

Introduction

The New Education Policy (NEP) 2020 in India made the required provisions to address the issues as identified by the SDG4 (e.g. inclusive, equitable and lifelong education) and due importance has been given to integrate technology in the education system because without integration of technology it may not be possible to address the above issues. The NEP 2020 was implemented in India in such a time when the entire nation was under lockdown due to pandemic. The only way for our survival was to use technology. Here the relevant provisions of NEP 2020 are very important to mention in the present context when the COVID-19 pandemic has disrupted the education sector tremendously.

- i) Chapter 21 deals with Lifelong Learning
- ii) Chapter 23 has the provision for Online Education and Digital Learning and
- iii) Chapter 24 describes the use of technology in education

The Indian education system is one of the largest education system in the world with varieties of courses and levels of programmes having millions of enrolled learners. Higher education has the major role to play in the transformation of society as well as in the development of the national economy. COVID-19 pandemic has disrupted all the sectors including the education sector all over the world. The sudden closure of on-campus educational institutions has disrupted the routine academic and research activities. The emergence of global pandemic has changed the teaching-learning system and pedagogical design to deliver the educational content to the students at their home. The post COVID era has compelled us to alter how we look at the education system. We witnessed various strategies by which the educational institutions could able to engage their students in their studies during the pandemic/ lockdown period through integration of digital technologies and tools in the teaching learning process. The educational institutions, teachers and students were forced to adapt to online learning utilizing the technological tools. Learning in 21st Century is experiencing rapid changes in pedagogical system due to advent of ICT which has been boost up by the global pandemic. The online learning gets momentum in the wake of COVID pandemic not only in India but also in other parts of the world. The regular classroom teaching may not be possible in near future. Every challenge gives us opportunities. We have to capitalize these opportunities for the benefit of the community and society as a whole. These opportunities/ avenues may be explored to overcome the challenges that we are facing now in our daily life. One of such opportunity is the use of information and communication technology (ICT). Judicious use of technology can help solve many challenges digitally and remotely. The home quarantine to combat COVID-19 has shown us the importance and potentials of digital platform to continue our academic activities too. The policy makers, faculties, educational institutions are trying to use the online platform at fullest possible way to reach their students for motivating and engaging them in their studies. The following methods of education are now available -- traditional face to face class room education and online education. Online education is about reskilling and restructuring the pedagogy how and what we teach in the digital environment. In online education, the technology is used to support learning through digital tools. Artificial Intelligence (AI) can be effectively utilized for imparting quality education to larger number of aspirants. But for effective application of AI, we cannot ignore the importance of Human Intelligence (HI). The HI is very important at every step of implementing the online education. The role of subject experts and technology experts are equally important for successful introduction of online education system (both synchronous and asynchronous). Only HI can implement the AI judiciously to integrate the Information and Communication Technology (ICT) in developing and delivering the course content to the mass. The objective of democratization of education can also be fulfilled by integrating ICT in the education system. This is due to the capability of ICT in providing a dynamic and proactive teaching-learning environment. ICT is now playing an important role for the dissemination of sustainable quality learning resources through web to achieve the goal set by SDG and NEP2020 India.

About the University

Netaji Subhas Open University (NSOU) was established in 1997 to commemorate the birth centenary of the great Indian patriot Netaji Subhas Chandra Bose by an Act of West Bengal state legislative assembly (West Bengal Act XIX of 1997). The university is duly recognized by UGC-DEB and RCI for all its degree programmes. One of the objectives of establishing the sole State Open University (SOU) in West Bengal was to bring the higher education at affordable cost to the aspirants irrespective of their age, profession and location. In the academic year 2019-20, NSOU had 162 Learner Support Centres (LSCs) across the State of West Bengal. These LSCs are assigned to three of its own Regional Centres (RC) and Headquarters for close monitoring and providing academic and administrative support services to its learners. The faculty members of different disciplines are also posted at Regional Centres for providing academic support to the learners of the respective region. Total number of learners enrolled in 2021-22 was 4.50 (including renewal). Approximately 3,385 Academic Counsellors are engaged at 162 LSCs who are the UGC qualified teachers of the host institutions. The University offers fifteen Under Graduate and fourteen Post Graduate, two 2nd Degree Programme (B.Ed.-Special, BLIS) and twenty nine short-term vocational and skill development programmes under its six Schools of Studies. The university has also started its Ph.D. programme (in regular mode) w.e.f January 2021 session.

