Learner Centered Learning 2020

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IBS Scientific Workshop Proceedings

The “Learner Centered Learning” (LCL 2020) held on 10 and 11 November 2020 is the second workshop by the “Internationales Informatik- und Begegnungszentrum Sachsen (IBS)” fund and organized previously in 2018 for the first time. This year, the LCL 2020 organizers are from the Open Education Center of Mongolian University of Science and Technology, University of the Philippines Open University and IBS.

The successful organization of LCL 2020 allowed us to provide an opportunity for leading international researchers to share ideas and research outcomes, facilitating knowledge exchange among the research community.

Due the Covid–19 pandemic this year’s workshop took was an online event.

It is our strong belief that the issues discussed in this symposium did not only allow us to overcome unprecedented challenges but also open the door for citizens of the world to access high quality researches relevant in their field of interest from anywhere in the world.

We will always be eager to further cooperate with you.

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Self -Assessment of E-Learning Using the Structure - Oriented Evaluation Model

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Abstract

E-learning has been confirmed as one of the form of training that has the potential to continue and provide education during the pandemic around the world today. Our aim is to identify the need for changes in e-learning materials, e-learning environments, and communication tools, subject teaching and student assessment methods, and measure the success of e-learning in a given semester. The assessment was carried out by collecting data from 50 students who took the Programming Fundamentals course in the second semester of the 2019-2020 academic year, the data was processed using the online software structure oriented evaluation (SURE) model for a structuring-based assessment methodology. The results of the study are the following conclusion: teach students to use Learning Management Systems (LMS) well, prepare educational materials in the mobile version, during e-learning, the teacher must constantly encourage and support students, it is inappropriate to consider the number of logins into LMS as the main assessment when assessing student performance.

Keywords: SURE model, distance learning, learning material, assessment objective, assessment methodology, teacher's activity, learning environment, communication tool, assessment value

Self -Assessment of E-Learning Using the Structure - Oriented Evaluation Model

E-learning and distance learning are becoming more sophisticated. Mongolian universities have been widely supporting e-learning. Mongolian University of Science and Technology (MUST) is the first Mongolian university to focus on e-learning and distance learning. Our university initiated, developed and implemented e-learning standards by creating an open institution.

From 2007 to 2010, the MUST developed and implemented a distance learning program. Under this program, online learning is widely supported and many lessons have developed (Jargalsaikhan, MUST-Library's web, n.d.). Between 2007 and 2018, about 500 e-courses has been prepared and master's courses were fully conducted online.

With the outbreak of the novel coronavirus (COVID-19) in China in December 2019 which has been spreading at an alarming speed, Mongolia, neighboring with 4700 km wide land and 13 border points with China, faced a high risk of being affected by the virus at the first. Therefore, as a preventative measure to protect its citizens from this risk, the Government of Mongolia has suspended all educational deliveries and facilities starting from 26 January 2020. Meanwhile, to continue the studies of the students, the Government has prepared online courses and Tele-lessons in several languages such as Mongolian, Kazakh, Tuvan and sign language which are available to the students, their parents, and teachers and are being delivered on 16 different television channels with a fixed daily (Ministry of Education and Science, 2020). In connection with the global situation and the spread of the COVID-19 virus in the world, the Minister of Education and Science of Mongolia issued a decree on January 27, 2020 No. A/43 "On the adoption of urgent organizational measures" (Ministry of Education and Science, 2020). In accordance with the Decree of the Government of Mongolia and the Order A/43 of the Minister of Education, Culture, Science and Sport dated January 27, 2020, the Mongolian University of Science and Technology has been teaching all degree programs online since January 27, 2020. In Mongolia, in the second semester of the 2019–2020 academic year, 148.5 thousand university students were engaged in distance e-learning (Ministry of Education and Science, 2020). 1003 teachers for 20518 students of the Mongolian Science and Technology University taught using the UNILMS cloud platform (MUST, n.d.). And 1319 students of total students are studying 108 undergraduate courses, 75

students are studying 59 master's courses, 5 students are studying 12 doctoral courses at the School of Information and Communication Technologies using distance learning system MOODLE.

The global situation shows that the duration of the epidemic is uncertain. On the other hand, e-learning materials should be used in parallel with classroom teaching and beyond, so it needs to be clarified whether the teaching materials used in this training, the e-learning environment, communication tools, teacher activities and student assessment methods need to be changed. This article summarizes the results and conclusions of the Programming Fundamentals course using a structure-based assessment methodology to measure the success of the e-learning process over a semester.

Methodology for evaluating distance learning

E-learning is a new form of learning. The development of computer technology, low cost, and the advent of Web 2.0 technology laid the foundations for the widespread use of e-learning (Tudevdagva and Hardt, 2012). As a result, the development of the Internet has entered a new phase, with improved Internet speeds and increased access, making e-learning more accessible to students (Tudevdagva, 2014). Although a number of quantitative and qualitative methods for evaluating e-learning have emerged, assessment methods that have become the standard worldwide have not yet been developed. E-learning assessment can be performed using model-based methods such as Dr. Don Kirkpatrick's four-tier model and Anderson's three-stage learning value model (Industry", n.d.). Of these methods, a structure-based evaluation methodology was selected for the assessment.

SURE Distance Learning Assessment Methodology

E-learning is the collaboration of many different groups of people. For example:

- Professor;
- IT staff;
- System Administrator;
- University Management;
- Students; etc. can be mentioned in the first place.

E-learning is should consist of minimal elements such as:

- Training Materials;
- Learning environment;

- Subject teacher;
- Learning management personnel.

The aforementioned stakeholders will be responsible for the e-learning elements in their respective areas. Only through this collaboration e-learning is possible. Therefore, it is recommended to use a model and methodology that fully evaluates the responsibilities and effectiveness of all stakeholders in conducting a meaningful e-learning assessment.

No researcher in the world has yet developed such a comprehensive methodology. Researchers continue to come up with their own methodologies, but the nature of e-learning is so broad that it will take time for any method to become the standard.

The SURE e-learning model name is an abbreviation of the English name “Structure oriented evaluation model”. This methodology is unique in that it evenly involves all parties involved in e-learning in the formulation of the target assessment framework.

The methodology is also designed to be the first to use assessment questionnaires and assessment indicators based on these goals. The biggest feature is the use of pre-designed mathematical calculation methods to process the data collected from the questionnaire and this calculation rule is significantly different from all other e-learning assessment methods (Tudevdagva, 2020).

There are 8 steps to evaluate the SURE assessment methodology. This includes:

- Define the main purpose of the assessment and create a logical sequence structure;
- Define sub-objectives for the assessment and create a coherent logical framework;
- The main and sub-objectives of the assessment will be sent for approval to the groups participating in the assessment;
- Develop assessment questionnaires and data collection questionnaires based on the approved structure;
- The assessment questionnaire will be sent to the assessment teams for approval;
- Data will be collected and assessed using approved questionnaires;
- The collected data will be calculated and processed mathematically based on the assessment framework;
- Based on the results of the assessments, a report will be prepared.

Based on these steps, an online tool was developed to simplify the evaluation data processing section. This is another prerequisite for the use of a structure-based assessment methodology.

Participants / Processing of evaluation data and results

Statistics and evaluation data

Data was collected from 54 students who completed the Programming Fundamentals course in the second semester of the 2019-2020 academic year using an online survey or a Google form. Of the total number of students who participated in the assessment, 4 students did not answer the questions, so the assessment data of 50 students was processed. From the students who surveyed, 68.62% were first year students, 9.8% were sophomore students, 9.81% were third and fifth year students, and the remaining 11.76% were students of more than five years. Of these students, 35.29% were women and 64.81% were men. 72.55% of students used only smartphones, 3.9% only personnel computers, 5.88% only laptops, and 17.67% used a combination of all above, 82.35% said they bought dates for mobile internet, 9.8% used home internet, and 7.85% used both.

The assessment questionnaire was designed to assess the main components of e-learning, including e-learning materials (Jargalsaikhan, 2013), communication environment, teacher-student relationship, and student assessment methods. The assessment questionnaire consisted of 25 questions from 4 main groups: teaching materials, communication to create a learning environment, teacher skills and knowledge, and knowledge assessment methods. During the term, the teacher developed questions for assessment, based on the specifics of the course, course materials, as well as the methods and technologies used to conduct the online course.

Data processing

The assessment questionnaire consists of 4 main groups and a total of 25 questions. Each main group and subsection consists of a different number of questions. The data of the collected assessment questionnaires were processed by the online program for calculating the data of the SURE model (Tudevdagva, SURE model evaluation, n.d.) As a result of data processing by the online program: the logic diagram of the structure to be assessed and the table of the assessment results are displayed directly. Figure 1 shows the logic diagram of the framework for which the assessment was conducted. Figure 2 shows the scorecard results with primary and secondary objectives.

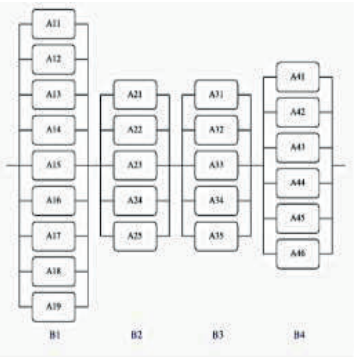

Fig. 1. Logical structure of the assessment

Fig. 2. Table of calculated results

One of the advantages of using the SURE method for assessment is that the ability to process collected data in minutes with online computing software saves researchers time and opens up a wide range of short-term processing of multiple assessment data.

Evaluation result

The grading program calculates the grade values for each major group and subgroup and for each student and displays them in a table. Evaluation of the e-course "Fundamentals of Programming":

$$\boldsymbol{Q_e^*(C) = 0.714913} \quad (1)$$

it is estimated that 50 students have successfully completed the Fundamentals of Programming course by 0.71%. In other words, the four core tasks that are considered important for the electronic lesson are graded together with a score of 0.71.

In addition, the following assessment results show how the four main objectives of the assessment were achieved, which are considered successful:

B_1=0.8; B_2=0.75; B_3=0.72; B_4=0.69;

Here, the highest score for e-learning materials is 0.8, the e-learning environment and means of communication between teacher and student is 0.75, the teacher's skill score is 0.72, and the lowest score is 0.69 for student assessment activities.

The table provides an overview of the collected data, prepared according to the framework of the assessment objectives, as well as the results of each assessment. (Table 1 and Fig. 3).

Table 1. Survey questionnaire and assessment

Assessment subsection questions	Notation	Value
The teaching materials were consistent with the objectives of the course.	A_{11}	0.63
The volume of training materials was appropriate for the size and duration of the training.	A_{12}	0.6
The composition and format of the training materials have been prepared in an interesting way to stimulate learning.	A_{13}	0.62
Learning materials prepared in PDF format for easy download.	A_{14}	0.7
Video lectures are suitable for studying them on your own, interrupting and re-watching the lecture.	A_{15}	0.68
Laboratory examples and tasks corresponded to the lecture material.	A_{16}	0.64

The instructor's personal explanation of the lab work in the online video conference helped to understand the lesson.	A_{17}	0.69
Video tutorials explaining the programming example supported self-study of the subject.	A_{18}	0.67
The duration of the video lecture was 15-30 minutes, which turned out to be optimal.	A_{19}	0.70
UNILMS at the Mongolian University of Science and Technology fully provided the communication environment for e-learning.	A_{21}	0.52
Moodle provided a complete e-learning communication environment.	A_{22}	0.56
Using the social network Facebook as an additional communication channel allows you to quickly contact the teacher, helped to understand the training materials.	A_{23}	0.68
The speed and quality of the Internet affected the download and learning of course materials.	A_{24}	0.71
In some cases, the use of a telephone connection was beneficial when the Internet was not available.	A_{25}	0.56
The weekly instructor's advice helped me learn the course materials on my own.	A_{31}	0.64
The teacher's answers to the students' question came quickly and consistently.	A_{32}	0.66
The instructor regularly sent us messages urging us to be persistent through e-learning and social media	A_{33}	0.73
Feedback was provided every time an assignment was submitted, making distance learning easier.	A_{34}	0.67
The teacher, every week, sent students the results of their learning, communicated with each student, encouraged them and gave them explanations, which strengthened their motivation for learning.	A_{35}	0.52
The assignments were not limited in time, which made it easier for students to complete their studies on their own.	A_{41}	0.61
It was fair to rate the progress of each topic against the progress of the student's knowledge.	A_{42}	0.58
Students' activity should be correctly assessed by the number of logins in the system.	A_{43}	0.50
Participation in the discussion was fairly factored into the assessment.	A_{44}	0.59
Each topic had a test section that helped you evaluate your own progress.	A_{45}	0.63
The assessment was conducted differently than in the classroom	A_{46}	0.57

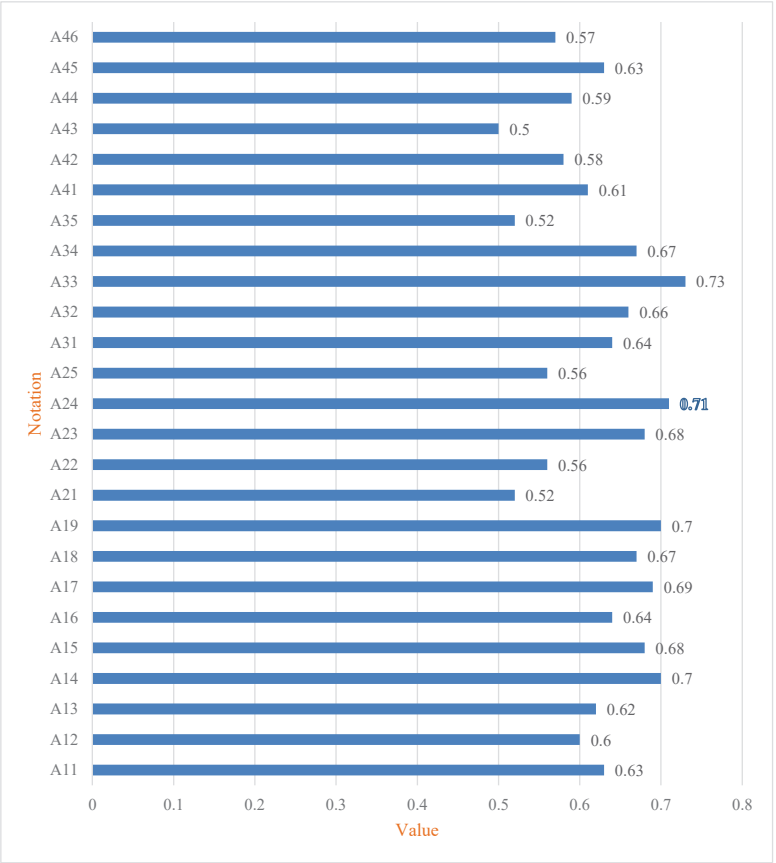

Fig. 3. Graphic of sub goals assessment results

Outcome 1

The highest student score, 0.73, was given to sub-indicator A33 "The teacher regularly sent us messages encouraging us to be persistent through e-learning and social media."This was one of the five sub-objectives of the third key indicator, Teacher Skills and Knowledge.

In distance learning, the most important assessment of these 50 students was that the teacher in charge of the lesson looked after the students, regularly monitored their activities and reminded him or her to actively pursue their studies.

Outcome 2

The A43 received the lowest grade of 0.50 from students. "Students' activity should be correctly assessed by the number of logins in the system." This was one of the six sub-objectives of the fourth key indicator, Knowledge Assessment Techniques.This confirms that Goal 4 was the lowest of the four main goals. The results of this assessment indicate that it seems inappropriate to take into account the number of course visits when assigning grades to students.

Conclusion

During the spring semester of the 2019-2020 academic year, 54 students taking the Fundamentals of Programming course using the Moodle eLearning management system were invited to familiarize themselves with the course materials, the eLearning environment, teacher activities and student assessment methods. During the 11th to 12th week of the spring semester, we received answers to 25 questions of the questionnaire. A 25-question questionnaire, consisting of a core group, was used to process and validate 50 valid data collected online using a Google Form and processed the data using the online version of the Sure model. The evaluation of the research results was 0.715, which indicates the successful organization of the course "Fundamentals of Programming" in online form. Among them, the value of the assessment of the subgroup was 0.80, which indicates the ease of studying the training materials. Based on this finding, prior to e-learning, students should be trained in the use of learning management systems, or guidelines and guidelines for the use of e-learning systems should be prepared and posted on the system. During e-learning, educators should always look for ways to motivate learners and use them in their teaching. Considering that the majority of students study using mobile phones, add a format option to the course materials that can be studied on mobile phones. It is inappropriate to use the number of course attendances as the main score for evaluating students.

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Theoretical and Methodological Analysis of the Essence of Distance Learning in Smart Cities of Kazakhstan

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Abstract

This study deals with the theoretical and methodological analysis of training University teachers to work in the system of distance learning in smart cities of Kazakhstan. The principles of distance learning are described which provide the main didactic and other requirements for the design and training process in the distance learning system. The main models that are used in distance learning were observed. The results and conclusions on distance learning models were summarized. Problems of introduction and development of distance learning are described. The impact of the pandemic in the country on the development of distance learning. Distance learning in the smart city of Nur-Sultan city.

***Keyword**:* Distance learning, model, case technologies, network, virtual, University.

Theoretical and Methodological Analysis of the Essence of Distance Learning in Smart Cities of Kazakhstan

In modern socio-economic conditions of society, the problem of establishing a distance learning system is of particular relevance. The need to meet several factors, among them: the length and focus of research and development centers in the major cities, the formation of new societal needs in relation to the content and technologies of distance education, the development of market economy, increasing population migration, quarantine, etc.

In the modern world, many social groups need distance learning:

- university students studying remotely (in the context of a Pandemic);
- students of secondary schools in rural areas, towns, small towns;
- managers of various levels;
- heads of regional management bodies;
- dismissed and reduced employees;
- persons who want to get a second education or pass retraining;
- employees who are forced to improve their skills in a new field of knowledge;
- citizens with limited freedom of movement;
- disabled.

Distance learning should help to solve such socially significant tasks as:

- improving the level of education in society and the quality of education;
- meeting the needs of the population in educational services;
- meeting the country's needs for quality trained specialists;
- increasing the social and professional mobility of the population, its entrepreneurial and social activity, the level of self-awareness, expanding horizons;
- preservation and enhancement of knowledge, personnel and material potential accumulated by the national higher school;
- development of a unified educational space within the entire world community which implies providing the possibility of obtaining a standardized education at any point of the educational space.

Method

Participants

Meanwhile, distance education is not fully used in the educational system. Many problems in the organization of distance learning are caused by the lack of teachers who are ready to professionally, technically and psychologically use remote technologies in the educational process of the University. It seems that a successful solution to the problem of training University teachers to work in the distance learning system will contribute to the accelerated development and wider use of the high potential of distance education in modern education.

In the system of distance learning has identified a number of issues that will allow us to create and implement an individual educational trajectory of training of teachers to work in distance learning system:

- poor use of modern achievements of science (philosophy, sociology, psychology, pedagogy) to justify the theoretical and methodological assumptions of the design of the pedagogical system of training of teachers to work in remote training system;

- the qualification characteristic of a distance learning teacher is not clearly defined, which would become a "goal-setter" for his training of University teachers to work in the distance learning system;

- forms, methods and means of training University teachers do not correspond to the specifics of the trained contingent and the features of distance learning technologies;

- in determining the content of the formation of the competence of a distance learning teacher, the main attention is usually paid to the formation of their professional competence as opposed to its integration with social competence and professionally significant personal qualities.

The elimination of these shortcomings is hindered by the contradictions existing in the modern socio-economic conditions of society:

- between the continuously growing needs for higher education of the population of territories remote from the educational centers of the country, and the lack of organizational and pedagogical conditions for meeting these needs;

- intensive development of information technologies (hardware and software), significant potential of higher education institutions in technical support and lagging behind the corresponding pedagogical technologies;

- the need to increase the number of students at the University through the use of remote technologies in the educational process and the lack of experienced teachers who know these technologies;

- the desire of the majority of University teachers to master distance learning technologies and the lack of methods for preparing them for activities in the distance learning system;

- accumulated experience in organizing distance learning in foreign and domestic educational institutions and the lack of results of theoretical and methodological generalization of this experience for use in the training of distance learning teachers;

- specific requirements for training University teachers to work in the distance learning system and the lack of criteria and readiness for it.

Distance learning is distinguished from traditional forms of learning by the following characteristics:

1. Flexibility – the ability to study at a convenient time, place and pace. An irregular period of time for mastering the discipline.

2. Parallelism – parallel training with professional activity, i.e. on-the-job training.

3. Coverage – simultaneous access to many sources of educational information (electronic libraries, knowledge bases, etc.) for a large number of students. Communication via communication networks.

4. Cost – effective use of learning spaces and technical facilities, concentrated presentation of information reduces the cost of training.

5. Technology-the use in the educational process of the latest achievements of information and telecommunications technologies that promote human progress in the global post-industrial information space.

