A COMPARATIVE STUDY RESULTS ON IN-PERSON AND ONLINE SESSIONS OF FALL SEMESTER OF 2020-2021

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ABSTRACT

It is inevitable that digital transformation and technological advancement in ICT sector brings drastic changes into every aspect of our lives, and it has become top priorities of the countries around the world for the successful utilization into the mode of learning and teaching within the education sector. Though the fall semester of our university started off with regular regulations, all the education services were shut down due to the local transmission of COVID-19 pandemic in Mongolia. To continue the education services to the students during the strict lockdown, the usage of online training approaches through TV, radio and other means of technology were required to be introduced.

The purpose of this comparative study is to conduct detailed analysis on the benefits and downsides of both online and in-person training approaches with its impact, and to highlight the key follow-ups for further improvement.

Introduction.

During the spring semester of 2021, total of around 1.5 billion children of over 190 countries have been severely impacted by education institutions closures in all settings due to the COVID-19 pandemic. In order reduce the disruptive impact of the prolonged education loss of the children, utilization of different teaching and learning methods incorporation of internet and digital technology has had become the biggest priority of education sector. Certainly, this drastic change in the education sector brought both challenges and opportunities to children and teachers which many researchers are now interested in conducting detailed analysis of its impact and discovering new methods for strengthening and quality and delivery of the education services.

The key purpose of us including the universities and education institutes is to identify the primary means of strengthening the existing education services to provide the most favorable and holistic learning environment that can nurture and meet the needs of students in gaining necessary skills and habits for better adapting into disruptive and sudden changes. At this point, every country has gained valuable experiences

and established its proven ways and structure to continue the education services through different means of teaching methods and approaches.

Top universities including MIT, Harvard and Oxford have already started establishing e-training centers. Number of users and subscribers of free education websites including coursera.org and khanacademy.org has been increased drastically since the pandemic has started. Throughout the history of mankind, new innovations and technological advancements have always been and will be our greatest ally in development and prosperity. As many of us describes the era that we are all living in now has brought us the 4th industrial revolution (started from 2015) through the innovations and technological advancements in AI, cloud technology, 3D printing, internet services. It has already been over 5 years since the great advancement has started. Though the idea of 4th industrial revolution can rather be a recent discussion in Mongolia, there's already been great advancements and achievements in other countries. (6. P.12)

Furthermore, the 21st century can easily be defined as information and technology era (knowledge based, information technology and etc.) where the speed of information flow and technological advancement has already surpassed our imagination. This requires us share our knowledge and information with others more and work together closely.

The presentation from the Authority for Communications and Information Technology of Mongolia in September 2019 given during the "Nomads in the Digital Age" conference highlighted that Mongolia is in #14 in Asia in terms of ICT development index. In terms of digital infrastructure outreach, over 80% of households are connected to electricity. Usage of mobile phones in every 100 persons is 113%, capacity to purchase 4G services is 70%, usage of mobile internet services in rural areas is 26,3%. Number of users in social media are as 2,2 million in Facebook, 440,000 for Instagram and 44,000 for Twitter. These figures can easily prove that use of internet services and social platforms are high in demand in Mongolia. (As stated by Ms. Bolor-Erdene. B, the head of Authority for Communications and Information Technology of Mongolia) We've already passed significant period as we've started to utilize different means of information technology-based training and teaching approaches.

As for myself, I've utilized and examined different teaching approaches and methodologies to identify the most suitable options to strengthen the quality and output of the training programs for students and identify the appropriate implementation tools through conducting detailed comparative study and analysis. As I've already mentioned in the research paper that I presented in the previous Scientific Conference, the most suitable training approach is the hybrid approach where both online and in-person training programs are utilized simultaneously. This approach is also well described as "Blended learning" internationally.

The entire academic year of 2020 allowed us to carry-out the academic sessions completely online and identify the benefits and downsides of online learning approach, and further compare it with traditional learning approaches. The comparative research study was published in the Scientific Conference publication of the Mongolian Association for Higher Education Research.