Access to higher education is one of the most fundamental issues before the University. All the initiatives taken by the University are to ensure the i) *Expansion* (establishing LSCs in the remote areas, using ICT in the fullest possible way), ii) *Equity* and *Inclusiveness* (in the open university system, any person can pursue any course subject to fulfilment of minimum criteria as laid down by the UGC), and iii) *Excellence* (by recruiting quality teachers & providing relevant academic contents through SLMs, Audio-video lectures, etc.). The effective use of ICT can address many challenges in education sector.

ICT Integrated Pedagogy- The Innovation

Educational institutions across the globe are going through a revolutionary change in developing curriculum and its pedagogical design in the changing environment specially in the post pandemic period. With the advent of ICT, there are different stages in the pedagogical approach which needs to be integrated for effective learning. ICT may be defined as diverse set of technological tools and resources which have the potentials to increase access and give equal opportunity to all types academic resources. The judicious use of ICT facilitates anyone, anytime and anywhere learning. Designing the pedagogy for any particular programme is to identify teaching strategies, activities to be carried out and assessments strategies to achieve desired learning outcomes. Due to emergence of digital era and to overcome the challenges of COVID-19, Netaji Subhas Open University has integrated the modern tools of ICT and facilities in the pedagogy for delivery of its programmes. This innovation of “ICT integrated pedagogy” has changed the learning style and attitude of the learners of the university significantly specially in the pandemic period. Increasing internet penetration and rising demands from students have also enabled the university to overcome the challenges to impart education through digital platform. The integration of ICT in the pedagogy of the university programmes fulfils in one hand, the provisions of Chapter 21, Chapter 23 and Chapter 24 as laid down in the NEP2020 and on the other hand addresses the issues like inclusive, equitable and lifelong education as identified in the SDG4. This initiative reduces the costs, personalize students’ learning experience etc. Teaching-learning process has been radically transformed from traditional face to face method to technology enabled digital learning having the facilities of wide accessibility, flexibility in terms of time and pace, cost effectiveness etc. With the integration of technology in the pedagogical design the access to educational resources increases significantly. The digital platform has now become the necessary to reach the mass and to democratize the education. The global pandemic forced the educational institutions to operate digitally plunging them into a digital educational revolution. Now the digital education has become an important part of the course delivery system of education.

“ICT Integrated Pedagogy” is a combination of

- The dedicated LMS - developed in MOODLE platform
- The NSOU OER Repository - developed on DSpace software
- The Mobile App - hosted on android setup (downloadable through Google Play store)

All the digital platforms are learner friendly which can be easily accessed any time any where either on PC/Laptop or mobile phones.

Components of ICT enabled learning system

- i) e-SLM
- ii) Audio-Visual Lecture
- iii) Live Chat through LMS
- iv) SMS through registered mobile number
- v) LMS (www.nsouict.ac.in)
- vi) OER Repository (www.nsou.krc.net.in)
- vii) m-Learning (Mobile App) for online learning
- viii) SD Card for off-line learning
- ix) Online Placement Facilitation Service
- x) Web TV
- xi) Web Radio-Muktak

The ICT enabled courses have two areas of focus, viz. generation of content (audio-video lectures and reading materials) and creating awareness of using digital devices with internet facility for education purposes. All the e-content are developed in the studio set up by the University. The faculties are engaged in developing and editing the e-content. Once it is approved by the competent authority, the e-content (e-SLM and A/V Lectures) is uploaded on the dedicated LMS and OER Repository. The registered learners can access all the academic resources available in LMS through their user ID and password. The academic resources are also made available through Mobile App. The NSOU OER Repository helps access the academic resources any time any where with CC BY-NC-SA license. All the services are being provided on internet services i.e. internet accessibility is

required to access the academic content through LMS / OER Repository. The academic resources are also provided through SD card to facilitate off line learning in selected course like B.Ed. (Special education).