6. Social equality – equal opportunities to receive education regardless of the place of residence, state of health and material security of the student.

The principles of distance learning were considered in the works of I. V. Sergienko (Sergienko, 2006).

The principles of distance learning — a certain system of initial basic didactic and other requirements for the design and training process in a distance learning system, which should be formed taking into account these requirements (Sergienko, 2006). The distance learning system is based on General didactic principles:

- the leading role of theoretical knowledge;
- unity of educational, educational and developmental functions of training;
- stimulation of students ' positive attitude to learning;
- combining collective learning with an individual approach to learning;
- a combination of abstract thinking with clarity in learning;
- awareness, activity and independence of students under the leadership of the teacher;
- consistency and consistency in training;
- availability.

Considering various options for organizing the activities of educational institutions, highlighted in the work of R. S. J. Tuninga and I. B. J. Seinen (Tuninga, 1995), reflect the experience of foreign educational institutions in the organization of distance learning, the following models of distance learning can be distinguished:

1. Consulting model. Its main distinguishing feature is that the student regularly visits the consulting training center. In the center, students listen to lectures, meet with teachers, get the necessary explanations and evaluation results of previous works. Teachers give recommendations on how and what you need to learn in the near future. The educational process is supervised by tutors in the consulting center.

2. The model of correspondence (correspondence). This model is based on the process of permanent exchange between the teacher and the student of educational materials, homework and results by mail or in some other way, impersonal contact. Students receive study materials, assignments, and questions that they must study over a certain period of time. Then the student sends all completed tasks to the teacher and receives a response that contains a formal assessment and analysis of the content of the answers.

3. Model of controlled self-study. Its main characteristic is greater student independence - greater freedom to choose the time and place of study. Training takes place through tasks, questions, and structured material. The quality of knowledge acquisition is evaluated by the student using questions with keys.

4. The "case"-technologies model-. After passing the entrance tests, the student receives a set (case, kit) training material. Normally, a group of students living compactly in the district is formed.

If we consider this model, the tutor explains how to work with teaching AIDS, what to pay attention to when studying the subject, instructs on how to organize independent work, and so on. This

is followed by periodic consultation and testing. Supervised independent work forms the basis of the educational process. The study of the subject usually ends with the final lesson, where the exam is held.

The basis of the set of training tools is made up of paper (printed) textbooks, which can be supplemented with audio and video materials, computer programs on CD or other media.

The case technology model resembles a distance learning scheme. The visible differences are that special training sets of training tools are developed and used, more free time frames of the process are provided, and attendance is mandatory. For each discipline, a student is assigned a teacher-consultant (tutor), who must pass certification at the basic University and conducts classes with students on an individual schedule.

5. Radio and TV training model. Its essence lies in the fact that television, radio, and urban radio networks can be used to deliver educational information to the student. On the basis of these systems, installation classes and lectures are held. Consultations and exams are usually conducted in person (Tuninga, 1995).

A typical organization of distance learning in this model includes the following stages •

* lecture form of training on radio or television;

* self-training in textbooks and additional literature in accordance with the approved program;

* consultations on the proposed training course;

* monitoring of the educational process, which includes evaluation of written works and testing;

• final control.

This model already is used in Japan, China, the Institute of tele-education France, in the Center DL of senior secondary schools and the unemployed population considering the situation in the country and also used in Kazakhstan.

Results

Outcome 1

Conclusions on distance learning models:

1. all models are used to some extent in everyday training in the classroom by teachers.

2. given the situation in the country associated with the pandemic, all educational institutions in Kazakhstan use these models.

3. the most effective model for higher educational institutions is the network learning model, which is a form of both joint / collaborative and individual acquisition of knowledge and skills, operating on the basis of remote technologies;

4. remote, otherwise called information and communication technologies are the basis of network learning, connect geographically remote participants in the educational process in a single virtual environment;

5. the model of a network form of learning is a virtual network community that can change and transform over time and in connection with the joining or exclusion of participants in the learning process.

Outcome 2

Considering the situation in the country and in the world, distance learning has become an integral and mandatory form of education.

The platform for learning is also not unimportant in distance learning, because the quality of work depends on it.

There are many classifications of educational platforms. Conditionally, according to the criterion for selecting the goal of implementing distance learning, it can be divided into:

- platforms for implementing distance learning in schools and the universities;
- systems for implementing some elements of distance learning, that is, for the electronics of the educational process;
- platforms for corporate training;
- platforms for conducting business trainings.

A distance learning platform is a link between multiple programs for distance learning. These platforms always consist of an HTTP server and an SQL database, as well as software components for managing group and individual classes.

The functionality of the complete distance learning platform includes the following:

- content creation software is a tool for managing the design of educational content, consisting of text, graphics, and multimedia, as well as allowing you to export and import to this environment;
- content management software is a tool that is responsible for making changes to the material, observing access rights to platform resources, and searching for the necessary material;
- software for managing and supporting the educational process is a tool that is responsible for organizing the material, analyzing and summarizing the educational process, as well as organizing the relationship "student-teacher", "student-student" and "parent-teacher".

Conclusion

Foreign remote platforms are most often costly and include expensive technical support from the developer. In Kazakhstan, unfortunately, at the moment the choice of distance learning systems is small. Almost all systems do not provide opportunities for implementing an uninterrupted life cycle of distance learning. Most of the platforms are aimed at Internet resources for implementing training.

In connection with the emergency measures of switching to distance learning, video conferencing systems such as Zoom, Webex and others were used first.

The Ministry of Education has made decisions for school students to conduct classes in a single intuitive and easy-to-manage Microsoft Teams platform, which allows students, teachers and school staff to conduct not only training, but also various meetings and video conferences. This platform is also used by major universities of the Republic.

Universities that are included in the program of smart cities of Kazakhstan, such as Nur-Sultan, Almaty, Uralsk, Kyzylorda, etc., easily switched to distance learning. Where city residents actively use smart technologies of smart cities.

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Mentoring: Matching Mentors and Mentees with the Hungarian Algorithm in Higher Education

Matching Mentors and Mentees in Times of Covid-19:

The Freie Universität Berlin has developed a matching tool as part of the project “tech4comp“, with which mentors and mentees can find each other online

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Abstract

The matching tool, developed by the Freie Universität Berlin on the foundation of the Hungarian Algorithm serves in its most basic form the purpose of matching mentors and mentees to each other with data provided by a simple online application form, thus providing a much-needed opportunity for social interaction in the university context during the Covid-19 pandemic. Its high flexibility and dynamic nature allow for its adaptation to various mentoring formats and for consideration of the themes, aims and interests most sought after by the parties involved. The ability to build heterogeneous groups with the tool alongside the usage of agile methods such as Scrum and its educational component eduScrum presents itself as a way to increase effectivity, creativity and productivity in university courses.

Keywords: Matching, Mentoring, Peer Mentoring, Mentor, Mentee, Scrum, eduScrum

Mentoring: Matching Mentors and Mentees with the Hungarian Algorithm in Higher Education

Introduction

The measures taken by universities to aid the containment of Covid-19 pose the challenge of studying predominantly online and to manage precarious transition periods from school to university and from university into career under difficult conditions. Under "normal conditions" academic mentoring has proven itself as a worthy support for university freshmen and newly graduated with their career entry as well as international students, students with migration backgrounds and for the advancement of women. The challenge of mentoring lies in matching mentees and mentors in mentoring tandems or groups. Now the question arises, how mentors and mentees can find each other during online semesters.

Matching Tool

The Freie Universität Berlin has, as part of the project "tech4comp", analyzed the mentoring programs of German speaking universities[1], has observed the pandemic-related protective measures and has developed a solution for the implementation of Classical Mentoring, Peer Mentoring and Cross Mentoring[2] which runs digitally and can rise to the high demands posed by the matching of mentoring tandems and mentoring teams despite the continuing limitations due to Covid-19.

The matching process is defined as a predictor of the success of the mentoring and the development of the mentees (Cox, 2005). It should take place wholly in regards to field of study and person, because mentoring goes beyond a purely specialized service of instruction and the conveying of information and includes functions such as consultation, activation, motivation, socio-emotional support, networking and role model function by the mentor (Demus, 2018). Mentoring requires a large scope, which can influence the mentees and mentors in a positive as

[1] In the time between January 2019 and January 2020 142 mentoring offers of 29 German-speaking universities in Germany [119 M], Austria [5] and Switzerland [18] were analysed and were investigated in regards, to which tasks and functions of mentoring could be depicted digitally. It was concluded that it is possible to adequately formalise and digitally implement the matching process.

[2] The classical understanding of mentoring describes a process in which an experienced person (mentor) accompanies one or more experienced persons (mentee/s) (cf. Stoeger et al., 2009, S. 11). In the last few years peer mentoring has also increasingly established itself (Brocke et al., 2017, S. 91 ff.), as a form of mentoring where two formally equal persons support each other.

well as negative manner. Due to the uncontrollable and immeasurable nature of the expectations regarding the configuration of the mentoring relationship, the success of the mentoring or the initiation and maintenance of the mentoring relationship can be jeopardized.

Scientific Approach

The matching tool aims to secure the best possible fit of mentoring tandems and to support mentees and mentors through the inquiry of their technical and personal interests, to concretize their individual expectations for the mentoring and the aims they have for the mentoring.

The tool was developed on the basis of the applied knowledge gained through the mentoring programs of the excellence universities and the tech4comp-project partners. For these purposes the application forms for their mentoring programs, which were available online, were aggregated[1] and the evaluation reports of their programs and the manuals used to inquire about the relevant themes were taken into consideration for the formulation of themes, interests and aims, which are relevant for mentoring. The result of this effort revealed a foundation for a targeted matching which can be adjusted for different mentoring formats. In the next development stages, the items in question were extended to accommodate different mentoring scenarios, through which the prototypical matching tool was generalized and refined to assist the application for mentoring programs in different formats as well as the initiation of spontaneous learning partnerships and the formation of effective learning teams.

The high flexibility of the tool takes on one hand the dynamic development of mentoring offers and on the other hand the everchanging mentoring needs and offers of students, teachers as well as external mentors into account. Consequently, the users create a personal profile by filling out the online application form, which they can manage in the profile settings. Moreover, they can decide, which of their personal information will be shown to the suggested contacts in the profile settings and can revoke their once given consent for the terms of use.

The following chapter illustrates how the matching tool can be implemented in a specialized use case of digital peer mentoring.

Use Case „eduScrum“

Peer mentoring is ordinarily an internal-led or external-led Mentoring, where during its course two or more formally equivalent persons with different background experience consult and

support each other. The matching of peers regularly takes place randomly or seemingly arbitrarily according to the online research and expert interviews conducted for purposes of planning, implementation and evaluation of Mentoring and Matching[3] as part of tech4comp.

In one of the researched cases the “first come, first serve” principle is applied, in another case the peers pick their mentor during the opening event after a short introduction under subjective criteria such as sympathy.

The results of the research give no indication, that the composition of peer groups at the observed German-speaking universities takes place in a targeted manner. In contrast in professional settings, it is common practice to form heterogeneous groups, particularly during the development of innovations with “Design Thinking” or the “Scrum”-Method.

The agile framework “Scrum” was developed by Ken Schwaber and Jeff Sutherland. It has been used since the early 1990s to increase the innovation ability of companies and organisations. It was adaped to the school context under the name “eduScrum” by Arno Delhij, Rini van Solingen und Willy Wijnands (Delhij et al., 2015) and has started establishing itself in German universities also under the name “eduScrum” in the recent years (cf. TU Chemnitz, 2019).

The application of eduScrum is clearly structured and is characterised by the iterative feedback loops (Daily scrum, Sprint review), short work cycles (Sprints) and defined roles of the participants (Scrum master, Product owner, the Development Team). The focus of the collaboration in the team lies in maximizing the creativity and productivity through an adaptive and easy system, which takes the ideas and needs of all members of the team into consideration (Schwaber & Sutherland, 2015).

The Freie Universität Berlin has conceptually adapted the eduScrum as an online usable method for seminar-like arranged projects to document, evaluate and intervene in terms of mentoring with the usage of Learning Analytics (e.g. through activation of reluctant members of the team or the optimal composition of teams) into the learner’s acquisition of skills on higher

[3] From July until August 2020 8 8 guided expert interviews were conducted in the universities involved in tech4comp as well as at the Freie Universität Berlin and qualitatively evaluated.

taxonomy levels along the structure of the process of learning with help of digital Scrumboards and peer reviews.

For these purposes an online research of the on the personality traits of an optimal scrum master was conducted. Subsequently with the help of the personality traits from the Five-Factor-Modell were depicted and an online survey with the standardised Big Five Inventory, BFI-10, (Rammstedt et al., 2014) was created, to match students with the help of the optimal scrum master and to identify the ideal students. Additionally, the Study Process Questionnaire (SPQ: Biggs, 1987) was added to identify the learning types by Biggs (Surface Learner, Deep Learner and Achieving/Strategic Learner). Though this, a number of participants can be evaluated in regards to how the formation of groups with different learning styles affects the effectivity, creativity and productivity of the group work.

In the current context, the focus thus lies in the further development of the matching tool, to build heterogeneous learning teams with the usage of technology in conditions more objective than before and to evaluate this process. With this purpose the aforementioned application forms will be supplemented and technologically implemented with questions from personality tests. Moreover, an exemplary virtual learning environment will be conspired for available learning systems, in which the Scrum-Team members can define their roles and could take part in time-limited events along the Scrum-Roadmap and acquire artifacts to document their learning progress and the final mutual evaluation. Their documentation can be used as a test performance for a grade.

Technical Implementation with the “Hungarian Algorithm“

The user data will be stored in the cluster las2peer, a distributed network, which grants the users the ownership of their own data and offers a high level of security through a double asymmetric ciphering method. The matching tool is also contained in the cluster and will calculate with help of the answers collected through the online application form, which themes, interests and aims the mentors and mentees share. The technical infrastructure is provided through the “Hungarian Algorithm”, also known in the technical community as the Kuhn-Munkres-Algorithm. It was developed by the mathematicians Harold W. Kuhn and James Munkres as a solution for the optimal matching problem and has proven itself successful in practice for example for the efficient assignment of work force or the logistic utilization of capacities.

The Freie Universität Berlin has utilized the “Hungarian Algorithm” in an educational context for an accurate matching, to ensure the maximum similarity of the themes, interests and aims between a large number of mentors and mentees. During the application the mentees and mentors were asked to evaluate the relevance of certain themes, interests and aims on a Likert-Skala from 1 to 5 (1= not important, 5= very important). Afterwards the given values of the mentors and mentees are compared: The shorter the distance between the given values, the closer are the mentee and mentor to each other. The functionality will be explained below with an example.

Collection of the given values (Examples)

Mentees	Values		Mentors	Values
Mentee 1	1		Mentor 1	5
Mentee 2	5		Mentor 2	3
Mentee 3	3		Mentor 3	2
Mentee 4	2		Mentor 4	4
Mentee 5	4		Mentor 5	1

Fig. 1. Collection of the given values

Calculation of the Differences

	Mentor 1	Mentor 2	Mentor 3	Mentor 4	Mentor 5
Mentee 1	4	2	1	3	0
Mentee 2	0	3	3	1	4
Mentee 3	2	0	1	1	2
Mentee 4	3	1	0	2	1
Mentee 5	1	1	2	0	3

Fig. 2. Entering the difference in the matrix.

	Mentor 1	Mentor 2	Mentor 3	Mentor 4	Mentor 5
Mentee 1	4	2	1	3	0
Mentee 2	0	3	3	1	4
Mentee 3	2	0	1	1	2
Mentee 4	3	1	0	2	1
Mentee 5	1	1	2	0	3

Fig. 3. Selection of the matched pairs with help of the lowest differences

If necessary, the values can be reduced by going over the rows and columns until the lowest value is zero. When a row contains more than one zero, the zero is chosen, which stands alone in a row and a column.

Outlook

Currently the matching tool is being tested in a seminar at the Humboldt Universität zu Berlin in context of eduScrum and is being optimized for future (project) seminars and tutorials in international universities. Since summer semester 2020 due to Covid-19 no face-to-face meetings can take place. Therefore, it is not possible to compare the matching tool with other analogous methods used in the same context for group formation.

The Freie Universität Berlin will concretise furthers use cases for the matching tool in reference to the regional and nationwide compiled needs of the students in times of Covid-19. Due to the manyfold criticized absence of personal encounters with fellow students, social contacts on the campus as well as corridor talks before and after lectures (cf. Seyfeli, 2020) different concepts of peer mentoring, the formation of learning tandems and learning teams together with the enabling of (informal) social interaction will be in focus.

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The instructional design of MOOC discussion forums: An analysis of the cognitive engagement prompted in the forums

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Abstract

Forums in Massive Open Online Courses (MOOCs) offer learners the opportunity to engage cognitively in significant interactions aimed at the construction of knowledge. These interactions, however, have to be purposefully designed by the MOOC instructors to facilitate the use of different cognitive processes. This study examines the instructional design of the discussion forums of 4 edX MOOCs created by the Université catholique de Louvain (UCLouvain). It uses two learning taxonomies to pinpoint the different cognitive processes prompted in the forums. Semi-structured interviews with the MOOC instructors verify the findings from the analysis of discussion forums. The goal of this study is to portray the different cognitive processes that MOOC instructors seek to facilitate in their forums. Thus, it contributes to a better understanding of how the instructional design of MOOC discussion forums can facilitate significant interactions aimed at the construction of knowledge.

***Keywords**:* MOOCs, discussion forums, instructional design, cognitive engagement

Gap analysis on E-Learning implementation of Mongolian TVET Institutions

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Abstract

E-Learning and its implementation is been one of the important topics among TVET for almost last 2 decades. With this intuition, middle level policy institutions are initiating various activities aiming to implement e-learning, including Best e-learning content contest among TVET institution teachers per year, individual schools to motivate teachers on their contribution of e-learning content development by salary or credits, unified content management platform installment and promotion for teachers to attend experts' courses on this area etc. The key challenge is that there is not enough good practice among Mongolian 80 TVET institutions on implementation of e-learning system completely. Even learners have not enough habit to receive the academic part of subjects through online learning. During the pandemic situation of COVID19 from Jan to June 2020, all schools closed but most of the teachers weren't ready to release the lessons online, even haven't ready plan to continue the academic activity using technology. This research aims to make gap analysis on e-learning implementation of Mongolian TVET institutions. It is essential to define the required parts to successfully implement e-learning.

***Keywords**:* e-learning, e-learning content development, gap analysis

Gap analysis on E-Learning implementation of Mongolian TVET Institutions

Introduction

In Mongolia, there are 80 Technical and Vocational Education and Training (TVET) institutions (Ministry of labor and social protection, 2020) and all of them based on traditional classroom training except vocational practices. As 6 Regional methodological centers provide pedagogical management to belonging TVET schools, there have been initiatives on e-learning such as Best e-learning content contest among TVET institution teachers per year, organize training for teachers on e-learning content development. At the sector management level, e-learning implementation is trend topic to discuss. With those efforts, reasonable number of teachers and staff trained in the area.

The pandemic situation of COVID 19 was the test for TVET sector checking its' readiness for e-learning in management, infrastructural and methodical level. So far, none of TVET institution implemented local e-learning platform, even no strategic plan on this topic. For example, in June 2020, after 6 months of school lockdown, an observation and summary interview with teachers conducted at TVET school of Tuv province. As summary of this activity, most of the teachers used Facebook and messenger group chat as e-learning tool to distribute and communicate the learning materials to learners. And teachers evaluated the learners' activity based on their 'seen' and chat activities mainly. The learning materials are mostly reading materials and PPT since teachers didn't have enough e-lesson library. In some subject, teachers shared video content from Youtube if the content is similar. In September 2020, school started in normal routine, most of the subjects taught in classroom to fulfill the gap which was scheduled during the pandemic period.

With above reasons and situation, there is a gap to be defined for further improvement of e-learning implementation. This study defines the overall gap which impacts to e-learning strategy in Mongolian TVET sector. Further actions to be done based on the research result by introducing to the key stakeholders.