The main challenge with the digital transformation is that its transforming "US" not the world we live in.

Our future generation: new generation ("Z" generation) is the perfect users of smart technology and internet services. Key good features of the new generation are; born and raised in the era of major technological advancements and innovations, prefers online and virtual learning approaches, have preference and capacity of learning independently, full of innovative and new ideas, have great expectation from society, have great ambitions to contribute globally – in other words, would like to bring positive energy in their surroundings. As for the shortcomings, few can be mentioned including low attention span, tries to focus on many tasks at the same time and etc.

As defined by the renowned Russian psychologist and educator, Lev Vigotsky (1896-1934), persons' cognitive development and learning ability is greatly guided and mediated by their social interactions and surrounding environment. He also stated that culture played an important role in shaping cognitive development and child's cognitive development flourishes more in culturally favorable environment. (1, p. 121)

Since the earliest invention and development of computer technology and the emergence of the internet services, scientists, and teachers from both developed and developing countries have been conducting various experiments and research on the use of digital technology and tools in education settings.

Depending on the different types of utilization of information technology tools in the education programs, several learning and teaching approaches including e-learning, m-learning, u-learning and blended learning approaches have emerged.

Within this comparative study, learning materials and programs were delivered to students through e-learning and blended learning tools including e-learning website of MUST, google classroom, google forms, Office 365, and social media platforms including the Facebook. Overall results and impact of the above tools were analyzed in detail.

The traditional teaching and learning approaches have been with us for a significant period of time and sadly fails to meet with needs of students along with social and technological advancements. As its heavily teacher-centered approach, only certain approaches provided by the teacher are pushed to students regardless of student's needs and their individual capacity of receiving information. Additionally, because traditional teaching methods emphasize in-person attendance, students who leave class or turn up late carry a significant risk of losing out on crucial lessons. Moreover, due to the digital technology children are not in favor of reading books and textbooks and prefers digital options more.

Teachers now have easy and direct access on putting necessary education materials on website or e-learning platforms and reach out to students with ease.

Comparative result of e-learning programs (spring and fall semester of 2020).

Within the academic year of 2019-2020, virtual learning program was delivered to 110 students in Architecture Department through 2 programs including 3D modelling - A.AR328, automation of engineering drawings. The purpose of the comparative study was to identify how well the students were learning and receiving the necessary knowledge and information related with the topics along with the challenges that students were facing due to the online and e-learning approaches. Key benefits and downsides of the blended teaching tools and e-learning approaches were examined and analyzed.

In the fall semester blended learning approach was scheduled as follows; first 4 weeks of the program were through online sessions, 5-11th weeks of the program were in-person, 12-16th weeks of the program were online.

At the beginning of program following questions were asked from students through survey:

While connecting the online classes, from where are you connecting from? – To identify the locations of students (name of the city, or name of the province or soum) – 110 students answered to the question and results were as shown in the below picture. (Figure 1)
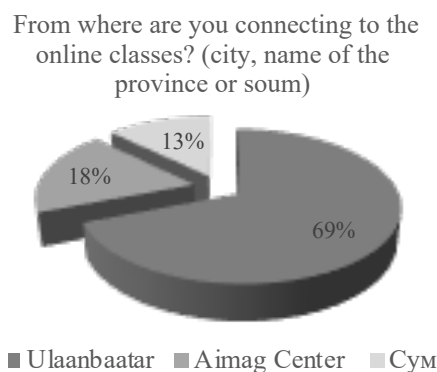

From where are you connecting to the online classes? (city, name of the province or soum)

13%
18%
69%

■ Ulaanbaatar ■ Aimag Center ■ Сум

Fig. 1. Average percentage of students' location from where they're connecting to the online classes

Due to the start of the academic year, most of the students were already in Ulaanbaatar regardless of the pandemic lockdown situation with over 70% of them attended to the both online and in-person classes while they are in Ulaanbaatar. Remaining 30% of the students attended to the classes virtually from aimag and soum center. The same pattern in the students' attendance can be seen in the spring semester as most of the students went back to their hometowns before another lockdown started.