Benefits of the ICT Intervention in the pedagogy

In educational context, ICT has potential to increase access to educational materials and improve its outcome and quality. The educational resources developed under this innovation follow four quadrant approach which includes text, A/V lectures, animations, self assessment questions/ quiz, link of online resources (further readings) which increase the learners' motivation and their interest to learn. The ICT integration encourages interaction and cooperation among peers and teachers regardless of distance and promotes learner centric education which helps them assessment and decision making. In ODL system, the learners and teachers are scattered in terms of places. The "ICT Integrated Pedagogy" helps in minimizing the distance and facilitates real time interaction. In short, this particular innovation has the potential to i) meet the learning needs of individual learners, ii) provide quality educational resources and iii) promote Equal opportunity. The use of technology can cater to individual needs with respect to time and pace. The content which is prepared and presented using multimedia makes learning interesting, joyful and effective.

The "ICT Integrated Pedagogy" has the following benefits:

- ❖ Outreach & inclusivity
- ❖ Increase access to quality learning materials
- ❖ Personalized learning and improving learning outcome
- ❖ Improve in Institutional image
- ❖ Increase in GER
- ❖ International presence of NSOU faculty on the web

The open university is established to overcome the limitations of infrastructural facility and human resources. But increase in enrolment in the open universities is beyond expectation. The learners from diverse background join open university courses for different purposes e.g. some may join to gain knowledge, some may join to get certificate for vertical or horizontal mobility at their workplaces or some may join for lifelong learning. To address the learners' diverse needs, the ICT intervention in the pedagogy might be an appropriate solution both from institutional point view and from learners point of view. This innovation has the potential to bridge the gender inequality gap among the female minority too as they can pursue their higher education from their home due to family restrictions in different community. This particular intervention helped maintain the increasing trend in the enrolment in various programmes of the university during the last couple of years in spite of the pandemic situation. The COVID-19 pandemic has shown us the necessity of digital education as well as various creative means to engage, interact and collaborate with the students on digital platform. ICT mediated educational programmes have become an indispensable part of the pedagogy with student centric approach, providing flexibility of time and space to the teachers and students. As every challenge gives new opportunities, the COVID-19 forced to restructure and redesign the delivery mechanism of educational programmes with the integration of ICT in the pedagogical system of education.

In order to make use of technology in the education system effectively, all the stakeholders should have positive attitude towards technology and they should be trained in using the modern technologies not only in developing the educational content but also in delivering the content to the learners. Presently, the ICT doesn't confine with use of laptop and presenting the lecture with PPT, it is some thing more where the ICT is being integrated to develop and delivery of the educational contents to the mass. This innovation will definitely meet the demand of higher education for thousands of people who wants to acquire knowledge and skills irrespective of their age and place of residence. Thousands of learners can take the benefit of lifelong learning through the innovation - "ICT integrated Pedagogy".

In open education system, four basic foundations are very important viz. i) more opportunity for large numbers, ii) flexible learning in terms of pace and time, iii) continuous learning i.e. lifelong learning and iv) inclusive education i.e. including the excluded. All these objectives can be achieved through effective utilization of ICT. Today, ICT plays a major role in our lives. At every step, we are dependent on the technology whether it is mobile phone or internet. Due to advent of technology, the distance is no more distance today. Open and Distance Learning can now be termed as open and digital learning which help a real time interaction between the teachers and taught and among the peers. This particular ICT based innovation is very much relevant to the concept of ODL system as it addresses all the basic foundation of ODL system.

Analysis of Learners' Feedback on the ICT intervention

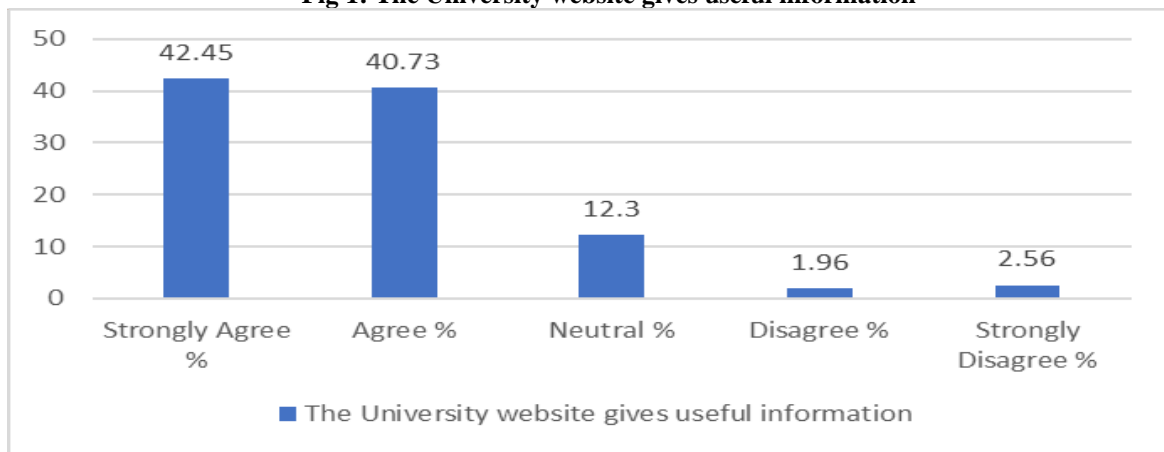
Due to emergence of digital era Netaji Subhas Open University had integrated modern tools of ICT and facilities in the pedagogy for delivery of its courses. This intervention of ICT in the pedagogy has changed the learning style and attitude of the learners of the university significantly. Among other questions, the following questions were asked in the survey during the pandemic.