Gap analysis

Methodology

To define the overall gap on e-learning implementation in sector, we have covered 14 TVET institution representatives and gained their feedback. SWOT analysis (SWOT Analysis: Discover New Opportunities, Manage and Eliminate Threats" 2016.) used as tool. Below points were the most repeated and important aspects on each section (Fig. 1):

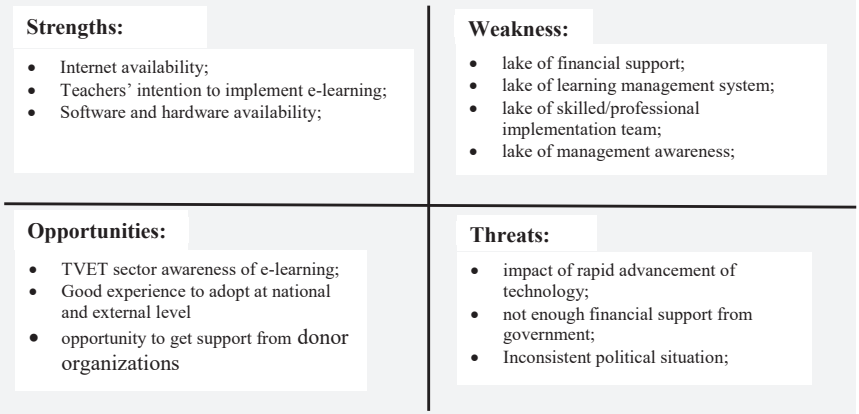

Fig. 1. Result summary of SWOT analysis

Strengths and Weaknesses on e-learning implementation, internal TVET institutions

There were various strength points raised including internet availability; teachers' intention to implement e-learning; software and hardware availability; having e-learning professionals; and management support. The most repeated points and considered as important were first: teachers' intention to implement e-learning on their teaching activities; second: Internet availability and third: Hardware and software availability. At another side, lake of methodology on e-learning; lake of financial support; lake of learning management system; lake of skilled/professional implementation team; lake of management awareness; teachers' workload and lake of teachers' technological excellence were discussed. The most important and crucial weakness to consider

were first: Lake of skilled/professional e-learning implementation team; second: No Learning management system installed at school; third: lake of methodology or pedagogical experience on e-learning development among TVET institution staff.

Opportunities and Threats on e-learning implementation, external impacts

As opportunities, participants highlighted first: TVET sector awareness of e-learning, second: Good experience to adopt at national and external level and third: opportunity to get support from donor organizations. For the threats, first: impact of rapid advancement of technology, second: not enough financial support from government, and third: Inconsistent political situation was stated.

Discussion

SWOT analysis helps to define both internal resource and external impacts. The advantage we have is the psychological readiness among staff which strengths the implementation from human resource side. Also the internet availability is important factor which make learners available to receive the e-learning content. In the sector the skilled and experienced in e-learning staff is required as well as the methodological aspect including learning management system. Above situation defines that TVET sector still need planning and strategy preparation on e-learning management (Aydin & Tasci, 2005) which is basic of successful implementation.

As external impacts there are plenty opportunity to take support of policy makers when the initiation raised. Meanwhile the technology advancement impact is always challenge to all types of education institutions.

Conclusion

It is essential to have realistic plan and strategy to implement e-learning in TVET. The base study should consider on e-learning readiness including psychological, social, environmental, human resource, technological, financial and content readiness (Jaiswal A. 2018). Lesson learned from the pandemic situation was that needs of establishing e-learning infrastructure within all institutions. Based on this study, policy and future plan can be defined focusing on the key gaps.

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The Influence of High-Stakes Tests on Classroom Instruction: The Case of SSC Level Education in Bangladesh

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Abstract

This study explores the influence of high-stakes tests on classroom instruction; specifically, in SSC level education in Bangladesh. The study aims to find out the influence a high-stakes test like the SSC (Secondary School Certificate) examination can have on classroom instruction and finding ways to establish learning-centered instruction in classroom. Data for this study was collected from schools and top organizations and institutes involved with educational decision making in the country. The sample included secondary school teachers, students and education experts. Qualitative data was collected through different data collection processes like- interview, FGD and classroom observation. Qualitative data analysis process was followed, and data was analyzed thematically in this study. Among many findings of this study the major influences of high-stakes tests were found to be- teachers inspiring rote learning, narrowing down or skipping curriculum, instructing and guiding on test-preparation, giving suggestions before exam and focusing more on good students to do even better while ignoring the needs of weaker students. The existing social mind-set that overemphasized the importance of tests and abnormal pressure exerted on teachers to make students do well in tests were found to be the prominent reasons fueling test-centered instruction in the classroom. The possible solutions to overcome this situation suggested in the study include- re-evaluating the purpose of the tests and ensuring that purpose is served through assessment, creating social awareness, ensuring curriculum prescribed lesson plans and instruction and elimination of counting SSC test score as a criterion for university admission.

***Keywords**:* High-stakes tests, classroom instruction, learner-centered.

The Influence of High-Stakes Tests on Classroom Instruction: The Case of SSC Level Education in Bangladesh

Bangladesh has a centralized education system that has to attend to large numbers of students, teachers, schools, education officials, authorities and personnel associated with the system. There are several board exams throughout the school years which are taken after certain grades. These tests are- Primary School Certificate (PSC) Examination, Junior School Certificate (JSC) Examination, Secondary School Certificate (SSC) Examination and Higher Secondary School Certificate (HSC) Examination (CAMPE, 2015). Tests like the SSC and HSC are rather celebrated in the country. Many stakeholders, especially parents as well as some administrative divisions encourage test driven teaching in classroom (Cameron, 2011). Many hold the idea that it enriches and motivates classroom teaching–learning activities. But research on these trends indicates that high stakes testing does motivate teachers and administrators to change their practices, yet the changes they motivate tend to be more superficial adjustments in content coverage and test preparation activities rather than promoting deeper improvements in instructional practice (Supovitz, 2009). The influence of these tests can prohibit authentic learning in the classroom (West, 2017) and construct only a test-based accountability among teachers (Supovitz, 2009). In this study the learning-centered instruction in fact refers to the instructional strategies which engage learners in authentic learning activities in the classroom and which is derived from learner centered accountability among teachers, not from test-based accountability.

George Madaus coined the phrase "high stakes testing" to refer to testing which promotes pressure and behavior change by associating test results with important consequences (Herman & Golan, 1990). Tests are often used for high-stakes purposes such as- determining which students will pass or graduate, which teachers are fired or given raises, and which schools are reorganized or given more funding. In high-stakes tests “stakes” are “high” because the results of the tests, as well as the ranking and categorization of schools, teachers and children that extend from the results are reported to the public (McNeil, 2000). The Secondary School Certificate (SSC) Examination in Bangladesh, held after the completion of grade 10, is a high-stakes test as there are high stakes attached to it: concerning students’ certification, schools’ categorization and popularity, and the fact that the results of this test is very much “public”.

High-stakes tests have many negative effects on teaching and learning. And as McEwen (1995) puts it- "What is assessed becomes what is valued, which becomes what is taught" (p. 42). These tests narrow the curriculum and undermine teaching practice (Nichols & Berliner, 2010). In Bangladesh summative assessment has a dominant and very visible influence on teaching learning activities across all levels of education (Jahan, Ahmed & Uddin, 2017). Naturally a big terminal test like SSC has a big influence as well. In this study this influence is explored. The research questions for this study are:

1. In what ways does the SSC Examination influence classroom instruction?
2. Why does the SSC Examination affect the classroom instruction in grade 9 and 10?
3. How can learning-centered classroom instruction be ensured in grade 9-10?

Method

The study followed a qualitative approach. Qualitative data was collected through-interview with teachers, FGD with students, interview with education experts and classroom observation. The area of the study was chosen to be Dhaka city as par convenience. Five schools and two prominent institutes involved with educational decision making in Bangladesh were visited.

Participants

The participants of this study were five teachers, forty students and three assessment experts. To find out the influence and the extent of the influence of the test it was important to compare the classroom instruction between SSC level grades (grade 9-10) and other secondary grades (grade 6-8). From each school one secondary teacher who teaches both at grades 9-10 and in other secondary grades (6,7,8) was selected. From each school eight students either from grade 9 or grade 10 where the interviewed teacher takes class were selected. Moreover, two classes by each teacher (one in grade 9 or 10 another in grade 6, 7 or 8) were also observed. Three assessment experts from three prominent organizations associated with the education system of Bangladesh were also interviewed. Teachers were selected purposively on the basis of criteria of the study, which is the teacher taught in secondary classes including grade 9-10, but teachers' availability was also considered, so the sampling was also somewhat convenient sampling. Students were

selected using random sampling method. Education experts were sampled following convenience sampling method.

Data Collection Tools and Data Analysis

The data collection tools for this study were a semi-structured interview schedule for teachers, a semi-structured FGD questionnaire for students, an open-ended observation protocol for classroom observation, and a semi-structured interview schedule for assessment experts. Teachers were asked mainly about their instructional techniques in different secondary grades, the communication and dialogue they have with the school authority and parents regarding the tests and specifically the SSC exam, the kinds of pressure they feel around ensuring good student achievement, what students' achievement mean to them and how they help students regarding the SSC exam. Students in the FGDs mainly reflected upon how they feel about the SSC exam, what are the relationship dimensions among the teachers and themselves, what kind of pressure they feel to do good at the exams; specially the SSC exam and how are they preparing for SSC. During the classroom observations it was observed what actually happens in a secondary classroom, what are the instructional methods and strategies, how instructions differ in different secondary grades and how much of instruction time is spent for different activities. During the interviews with the experts, they mainly reflected on their thoughts on the assessment system and how it is executed in the country, curriculum and its fulfillment through classroom instruction as well as through the assessment, the existing social issues regarding assessments and how the issues regarding a high-stakes test like the SSC can be resolved or minimized. The data achieved through these tools was analyzed following qualitative approach and was analyzed thematically.

Results

The major findings of the study are presented and discussed under the three research questions of this study in the following sections.

The Influence of SSC Examination on Classroom Instruction

The influence SSC examination on classroom instruction found to be prominently existent on classroom in grade 9-10. According to students in grade 9-10, they are directed towards rote

learning by teachers. Narrowing down of curriculum by teachers occurs frequently which include-giving more importance to "test-worthy" topics, skipping unimportant topics and sometimes even omission of entire chapters. Students are frequently reminded that whatever they learn has to stay with them for two years, so repeated learning and cramming are inspired. Suggestions and guidance on cracking the tests are embedded in daily classroom instruction in grade 9-10. These instructions take a fair amount of time from the overall class-time. This phenomenon is not as much prominent in other secondary grades. All the schools have embedded system to better prepare SSC students through after-school coaching programs. It was also found that good students are taken better care of and are given frequent one to one feedback because they are the ones who would increase the number of good achievement results for the schools. Teaching methods across all the secondary grades mostly include lecture method and lack engaging learning activities for students. But in grades 6-8 there is scope to be more relaxed; activities like group-work and pair-work are practiced in these grades.

Why SSC examination influences classroom instruction

Both teachers and students think that SSC exam is very important for any person's life and serves as a milestone in learners' academic and professional career. Teachers, parents, school authority, the government and society expect and pressurize both teachers and students for good result in SSC. Even the media attention and highlighted coverage on schools with good result add to the stakes associated with SSC exam. This pressure reflects upon classroom instruction as both teachers and students engage more in test preparation activities rather than in deep teaching-learning activities. In practice teachers were motivated more by test-driven accountability rather than learning-centered or students-centered accountability. Most students in grade 9-10 take private tuitions or attend coaching centers to better prepare for the SSC exam and teachers are aware of this. As a result, teachers sometimes feel that the responsibility to ensure learning is not their sole responsibility and show lack of sincerity in classroom. Students feel a huge pressure to anyhow achieve good result in SSC, consequently they tend towards rote learning instead of deep learning, asking questions or an overall investigative approach in classroom. Students also develop a competitive mindset in learning environment, which hampers collaborating teaching-learning approach in classroom. Teachers provide students with suggestions (short prescriptions on topics

and questions more likely to appear in the test) and dependency on these suggestions inspire students to skip topics from the very beginning. Teachers do not follow any lesson plans or the curriculum to conduct lessons. According to teachers, following the curriculum prescribed lesson plans requires a lot of time and the syllabus in grade 9-10 is very long; if they followed the curriculum prescribed teaching learning activities, they would fail to cover the whole syllabus.

Ensuring Learning Oriented Instruction in Grade 9-10

According to the assessment experts and teachers, the purpose of the SSC examination should be re-evaluated and be more aligned with the curriculum. The goal and criteria of testing should be such that eliminates rote learning by students and that actual understanding and learning are reflected through test scores. Teachers should not be the only one to be blamed for the negative influences of high-stakes tests. Parents, society, government, media- everyone contributes adding to the stakes of these exams. A social awareness should be created among all of us to take test scores less seriously and focusing mainly on learning. Teachers should be made aware about their accountabilities as teachers and this test-based accountability should be deconstructed. Learning oriented accountability should be promoted rather than test-oriented accountability. For reducing associated stakes of SSC exam, the marks of tests like SSC and HSC could be eliminated from the university admission criteria. It was also suggested that if the admission tests can be conducted in a fair and skilled way, the university tests should be enough to assess students' competency and talent.

Discussion

Students in this study find SSC exams very important and the exerted pressure on them from the teachers, parents and the society make sure that they study to score good on tests. The SSC certification is regarded as a major academic milestone and good achievement in it is socially desirable as well as nationally celebrated. But the increase in the scores does not necessarily indicate that such increases are anything but the result of test preparation (Amrein & Berliner, 2002). Teachers in this study said they felt most accountable to students, but in practice they were found to be acting and teaching in classrooms based on test-driven accountability. In a sense they were not incorrect in their answers either, as like most people in our society teachers also think

that getting good results in the public tests is the ultimate goal of education. As a result, they feel accountable to ensure good grades for students and test-driven accountability is synonymous to accountability towards students for them. Here if teachers' accountability could be deconstructed and sensitized, then authentic learning in classroom could be promoted. Previous research on high stakes tests suggests that testing can greatly shape the delivery of culturally and developmentally responsive curriculum by creating dichotomies and positioning the two as mutually exclusive (Thomas & Howell, 2012). Blazer (2011) claimed that high-stake test can have positive effect on education such as increasing teacher professional development, added effective remedial program for underperforming students and better alignment of instructions with national standard of good content. There is scope for policymakers and instructional leaders to learn from this and come with classroom instruction strategies which will be beneficial for learners.

Conclusion

Everyone wants to ensure good result in SSC exam, Students, teachers, experts everyone agreed that the good result in SSC serves a person individually as well as serves the society and nation. But as experts added, the test criteria have to be authentic and objective oriented and the testing process has to be fair and corruption free. Otherwise the country will get a huge number of graduates who won't be able to serve the nation. By all means possible, the stakes associated with SSC exam have to be reduced. For this the valuable recommendations by the experts like- reducing social pressure on teachers to ensure good results, creating a social awareness about learning focused education system rather than a test focused one, reducing numbers of high-stakes tests during school years and making teachers aware of the accountability they should reflect through practice are important. The experts suggested that the existing curriculum and questioning system is a good one and there is much scope to achieve greater benefits through them. The tests must become more goal-oriented and alignment with curriculum must be maintained. If the questioning criteria can ensure to reflect learning, the classroom instruction would be forced to ensure learning as well. This way the negative influence of high-stakes tests like SSC on classroom instruction can be reduced, and even eliminated.

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The Rise of E-learning in Public Administration and Governance Education: The Case of the Master Public Management Program of the University of the Philippines Open University

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Abstract

In the Philippines, capacity development is very important despite the lack of ICT infrastructure and limited access to the internet. This paper presents the rise of e-learning in the public administration and governance (PA/G) education. It discusses the case of the Master of Public Management Program of the University of the Philippines Open University and how it utilizes e-learning in capacity development of the public servants. It presents the innovations that were introduced by the Program in order to provide quality education to the sector. This include the recognition of prior learning to provide openness. Moreover, the creation of the playlist and MOOCs offering are also included. Partnership with other stakeholders is also another strategy used by the program to ensure quality of learning materials. The paper also provides prospects for the future for program.

***Keywords**:* E-learning, Public Servants

The Rise of E-learning in Public Administration and Governance Education

Introduction

Governments have recognized the use of information and communications technology (ICT) which enabled education to become more accessible and inclusive. It is also a means to achieve one of the 17 sustainable development goals of the United Nations which is the provision of quality education and promotion of lifelong learning (Gervacio in Brown, 2020).

In the Philippines, capacity development is very important despite the lack of ICT infrastructure and limited access to the internet. Hence, this paper presents how e-learning is utilized in developing the capacities of public servants.

Objectives

This paper presents the rise of e-learning in public administration and governance (PA/G) education in the Philippines. Specifically, it aims to: a) discuss the use of e-learning for capacity development of public servants; b) present the experiences of UPOU's Master of Public Management Program in e-learning; and c) determine the future e-learning in Public Administration and Governance Education.

Methodology

The researcher utilized primary and secondary materials for this study. The study reviewed secondary materials, program reports and articles in order to trace the history of public administration and governance as an e-learning program. Further, the author gathered information from the Office of the University Registrar of UPOU. Finally, the researcher also included her own experiences and observations being the chair of the MPM Program.

Framework of the Study

The paper utilized two important frameworks to determine the evolution of the discipline of public administration as an e-learning program. First, the study utilized Terry Anderson's Three Generations of Distance Education Pedagogy (2011), namely: Cognitive Behaviorism, Social Constructivism and Connectivism.

The Cognitive Behaviorism Pedagogy assumes that learnings are generally defined as new behaviors or changes in behaviors that are acquired as the result of an individual's response to stimuli (Anderson, 2011). The focus is on the individual and is very teacher-centered. Due to technological limitations, only a one-to-one or a one-to-many communication can be facilitated. The mode of learning is through teleconferencing and the use of postal service. It is described to be slow, expensive and has a limited scope for interactivity.

Under the Social Constructivist approach, it acknowledges the social nature of knowledge and of its creation in the minds of individual learners (Anderson, 2011). During this period, technological advancements can now facilitate a many-to-many communication. The mode of learning is done through the use of email; bulletin boards; World Wide Web and mobile technologies.

The Connectivist approach posits that learning is the process of building networks of information, contacts, and resources that are applied to real problems. Some of the technologies used in this pedagogy include web browsers, email, wikis, online discussion forums, social networks, YouTube, and other tools that allow users to learn and share information with other people.

The other framework that this paper utilized is relative to the growth of Open and Distance e-Learning (ODeL) in the Philippines. Former UPOU Chancellor Grace Alfonso in her article "*UP Open University: Entering the Fifth Generation of Open and Distance Learning and Building Global Knowledge Communities in the Changing ICT Environment,*" describes Online Education in different generations.

In what was described as the first generation of Open and Distance Learning, learning modules were created by experts and were distributed through traditional media (print, radio and TV). During this period, print was the dominant medium and radio and TV were just for supplementary materials.

The second generation saw the use of more videos as audiotapes were being used as stand-alone materials. Majority of the print materials were sent directly to the students. This generation also saw the promise of the internet as a means of communication as the use of electronic mail was introduced.

The third generation of ODL saw the rising potential of the internet as a means of delivery, therefore, adding an ‘e’ to Open and Distance Learning making it Open and Distance e-Learning (ODeL). As early as 2001, the UPOU declared that it will go online through the use of the Integrated Virtual Learning Environment (IVLE) to facilitate online connectivity of learners and teachers. UPOU was preparing to shift 100% online to also cater to students abroad. From IVLE, UPOU started to develop courses using the open source Modular, Object-Oriented, Dynamic Learning Environment or MOODLE.

As UPOU was entering its fourth generation of transitioning to a fully online university, it was also conscious on those who will be marginalized by this move. In order to address this concern, a flexible approach was used to these diverse sectors.

It was also a time for course development utilizing a Learning Management System (LMS). In order to ensure the quality of materials in this approach, the Resource-based Course Development (RBCD) strategy was used. In this strategy, learners are empowered by providing them access to learning materials and deciding for themselves how these will help them in their own learning (Lumanta, 2014).

Premised on a fundamental orientation wherein student and teacher are considered as co-creators of knowledge, the RBCD approach allows for greater flexibility in putting together course materials. In this approach, the faculty-in-charge, after preparing a course guide in which course goals are articulated, takes on a facilitation role through a process of referencing, compilation, integration, and synthesis of resource materials which the students can use, evaluate, and reuse in the learning process (Lumanta, 2014).

The fifth generation of Open and Distance eLearning was identified by further widening the access to education by venturing into the global scene. By 2009, UPOU started doing international collaboration with academic and other institutions were forged for various projects including course development, course offering, short-term training, and institutional assistance (Lumanta, 2014).

By going online, global and international, UPOU did not stop finding way to fulfil its mission of providing access to quality higher educations. UPOU started offering Massive Open Online Courses (MOOC) in 2013. Massive Open Online Courses is defined by Oxford Dictionaries

(2019) as "a course of study made available over the Internet without charge to a very large number of people."

By July 2013, UPOU launched its first Massive Open Online Course (MOOC) about an introductory course on mobile application development. The MOOC was developed by the UPOU Faculty of Information and Communication Studies (FICS) in partnership with Smart Communications.

The Use of E-learning for Public Servants

Sangra (2012) defines "E-learning as an ***approach*** to teaching and learning, representing all or part of the *educational model* applied, that is based on ***the use of electronic media*** and devices as **tools** for improving access to training, communication and Interaction that ***facilitates the adoption of new ways*** of understanding and developing learning" (Sangra et. al., 2012, p. 152).