For the students who were even far from the aimag and soum center, overall availability of attending online classes were limited in both semesters as they were required to travel to aimag and soum center for better connectivity and services. During the spring semester of 2020, total of 25-30%

of students were faced with this issue. However, at this time, this number went down to 14% which can illustrate that from spring semester students understood the importance of being the places with good connections and infrastructures.

Students who were studying and connecting from far rural areas were required to travel to aimag or soum center everyday or several days a week and stayed there to attend the online classes. This was the main challenge that students faced in the beginning of the blended program.

Thus, it showed that while even conducting online classes its not appropriate and suitable to impose or push the online classes directly students which will also affect the result and quality of the program.

There were many other challenges that students faced during the online and blended program approaches. To name a few, the overall capacity of the computer that the students were connecting to online classes with, different types of internet connections, stability and speed of internet connections, overall knowledge and digital literacy of students, financial burdens if they were connecting with 4G connection, main feature of the selected program, preparation tools, teacher's methodology and skills. Through conducting survey consolidating all above issues, showed us fascinating results which I'd like to share as part of this study.

Answers to the question "How stable were the internet connection services while you're connecting to the online classes?" (figure 2)?

2%
25%
57%
16%

■ Stable connection

■ Stable and good connection but connects to the online classes sometimes
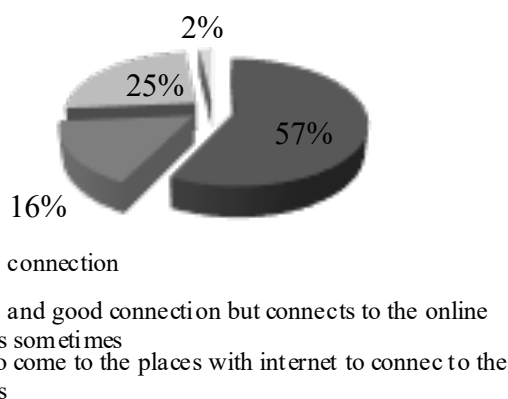■ Had to come to the places with internet to connec to the classes

Fig. 2. Percentage of connectivity availability

From above illustration we could see that being the urban areas doesn't mean that students have stable internet connection availabilities. As 45% of the students replied that they need to travel to other places that have good internet connection, connectivity issue was major challenge for students regardless of them being in Ulaanbaatar or other locations. This figure has dropped significantly in the fall semester as only 25% of the students highlighted the same issue. It can be explained by the fact that most of the students were in Ulaanbaatar during the fall semester.

Even being in Ulaanbaatar couldn't guarantee good internet connections as certain locations including Bayankhoshuu, Tolgoit, 7 Buudal, and areas closer to the airport have poor connection services. Students who were living in these areas often required to travel to city center or university building to complete their assignments or connect to online classes. As only small part of the students replied with this answer, hope the connection services in above areas in Ulaanbaatar will get better.

Another major challenges that students were faced with directly related with quality and capacity of the digital and electronic tools that they were using to connect to the classes, can be seen from figures in below figure (Figure 3.)

As shown in the below figure, over 50% students used their smartphones and 46% of students used laptop and desktop computers while connecting to the online classes.
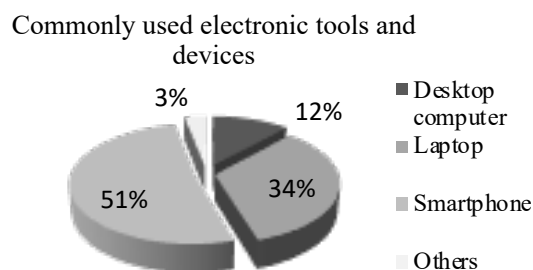
Commonly used electronic tools and devices

- Desktop computer
- Laptop
- Smartphone
- Others

3% 12% 34% 51%

Fig. 3. Types of electronic devices and tools that students use to connect to online classes

Though it seemed that students were able to take notes, calculate and see the class materials with ease, they faced with challenges when I taught the required software program that is needed for the class. In other words, usage of laptop for desktop computer was required from the students to fully learn and work on the software program. This issue posed little concern as students were completing their assignments and classes by borrowing laptops or desktop computers from others when necessary. However, online, or e-learning classes are more in favor of the students who are equipped with necessary tools and devices. For the students who are attending to in-person classes, online tools and classes can be utilized as supplementary means of support which is also described as "Blended learning".