- a) The University website gives useful information
- b) Multimedia (Audio/Video etc.) content is supplementing the teaching learning process and academic counselling
- c) The university mobile app provides useful information including e-content
- d) Online lectures are preferred over face to face counselling session
- e) Do the Audio/ Video Lectures enhance your reading skills in ODL environment?

The study examines students' attitudes on "ICT integrated pedagogy" during the COVID-19 pandemic. The study is based on quantitative method, collecting responses using online questionnaire from enrolled learners of under graduate and post graduate programmes of the university. The questionnaire was framed to examine the online teaching-learning experiences and their perceptions of the ICT enabled learning system of the university. Following figures exhibit that the learners are happy to get the information and academic content online. 16,214 learners participated in the online survey which has been analysed to get the students' perception on ICT based online education of the university.

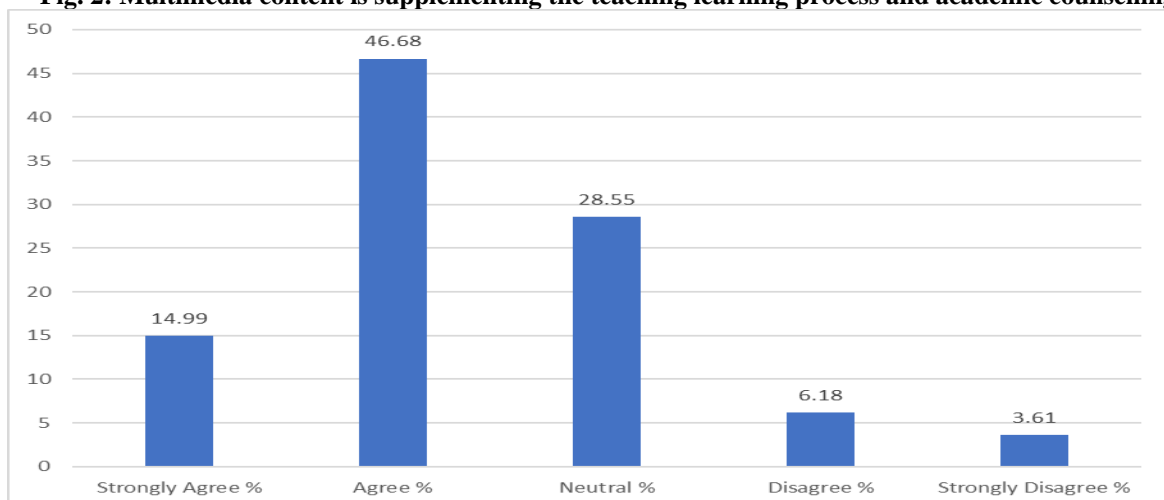
The NSOU website is the main source of information from where the learners get all information pertaining to their teaching-learning process. The learner's Life Cycle from entry to exit is based on ICT services. Online admission, online course materials, online payment, online examination form submission and publication of results etc. are made through the university website.

Fig 1: The University website gives useful information



As per Fig.1, majority of the respondents agree that the university website provides useful information to fulfil their needs for pursuing their course.