Several countries have initiated the use of e-learning in developing the capacities of public servants. The G20 Countries embarked on the use of e-learning as a means for education and lifelong learning. Moreover, countries like South Korea, South Africa, Romania, and Pakistan are just some of the countries that have also utilized e-learning for public servants (Gervacio in Brown, 2020)

However, several barriers have also been noted in the use of e-learning. Some of these include the lack of resources to realize e-learning projects; preference for face to face learning; low quality of broadband connections; and lack of policy for providing rewards and incentives (Stoffregen, J., et al. (2015).

The UPOU Master of Public Management Program

It was in 1995 when the UP Open University (UPOU) became the fifth autonomous campus of the UP System becoming a full-fledged university and joining the eight campuses of the UP System. The Master of Public Management (MPM) Program of the Faculty of Management and Development Studies was one of the first courses offered by UPOU when it debuted during the second semester of AY 1997-1998. At present, the program has three specializations; Public Policy and Program Administration (PPPA); Local Government and Regional Administration (LGRA); and Voluntary Sector Management (VSM).

Table 1 provides a summary of the development of the MPM Program related to the Anderson's three Pedagogies of Education and Alfonso's Generations of Open and Distance e-Learning (ODeL). The table reveals that initially, the written modules of the MPM Program were initially sent to students via courier services. It also shows the rise of e-learning in the Program. During the second generation of Open and Distance e-Learning, UPOU shifted to the use of electronic mail in communicating to students and in sending the learning materials. With web 2.0, the MPM Program resorted to the use and development of open educational resources, fostering partnership with other stakeholders and the offering of massive open and online courses (MOOCs).

Table 1. The Rise of E-learning in the Philippines' Public Administration and Governance Education

Terry Anderson's Three Pedagogies of Distance Education	UPOU's Generations of Open and Distance eLearning by Dr. Grace Alfonso	MPM Program
Cognitive Behaviourist Teleconferencing Postal service	**First Generation:** learning modules were created by experts and were distributed through traditional media	Modules were all written and sent to students via courier
Social Constructivist Email; bulletin boards; world wide web; mobile technologies	**Second Generation:** -use of more videos -printed materials were sent directly to the students -the internet as a means of communication d **Third Generation:** -addition of an 'e' to Open and Distance Learning	The use of electronic mail in communicating with students Modules were made available through pdf files and shift to IVLE as a repository of assignments and course guides
Connectivism Networked connections between people, digital artifacts, and content.	**Fourth Generation:** -course development through the use of a Learning Management System (LMS). -Resource-based Course Development (RBCD) **Fifth Generation:** - widening the access to education by venturing into the global scene -by 2009, UPOU started doing international collaboration with academic and other institutions	The use of OERS in the courses. Modules are contracted for updating using the RBCP approach Creation of OERs through collaboration with GIZ (ILC) and ASPAP schools Creation of MOOCS

Innovations Introduced

For the past 22 years of UPOU's MPM Program, it has transformed in accordance with the development of ICT and e-learning. The following are the innovations that were introduced by the program.

1. Open Admission – The MPM is the only program of UPOU that conducts a Graduate Admission Test (GAT). In order to align the Program with UPOU's principle of

openness, the Program started to recognize prior learning starting from the 1st Semester of AY 2013-2014. This means that the Graduate Admission Test (TEST) is not the only basis of admission to the Program, but it also considers the nature of work, education, position among others, of the applicant.

2. Utilization of Open Educational Resources (OERs) – The Program has started utilizing open education resources (OERs) in updating the learning materials. Later, it has also started producing its own learning resources.
3. Creation of the MPM Playlists – The Program has created a playlist to be utilized not only for its lecturer and students but for everyone. The playlist includes several lectures conducted by different experts from the field. They were curated and edited for 21st century learners. The playlist is available through networks.upou.edu.ph.
4. Collaboration with Partners — The MPM Program has coordinated with international organizations such as the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, (GIZ), Department of Environment and Natural Resources (DENR) and other universities offering public administration in the areas of content development, research and consultancy and production of learning materials.
5. Offering of Massive Open Online Courses (MOOCs) – The Program also developed and offered four courses on Inter-local Cooperation for Local Government Unit.

Prospects for the Future of Public Administration and Governance Education

With all these capacity development initiatives for the public servants, it is important to determine the prospects of e-learning for public administration and governance education. E-learning will be the new normal, hence it will entail capacity development of educators and learners on digital skills. This include the skills on online tools in communication and collaboration.

It is perceived that there will also be a shift to automated and autonomous learning which means the development of personalized, self-paced, micro courses including MOOCs. New skills related to decision making and design thinking scenarios are also needed, hence new programs and courses will be developed such as data analytics and agile governance.

Finally, it is also recommended that partnership and working together is important. This includes the creation of an e-learning platform and sharing of open access publication and research,

including the continuous capacity development of public servants. Moreover, it is also important that there is Quality Assurance in the PA/G education.

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SPINS: A Set of Active Learning Strategy in Physics Amidst Pandemic

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Abstract

This study determined how the researcher-organized active learning strategy, SPINS, impacted students' engagement and achievement in online facilitated Physics class. It employed the pre-experimental design with an achievement test in Physics and student engagement questionnaire as research tools. It was found out that students' engagement varied depending on the specific SPINS strategy, Physics achievement significantly improved across all student groups, and the interactive presentation fostered a high level of enjoyment and engagement.

***Keywords**:* active learning, engagement, Physics education, online learning

SPINS: A Set of Active Learning Strategy in Physics Amidst Pandemic

The pandemic has changed the global educational landscape. In Asia, 75% of schools reported delivering instruction online (UN, 2020). One of the strengths of online learning is the availability of vast resources and the novelty of presentations. However, the flexibility in the cornucopia of resources, tools, and approaches in this modality of learning (Bates and Poole, 2003) exposes students to more distractions (Lepp, 2019) and may pose threat to students' holistic achievement. A recent survey shows that 55% of student-respondents are concerned about the lack of social interactions in online learning and 45% are concerned they will not perform as well academically (BNED, 2020). From the teacher's perspective, *Keeping all pupils motivated and engaged* (42.7%) came out to be the main challenge for teachers in online learning (School Education Gateway, 2020). Clearly, online learning heightened the existing concerns of having students to be actively engaged in the lesson and for them to achieve a certain degree of expectations.

This "New Normal" condition challenges teaching staff to design intentional online opportunities that ensure students' active engagement and satisfactory achievement. It is for this reason that the researcher thought of developing the SPINS Strategy. SPINS is a thoughtful collection of steps that practice an active learning strategy to increase students' involvement and achievement. Consequently, this study determines the effectiveness of SPINS in terms of student engagement and progress. Specifically, it seeks to answer the following questions: a) How does the students' level of engagement vary with the use of SPINS strategy?; b) To what extent, if there is, does the SPINS strategy affect students' Physics achievement?; and c) Which among the strategies used in SPINS largely contributed to students' engagement and achievement?

Method

Participants

SPINS was used for every Grade 11 and 12 Physics session while the class progressed in a regular schedule from mid of July to fourth week of September. The strategy was employed in facilitating different Physics topics to 19 and 28 Grade 11 and 12 students, respectively. These International Baccalaureate (IB) students served as the student-respondents. The students were categorized into three groups namely below average, average and above average. Prior Physics performance compared against the 7-point IB grade boundaries was the basis of the classification. The range of students' average scores and their group is shown in the table below:

	Physics SL (Grade Boundary)						
Score	0-22	23-31	32-43	44-53	54-64	65-75	76-100
IB Classification	1	2	3	4	5	6	7
My Classification	Below Average			Average		Above Average	

Fig. 1. Students' Classification

This classification was critiqued by three IB Physics teachers and two IB Coordinators. The inter-rater alpha generated is 0.87.

SPINS Strategy

Starter, Presentation, In-class Activity, Note Writing and Sentiment Sharing or SPINS pertain to a collection of active learning strategies put together in facilitating Physics learning.

Starter. Starter is employed at the beginning of the session, immediately after the learning objectives are shared. Students can either be given a prompt that they think about, perform a simulation, brainstorm about a phenomenon, etc. *Presentation.* The teacher presents the lesson using an interactive power point tool. The students are given numerous opportunities to share thinking, draw ideas, make conclusions, participate in polls, and display critical thinking while the discussion is going on. *In-Class Activity.* After the presentation, the students are given an inquiry learning activity. Students usually engaged in simulations, however, the students did some investigations using the materials they have at home in some earlier topics. *Note Writing.* A novel feature of SPINS strategy that is not evident in other active learning strategies is the inclusion of

individual digital notebook. Prior to the employment of SPINS, students were taught how to organise their notes. Initially, the teacher will give students a prompt in the form of an assessment statement. The students can respond multimodally. Feedback will be given by the teacher and reflection will be written by the student. *Sentiment Sharing.* At identified parts of the presentation, the teacher employs Muddiest Point with the use of the interactive presentation, employs the Thumbs Up (Keeley, 2008), or when time is constrained, allows students to write an exposition at the reflection part of the notebook.

Research Design

The researcher employed a pre-experimental research design. The pre-test was administered to determine students' initial understanding of some Physics topics. The students were then exposed to the use of the SPINS strategy. Prior to this implementation, however, the teaching plan was first evaluated by science teachers following an adapted standardized rubric. Afterwards, the effect of this strategy on students' Physics achievement was tested with post-test. Finally, the students were asked to fill out a survey/questionnaire form to determine the impact of the SPINS strategy in terms of their learning engagement and achievement.

Assessment and Measures

Literature describes an effective evaluation of active learning strategies as one which compares before and after tests, assignments or quiz results and eliciting feedback from students. This directed the use of the following instruments.

Achievement Test in Physics. The 30-multiple choice test was developed to determine students' learning and retention in topics about Measurement, Kinematics, Forces, and Electricity and Magnetism. The questions were lifted from the International Baccalaureate Question Bank. This test was pilot studied to students who had previously taken the subject. This enhances the validity of the test items used. Also, its computed reliability value is 0.84.

Student Engagement Questionnaire (SEQ). Twenty-six of the items in the questionnaire were adapted from the National Survey of Student Engagement (NSSE). For the purpose of this research, Engagement Indicator (EI) items from three of the four themes were considered. However, these EI were regrouped according to how they fit the purpose of the different types of strategy used. These EI characterizes specific parts of the SPINS strategy. The revised SEQ was

evaluated by five experts in South East Asia and has a value of kappa = 0.884 (95% CI, 0.861 to 0.909).

Planning for Active Learning Rubric. The rubric is adapted from Connecticut Common Core of Teaching (CCT) Rubric for Effective Teaching 2017. Variations were made but these do not affect the general meaning of the descriptors used. Science teachers who employ active learning strategies served as raters of the plans. The kappa values of the assessed lesson plans all fall to strong agreement interpretation with the highest kappa value, $\kappa = 0.825$ (95% CI, $p < 0.001$).

Results

The following table displays the results of this study.

Students' Engagement Level

The table below shows the frequency of engagement to specific strategies included in the SPINS active learning strategy. It shows the highest accumulated responses for the engagement indicators that were used to describe the technique.

Table 1. Students' Frequency of Engagement to SPINS Strategy

Strategy	Above Average (n = 16)	Average (n = 18)	Below Average (n = 13)
Starter	3 (42.19)	3 (45.83)	3 (44.23)
Presentation	3 (53.13)	3 (79.17)	3 (73.08)
In-Class Activity	3 (36.56)	3 (34.72)	3 (36.54)
Note Writing	2 (32.81)	3 (34.72)	3 (46.15)
Sentiment Sharing	3 (68.75)	2 (87.50)	2 (76.92)

Legend: 1-Never; 2-Sometimes; 3-Often; 4-Very Often

It is evident that all of the students regard their engagement as *often* when doing the activities employed in *Starter, Presentation* and *In-Class Activity*. However, 87.50% and 76.92% of the students belonging to Average and Below Average groups, respectively, regard *Sentiment Sharing* activity only as *sometimes* engaging. The table also reveals that the same set of student groups (A = 34.72%; BA = 46.15%) consider *Note Writing* as *oftentime*s engaging.

Achievement in Physics

Table 2 on the next page shows the results of the students' responses to the Physics achievement test after the implementation of SPINS active learning strategy.

Table 2. Pretest and Posttest Results of the Student-Respondents

Group	Test	$\bar{x}$	N	std deviation	t	p
Below Average (BA)	Pre	4.92	13	1.85	2.11	0.000
	Post	14.92	13	3.93		
Average (A)	Pre	9.17	18	3.07	2.03	0.000
	Post	18.72	18	3.74		
Above Average (AA)	Pre	11.13	16	2.33	2.05	0.000
	Post	21.88	16	3.18		

The results of paired samples t-test revealed a statistically significant difference from the pre-test to the post-test of the groups (BA: $t = 2.11$, $n = 13$, $p < 0.000$; A: $t = 2.03$, $n = 18$, $p < 0.000$; AA: $t = 2.05$, $n = 44$, $p < 0.000$). It is worthy to note that SPINS active learning strategy has greatly improved the academic achievement of students belonging to the *Below Average* group, followed by *Above Average* and finally, has the least effect on the *Average* group. The effect size for each group 0.51, 1.20, and 0.90, respectively indicates that the posttest scores are slightly more than a standard deviation better than the pretest scores, which is considered as a medium for BA and high effect size for both A and AA groups.

Table 3. Importance of the SPINS Strategies on Students' Achievement, Engagement, and Enjoyment in the Lessons

Strategy	Achievement			Engagement			Enjoyment		
	AA	A	BA	AA	A	BA	AA	A	BA
Starter	3 (43.75)	3 (44.44)	3 (46.15)	3 (31.25)	3 (38.89)	3 (53.85)	3 (43.75)	3 (33.33)	3 (46.15)
Presentation	4 (31.25)	5 (38.89)	4 (46.15)	5 (43.75)	4 (44.44)	3 (38.46)	5 (37.50)	5 (38.89)	3 (38.46)
In-Class Activity	5 (43.75)	4 (27.78)	3 (53.85)	5 (43.75)	4 (38.89)	3 (46.15)	4 (31.25)	3 (44.44)	3 (53.85)
Note Writing	5 (31.25)	4 (33.33)	3 (30.77)	4 (31.25)	3 (33.33)	3 (38.46)	1 (37.50)	1 (33.33)	3 (53.85)

Sentiment Share	4 (31.25)	3 (55.56)	3 (46.15)	4 (43.75)	4 (38.89)	3 (38.46)	5 (31.25)	3 (38.89)	3 (38.46)

Legend: AA, n = 16 ; A, n = 18; BA, n = 13

1 - Strongly Disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly Agree

Table 3 on the previous page shows the students' assessment on the degree of importance of the different SPINS strategy to their sense of achievement, engagement, and enjoyment. It is clear that students agree that Presentation has the biggest impact on them in terms of the variables mentioned followed by *In-Class Activity*.

Discussion

The results show that SPINS fostered engagement in the students' online learning. It promoted engagement where learning occurs that resulted in satisfactory achievement in Physics. This is evidently shown by the wide pretest and posttest gap across all groups. Also, all of the SPINS strategy, except *Note Writing*, stimulated enjoyment to the students. However, students in all groups agree to a certain degree that this SPINS strategy is an important part of their achievement and engagement. As one of the students put in an informal interview, "*Physics became more understandable as there's a balance of sentiment, engaging investigations and note writing activities*." On a more positive note, students' assessment on the strategy *Presentation* shows that they enjoy the strategy. This explains their response on the engagement indicators for the strategy which signifies a high level of engagement. These results are corroborated by Collie, R, et. all (2018) who found out that enjoyment is a significant determinant of engagement. Engagement, in turn, plays a huge role in students' high academic performance (Wonglorsaichon, B, et.al, 2014). This along with the other SPINS strategy nurturing student engagement, suggests a plausible explanation for the big difference seen between the pretest and posttest results in all groups of students.

Conclusion

From the foregoing, it is therefore concluded that a) the SPINS strategy promotes varying levels of engagement to the students during their online learning; b) academic achievement on all student groups significantly improved with the use of SPINS strategy amidst the pandemic; and c) the interactive presentation largely contributed to the students' level of engagement and achievement.

Recommendation

This study is limited to the number of Physics students currently enrolled in the program. Having said that, the strategy discussed in this study can be tried out to students of other subjects where there is a bigger population size to validate the findings mentioned above. Furthermore, the subject of this research, SPINS strategy, can also be correlated with students' motivation and attitude towards Physics to determine how the strategy affects other facets of learning like learning styles and beliefs towards the subject.

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Generating an assignment using the new taxonomy

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Abstract

This article provides a study on the methodology of creating assignments using the new taxonomy (Marzano, 2007). If a student's learning process is referred to as a scheme, the self-system, metacognitive system and cognitive systems of the brain are that scheme's elements. At the same time, an assignment that has been formulated using the new taxonomy of educational objectives will function as a conjunction that builds the learning scheme. The characteristics of a scheme conjunction is represented both in the content of the assignment's level of correlation with the context and comprehensive skills that are related, and in the level of the assignment's designation towards improving learners' knowledgeability.

The wholeness of the scheme is evaluated by the completeness of the cycle, "self-system - metacognitive system - cognitive system - metacognitive system - self-system", in the learner's brain while the variations of the scheme are conditioned by whether the activities of the learning process were majorly externally-directed or majorly self-directed.

Based on modern learning theories, the learner creates knowledge through their own activities in the process of becoming a creative, realistic citizen, while the teacher creates a comprehensive environment that supports his or her learning.

Keywords: self-system, metacognitive system, cognitive system

Generating an assignment using the new taxonomy

In our educational system, it has been quite an amount of time since theoretical and policy paradigms have been introduced. Unfortunately, in educators' performance, there are no signs of paradigmatic changes and is in a slump. Thus, to suggest a solution to some extent to this significant issue, the core characteristics of educators' performance must be highlighted into analysis. If we take learning process externally, it is a continuous chain of processes including fulfilling learning needs for giving learners knowledge competence, teaching and feedback. But when analysed internally, it can be understood as the process of comprehensively developing the learner's brain functioning system. The only way we could assess the learner's level of brain functioning is to observe the learner's reaction to the teacher's influence. Therefore, learning is directly dependent through communication. "Knowledge is not passed, but created" is another phrase used often, which summarizes how constructivism including the learner's studying activity is crucial in conducting the learning process.

Observing from all this, learning can be defined as a process that happens through communication called teaching and is accomplished through activity called learning, which is purposefully directed by the teacher with an aim to give the learner a comprehensive understanding and skills (Fig. 1).

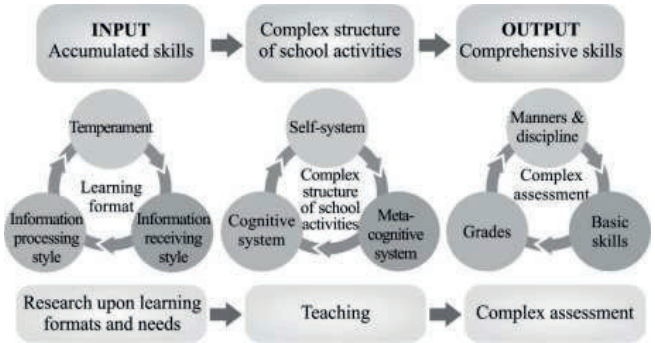

Fig. 1. Learning process

Here, assignments are main tools influential for including learners into the process and also inducing communication between the teacher and the learner. Teachers are able to control the learning process when they can provide assessments and analysations on the performance from the learners for the assignments they have produced for the learners, as it helps create

reliable feedback communication. Assignments can be multi-functional; motivating, skill-providing, or even rewarding at times, but a 'good' assignment has some characteristics they must utilize. Researchers generally viewed that 'good' assignments that support the learning process must be generated to fit with every stage of the lesson, created in relevance of comprehensive skills related, considered favoring various methods of solution and also constructed to be supportive of developing independent learning skills or team-working skills (Marzano, 2007). It is really important for teachers to have a methodology aimed at ensuring the active participation of students in all aspects of learning and creating an active environment that allows them to produce knowledge on their own.

Problems presented in the research

Researchers take up assignments from several different points to classify them and process them variably. Assignments that are aimed to support the learning process through differentiating between activity alignments, teaching them and developing them or assignments that are aimed to reward learners and their achievements by minor assessments, or assignments that evaluate learners' process and quality and such. What is the best perspective for assignment formulation? Here, when we formulate an assignment by referring to the learning process as a system development for brain functioning, it has been decided that the latest version, the New Taxonomy, of the educational learning objective classification, generally the Bloom's taxonomy is the most accurate choice.

We believe that the new taxonomy of educational goals can have a positive impact on learning outcomes if it is implemented through student participation and support for learning.

Methodology

How traditional assignments can be altered is attempted to be explained in the answers of these two questions. Including:

1. How does the human brain function system work?
2. How to formulate an assignment using the New Taxonomy?

Main part

1. How does the human brain function system work?

The following scheme shows the learner's brain function system while working on the assignment given by the teacher (Fig. 2).