Another key prerequisite of online classes is internet connection speed. (Figure 4).

Internet connection speed (by percentage)

- Very good
- Good
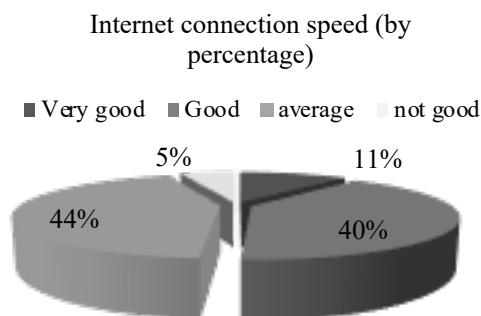- average
- not good

5% 11% 44% 40%

Fig. 4. Overview on internet connection speed

The internet speed may differ based on the student's location in the city or the countryside and the internet network they are utilizing. According to the above figure, 44% of the internet speed used by students was average, and 51% of it is good, which can be considered as a reasonably reliable good indicator.

Though this figure got slightly improved in the fall semester but with no significant result or improvement. As the internet connectivity and infrastructure issue is closely relates to the overall ICT sector development of our country, we hope that this figure will get better year by year as more households can be provided with internet connections. In the end, we were provided with opportunity to implement blended learning programs based on the overall ICT development of our country.

During the fall semester, the blended learning tools and approaches were also utilized as well to provide more opportunities and favorable learning environment for students. In order to strengthen the quality and output of the class materials additional teaching materials were prepared by teachers utilizing video lesson preparation, slide and flash technology, power point, screencast o matic, camtasia, adove flash, ispring and other teaching tools effectively. (Oliveira et al., 2019). Detailed class materials were given to students to e-learning website of MUST along with Google classroom and the Facebook through creating designated groups for students and put the classrooms materials in the group platform. (Figure 5).
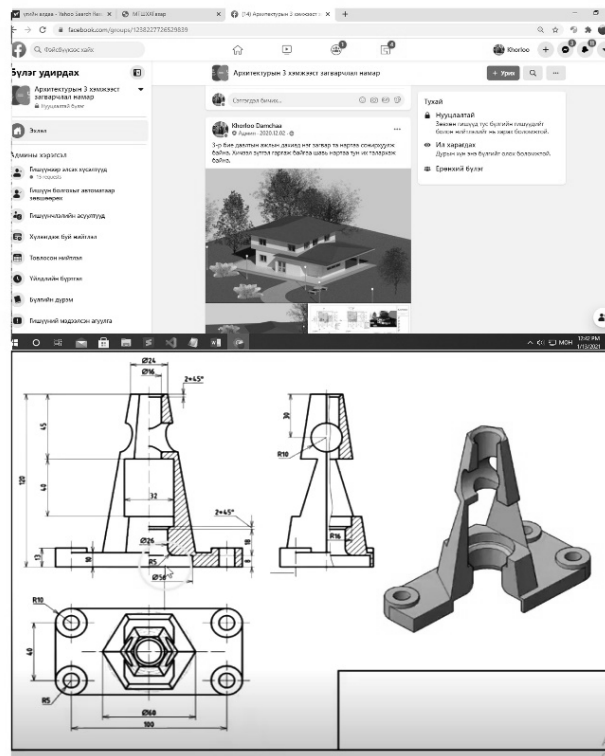
Fig. 5. Example of video lesson put on the Facebook group for students

