: Configurations and determinants. *Feni University Journal*.
- Huett, J. B. (2006). *The effects of arcs-based confidence strategies on learner confidence and performance in distance education*. University of North Texas.
- Irvin, M. J., Hannum, W. H., de la Varre, C., Farmer, T. W., & Keane, J. (2012). Factors related to rural school administrators' satisfaction with distance education. *Distance Education*, 33(3), 331–345.
- Islam, M. N., & Pavel, T. (2011). Factors contributing towards dropouts at undergraduate level: An analysis. *ASA University Review*, 5(1), 97–113.
- Islam, T. (2011). Cost-effective, equitable and flexible higher education through open and distance learning in Bangladesh. *Turkish Online Journal of Distance Education*, 12(2), 102–113.
- Ivankova, N. V. (2002). A sample mixed methods dissertation proposal. *Education*, 48(1), 93–135.

- James, S., Swan, K., & Daston, C. (2016). Retention, progression and the taking of online courses. *Online Learning*, 20(2), 75–96.
- Jony, A. I., Rahman, M. S., & Islam, Y. M. (2017). ICT in higher education: Wiki-based reflection to promote deeper thinking levels. *International Journal of Modern Education and Computer Science*, 9(4), 43.
- Keller, J. M. (1987). Development and use of the arcs model of instructional design. *Journal of Instructional Development*, 10(3), 2–10.
- Kim, K.-J., & Frick, T. W. (2011). Changes in student motivation during online learning. *Journal of Educational Computing Research*, 44(1), 1–23.
- Littlejohn, A., & Pegler, C. (2007). *Preparing for blended e-learning*. Routledge.
- Mahmud, K. (2010). E-learning for tertiary level education in least developed countries: Implementation obstacles and way outs for Bangladesh. *International Journal of Computer Theory and Engineering*, 2(2), 150–155.
- Pérez-Marín, D., & Pascual-Nieto, I. (2012). A case study on the use of blended learning to encourage computer science students to study. *Journal of Science Education and Technology*, 21(1), 74–82.
- Radford, J., Bosanquet, P., Webster, R., & Blatchford, P. (2015). Scaffolding learning for independence: Clarifying teacher and teaching assistant roles for children with special educational needs. *Learning and Instruction*, 36, 1–10.
- Rapchak, M. E. (2018). Collaborative learning in an information literacy course: The impact of online versus face-to-face instruction on social metacognitive awareness. *The Journal of Academic Librarianship*, 44(3), 383–390.
- Ryan, R. M., & Di Domenico, S. (2016). Epilogue: Distinct motivations and their differentiated mechanisms: Reflections on the emerging neuroscience of human motivation. In *Recent developments in neuroscience research on human motivation* (Vol. 349, pp. 349–369).
- Sarkar, S. H., & Hossain, S. Z. (2016). Budgetary challenges of higher education: Evidence from Bangladesh. *Journal of Education and Practice*, 7(12), 32–41.
- Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education*, 55(4), 1721–1731.
- Styer, A. J. (2007). *A grounded meta-analysis of adult learner motivation in online learning from the perspective of the learner* (Unpublished doctoral dissertation). Capella University.
- Torrissi-Steele, G., & Drew, S. (2013). The literature landscape of blended learning in higher education: The need for better understanding of academic blended practice. *International Journal for Academic Development*, 18(4), 371–383.