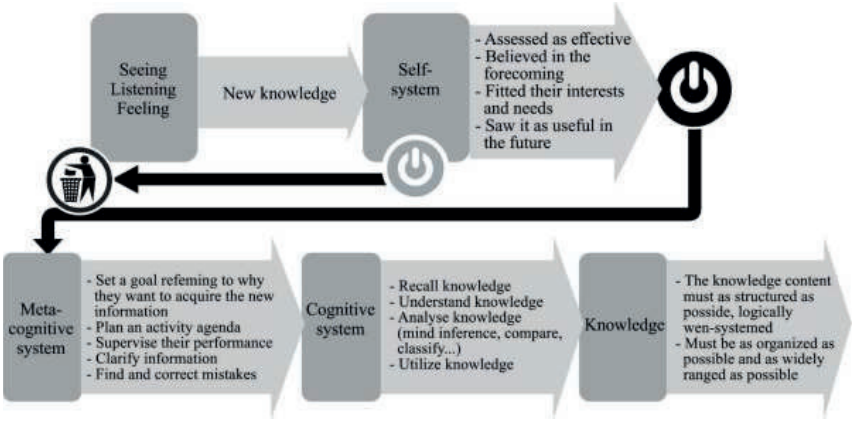

Fig. 2. Brain function system

Creating a knowledge is the cycle of brain function systems processing the subject's content. For example: assignment that has arrived through the external sensory organs is firstly received by a self-system, where whether attempting to complete it or not is decided. If that particular assignment has succeeded in attracting the learner into studying, the self-system will decide "Yes", while if the case is the opposite the answer would be no. If the decision was 'yes', the metacognitive system organizes and knows all the necessary aims, goals, strategies, tactics and further that must be used during the performance for the assignment. For the metacognitive system to function it needs to be connected to the cognitive system. This is because it is crucially included in the procedure of active knowledge processing and problem solving, as a decision maker. Lastly, whether or not the student has successfully performed the assignment is directly related to their knowledge which includes *information, mental procedures and psychomotor procedures*. If one's knowledgeability is organized, widely ranging and logically well synced with good structure, the brain function system works at its optimum beneficial level (Batbold, 2013).

2. How to formulate an assignment using the New Taxonomy?

When the New Taxonomy was created, it was based upon brain function system, so by using it,an educator is not only clearly demonstrating their aims, but also is suggesting them a

chance to rule over and regulate the learning process (Petty, 2004). Now the methodology of formulating an assignment based on the different levels of knowledge skills of the New Taxonomy is presented.

Aims and assignments of the retrieval level

The Cognitive-system-Retrieval is a complex structure including 3 types of learning activities "recognizing", "retrieving" and "performing". For retrieval, the learner is not required to use a strong fundament of knowledge. For instance, if the learner is able to choose between the right or the wrong answer within given answers, their retrieval process is at the "recognising" level. If answer choices are not given at all, and the learner is able to answer correctly to the given problem, then their retrieval process is at the "retrieving" level (Batbold, 2014).

- "Recognising" level assignments are usually provided in a multiple-choice test.
- "Retrieving" level assignments are usually conducted in a writing assignment or oral exam structure.
- "Performing" level assignments are usually aimed to let learners master and habitualize the sequence of psychomotor and intellectual activities, so it is structured to let the learner repeat similar activities in similar conditions, and also let them imitate.

Aims and assignments of the comprehension level

The *Cognitive system-Comprehension* is connected to differentiate and recognise the peculiarities of a particular knowledge, and is a complex structure including 2 types of learning activities, integrating and symbolizing. Here, 'symbolizing' activity shall be understood as higher level of activity above 'integrating' process. Comprehension level assignments are often provided in a question form that is structured to accepts learners' answers in oral, linguistic or actionary methods.

Aims and assignments of the analysis level

Cognitive system-Analysis is a complex structure consisting of five levels of learning activities including, "comparing", "classifying", "analyzing", "generalizing" and "clarifying". This includes:

- "Comparing" assignments teach learners the skill to compare, contrast and evaluate between the knowledge building sections that has been achieved.

- "Classifying" assignments teach students the skill to group things into units that are of similar characteristics.
- "Generalising" assignments provide learners with skills to derive new generic piece of knowledge from previous knowledge or from observations.
- "Clarifying" assignments provide learners with skills to suggest speactucaltions upon different conditions and their following results, and also with skills to present revised generalisations and principles upon particular examples.

Aims and assignments of the knowledge utilization level

Cognitive system-Knowledge Utilization level assignments are complex structures that include four levels of learning activities; 'decision making', 'solving problems', 'experimenting' and 'researching'. Here:

- "Decision making" assignments provide learners with skills to make decisions in a case of two or more variables.
- "Solving problems" assignments provide learners the skill to deal with different types of situations and difficulties using their knowledge.
- "Experimenting" assignments provide learners the skills to experiment and check the presented hypothesis and generific with the aim to find what's behind things and events.
- "Researching" assignments give learners the skill to check and generalise the hypothesis made upon what happened, is happening and might happen respectively in the past, present and future.

Aims and assignments of the metacognitive level

Metacognitive system assignments are complex structures that include four levels of learning activities; 'determining goals', 'supervising the performance', 'checking if the goal is understood' and 'monitoring mistakes'.

- "Determining goals" assignments provide learners with skills to determine their study goals and to plan to reach that goal.
- "Supervising the performance" assignments provide learners with skills to supervise and assess how efficient their performance towards their goal is.
- "Check if the goal is understood" assignments provide learners with skills to check whether the assignment has been understood well with one consistent meaning or not.

- "Monitoring for mistakes" assignments provide learners with skills to check their level of mastering the knowledge with the correct structure.

Aims and assignments of self-system level

The Self-system level assignments are complex structures that include four types of mental activities: "assessing significance", "recognizing efficiency", "controlling emotions", and "controlling motivation".

- The "Assessing significance" assignment provides students with the skills to identify whether new knowledge is relevant to their personal goals or learning needs.
- Accepting the benefits" assigns students the ability to recognize what they can do.
- "Controlling Emotion" teaches students the ability to identify and control their emotions, whether they are positive or negative.
- Controlling motivation provides students with the ability to identify whether they value the importance of new knowledge, accept its benefits, and whether their emotions are positive.

Conclusion

By learning to use the new taxonomy to generate assignments, teachers will be able to solve 3 problems which have had negative impacts on the quality of their work. These include:

- Because we organize training only in the context of cognitive, there is no need for teachers to act in the context of learning affective and psychomotor.
- Teachers have sufficient experience in acquiring "information" of knowledge, but they don't have a systematic understanding of how to acquire "intellectual knowledge" and "psychomotor knowledge", so the process of acquiring skills is ineffective.
- When a teacher directly imposes on students a method that he or she is said to have mastered, without examining the data related to the student's learning style at the learning input is ineffective
- The brain level reflects an individual person's development level and his or her maturity. So we need to look at the task at the cultural level, not in the traditional sense.
- Therefore, we need to look at the task being developed by the teacher from the point of view of it as a "tool" for the comprehensive development of the student's brain function.

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Does Augmented Reality enhance learning effectiveness? An exploration of AR application in a Mongolian Folk Culture Course

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Abstract

In our country, which has a nomadic culture for a long time. On the one hand, there is a transition to a settled culture, and in the near future, the trend of urbanization is accelerating. On the other hand, as a result of two factors, the rapid development of ICT and the influx of foreign culture, our country is entering a new era in a new spiritual and living environment. As nomadic peoples became more sedentary, their nomadic culture became more and more distant, and their traditions of interest, preservation, and inheritance were threatened. In our country, students of grades 1-5 are taking the “Mongolian folk culture and upbringing” course to provide cultural education, and through the content of this course, children and young people are getting acquainted with national culture and traditions.

However, UN 2012 and Ministry of education and science 2019 studies show that the results of this course are not satisfactory. Although Ministry of education and science updated the textbook and syllabus for this course in 2019, it remains unclear to teachers how the content will be delivered to students and what the results will be. Therefore, in this study, the learning outcomes of the ""“Mongolian folk culture and upbringing" course were determined, and in order to achieve this result, the student activities were organized with the support of the AR mobile app. To measure learning and technology outcomes, experimental studies were conducted in Grade 5 and 3 groups and compared achievement, motivation, and cognitive load.

***Keywords**:* Mongolian folk culture, AR technology, experimental study

Does Augmented Reality enhance learning effectiveness? An exploration of AR application in a Mongolian Folk Culture Course

Mongolia has long history of nomadic culture and traditions, especially the lifestyle of livestock breeding is hugely influenced on its nomadic culture and traditions. Nomadic culture is not only closely engaged with mother nature and wild animals but also it carries the concept of how to save and protect nature because nomadic pastoralists hugely rely on their livestock products, commodities, and passing on their way of life to later generations (www.wikipedia.org). Getting closer to civilization, nomadic cultural heritage is fading away because Mongolian folk culture is permeated through its lifestyle.

In order to promote public advocacy aimed at establishing a common norm of Mongolian values, culture, rituals and traditions to promote public advocacy for universal values, culture, traditions and traditions, the Mongolian traditional thought and methodology course is a “Mongolian folk culture and upbringing” required courses. Since 2011, Mongolian secondary school offers “Mongolian folk culture and upbringing” courses in grades 1 to 5, and all students must study culture. This lesson was taught for two hours per week in all classes.

The UN in Mongolia and Ministry of Education and Science of Mongolia had twice reviewed the implementation of this curriculum. In the 2012, UN in Mongolia Review Implementation Report states that it is advisable to provide methodological training and improvement of teachers who in charge of exact lesson and their teaching materials (UN, 2012). In June 2019, the Ministry of Education and Science of Mongolia updated textbooks and curricula based on the results of this study (MEDS, 2019).

Although this course has been taught since 2011 and the curriculum, textbook has been updated in 2019, it is still unclear for teachers How is civic education different from other subjects, their teaching and learning methods, and their attitudes? Is there a need for any methodological and innovative approaches to the training? And so on (UN, 2012).

Literature review

The works of UNESCO’s World Heritage Education Program, as well as the eTwinning EU project and other trends in the promotion of international cultural education, are all based on "building structural synergies, achieving long-term and effective joint construction to achieve greater sustainability "(UNESCO, 2015).

Van Lakerveld, 2011, and researchers have also suggested that “the content of traditional cultures should be directed to provide a more active, in-depth knowledge and skills than passive learning”. To this end, techers can use ICT to make content delivery clearer and more interesting. About this researcher said “ICT, in fact, on the one hand, offers an easier access and a multi-perspective view of Cultural Heritage artifacts, and, on the other, may also enrich and improve Cultural Heritage Education thanks to the adoption of innovative learning/teaching methods ” (Ott, M., & Pozzi, F. 2011). In addition, there are examples of ideas about how to teach linking culture with ICT which is mentioned in a section of ‘Teaching with digital cultural heritage in 21st century’ of the handbook of eTwinning project.

There are many examples of cultural education with technological support. One of these is argumented reality technology. The analysis and discussion of a large number of empirical studies show that AR technology has great potential and application prospects in learning support and teaching(Cai Su, etc, 2016). The use of AR in the cultural sector can develop in two ways.

1. Use Location based AR technology (Dunleavy, M., & Dede, C, 2014) to redefine and disseminate using extinct 3D cultural heritage. Or it could be possible to disseminate information about the cultural heritage to people, through video, text or 3D simulation.

2. Use task based AR (Dunleavy, M., & Dede, C, 2014) to a younger generation a deeper understanding of their culture and heritage. Support classroom learning and learning activities with chamber training. This will enable the students to demonstrate cultural heritage that can’t be seen or experimented in classrooms.

At present, The research based on task AR does not currently exist in the cultural sector and 2 cultural studies have been conducted using location based AR. These are two:

Corrado Petrucco, Daniele Agostini designed the application "AR-CIMUVE" app on a mobile device. The AR-CIMUVE Augmented Reality for the Veneto is an original project which deal with transmitting our cultural heritage and which teach primary and middle school children the cultural and historical cities. In this learning experience, students will explore how our environment has developed across the ages using the mobile devices with the technical back-up of the AR App. This will allow them to see maps, examine data, 3D models and will enable them to test and improve their skills (Corrado Petrucco, Daniele Agostini, 2016).

Doaa Mohamed Atia Tahoon “Simulating Egyptian Cultural Heritage by Augmented Reality Technologies”. The main objective of the research is to introduce the AR technology as an

approach of presenting the Egyptian cultural heritage to the users. The methodology starts with analyzing examples of computational prototypes which used AR applications in cultural heritage, and their AR display approaches. Then, at the end of the research, they would be able to put guidelines to the means of producing a computational model of augmented reality that enables the simulation and visualization of the case study (Doaa Mohamed Atia Tahoon, 2016).

I analyzed the results of this research, and location-based AR has some limitations. For example: It is impossible to reach the target position in every lesson, and both teachers and students use BYOD. And the trend in classroom teaching and cultural education is to move from outside the classroom to inside the classroom. So, we need to conduct research based on task AR.

Therefore, the purpose of this research is to use task-based AR applications in the classroom to teach Mongolian folk culture and evaluate its effectiveness. According to the purpose, the survey was conducted within the framework of the following two research questions. These include:

1. Can augmented reality technology assist to enhance learning Mongolian traditional culture?
2. What are the effective of using a combination of KHAS learning strategy and AR app?

Research Methodology

In order to improve the teaching methods of Mongolian folk culture, the results of the training were identified. An experimental study using the AR app was conducted to achieve the defined results, deliver the content more realistically, and support student activities.

Experimental procedure

Quasi-experimental study was used in the research experiment. A total of 3 groups were taught one topic and 90 minutes of experimental lessons once a week.

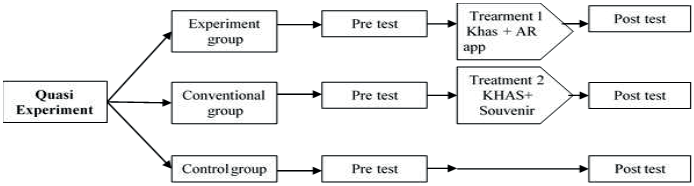

Fig.1. This study planed quasi experimental design

Learning design

The teaching method of the control group is the traditional method. Conventional and experimental groups have similar teaching methods and lesson plans, but different learning tools.

In order to plan the conventional and experimental groups learning activities, it was first necessary to determine the learning outcomes. Therefore, I studied the specifics of Mongolian folk culture and cultural education, conducted a survey of teachers, talked to researchers, evaluated the results, and developed the KHAS model. The KHAS meaning is 1. **Knowledge** - Gaining knowledge of cultural content, 2. **Habit** - Be able to use cultural content, 3. **Adore** - To love and protect folk culture, 4. **Spread** - Share what you learn with others. The goal of Mongolian folk culture education is to provide students with these four types of knowledge, skills, and attitudes. To achieve this goal, learning activities were organized using the learning pyramid (adapted form National Training Laboratories Institute Bethel, Maine). Lesson stages are:

- Ask – Teacher and students together define question.
- Demonstration - Group students find information and give answers based on questions. Used tablet, internet.
- Practice by doing - Students use AR apps to practice. Use AR apps to experiment, practice and learn how to build a yurt.
- Discuss group - A group of students discuss, share, and report their own cultural product information. How to adore and protection Mongolian folk culture? Every student makes one appeal.
- Teaching others - Students own known song, songs, poems, riddles teach in classmates. If students don’t know teacher teach them and student’s homework is teaching family and friends.

Learning tools

The control group tools are textbooks, blackboards, and videos, while the conventional group materials are souvenirs, papers, makers, stickers and flashcards. The experimental group tools are AR apps, tablets, papers, makers, stickers, and AR apps to print flashcards for the target pictures. The AR application is a "4d Ger" educational Android learning application developed by Argun trade LLC.

I have prepared 40 tablets of the same type, size and specifications for training. It also installed an AR application and connected it to the Internet to ensure that training was ready.

Participants

A total of 119 students from 3 groups of the 5th grade of "Unur complex" school in Ulaanbaatar were involved in this experiment.

Measuring instruments

Collect data before and after the experimental to measure the effects and results of KHAS model, AR app learning. The results of the tests are developed and compared with the collected data. Table 1 presents data collections and how to collect data and how to analyze it during experimental studies.

Table 1. The data source and analysis

Research Question	Data Sources	Analysis Focus	Analysis Methods	Participants
Pre and Post test	Developed for the purpose of this research	Learning achievement	SPSS, ANCOVA	3 group
Intrinsic Motivation Inventory (IMI)	Secondary data	Learning motivation	SPSS, Mean, SD, Cronbach's Alpha	3 group
Nasa Task Load Index (TLX)	Secondary data	Cognitive load	SPSS, Mean, SD, Cronbach's Alpha	Only Control group

Result

Motivation

Table 2 shows the descriptive results of the subscales assessing intrinsic motivation. The answer ranges from 1 (=Low) to 7 (=High). The results in Table 2 show a high approval within the scales interest/enjoyment, perceived competence and perceived choice for the experimental group (used AR group), lower means for these scales have been found for the conventional group and control group. This result shows that students agree that the use of the AR app in teaching was more interesting and supported their learning ability.

Table 2. Intrinsic motivation comparative results of the three groups

Items	Mean (SD)			Cronbach's Alpha		
	Experimental (N=38)	Conventional (N=40)	Control (N=41)	Experimental	Conventional	Control
Interest/ enjoyment	6.285 (.748)	6.054 (.792)	5.926 (1.062)	.813	0.72	.518
Perceived competence	5.872 (.771)	5.740 (.918)	5.648 (.904)			
Perceived choice	4.171 (.816)	4.637 (2.525)	3.8902 (1.036)			
Pressure/ tension	4.000 (1.031)	3.966 (1.20)	3.6341 (1.405)			

As a limitation the low value of *Cronbach's Alpha* (0.518) for the all scale within the Control group has to be mentioned. The Cronbach's Alpha value of the experimental (0.813) and conventional (0.720) groups is good and acceptable.

Learning Effects

The experiment produced pre and post test results for the experimental, conventional group, and control group. The maximum test score was 100. Table 3 shows the basic groups descriptive statistics of pre-test and post-test scores. Paired t-tests was conducted for the pre-test and post-test score variables of the experimental, conventional and control groups. The fact that the post-test is higher than the pre-test score indicates that the students' knowledge, skills and attitudes have increased as a result of the training (*experimental group: $t = 6.167$, $p < 0.01$, conventional group: $t = 6.853$, $p < 0.01$, control group: $t = 4.736$, $p < 0.01$*).

Table 3. Descriptive statistics of test scores. Paired t-test for pre-test and post-test score variables of three groups

		Mean	**SD**	**T**
post-test score minus pre-test score	Experimental group	17.29	11.2	6.1
	Conventional group	17.15	10.8	6.8
	Traditional group	12.3	10.5	4.7

To check the effect of AR, we conducted a one-way analysis of covariance (*ANCOVA*) for the posttest scores of all groups. The covariance's are students' pre-test scores (*the scores before the treatment of AR*), and the dependent variables are students' post-test scores (*the scores after the treatment of AR*). The results are shown in Table 4. ANCOVA results revealed that experiment group obtained significantly higher scores in the posttest ($F = 0.626$, $p < 0.01$, $\eta 2 = 0.389$).

Table 4. Descriptive statistics of students' pre-test and post-test scores and ANCOVA summary

Groups	Before treatment			After treatment			Univariate ANCOVA			
	N	Mean	SD	N	Mean	SD	Mean (adjusted)	Standard error	F	eta2
Experimental group	38	62.180	12.990	38	78.421	8.576	79.097	1.375	16.626	.389
Conventional group	40	64.210	12.171	40	79.097	8.561	78.500	1.410		
Control group	41	64.060	12.684	41	75.563	9.221	75.888	1.358		

In summary, after the course is over, the students' learning probability has been improved. It is worth noting that AR technology has developed students' ability to build Mongolian yurt, reinforcing their interest in learning and the knowledge they have acquired. In addition, after the course, the differences between the groups increased, and the scores of the experimental group were higher than those of the control group.

Cognitive Load

The calculated NASA Task Load Index often contradicts the findings of Dunleavy et al. (2009). Table 5 shows the mean, standard deviation value of each item. The answer ranges from 1 (=Low) to 5 (=High).

Table 5. Results of the NASA Task Load Index

	Mean	Std. Deviation	N
Mental	3.5263	1.37028	38
Physical	2.0263	1.46097	38
Temporal	3.6842	1.57866	38
Performance	2.5789	1.73410	38
Effort	3.0789	1.28150	38
Frustration	2.1579	1.53388	38

The results of the study show that the students of the experimental (*used AR app group*) group had less cognitive load during the training, which shows that Physical, Performance and Frustration. Also, because the course was multi-stage, the results of Temporal and Mental were slightly higher than other indicators.