Students can access to their preferred online tools and websites to retrieve the classroom materials which allowed them to improve their self-learning skills while connecting and communicating with teachers and other students easily through different tools. Students were also provided with online easy tests to evaluate their knowledge on the class materials through Google Form and Office 365 tools. (Figure 6).
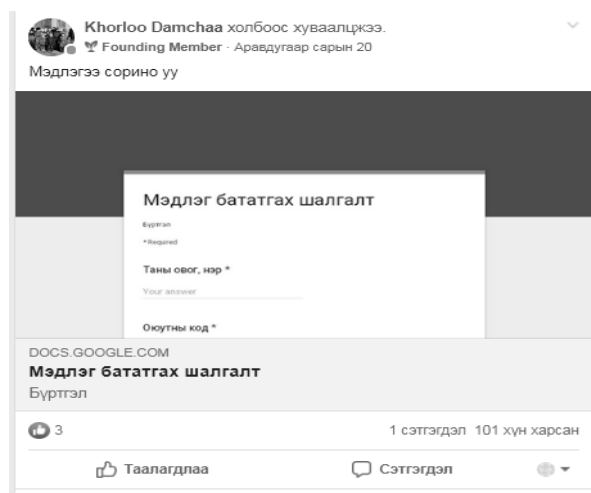

Fig. 6. Example of online test on the Google Form

By providing online easy test tools for students, students were able to examine and evaluate their knowledge and information gained through each class materials. If any improvements were needed, students were able through class materials again with ease and correct their mistakes which can also considered as good leverage to boost students and participation and engagement. On the other hand, these types of online tests can also provide overview of students' knowledge level to the teachers and allow them to identify the areas of further improvement.

Smartphones are the easiest and most convenient electronic device that allow us to connect with internet services and online platforms. With ease of information exchanges and flows in the social media platform, students are provided with more opportunities to study and review class materials easily.

With the online curriculum and class materials are uploaded on the website, students were given the opportunity to control over the lesson activities and can review the materials again with ease. This allowed students to strengthen their self-learning skills.

To conclude, we can clearly see that students were not prepared physically and mentally for the online classes and blended learning programs in spring semester due to the sudden lockdown. From the results of fall semester, students were much more prepared for the blended learning programs as they acquired more experiences and skills compared to the spring semester.

Comparative study on in-person and online programs (Fall semester of 2020)

Compared to the online classes, in-person attendance to the classes allowed students to have more interaction with teachers and other students and discuss and ask about class materials directly with the teacher which can be one of the advantages of it. (Guzdial, 2015; Jenkins, 2002).

Over 70 students attend to the lecture sessions and projector was used to show and explain the program. Depending on the size of the projector screen and overall lightning, some students who were seated far from the screen had faced with difficulties in seeing the presentations in the screen. (Figure 7).
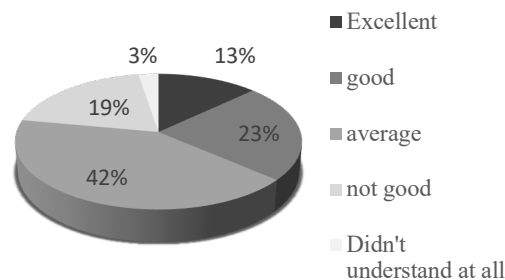

Fig. 7. Overview on students' understanding on the lecture sessions

Depending on number of students in the class, mode of classroom activity, equipment required for the presentation, in-person classes also reach to student differently as 36% of the students understood it very well, 42% of the students understood it good, over 20% of the students understood it poorly. The question was asked from the students after lecture was delivered to them with great efforts. As described by the cognitive triangle indicator, students will receive and understands only 5-20% of the lecture or presentation, the actual understanding level of students can be even lower. To improve above figures, additional efforts were taken by teachers to prepare the video lessons with explanatory notes were prepared.

Preparation of additional video materials allowed students to go over the class materials with ease and test on Google form themselves over the class materials and re-visit some materials if necessary. Students were also provided with opportunities to connect and communicate with the teachers through social media platforms, if necessary.