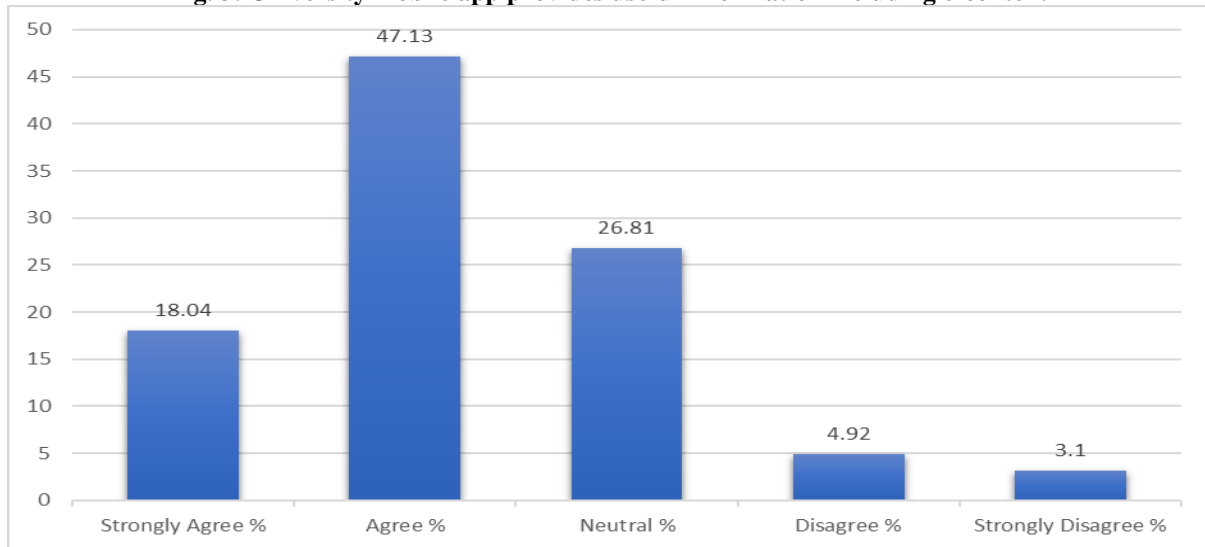
Fig. 2: Multimedia content is supplementing the teaching learning process and academic counselling



As discussed before, the university is developing non-print materials like e-SLM, multimedia content (Audio-Video lectures), study notes etc. under the "ICT integrated Pedagogy" scheme. Fig.2 shows that the NSOU learners are very much happy to access the multimedia content through web. This is a significant change in the

learning style of the learners. At the same time it may mentioned that 28.55% of the respondents could not decide on the effectiveness of multimedia content.

Fig. 3: University mobile app provides useful information including e-content



The University developed Mobile App for delivery of its educational content and information. The e-content i.e. non-print educational contents available on NSOU website are also made available on mobile App for its wide access. Fig.3 shows that majority of the respondents opine that Mobile App provides useful information and e-content and it is a welcome move of the university to make content easily available on their android mobile.

There was a specific question to know the learners attitude on online lectures. The lectures on different disciplines were recorded by reputed teachers including university faculties. These lectures were uploaded on website/ LMS. Fig.4 shows that the learners like online lectures. It has two aspects viz. the learners need not go to PCP centre and they can access the content any where any time as per their convenience. Another benefit is that the same content can be accessed for number of times for their understanding. According to Fig. 4, though 29.84% of respondents are neutral, majority prefer the online lecture over F2F counselling.