Conclusion

In order to improve the results of the "Civic Education" course, it is necessary to improve the teaching methods and materials. In this study, we used the AR mobile app to teach the traditional Mongolian cultural content, "Mongolian Yurt". As a result of the experiment, the results and interest of the group lessons using the AR app were higher. It was also observed that this group of students growing for additional skills such as the ability to use technology and to teach and involve others. In terms of training organization and KHAS design, the AR app was involved with the goal of creating a Mongolian yurt-building Habit for students. The knowledge, habit, adore, and spread of Conventional and Experimental students were examined in detail. As a result, students in the AR group had higher levels of Habit skills.

This suggests that the use of the AR app in teaching Mongolian folk cultural content improves learning outcomes. It also provides students with the opportunity to deliver content in a more engaging and realistic way.

Limitation:

The limitation of this research article only measured learning effect using the AR app, and the results of KHAS learning strategies will be measured in future research.

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An Overview of video lessons of Engineering drawing courses in MOOC

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Abstract

In recent years, there has been a huge growth in the number of MOOCs (Massive Open Online Course) worldwide. With the rapid development of online courses, higher demand for recording the online courses in video form has been generated. The purpose of this study is to reveal the best duration and production format of Engineering drawing courses as video contents on different MOOC platforms. We analyzed data from Engineering drawing courses in Coursera and other national MOOC providers offered in Fall 2020 (see Table 1). We selected courses from famous universities in six different countries (China, India, Italy, Spain, Russia and Taiwan). We identified engineering drawing courses provided by famous universities in different countries. The study can be of help during the development, selection and specific stylization of video contents to be included in MOOC.

Keywords **–** video format, video length, national MOOCs

An Overview of video lessons of Engineering drawing courses in MOOC

In recent years, there has been a huge growth in the number of MOOCs worldwide. MOOC which was initiated and designed to achieve the three cardinal principles of Education Policy; namely access, equity and quality (UNESCO, 2015). The activity of traditional teaching and learning is mainly limited to lessons in a classroom. Once they are absent-minded in a lesson, they will miss the important contents. MOOCs play a major role in self-organized learning and it provide sufficient learning resources and more learning choices for students. The most popular MOOC providers include Coursera, edX and Udacity in the United States and FutureLearn in Great Britain. National online platforms have emerged in a number of countries too: XuetangX in China, MiriadaX in Latin America, France Université Numérique (FUN) in France, EduOpen in Italy, SWAYAM in India, the National Open Education Platform (NOEP) in Russia, so forth.

With the rapid development of online courses, higher demand for recording the online courses in video form has been generated. It is important that the instructors know how they can create their video contents by using low-budget technology. For producing a video, another important thing is the choice of video production format and video length. The primary factors that determines which format to use are the objectives of the MOOC and the course, and the course content. For this present study, in order to explore a new teaching mode for "Engineering drawing" courses and obtain a methodology of producing video lessons for the course, we examined the Engineering drawing courses on the MOOC Platform – Coursera, FedericaX, XuetangX, MiriadaX, NOEP (based on edX) and SWAYAM (others excepted for the Coursera are national MOOC providers). Especially we focus on the format and duration for the video lessons presented in the MOOCs. The Engineering drawing is an important technical foundation course for students studying in engineering universities and is the universal communication language in the technological field.

Method

In MOOC mechanisms of delivering video lessons, the videos are diverse, such as by the content, the format, the duration, and so forth. Table 1 shows MOOC providers, courses offered, universities offering the course and number of videos viewed, from the selected sample. For our sample data set, we identified engineering drawing courses provided by famous

universities in different countries. The courses provided by universities, such as Tsinghua, Polytechnics of Madrid, Ural Federal, National Taiwan and Naples Federico II; in subjects including Industrial technical drawing, Engineering Graphics 2D CAD, Descriptive geometry and engineering graphics, Technical Drawing for Mechanical Engineering, Engineering drawing and computer graphics and Engineering drawing were selected. We watched around 300 video lessons across the providers of six countries and analyzed them. Over a period of eight weeks from September to October 2020, we signed up for courses on each platform and participated in each course, paying particular attention to the video formats in which the video was produced. For analysis purposes, we checked the videos examined in study using nine primary video production formats mentioned below (Table 2).

Table 1. Video lessons' selection for the study

MOOC providers	Course	University	Videos	Instructor	Video Length	Language
FedericaX	Industrial technical drawing	University of Naples Federico II in Italy	30	3	03'54" – 13'58"	Italian
Coursera	Engineering Graphics 2D CAD	National Taiwan University	62	1	01' – 15'	Chinese
NOEP (based on edX)	Descriptive geometry and engineering graphics	Ural Federal University named after the first President of Russia B.N.Yeltsin, Russia	38	3	03' – 48'	Russian
MiriadaX	Technical Drawing for Mechanical Engineering	University Polytechnics of Madrid, Spain	16	3	05'20" – 18'10"	English
XuetangX	Engineering drawing	Tsinghua University - Beijing, China	94	3	02'42" – 20'55"	Chinese
SWAYAM	Engineering drawing and computer graphics	Indian Institute of Technology Kharagpur	20	1	15'47" – 36'16"	English

Video contents in MOOC. The video contents are delivered by the instructor, which may contain caption and in-video activities like, quiz. The content materials provided with a video lesson may be presentation slides, transcript of video, related document and so forth. The lecture material is provided in different formats, and the text content of the video is presented in different languages. Different MOOC providers use different types of video presentation styles, lecture materials and activities for their video lessons.

Videos Types for MOOCs. We used an empirical study of MOOC videos (Guo, Kim, and Rubin, 2014) to identify and report video production style relevant to this research. A large-scale study from researchers at MIT that used data from 6.9 million video watching sessions was conducted. According to the researchers, video lectures are divided into following primary

types: I) *lecture videos for content delivery* II) *a tutorial/ demonstration* and III*) others.* The researchers coded the videos examined in study using nine primary video production formats, which have been summarized in Table 2.

Video Length in MOOCs. Videos are an important feature of many online courses. In producing and using videos to effectively engage students and improve their learning, one decision instructors must make is how long the videos should be. According to the practical research on the online video courses, duration of each video should be controlled within 5-15 minutes, and the best duration of course video is between 6-9 minutes or otherwise the students' attention will begin to decline after seeing video more than 10 minutes (Guo, P. J., Kim, J., and Rubin, 2014, and Berg R, 2014). It appears that videos as a part of online courses are here to stay and that tailoring them to the right length to engage students is an important consideration in providing an overall quality experience.

Table 2. The Video Production Format checklist of video lessons in the selected MOOCs

№	Video Production Format	FedericaX	Coursera	NOEP	MiriadaX	XuetangX	SWAYAM
I. Lecture-Style Video Formats:							
1	Instructor(s) with/without Presentation Slides: Features instructors lecturing, with or without PowerPoint slide presentation slides inserted throughout with instructor 'voice over' while slide is displayed.		√	√	√	√	√
2	Office Setting: close-up shots of the instructor filmed at his or her office, typically instructor speaks directly to camera	√			√		
3	Classroom Setting: video captured from a live classroom lecture						
4	Production Studio Setting: instructor recorded in a studio with no audience, typically speaking to the camera			√			√
II. Tutorial/Demonstration Video Formats:							
5	Video Screencast: of the instructor demonstrating a concept, i.e. writing code in a text editor, or command-line prompt (in the case of computer science courses), using spreadsheet or document.		√		√	√	√
6	Instructor Drawing Freehand on a Digital Tablet: using a software program, which is a style popularized by Khan Academy videos				√		
III. Other Formats:							
7	Instructor interviewing another expert or guest speaker						
8	Instructor delivering lecture in another setting related to the course for example an ecologist giving lecture at the beach, an art historian in a museum, etc.						
9	Panel Discussion of experts on specific course-related topic						

The analyse of video lessons in MOOC

FedericaX: Founded in 1224, Federico II is the oldest lay University in Europe. With its "Federica Web Learning" Center, it is at the forefront of innovation of online multimedia education. Federica's platforms offer over 300 blended courses and more than 160 MOOCs

entirely open access by some of the outstanding academics of the Federico II and other leading Universities (www.federica.eu). The Industrial technical drawing course is delivered by University of Naples Federico II in Italy. The course includes 30 video lessons and the lessons are taught by three instructors in Italian. Duration of the videos is between 03 min 54 sec – 13 min 58 sec (Table 1). If we look at the checklist in Table 2, it can be seen that Office Setting format was predominantly used in the video lessons. As the video progresses, lessons are enhanced by setting in class labs, providing the opportunity to meet modern technology for engineering drawing such as laser projection technology and VR technology (Fig. 1).

Fig. 1. Laser projection technology and VR technology

Coursera*:* Coursera is an American MOOC provider founded in 2012 by Stanford University's computer science professors Andrew Ng and Daphne Koller that offers MOOCs, specializations, degrees, and professional and master track courses. Coursera works with universities and other organizations to offer online courses, certifications, and degrees in a wide more than 3000 courses giving students a very broad range of information & experience in different fields (www.coursera.org). The Engineering Graphics 2D CAD course step-by-step teach how to use 2D CAD software technology to Engineering Drawings. The lessons were all taught by professor at National Taiwan University and had videos filmed in roughly the same style – PowerPoint slide presentation with voice-over and video screencast of the instructor drawing in AutoCAD program (Table 2).

NOEP (based on edX): National Platform of Open Education is an initiative project of eight Russian universities (Moscow State University. M.V. Lomonosov, St.Petersburg Polytechnic University etc), supported by the Ministry of Education (www.openedu.ru). Descriptive geometry and engineering graphics course consists of video lectures, multimedia lectures and LightBoard lectures that were guided participants through the engineering drawing

theory. It was a novelty that some of the lessons of the course were filmed with the instructor using the LightBoard, which is a glass chalkboard pumped full of light and is used for recording video lectures (Fig. 2).

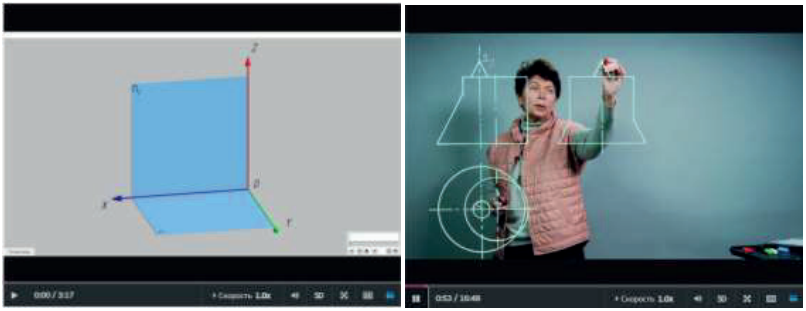

Fig.2. Light Board and multimedia lecture

MiriadaX: In 2014, Miríadax already had the participation of 45 universities from nine countries: Spain, Colombia, Chile, Argentina, Peru, Mexico, Brazil, Puerto Rico, the Dominican Republic and El Salvador; more than 1,000 professors and 195 data courses (www.miriadax.net). The next MOOC in this study is Technical Drawing course offered University Polytechnics of Madrid in Spain. The course is oriented to train engineering students in the use of the main tools to be able to understand and draw technical drawings used in mechanical engineering and mainly consisted of video lectures, PDF with presentation of Units and were usually followed by self-assessment quizzes. The videos are produced by variety of formats for instance Presentation Slides with Voice-Over, Khan-Style Tablet Capture, and Video Screencast (Table 2).

XuetangX: The XuetangX is an online free and open platform, and it is the online education research center and application platform of the Chinese Education Ministry (www.xuetangx.com). It is committed to provide higher education system for the public by cooperating with Tsinghua University worth of lessons consisted of a central video lecture, and several shorter lectures. The video production formats are in Table 2.

SWAYAM: The MOOC platform is a programme initiated by Government of India. In order to ensure that best quality content is produced and delivered, nine National Coordinators have been appointed (www.swayam.gov.in). Engineering drawing and computer graphics course hosted on the SWAYAM is in 4 quadrants – (1) video lecture, (2) specially prepared reading material that can be downloaded/printed (3) self-assessment tests through tests and

quizzes and (4) an online discussion forum for clearing the doubts. In all 12 weeks' lessons, the videos showed mainly long lectures. The video lectures consist of video screencast style, and Presentation Slides with Voice-Over that is able to show slides and instructor at the same time (Table 2).

Necessity to produce the video lesson based on MOOC

Annually, There are approximately 1500 students required to learn the Engineering Drawing courses, and they each belong to 8 different schools like School of civil engineering and architecture, School of business administration and humanities, School of industrial technology, School of geology and mining engineering, School of information and telecommunication technology, School of power engineering, School of mechanical engineering and transportation, School of applied sciences in Mongolian University Science and Technology.

Video content plays a central role in online open courses, and it provides constant and stable learning resources for students whenever or wherever students would like to learn by seeing teaching videos. Therefore, it is required to prepare contents for online learning. We use LightBoard to create lectures explaining the Engineering drawing concepts that we would normally discuss in a face-to-face class and provides links to the videos for our students to view before coming to class. The Lightboard lets us draw highly visible sketches as we lecture, work with our drawings in a natural way, face the camera, and capture good quality video without post-production editing. At present the teaching videos for engineering drawing courses have been producing (Fig.3).

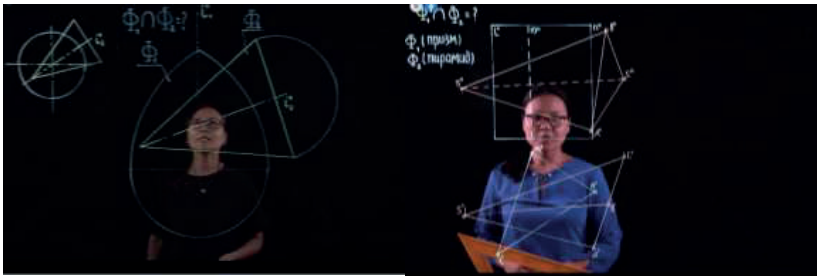

Fig.3. Light Board lecture

Conclusion

Too often we found video being used for lectures in MOOCs. When choosing a production style, it is important to keep in mind the goal of the video and its desired results. Different

production styles have different affordances, so it is vital that the selection process be both thoughtful and intentional. We found two video production styles that are most commonly used for the Engineering drawing courses (see Table 2): (1) the talking head style, where the instructor is recorded lecturing into the camera, and (2) the video screencast with voiceover style.

Video production tends to be the most expensive part of producing an online course, but it does not have to be. In many cases, opting for a lightweight or DIY production process is a great way to achieve pedagogical objectives, while at the same time, reducing cost. In order to avoid influencing students' learning effect from changing instructors frequently, the above mentioned videos of Engineering drawing courses are preferably taught by maximum of three instructors.

Duration of each video should be controlled within 5-15 minutes, and the best duration of a course video is between 6-9 minutes, otherwise the students' attention will begin to decline after seeing video more than 10 minutes.

Conclusions of this study may be useful for instructors in helping them to create the production of video courses for increasing the effectiveness of the implementation of new educational technologies.

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Peer Group Mentoring: Experience from Blended and E-Mentoring Scenario

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Abstract

Peer group mentoring (PGM) is well established as one of the most effective teaching methodologies in higher education. It enhances both academic and professional growth of the students. Therefore, this study analyzes the applicability of two different peer group mentoring (PGM) scenarios in a university education course regarding high quality scientific working. One of the scenarios represent "EduScrum" as blended mentoring approach while another named "Guided Networking" is an e-mentoring approach. Both the approaches have been realized in the university's learning management system (LMS). The qualitative findings indicate motivational differences of the students in taking part in the PGM activities from the two distinctive mentoring scenarios. However, results from both the implemented approaches point out significant fears of students in peer to peer scenarios which can be part wise compensated by a supervisor showing the necessity of an experienced moderator in peer mentoring groups just as design criteria for further PGM implementations.

***Keywords**:* Mentoring, peer-mentoring, e-learning, e-mentoring, blended mentoring.

Peer Group Mentoring: Experience from Blended and E-Mentoring Scenario

Mentoring is embedded in the teaching learning process of higher education (Lunsford et.al. 2017). Alongside with conventional mentoring, peer mentoring is well recognized in the higher education institutions due to facilitating the new students in coping up in the university environment, increasing students' retention and improving academic achievement. The plethora of research on study success show that the student's sense of identification with their peers is important for providing the sense of coping and therefore perceived control over academic progress. Peer mentoring describes a relationship where a more experienced learner helps a less experienced learner to improve overall academic performance and provides advice, support, and knowledge to the mentee (Terrion & Leonard, 2007). Unlike hierarchical mentoring, peer mentoring matches mentors and mentees who are roughly equal in age and power for task and psychosocial support (Terrion & Leonard, 2007). In spite of traditional dyadic model, peer-mentoring circle involves the concept of innovative group mentoring. These groups or teams generate many different perspectives, with group members combining energies and experiences beyond what individual members know or contribute (Ambrose, 2003). The group shares experiences, challenges and opportunities for the purpose of creating solutions (Darwin & Palmer, 2009). Students get support from peers as well as senior organizational members (Ambrose, 2003). This gives the scope to the mentee to gain access to networks, to reduce the feelings of isolation, greater connectivity, increased confidence and commitment, career progression, knowledge acquisition, better understanding of the culture and academic demystification (Darwin & Palmer, 2009). In this exploratory study, an implementation of the peer group mentoring (PGM) in blended and in e-mentoring scenario has been presented with the objective of investigating the experience of the students of higher education.

Theoretical Background

The concept of peer mentoring and peer group mentoring (PGM) is closely related to the education theory of "Community of Practice" (CoP) (Kopcha, 2010). It refers to the process of social learning where learners who have common goals interact as they strive towards the advancement of learning (Li et. al., 2009). Following this, in PGM 5 or 6 members from similar

academic or professional context form the groups or teams to offer flexibility, diversity, knowledge creation, the ability to depend on more than one person (Darwin & Palmer, 2009).

Along with technological advancement in the e-learning systems, the concept of e-mentoring and blended mentoring have evolved. Therefore, peer e-mentoring represents the virtual formation of groups and maintenance of communication and all the mentoring activities among the group members via e-learning technology without the mandatory traditional face to face settings (McLoughlin, 2007). Blended mentoring is the newest edition of mentoring and e-mentoring. It combines more than one means of communication in the PGM process including face-to-face mentoring sessions accompanied by communication or mediation through e-learning tools (Murphy, 2011). Accordingly, the mentoring process regulates different sessions with the presence of a superior mentor for the peer group (Murphy, 2011). Consequently, these two mentoring scenarios are distinguishable with the forms of communication and with the presence of an expert mentor for the peer groups.

To work well within the peer mentoring groups by incorporating e-mentoring facilities, it requires its own form of facilitation (Single & Single, 2005). Accordingly, there are five variables, which are associated with the pedagogical strategies of forming and operating PGMs (Single & Single, 2005). First one is topic-based which represents that each group must have a topic or theme to work on. Second one is critical mass of participants who will last through the whole program. Third one is formal or informal facilitation performed either by participants or by the program staff. Fourth variable is that these groups should have the opportunity of synchronous and asynchronous discussion via forums or in other forms in the learning management system. Lastly, the fifth variable ensures that the groups work successfully in safe and supportive communities, where the participants can expose their concerns and opinions.

Method

In this study, the approach used for PGM in blended scenario is known as “EduScrum” and the e-mentoring scenario has been realized completely in the learning management system (LMS) and named as “Guided Networking”. Both the scenarios have been administered in a seminar for learning scientific working methods in Computer Engineering education. The course is divided into a lecture part and a practical exercise part. The lectures are used to explain methods necessary

for fulfilling high scientific standards in the field of literature survey, presentation style and preparation, professional discussion just as scientific writing and reporting representing the evaluation criteria. The examination is conducted by presenting the state of the art of a self-chosen topic and writing a scientific report of 10 to 15 pages. The learning outcomes of the course cover a wide range of competences required in the field of Computer Engineering following the competency model of information technology (IT) industry ("Information technology competency model", 2012). The course trains competencies from the tiers – Personal Effectiveness Competencies, Academics Competencies, Workplace Competencies and Industry- Wide technical Competencies, by self-determined work on real world industry topics, by using scientific methods for elaborating the presentation followed by a series of questions and a report. It has the provision of the university's learning management system "OPAL", where all the course material, necessary information and registration facility is available.

EduScrum

EduScrum is based on Scrum (a framework for developing and sustaining complex products). EduScrum is an adaptation of Scrum to education (Ferreira & Martins, 2016). It is a framework for mentoring students where the responsibility for the learning process is delegated from teachers to students. The three main roles in eduScrum are- product owner (expert mentor) who manages and defines the product backlog, scrum master (peer mentor / team leader) who coaches the teams to follow eduScrum rules and the development team is a group of students who delivers the product. For using the eduScrum method within the pre-defined course structure it was necessary to apply it to the LMS OPAL (Tudevdagva, Heller & Hardt, 2020). Groups can be formed by students at the beginning of the semester by registering to the designated eduScrum groups. In each group, there is a virtual forum and email distribution system available in the LMS "OPAL" to maintain the asynchronous communication among the peer group.