Figure 8 shows how students' knowledge improved after the supplementary online tools including video lessons and class materials were provided to them. It is observed that 76% of the students who studied the lesson fully and got a good understanding of the online lectures have significantly increased their knowledge. For the students who ignored the online opportunities and didn't review the online materials, no significant improvements were recorded. There was not a single student who didn't understand the lecture material completely.
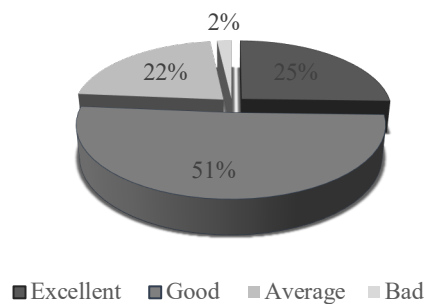
Fig. 8. Overview on students' understanding on the online lecture topics

Laboratory sessions were organized with usage of laptops as the teacher demonstrated and explained the usage of required software tools to students. With actual demonstration of the teachers during the laboratory, students were assigned with individual assignments at home. Of course, the capacity and overall condition of the laptops impact students' speed and capacity to understand and receive the given knowledge. (Figure 9).
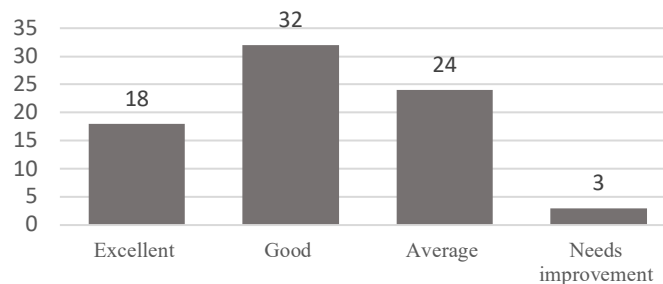

Fig. 9. Overview of laboratory assignments completion performance of students

Each laboratory session includes 25-27 students in each class and follows the order of teacher presenting and demonstrating the usage of tools to students, and students follows and performs the assignments on their own. During the laboratory sessions, many factors impacts the overall understanding and performance of students including teaching approach of the teacher, students' capacity to receive information and knowledge, information processing speed and capacity, basic knowledge and skills on digital tools including laptops, technical capacity of the laptops and other devices. The biggest downside of the laboratory sessions is once student misses the session they cannot retrieve and review the session again which will also affect their capacity to complete the given assignments. As all laboratory sessions closely connected with each other and are in order of sequence, missing these sessions will have severe impact on the overall understanding on the given topic. To prevent such cases and reduces the risks for students, laboratory sessions can be recorded and shared with students for them to review and retrieve with ease. After incorporating online laboratory sessions for students, following significant changes were shown. (Figure 10).
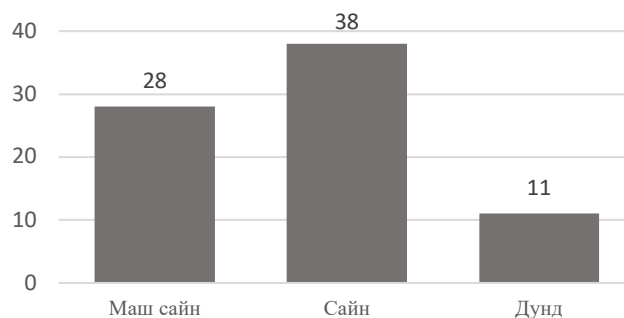
*Fig. 10. Progress shown in the students' performance after blended approach
was introduced in the laboratory sessions*

Preparation of online tools and materials for the laboratory sessions significantly improved the quality of program and both teachers and students were satisfied with the results.

Incorporation of online tools in the laboratory sessions recorded significant improvement the performance of students and both students and teachers were satisfied with the improved quality and output.

In classroom sessions, 50 (64%) of 77 students understood the lesson well or better, 27 (34%) students understood the lesson at an average or poor level, while in mixed learning, 66 (86%) students understood the lesson well or above, and 11 (14%) had an average level of knowledge. took. From here, the number of students who understood the subject at an intermediate or lower level immediately decreased by more than 20 percent. This can be understood as the result of our use of blended learning methods.