Fig. 4: Online lectures are preferred over face to face counselling session

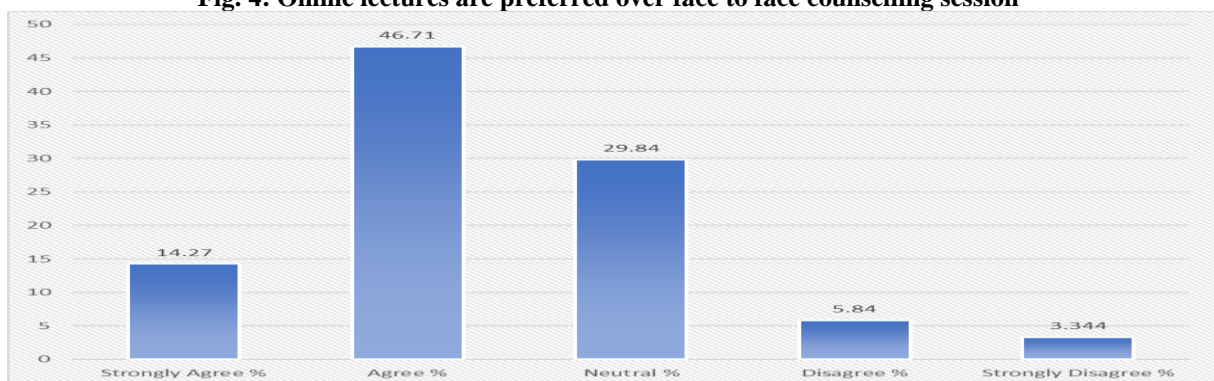
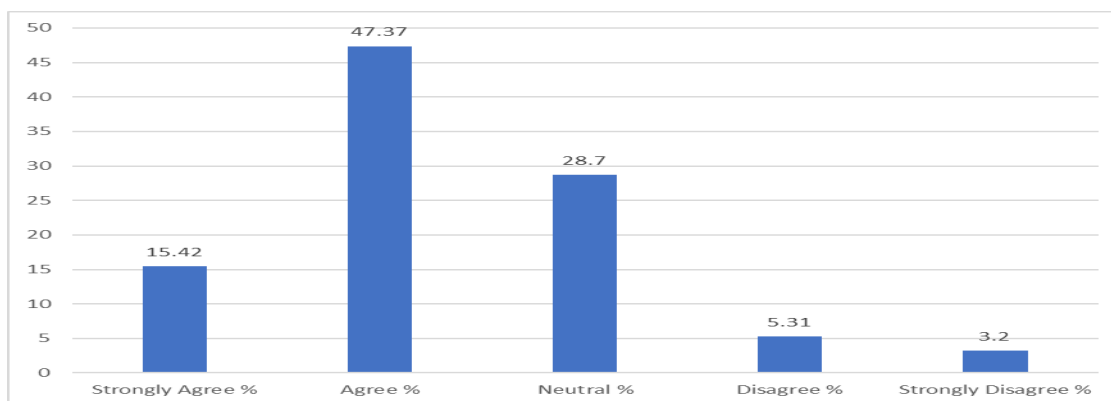


Fig.5 also supports that the A/V lectures developed by the university enhance the learning skills in open and distance learning system. The important advantage of recorded lectures is that it enables the learners to learn any where any time whether they are at work place and during their travel. The Learning Management System (LMS) plays a vital role in asynchronous mode of learning which is facilitated by MOODLE.

Fig. 5: Do the Audio/ Video Lectures enhance your learning skills in ODL environment?



Conclusion:

The University has taken a number of initiatives for the benefit of its learners. To cater to the needs of the huge learner base, we are developing more non-print/ e-content (e-SLM, A/V lectures, SD card etc.) for delivering the same at their doorsteps. These initiatives help us in reaching our learners directly with an objective to minimize their dependency on the study centres. The learning style and attitude of the learners has been changed in this century. The present survey results are very encouraging for the university that the 21st Century learners need online support whether it is academic and administrative matter. The university is on its right path to integrate the ICT in its pedagogy. The ICT initiative facilitates any time anywhere learning, ensures inclusive and equitable quality education and promotes lifelong learning for sustainable development. Though the COVID-19 pandemic has disrupted the teaching-learning activities and on-campus learning environment, the ICT enabled digital learning has created a new dimension in education at all levels.

The technology integration is the only way to address the issues like accessibility, inclusivity and lifelong learning. But whenever we talk about accessibility and inclusivity, we face the challenges of i) digital divide, ii) poor internet connectivity, iii) poor supply of electricity, iv) lack of training for teachers, and iv) language of the e-content. The govt. of India is taking various initiatives to promote the digital education under “Digital India” programme. “Digital India” was launched (2015) in order to make available to citizens the online infrastructure and by increasing Internet connectivity or making the country digitally empowered in the field of technology. With the help of NME-ICT project, a good number of quality E-contents have been developed. The UGC/CEC/ NITTTR etc. have already taken initiatives to translate the e-content in eight different Indian languages to increase its reach.

The successful implementation of blended mode (F2F and online / digital education) will have an impact in increasing the GER as well as in continuing lifelong learning for reskilling or retraining the existing workforce to remain relevant in the job market of 21st century and fulfil the objectives set forth in the NEP 2020. The government policies and initiatives will definitely help us change our mind set in adopting the blended pedagogy for the benefit of our students and the society at large. The education system can be restructured with the integration of technology and if the blended pedagogy is implemented successfully, the learning outcome may be improved.