Guided Networking

Guided networking has been implemented in the learning management system OPAL of the respective university. It provides the autonomous activities necessary for e-mentoring group formation. There is no scope of personal presence of an expert to conduct, monitor or supervise the peer group's activities leading the students to a self-determined working style supported by the given e-mentoring tools. For the voluntary registration in working groups the registration course

module is used, which provides pre-defined working groups with a maximum capacity of 5 students. Each working group is provided with a short guide generated according to the "EduScrum" framework of the successful group work, which includes phases, short and medium term goals to achieve the final goals just as reflection questions based on the course learning outcomes. Additionally, a checklist is provided visualizing the individual progress contributing to the motivation of the student. For communication, each group is provided with a blog, an e-mail distribution list and a calendar.

Data collection and analysis

Qualitative data about the PGM strategy of "EduScrum" have been collected from an unstructured interview. The interviewee is from India and has been a scrum master of her team. Intelligent verbatim transcription has been done from the audio recording and 35 inductive coded segments have been curated for conducting narrative analysis to categories the overall mentoring experience in terms of concepts. For Guided networking, 43 students from the seminar have been asked in a short open ended questionnaire and the responses have been analysed qualitatively by conducting thematic analysis. Among the respondents, 70% are from India and rest are from different parts of the world.

Results

Peer group mentoring experience from "EduScrum" scenario

The results represents 13 concepts from the narrative analysis of the interview. These concepts state that the interviewee got active learning opportunities with the peer group of 5 members who were sharing their knowledge and experience to help each other in the course content and assignments. The interviewee particularly liked this approach as she scored highest grade in the seminar and she has reasoned this approach for attaining this. She has reported that this blended PGM enabled them to motivate each other and to get encouragement from the "Product Owner" by getting individualized feedback and suggestions for improving the tasks of the seminar. She has acknowledged her experience as a "Scrum master" helped her gaining analytical and problem solving skills which are useful in real life as well. In her interview, she ensured that they had the combination of e-communication and facilitation via OPAL and face to face session with their "Product owner" as a form of expert consultation. The interviewee has

reported that they did not share their individual presentation and report among the peer groups in a fear of replication of the information and format among the group members. She stated that multiple members from same group had same topics to complete individual assignment and it disabled them to get feedback or suggestion about the final assignments from the peer group. Nevertheless, she has thought that there is no disadvantage in this PGM approach.

Peer group mentoring experience from "Guided Networking" scenario

The result from the thematic analysis of the questionnaire shows that 17 students have been registered to the peer groups via Guided networking but none of them has utilized all the elements of the e-mentoring system. In three of the groups, two members from each team have interacted and discussed with each other and in only one group four of the members have discussed about their assignments of this seminar. All their meetings have occurred face to face and they all reported that the team members have been personally acquainted before registration. The 5 respondents of these teams have liked their team learning experience and have reported that it helped them to improve their performance. Two of the respondents have reported that they have registered at first and then deregistered from the team. Including them, 12 registered students have not used Guided Networking system at all and have not gained any team learning experience from this PGM approach. About 50% of these 12 respondents have stated that they could not understand how to get help from this peer group and they could not contact with other group member. The other two of these respondents have reasoned that other group member have not been motivated and willing to work in groups. The rest of the 60% respondents have not registered. The working principle of the teams have been incomplete and unclear to 10% of them. As one of them wrote,

> "I don't like to join this OPAL team and other people also said yes, OPAL teams are kind of strange."

Among these 60% of the students approximately 35% wrote that, they felt their ideas would be stolen in team-works. Having no personal information about the team mates were also a point of question to three of the respondents.

Discussion & Conclusion

The result of this exploratory qualitative study indicates the reformation needed in the existing framework for both blended and e-mentoring scenario of peer group mentoring (PGM).

The interview results show that the blended PGM has greater impact on the students learning and skill development and the expert mentor's initialization has an effect on the peer group activities and retention of student's motivation. The combination of online and face to face interaction is visible prominently in this learning experience. On the other hand, the e-mentoring guidelines and facilities in the LMS have not been seen as useful in contrast to EduScrum while both have comparable framework. The PGM have been successful, in which the peers knew each other before and have had face to face meetings only. Most of the students have not understood the benefit of peer group e-mentoring and it is relatable with their familiarity and attitude towards e-learning (Shegupta et. al., 2020).

Nonetheless, in both the scenarios the concern surrounds along with the 5th principle of e-mentoring group formation that is safe and supportive working environment. The blended and e-mentoring peer groups are not certain about showing their content and format of the assignment to get individualized feedback from their peers due to having no or less trust on each other. This needs to be taken care of for all the future implication of such PGMs. Though the theoretical perspective supports both the scenario of PGM, further in depth investigation is needed to point out all the disadvantages of both the system and optimize them accordingly.

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The Evaluation of Distance Teaching During Covid Guarantine at MUST

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Abstract

This paper describes the evaluation of distance teaching during covid quarantine time at Mongolian University of Science and Technology, public university, Mongolia. Due the corona virus almost all universities must was to change teaching type from traditional face to face to distance, electronic and digital teaching and learning. Many educational institutions has no preparation for such us unexpected change. The Mongolian University of Science and Technology has developed own learning management system for e-learning since 2007. Therefore e-learning and distance teaching was not so new for our faculties. But, from bachelor to doctor, all level to teach from distance in whole faculties was not really ready. All faculty members and IT center did what could to fit appeared situation.

The "International economics and business environment" course usually teach in traditional way, in classroom for bachelor students. The course has 3 credits including 2 hours lectures, 2 hours seminars and 5 hours self studies. The exam of course is the writing exam for 90 minutes. All this standard must was adapted to distance teaching. The first 4 weeks and the last 4 weeks of this course were conducted online, and the middle 8 weeks were classroom. For the lecture we developed 8 hours lessons with detailed PDF materials, 16 hours lesson classroom-based and 8 hours LIVE lesson, and we spend 150 hours in Unimis LMS, in Microsoft TEAM and FB social networking to communicate with our students.

For evaluation of distance teaching applied the structure oriented evaluation model (SURE model). Together with SURE model we developed structures for evaluation. For data collection we used Google form and collected data processed by the SURE model online calculator.

***Keywords**:* evaluation, e-learning, distance teaching, SURE model.

The Evaluation of Distance Teaching During Covid Guarantee at MUST

Introduction

The Mongolian University of Science and Technology (MUST) is the one of basic public university. Most portion of engineers graduated at MUST. The MUST has 1003 teachers and 20518 students. There are 47 faculties offers 294 study directions.

The Business Administration program offers a wide range of specialized majors, namely "Financial management", "Human Resources Management", "Marketing Management", "International Business Management", and "Information Systems Management". There are 33 faculty teaching undergraduate courses in "Business administration'', 12 faculties are Ph.D. doctors, and 21 faculties have a master's degree.

The Course Description

Traditional way to teach course

The course has 3 credits. The main goal of the first part of the course is to introduce students to both classical and modern theories of international trade in goods and services, as well as to introductory level of theories of international finance flows, determination of interest and exchange rates in interconnected economies, macroeconomic policies available to the government, and the nature of financial crises. The aim of the second part of the course is to introduce students to the effects on international business decisions of cultural, political, legal, and economic forces; The role of social and economic aid organizations such as the UN, EU, IMF and World Bank will also be discussed.

Teaching and learning activities consist of lectures, seminars and home assignments and self-study. Active student participation in seminar-style class lecture. Classes are highly interactive. Instructor prompts students for response to questions posed and solicits his/her thoughts on issues discussed. Format is probing and direct. Additionally, instructor provides concrete, real-world examples to illustrate concepts. Lecture format reinforces by example appropriate methods for asking questions, gaining relevant insights, and making appropriate recommendation. In presentation and discussion of readings by professor and students. Textbook and other assigned readings present relevant topics, which are covered more depth fully in LIVE and class lecture. In class discussion of readings, instructor highlights most relevant reading topics,

showing by example how to present data in a stimulating way, consistent with achieving course objectives. Case Study and/or Article Presentation. Case studies and articles are used to further illustrate real-world examples of subject topics. For all assigned cases/articles, students should be prepared to answer questions about the case/article and be able to illustrate its subtler aspects. For select cases/articles students will be selected to make a presentation. In class discussion of case studies/articles serves to highlight analytical methods, indicating specifically, ways to discern the most relevant focal points.

Adaptation of Course for Distance teaching

Due the covid situation the course must was deliver from distance. There were not much time for adaptation of traditional course.

In this situation, the following changes were made step by step. These include:

1. Provide the PPT material of the lecture with very detailed and detailed information. At the same time, the Mongolian University of Science and Technology (MUST) has launched a new distance learning platform.
2. Animation and audio have been provided on some of the topics that need to be explained through animation and the teacher's speech.
3. Students are provided with additional reading materials as part of the course content.
4. A distance learning platform has been introduced for students to watch real-life video footage of the course content.
5. Open channels for direct communication with students, create a Microsoft team’s the course team and a facebook group for classes, and use it to communicate online and directly with students.

The Evaluation Model

There are different evaluation approaches and models are master developed for educational evaluation. But, evaluation models which developed for e-learning evaluation is not so various. The selected evaluation model is the structure oriented evaluation model for e-learning [1]. This model originally developed for evaluation of e-learning process, therefore fit to our evaluation interest.

The SURE Model

Main concept of structure oriented evaluation model (SURE model) is based on a multidimensional understanding of evaluation process and a corresponding analysis [2].

Steps of Evaluation Process

- First step is definition of key goals. There are five key goals are defined by evaluators: Teaching materials, Learning environments, Skills of lecturer, Assessment types and Acceptance of distance teaching.
- Second step is definition of sub goals. The key goal can be reached by different possible ways. Those ways are called sub goal in the SURE model. In this evaluation process: first key goal defined trough eight sub goals, second key goals by four sub goals, third key goals by five sub goals, fourth key goals by six sub goals and fifth key goals by five sub goals respectively.

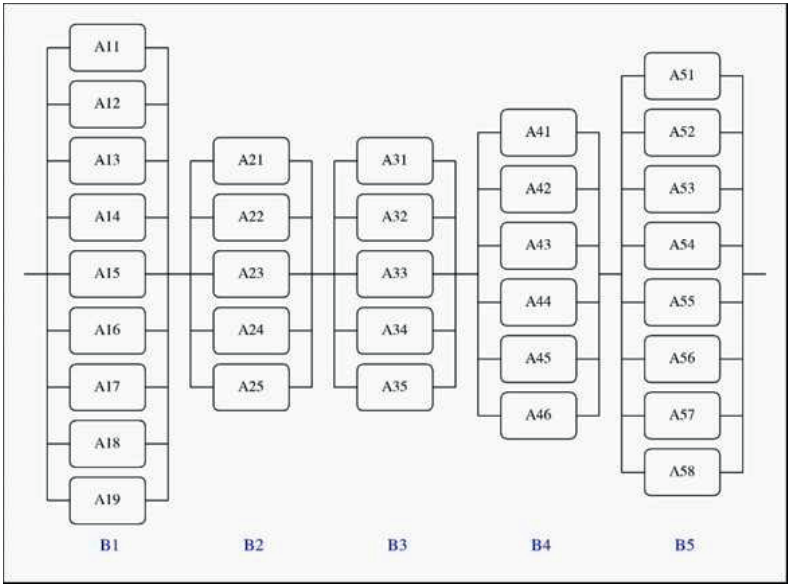

Fig. 1. The logical structures of evaluation goals

- Thirds step is confirmation of goal structures. First two steps are focused to design evaluation goals. The evaluation goals are defined via logical structures (Figure 1). After design of those logical structures by the SURE model, defined structures have to be confirmed by evaluators or all involved groups of evaluation process. In our case it designed by SURE expert and course owner together and therefore, this step is confirmed without doubled discussion.
- Fourth step is creation of the checklist (questions for data collection). Based on the logical structure from second step adapted checklist is developed. Sub goals are defined as statements but for checklist those definitions have to transfer to criteria or questions for data collection. The Figure 2 shows example of first key goals questions.

N	Sub goals	Disagree	Neutral	Agree <=30%	Agree 31-50 %	Agree 51-75%	Agree 76-100%
		0	1	2	3	4	5
Key goal 1. Teaching materials							
1.	Teaching materials fit to course description						
2.	Amount of teaching materials fit to course duration						
3.	Teaching materials type and format engaged to learn						
4.	Teaching materials delivered in .pdf format and it was easy to download						
5.	Lectures delivered in video type. It was very helpful to review in own learning speed.						
6.	Learning materials for self study fit to course content and additional materials.						
7.	Online discussion during self study was helpful for learning.						
8.	Duration of videos were 15-40 minutes and it was exact time for study.						

Fig. 2. Questions of first key goal.

- Fifth step is confirmation of the adapted checklist. By the SURE model rule on this step all involved groups of evaluation process have to check adapted checklist. Tested checklist by all involved groups should be confirmed by evaluators. In our case the SURE expert and course owner are together developed the checklist, therefore this step is confirmed by both side without tests.

- Sixth step is data collection. This is one of important step of the whole evaluation process which takes a lot of time. For this paper data collected from group students for summer semester of 2020/2021. Extra ordinary situation for students and lecturers were unplanned and unexpected switch from normal traditional teaching to distance and online teaching mode. For data collection was used Google form.
- Seventh step is data processing. This part is highlight of the SURE model. And data processing part described in sub section “data processing” below.
- Eight step is the report of evaluation.

Data Processing

Short Statistics

The course offers each semester for International business management and Marketing management. The number of students in the course is 30-60 students per semester, but for last semester, the number of students was 62 students.

Response Data

The checklist was send to all 62 learners. This questionnaire was completed by students at the end of the course after completing the 100-point scale. 54 surveys were completed. The sample has been taken from 37 female (69%) and 17 men (31%) participants.

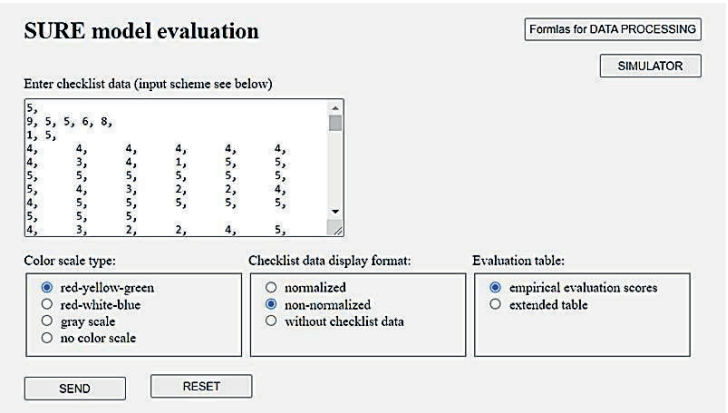

Fig. 3. The online calculator of SURE model

Processed Data

Collected data processed by online calculator of SURE model [3]. Figure 3 shows basic window of online calculator. Evaluator should put collected data in CSV format into the edit field. The online calculator computes all evaluation scores and return results in table (Fig. 4).

Empirical evaluation score $Q_e^*(C)$

$Q_e^*(C) = 0.892561$

Asymptotic confidence intervals $[q_{e,0}^*, q_{e,1}^*]$ for $Q_e(C)$ at confidence level $1-\alpha = 0.90, 0.95, 0.99$ and sample standard deviation σ_e^* with $\sigma_e^* = \sqrt{\frac{1}{n-1}\sum_{k=1}^{n}(Q_{e,k}^*(C) - Q_e^*(C))^2}$.

$1-\alpha$	$q_{e,0}^*$	$Q_e^*(C)$	$q_{e,1}^*$	σ_e^*
0.90	0.8566	0.8926	0.9285	0.1606
0.95	0.8497		0.9354	
0.99	0.8363		0.9489	

Sample size $n = 54$

Fig. 4. Part of result screen of online calculator

Conclusion

Main aim of self evaluation of distance course was to identify achievement offered course with in five dimensions. The SURE model online calculator computed evaluation scores by all defined sub goals, key goals and general evaluation result.

Main evaluation result measured as 0.89. It shows that course achievement calculated by students' evaluation successful as 89%, as well as very positive and high result. Key goals are reached its target with evaluation scores: B_1=0.92, B_2=0.92, B_1=0.94, B_4=0.83, and B_1=0.91. All five key goals evaluation scores are over 80%. And it confirms general evaluation score achievement once again. Worst score received sub goal: A_{21} "The communication environment of Unimis LMS was good". From the perspective of university level of communication environment of Unimis LMS is enough good for distance teaching. But, the feedback from students via evaluation scores gave opposite result by sub goal A_{21}. That means, the university need to do more precise survey including more students and try to find out reason for such us feedback. It should

help to university to include development plan for Unimis LMS relating to communication environment during the distance teaching and learning. One of the some limits of the Unimis LMS system is offline, although the UNILMS system produces statistics. However, this shortcoming is offset by the facebook group created in each course.

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The Evaluation for Faculty Performance based on SURE model

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Abstract

The learner centered learning environment consists from many aspects. One of the key aspect is quality of the faculties during teaching and learning. There are many different evaluation methods and models implement in evaluation of faculty performance. Each country, each universities has its own specific methodologies to do evaluation of faculty performance. The evaluation of subjects' performance is complicated task. Therefore, evaluators need to apply well structured, scientific oriented, objective methods and models for evaluation of faculty performance.

In this paper authors described one of possible way to measure faculty performance based on structure oriented evaluation model.

Keywords: faculty, performance, measurement, learner centered learning, structure, SURE model.

The Evaluation for Faculty Performance based on SURE model

The universities trying to support learner centered learning with high quality teaching and learning environments. Evaluation of the faculty performance is one of method to recognize weaknesses in teaching, moreover this is the way to support lecturers for their academic development and career making.

The Mongolian University of Science and Technology (MUST) is the one of the universities in country which implemented self assessment of faculty performance based on scientific measurement. For start the MUST used checklist for self assessment which consists of many different criteria's and questions. Since 2011 years the MUST requested to do self assessment by giving checklist from faculty member once per every two years (Bayar-Erdene, 2018). Later it improved and developed first logic structure for self assessment by doctoral dissertation at MUST (Bayar-Erdene, 2019). This paper analyzed first logical structure for faculty performance using simulated data.

Methodology and evaluation model

Main evaluation model which focused in this paper is the structure oriented evaluation (SURE) model which developed in 2014 by doctoral dissertation in Germany (Tudevdagva, 2014). The SURE model has next advantages:

- Open for multi dimensional evaluation
- Strong logical relation between goals structures
- Request to define evaluation goals precisely before to start whole evaluation process
- Consisted from well defined clear formulated steps for evaluation process
- Data processing formulas developed based on logical goal structures
- Developed online calculator for data processing
- Very objective data processing
- Can apply for many areas of evaluation cases

The SURE model is comparatively new model in evaluation practice. Main reason to apply this evaluation model is adapted checklist and logically linked data processing part with evaluation goal structure (Tudevdagva, 2020).

To apply the SURE model evaluators have to follow pre defined steps:

a. definition of key goals,
b. definition of sub goals,
c. confirmation of evaluation goals structures,
d. creation of adapted checklist,
e. test and confirmation of checklist,
f. data collection,
g. data processing,
h. reporting.

Here authors used defined logical structure from doctoral dissertation of author.

The logical structure of evaluation

As for key goals defined three main criteria (Fig. 1):

- Teaching (B_1)
- Research (B_2)
- Social activities (B_3)

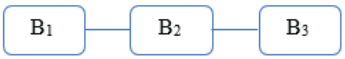

Fig. 1. Key goal structures

Main highlight of sequential logical structure is very strong dependencies between goal achievements. If just one of these three goal could not reach its target then general evaluation goals will be calculated as FALLED (0). That means all three goals has to be reached with any kind of positive scores.

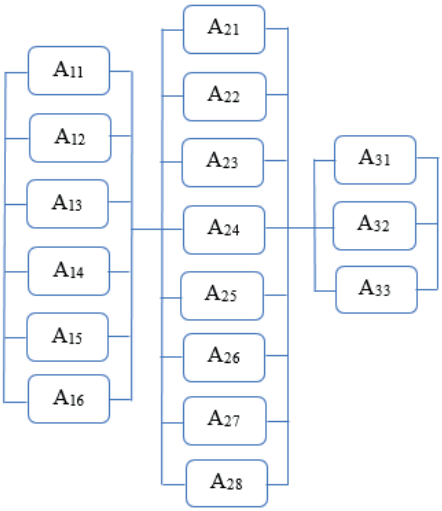

Fig.2. Sub goal structures

Based on three key goals defined sub goals in following way (Fig. 2):

- Teaching (B_1)
    1. Completeness of teaching course profile
    2. Readiness of teaching materials for students
    3. Handbooks for students
    4. Electronic versions of lessons for e-learning
    5. Description of laboratories
    6. Bank of tests and exams
- Research (B_2)
    1. Third part projects

2. Local projects
3. Conference papers
4. Journal articles
5. Organization of international scientific events
6. Scientific laboratory development
7. International cooperation
8. Supervising master and doctoral thesis

- Social activities (B_3)
  1. Self development
  2. Humanity activates
  3. Support to students beside teaching

Data collecting and processing

For data collection used online simulator of the SURE model.