As for the software program lesson, weekly assignments were given to the students and students were allowed to send their progress and assignment through chat with teacher and receive feedbacks directly. If any feedback and advise from the teacher is needed, the Facebook messenger and ZOOM were commonly used. These tools supported to nurture active learning process of students. Online video lessons on the software program lesson were prepared and delivered to students for them to follow each step of the process which allows them to acquire detailed understanding and knowledge.

In this way, every year, by conducting experiments and researching which method is more profitable, what results were obtained by using it in the training, from the indicators of A and B of the Descriptive Geometry (S.ED101) semester taught in the fall semester of 2015-2019 (Fig. 11) can be seen. A total of about 500 students participated in this experiment, and as a result of adapting the course content and teaching methods to the current situation, and improving them in the next semester, it will be clear what progress has been made in academic performance.
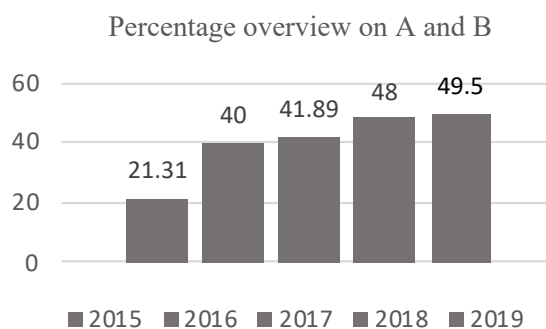

Fig. 11. Overview on the improvement of A and B

Conclusions.

Due to limited infrastructural development in both urban and rural areas, online training approaches cannot completely substitute the presence of in-person training approaches yet. It was observed from the study that if there are no problems with the infrastructure system and connectivity of the Internet services in rural areas, and if the students are fully provided with the necessary computer equipment for studying, there will be no problems in conducting courses in blended approach.

The knowledge level of the students in the program lesson that I taught this time significantly improved as the prepared the lessons were in accordance with the standards and delivered it using the techniques mentioned in the previous article. All students mastered at least 80% of the knowledge that should have been taught in the lesson. It may be argued that there is a chance to use it for the future generation's education. Within the blended learning approaches, students were allowed to connect and communicate with teachers directly. Certainly, there were several challenges relates to the blended learning program;

- Lack of access to internet connectivity and limited or poor internet speed
- Software tool program required students to have devices with good technical specifications and capacity
- The required software program needs to be installed in the computers and laptops.

In order sustain active engagement and participation of students in the class activities, additional points for their engagement and checking their progress and results regularly did certainly provided us with necessary encouragement and support.

REFERENCES

1. Роберт А. Рейзэр, Джон В.Демпсей
2. Сургалтын загварчлал болон техssнологийн хандлага, асуудлууд. Улаанбаатар 2014, - 530x
3. Пүрэдорж Ч., Багшлахуйн менежмент. Улаанбаатар 2013, - 486x
4. Берт Крйммерс, Леонидас Кириакайдс Багшлахуйн чанарыг сайжруулахад багшийн хөгжил. 2013, - 266x
5. Google forms, google drive
6. Socrative.com вэб сайт
7. Аж үйлдвэрийн IV хувьсгал. 2021, -15x, pdf (https://www.humanities.mn/)
8. Jenkins, T. (2002). On the difficulty of learning to program. In Proceedings of the 3rd Annual Conference of the LTSN Centre for Information and Computer Sciences, (vol. 4, No. 2002, pp, pp. 53–58).
9. Oliveira, A., Behnagh, R. F., Ni, L., Mohsinah, A. A., Burgess, K. J., & Guo, L. (2019). Emerging technologies as pedagogical tools for teaching and learning science: A literature review. Human Behavior and Emerging Technologies, 1(2), 149–160.
10. https://files.eric.ed.gov/fulltext/EJ842732.pdf
11. https://doi.org/10.7551/mitpress/9780262013949.003.0005
12. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9053052/