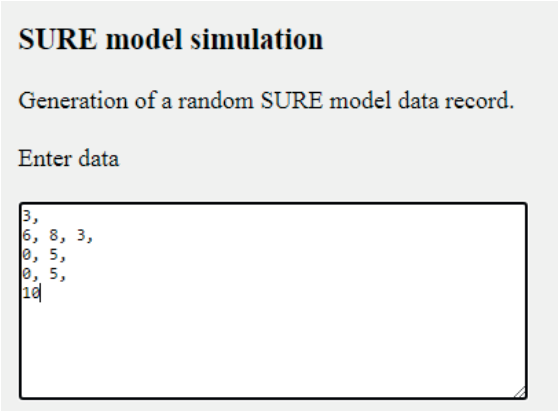

Fig. 3. Main window of the SURE model online simulator

To generate simulated data with online simulator evaluator should give command to main editor window with CSV format. For example:

- 3, - number of key goals
- 6, 8, 3, - number of sub goals
- 0, 5, - interval for measure units
- 0, 5, - requested interval for simulation data
- 10 – number of responses

Fig. 3 shows that above defined CVS command giving to online simulator.

SURE model simulation

Simulation parameters

Number of key goals:	3
Numbers of sub goals:	6, 8, 3
Evaluation interval:	[0,5]
Score limits:	[0,5]
Number of data records:	10

Simulation data record

```
3,
6,8,3,
0,5,
5,4,3,5,5,1,2,2,3,0,4,2,1,2,5,1,2,
5,2,5,4,5,2,3,3,3,1,2,4,4,1,4,2,5,
3,1,1,0,3,4,0,2,0,2,5,0,3,1,0,0,0,
5,0,3,2,3,1,3,5,5,2,1,3,4,1,1,0,2,
1,4,0,2,0,1,4,5,2,2,0,3,3,1,3,3,4,
5,0,5,3,0,4,5,2,2,4,3,4,4,5,5,3,0,
2,3,2,1,3,4,4,4,2,1,5,5,5,3,5,5,2,
2,0,1,2,2,4,1,5,2,0,5,2,3,5,4,1,1,
0,4,0,4,2,2,0,2,2,5,5,1,5,2,4,0,4,
1,3,2,2,2,4,2,2,0,0,1,5,1,3,5,5,3,
```

Fig. 4. Result of online simulator

Fig.4 shows how to online simulator generated data based on giving command. Additionally the simulator shows giving command above the simulated data.

Evaluation result

The simulated data sent to online calculator. Fig. 5 shows result of online calculator.

Evaluation table (empirical evaluation scores)

	B_1						B_2								B_3			
k	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	A_{16}	A_{21}	A_{22}	A_{23}	A_{24}	A_{25}	A_{26}	A_{27}	A_{28}	A_{31}	A_{32}	A_{33}	$Q^*_{e,k}(C)$
1	1	3	3	1	2	2	3	0	4	5	1	3	0	4	2	5	2	0.75
2	0	1	5	5	1	5	5	3	1	3	5	2	5	0	3	3	4	0.88
3	5	5	1	3	0	0	3	1	3	4	5	0	3	2	0	4	1	0.77
4	0	5	0	0	3	2	3	3	4	3	4	2	0	3	1	0	5	0.84
5	5	0	5	2	2	3	0	1	3	3	3	3	2	5	3	2	5	1
6	4	0	1	2	4	0	5	2	3	0	0	5	0	5	4	1	4	0.69
7	1	3	1	2	4	5	0	2	2	2	1	0	4	1	4	5	3	0.71
8	1	3	4	0	0	1	0	0	0	1	0	4	2	4	0	5	0	0.53
9	2	3	0	2	0	2	4	2	3	3	3	2	3	0	3	0	4	0.47
10	4	1	0	5	1	0	0	2	5	2	1	5	1	1	2	5	2	1
$Q^*(A_{ij})$	0.46	0.48	0.4	0.44	0.34	0.4	0.46	0.32	0.56	0.52	0.46	0.52	0.4	0.5	0.44	0.6	0.6	$Q^*_e(C) = 0.7653$
$Q^*_e(B_i)$	0.76						0.79								0.84			

Evaluation interval $[x_0, x_1] = [0, 5]$

Fig. 5. Result of online calculator

By online calculator random simulated data computed as:

$$Q^*_e(C) = 0.7653$$

Conclusion

Main aim of this paper was to show application of the SURE model in case of faculty performance evaluation. Most important part of the work is design of evaluation goal structures. Future discussion can be run on evaluation goal structures. By our view, if evaluators can develop evaluation goals structures together with stakeholders, professors, company leaders, experts in own fields, parents, and students together it will be very useful for self assessment of faculty performance. Especially for learner centered learning and teaching.

Limitation of this paper is simulated data. Data which shows in figures and which used for data processing is completely random data. Those are not relating to any kind of real responses. Idea to use simulated data is try to show how easy to process data if evaluator can design good

evaluation goal structures. Big advantage of the SURE mode is easy to explain evaluation results after data processing. All evaluation scores transferring into intervals: 0 to 1, due to the data normalization of the SURE model data processing rules. For any involved groups in the evaluation process for any interested person it is very easy to understand meaning of these two numbers. Worst case is 0: Evaluation is failed, and most successful case is 1: Evaluated in maximum 100% performance.

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Impact of Academic Library on Student Learning Achievement in Engineering Field

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Abstract

Although there was a body of research supporting positive impact of library on student academic achievement, most of them were focused on primary and secondary level of education and it was less studied for tertiary level. Therefore, we purposed to investigate the impact of academic library on student learning achievement for undergraduate engineering students. Moreover, the association between credit loading, library use and student learning achievement were also investigated. Our result indicated that there was statically significant, merely moderate and positive correlation exist between student academic achievement and library use particularly for 1A, 2B, and 3A semesters. We found no correlation between book usage and number of credit (credit loading) as well as between grade point aver and credit loading. The finding contradicted our conventional understanding, in which a greater credit loading may leads increased use of books and resulted decreased learning achievement. Our research is first domestic attempt to assess the value of academic library from user perspective. The study is also first international attempt that evaluating association between library use and student learning achievement in field of ICT engineering for tertiary level.

***Keywords**:* library use, student achievement, book borrowing, grade point average

Impact of Academic Library on Student Learning Achievement in Engineering Field

Academic library is one of the biggest infrastructure or institution in universities. Leading universities spends up to 15% of total expenditure on library program and services, which is not small amount of spending. Pritchard (1996) concluded that some administrators have questioned the need for conventional library, especially in technologically oriented academic program, thus the future vitality of library depends on whether they can continuously prove their value. A comprehensive research review by Oakleaf (2010) well outlined the areas of library value including student, faculty, and institutional dimensions. To prove library value, determining quality of academic library is essential and the measurement of quality depends on output of library as well as its needs of the users (Pritchard, 1996; Lonsdale, 2003).

In order to evaluate value of library, grade point average (GPA) and professional or educational test score were generally considered for student learning achievement (Oakleaf, 2010; Chan, 2008; Soria, Fransen, & Nackerud, 2013; Goodall & Pattern, 2011; Park & Yau, 2016; Gbemi-Ogunleye, 2016; De Jager, 1997; Brazier & Conroy, 1996). There was a body of research supporting positive impact of library on student academic achievement, though most of them were focused on primary and secondary level of education (Chan, 2008; Park & Yau, 2016; Baughman, 2000; Attakumah, 2020; Williams, Wavell, & Coles, 2001; Lonsdale, 2003; Lance, Rodney, & Hamilton-Pennell, 2000). For tertiary level, relationship between library use and student learning achievement was relatively less studied.

For college & university student, particularly for freshmen, early studies found that there was direct correlation between GPA and number of book borrowed (Barkey, 1965) and student who borrowed most performed best in their final exams (Braizier & Conroy, 1996; De Jager, 1997). Similarly, recent study from University of Minnesota showed that the first-time or first year undergraduate student who frequently use library have a higher GPA and retention (Soria, Fransen, & Nackerud, 2013). Studies had been relieved significant association between library use and student achievement in non-engineering field (Gbemi-Ogunleye, 2016) or in some particular subjects (Goodall & Pattern, 2011). Thus, for tertiary education, quantitative assessment of relationship between library use and student academic achievement needs to be analyzed. Therefore, in this study we purposed to investigate the impact of academic library on student learning achievement for undergraduate engineering students. In addition, the association between

credit loading (the number of credit per semester), library use and student learning achievement were investigated.

Method

Participants & Data collection

Totally 1531 undergraduate students who studied from 2016 to 2019 at School of Information and Communication Technology (ICT) of Mongolian University of Science and Technology (MUST) participated in this study. Of them, 1218 students (80%) and 313 students (20%) were male and female, respectively. Student distribution across the ICT field were computer science 4%, programming 18%, information system 10%, information technology 14%, electric communication 8%, wireless communication 11%, network technology 9%, internet security 15%, and electronics 11%. The student numbers studied in each semester were 1531, 936, 936, 554, 315, and 239 for 1A, 1B, 2A, 2B, 3A, 3B, and 4A semesters, respectively. Where, A is fall and B is spring semester. The 4B semester is not considered due to COVID-19 pandemic situation.

Three kinds of data were collected. A number of book borrowed from library per semester, which representing use of library (Goodall & Pattern, 2011; Barkey, 1965; Braizier & Conroy, 1996; De Jager, 1997), was collected from database of Lib4n program of library management system. The GPA representing student learning achievement (Barkey, 1965; Oakleaf, 2010; Soria, Fransen, & Nackerud, 2013) at each semester was collected from graduate school office of MUST. Finally, the number of credits that student selected each semester was obtained from UNIMIS university learning management system (LMS). Due to unavailability of data in GPA (student delay or drop out of school) or number of book loan (data removed from library system after graduation), 379 students from 1A semester, 37 students from 1B semester, 70 students from 2A semester, 50 students from 2B semester, 26 students from 3A semester, 15 students from 3B semester, and 28 students from 4A semester were excluded from our study.

Statistical Analysis

Pearson's product-moment correlation. Pearson's moment correlation method in SPSS statistical analysis software was utilized to measure the strength and direction of association exist between three variables including GPA, number of book borrowing, and number of credit for each semester. The correlation coefficient *r* can take a range of values from +1 to -1. Value greater than

0 indicates a positive association, whereas the value less than 0 indicates negative association. A value of zero indicates no association between variables. The strength of r coefficient can be interpreted into description like weak or low, moderate or medium, and strong or high (Schober, Boer, Schwarte, 2018). However, interpretation of the coefficient strength is depending on subject discipline and research purpose (Akoglu, 2018).

Two sample T-test. In this statistical test, students were divided into high GPA (>3.0), Medium GPA (2.0 < GPA < 3.0), and low GPA (<2.0) groups. The distribution of three groups in total student population was also calculated for each semester. Two sample t-test assuming unequal variance (α=0.05) was used to identify statically significant difference on number of book borrowing between high and medium GPA groups as well as between medium and low GPA groups.

Results

The result of the distribution of three groups as percentage of total number of students was shown in figure 1. At first year, the percentage of medium GPA (2.0-3.0) group was high as 41.0-42.5%. At second year, 2A and 2B, the percentage of low GPA student was increased dramatically up to about 50% of total population. For 3A, 3B, and 4A semesters, the percentage of low GPA group was decreasing, whereas the percentage of student number of high GPA group was increased inversely.

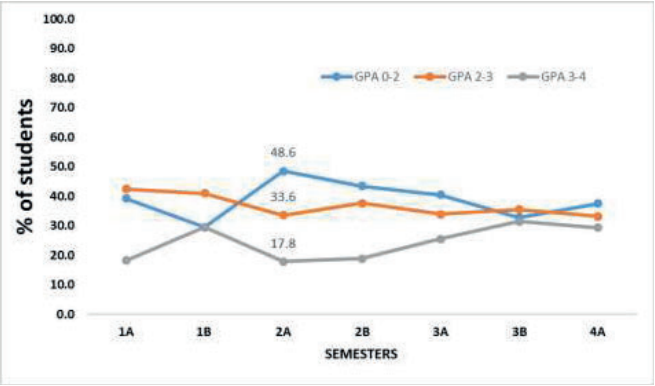

Fig. 1. Distribution of three GPA groups expressed by percentage of total number of students in each semester

Result of Pearson's moment correlation analysis

The results (Table 1) indicated that there was statically significant ($P < 0.01$) merely moderate and positive correlation observed between GPA and number of book borrowing in 1A semester ($r = 0.29$), 2B semester ($r = 0.26$), and 3A semester ($r = 0.24$). Although there was positive correlation exist between GPA and number of book borrowing in other semesters, the strength of r was relatively small ($r < 0.2$).

Table 1. Result summary of Pearson's moment correlation analysis (**. Correlation is significant at the 0.01 level, *. Correlation is significant at the 0.05 level)

1A-Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	1151		
GPA	Pearson Correlation	**.291****	1	
	Sig. (2-tailed)	0.000		
	N	1151	1151	
number of credits	Pearson Correlation	.059*	.128**	1
	Sig. (2-tailed)	0.047	0.000	
	N	1151	1151	1208

3A Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	504		
GPA	Pearson Correlation	**.239****	1	
	Sig. (2-tailed)	0.000		
	N	504	504	
number of credits	Pearson Correlation	0.069	.164**	1
	Sig. (2-tailed)	0.121	0.000	
	N	504	504	504

1B Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	895		
GPA	Pearson Correlation	.092**	1	
	Sig. (2-tailed)	0.006		
	N	895	895	
number of credits	Pearson Correlation	.078*	0.061	1
	Sig. (2-tailed)	0.019	0.066	
	N	895	895	895

3B Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	222		
GPA	Pearson Correlation	0.073	1	
	Sig. (2-tailed)	0.279		
	N	222	222	
number of credits	Pearson Correlation	0.036	.163*	1
	Sig. (2-tailed)	0.593	0.015	
	N	222	222	222

2A Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	863		
GPA	Pearson Correlation	.129**	1	
	Sig. (2-tailed)	0.000		
	N	863	863	
number of credits	Pearson Correlation	0.002	.127**	1
	Sig. (2-tailed)	0.963	0.000	
	N	863	863	864

4A Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	208		
GPA	Pearson Correlation	0.124	1	
	Sig. (2-tailed)	0.074		
	N	208	208	
number of credits	Pearson Correlation	0.074	-.267**	1
	Sig. (2-tailed)	0.291	0.000	
	N	208	208	208

2B Semester		number of books	GPA	number of credits
number of books	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	504		
GPA	Pearson Correlation	**.265****	1	
	Sig. (2-tailed)	0.000		
	N	504	504	
number of credits	Pearson Correlation	0.076	0.087	1
	Sig. (2-tailed)	0.087	0.05	
	N	504	504	504

Overall, there was no association between number of book and number of credits (Table 1). For GPA and number of credits, there was also no relation ($r < 0.2$) found except 4A semester. In 4A, moderate negative association ($r = -0.27$) found between GPA and number of credit chosen by students.

Result of two sample T-test

In 1A, 2B, and 3A semester, two sample T-test result revealed statically significant ($P<0.05$) difference exist for the number of book borrowing between low GPA and medium GPA groups as well as medium GPA and high GPA groups (Figure 2). For other semesters there was no significant difference on book usage between groups.

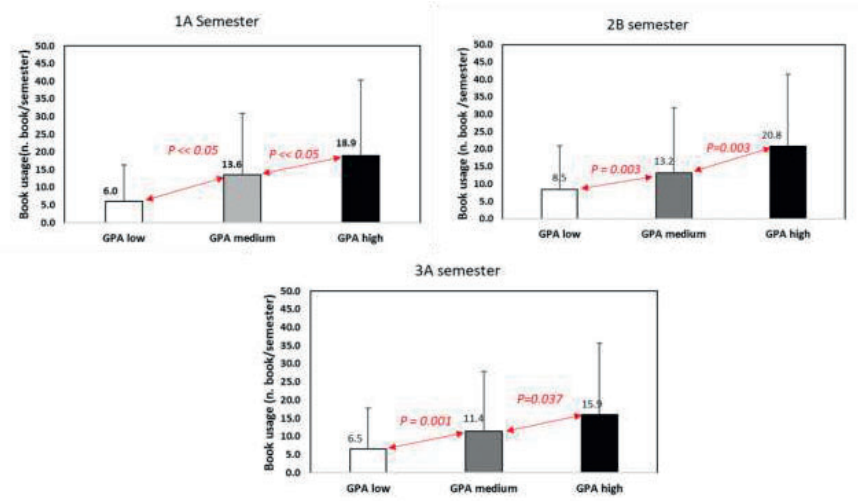

Fig. 2. Comparison of the result of number of book usage with two-sample T-test between groups in 1A, 2B, and 3A semester.

Discussion

For tertiary level, relationship between library use and student learning achievement was relatively less studied especially for engineering field. Thus, the current study purposed to investigate the impact of academic library on student learning achievement for undergraduate ICT engineering students. Aassociation between credit loading (the number of credit per semester), library use and student learning achievement were also quantitatively investigated.

Our result demonstrated that the percentage of low GPA student was increased dramatically up to about 50% of total population and inversely the percentage of high GPA group was decreased during second academic year (Fig. 1). Therefore, special attention of library service,

undergraduate student union, graduate school office to motivate and to monitor student may have needed for the sophomore. For instance, Gbemi-Ogunleye (2016) suggested that especial attention such as counseling can significantly influence to the student's library use and academic attainment.

The results of Pearson's moment correlation indicated that there was moderate positive association ($r = 0.29$) observed between GPA and number of book borrowed in 1A semester (Table 1). The finding is supported by a number of international scholars indicating first-time undergraduate student or freshmen who frequently use library have a better learning achievement than low library users (Barkey, 1965; Braizier & Conroy, 1996; De Jager, 1997; Soria, Fransen, & Nackerud, 2013). Previous studies, investigated non-engineering field of subjects, tend to observe association between library use and academic achievement for only first-year students. However, for engineering field, our result demonstrated moderate and positive correlation observed between GPA and number of book borrowing in 2B semester ($r = 0.26$) and 3A semester ($r = 0.24$). Two sample T-test result also supported that there is a statically significant ($P<0.05$) difference exist for the number of book borrowing between low GPA and medium GPA groups as well as medium GPA and high GPA groups (Fig. 2). The overall result demonstrated that academic library has a significant impact on learning achievement of ICT engineering student particularly for 1A, 2B, and 3A semesters. Further research may have needed for observing other semesters with no association between GPA and library use. Because the GPA solely cannot represent the learning achievement and other factors such as student engagement in other areas, retention, student literacy skill and attitude should be investigated (Kuh & Gonyea, 2003; Williams, Wavell, & Coles, 2001).

We found no correlation between book usage and number of credit (credit loading) as well as between GPA and credit loading. The finding contradicted our conventional understanding, in which a greater credit loading may leads increased use of book and resulted decreased GPA. However, we found moderate negative association, $r = -0.27$, between GPA and number of credits in 4A semester. That implies caution need to be considered on the credit loading for senior students. MUST have special policy on the limitation of maximum allowed credit of 20. Such policy may be needs research-based reconsideration.

Current study has several limitations. The first limitation is that we used only number of books borrowed from library to express library usage, though there are other library services, which is hard to collect data, including accessing database, electronic journals or books, website, and workshop. Although we only used the number book, we could have identified correlation

between library use and academic learning achievement. Inclusion of online access can increase the strength of correlation. Thus, such limitation could not alter overall conclusion of the study.

Another major limitation is that we concentrated learning achievement and did not considered student research outcome. Which can be justified as we investigating undergraduate level of students who have primary goal of learning rather than research. Finally learning achievement was quantified using GPA, whereas other soft skills including digital literacy, critical thinking or problem solving skill, student attitude, and team work should be considered in the learning achievement. We will consider those in our further studies.

Conclusion

In this study, we investigated the impact of library use on student learning achievement. Our research is first domestic attempt to assess the value of academic library from user perspective. The study is also first research that evaluating association between library use and student learning achievement in field of ICT engineering for tertiary level. Our result indicated that there was statically significant ($P < 0.01$), merely moderate and positive correlation between student academic achievement and library use for 1A ($r = 0.29$), 2B ($r = 0.26$), and 3A ($r = 0.24$) semesters. The result of our study could be quantitative proof for assessing the value of academic library, however, more research is needed further to strengthen finding of our study by considering more variables related student learning outcome as well as contribution of academic library.

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