Analysis of Advantages and Problems in Teaching and Assessment with Online System during Covid-19

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ABSTRACT

During Covid-19 spread over, throughout the world, online classes were arranged at school and University level. In certain institutions, the experiments of online systems were successful while in certain cases difficulties were observed and reported. In this paper, we are interested to highlight and analyze the problems occurring in assessment and evaluation. The delivery of lectures and grades assessment, comparison of time spent on in-class lectures and online, the provided infrastructure and technology to faculty and its synchronization with that arranged by students. The objective type questions are automatically marked by the system for example Moodle, whereas the essay type (subjective type) questions are normally preferred to be marked by faculty on the system. This is indeed a facility that all students are provided with different question papers. The online system is more economical, time-saving and easily usable. The most serious issues have been unfair means and cheating used by students during examinations. A detailed analysis of the state-of-the-art is presented in this paper. We also present a comparison of online and in-class teaching and assessment, but irresistibly the benefits of online system are more advantageous. For example, a lot of stationary is saved. The online system causes breaks and pauses during delivery of lessons due to instability of internet and concavity issues. The most important is the choice concerning system subject to available facility with leaner and the faculty and its compatibility with emphasis on technology. The use of anti-cheating software makes the examination secure.

KEYWORDS: Teaching online, Learning Management System (LMS), Online Examination System (OES)

1. INTRODUCTION

The learning systems are of three types, on-line, in-class on campus and hybrid. In view of the massive spread of Covid-19, online teaching and assessment gained rapid popularity around the world to save time for students during the closure of academic institutions affecting 150 crore students. The second author of this paper has shown a comparison of OES and LMS in [1] which is very beneficial in using an appropriate online system. However, a series of solutions have also emerged to cause improvements. In USA and Europe, according to [1], the platforms such as Google Class Room, Cloud and Moodle are functioning satisfactorily. The academic institutions and faculty are happy with the performance of Virtual systems of teaching its reliability and efficiency. The e-textbooks are also provided to students online for study. According to [2], a methodology to develop online curriculum and its teaching has been effective. It has been advocated that the camera of faculty must be on during teaching for the

learner's concentration. According to [3], digital, mobile technologies, Wi-Fi have been combined with other electronic devices to maintain requirements of education and describes the experiences in Nepal to implement online policies. Further [3] also highlights the role of the Indonesia Education program "learning House" which described useful information to strengthen online education, while Malaysian Television Channel has been delivering online lectures/lessons for all students not having internet facility.

According to [4], UNESCO has compiled a document that 1.9 billion students round the world in about 191 countries used internet and attended online classes during covid-19. Moreover, faculty, members of organizations have also working from home and instructing their subordinates to perform official responsibilities.

While teaching online and conducting the examination, a usual trend of students was observed that they do unfair means by sending screenshots (questions) for help from outside mostly by screen sharing. This is how

they dodge the technology by using a friend for help. Some do copy answers by writing on the desk or by keeping answers in their lap. The Zoom provides every user a unique identity and students face problems using unauthorized friends for cheating and getting help. However, Zoom itself is helpless to detect cheating. But setting the students video on, we may overcome this problem.

In Pakistan, according to [5] statistics for 2020-21 are as follows:

- The number of observed Coronavirus cases: 549032
- Deaths: 11802
- Recovered : 504,046

Figure 1: Total corona cases in Pakistan (Source [5])

Figure 2: Daily new Corona cases in Pakistan (Source [5])

2. LITERATURE REVIEW

According to [6], a few useful hypotheses have been presented regarding the relationship of communication technology and learning as well as the quality of the presentation on E-learning.

According to the survey conducted by the authors of [7], it is accomplished that in Pakistan online education for Medical and Dental students is not suitable as compared to on-campus classes and recommend that the Management and faculty must take adequate steps to improve the quality of online classes.

According to [8], the authors are of the view that online learning is more sustainable if a hybrid system is

introduced with more opportunities. Further, it is suggested that technologies to develop the instructional material for online lessons must be strengthened for effectiveness and efficiency by well-trained faculty having comprehensive knowledge and skill in this area. In certain cases, it is supposed by authors of [8] that a complete curriculum is not delivered remotely with available internet facilities.

The students may not have the requisite compatible technology to synchronize with online lessons.

According to the survey conducted reported in [8], the majority of students faced internet signal strength problems and wished that learners must have face-to-face contact with the faculty.

According to findings reported in [10], the authors are of the opinion that student's convenience and inspiration plays a pivotal role while the faculty should use technology to enhance the learning online. Other points highlighted by the authors relate to transmission, motivation of learners, students achievements after online learning, synchronization of lectures with curriculum and support of the staff delivering online lectures.

According to [11], presents a quantitative analysis method and suggests for improvement on online system for practicing student assessments and evaluations. The authors of [11] advocate that the course contents must be well organized, supported by faculty, need to develop a liking for online education amongst the students, effective strategy for university faculty and to advance the quality of higher education.

The significance of HR development in areas of Science and Arts has been discussed in [12], motivating to encourage students and faculty to enhance their potentials in the key areas of Human Development for professional practices.

According to [13], it is a matter of basic human rights to have access to education on the basis of impartiality and equity especially during emergencies like Covid-19, disaster and violence. The experience of online teaching has been successful around the world and Pakistan. The experiments of online classes in war and emergencies in Afghanistan, South Africa, Palestine and Syria have been successful.

A model of financing E-education has been reported in [14] in Russia to improve online learning for public and private sector that receive financing. The model provides standards of e-education. Moreover, it highlights a vision in the development of an educational structure for online education.

According to Word Bank Report [15] provides a guideline on remote on online mode of learning during

Covid-19. The world was practicing online teaching to fight out poverty. The is of the view to further improve the quality of online teaching; for this purpose supporting various nations financially to make the best use of usefulness and maximize the use of online working.

2.1. Experience of China in Online Teaching during Covid-19

China managed to successfully overcome the gap during the closure of the educational institutions by introducing online teaching up to the contentment of learners. According to [16], a survey was conducted in this regard based on a questionnaire and web crawler to explore the quality-related issues.

The data was collected online and offline for the survey to perform quantitative analysis.

3. METHODOLOGY

3.1. Features of Information Technology Frameworks for Online Classes

During the last year's teaching and training regarding online classes, it is emphasized that all the components should be functional, automated, combined and intercommunicating for the virtual classroom. According to [17], the most important points of structures are individualities and characteristics such as integration of components of the platform, the methodology of tracking, generation of reports, auto-evaluation scheme for assessment and mechanism for setting up a virtual classroom rather than a virtual classroom. There are several online learning platforms described by [1]; moreover, a list of 33 platforms have by provided by [19]. Table 1 provides some useful platforms and frameworks for online education.

Table 1: Well-known Platforms for online Teaching

1. Adobe Captivate Prime LMS
2. Administrate LMS
3. Accord LMS
4. Blackboard Education Technology Solutions
5. Best LMS for Banking & Finance Companies
6. Financial Services – Best LMS for Banking & Finance Companies
7. Looop: Next Generation Learning Platform
8. Moodle LMS – the world's most popular learning platform. An open source LMS.
9. Pathway Cloud LMS Review
10. Xyleme LCMS

All the features of the online technology must possess the requirement of learning such as self-registration, reporting regarding examination, attendance, course-

library and databank of questions of every course to be taught, consistent with accreditation principles. The engrossment and participation of students must be made mandatory. The course library may consist of all lectures date-wise along with video Zoom Lecture files. According to [18], an understandable user interface and dashboard is of pivotal importance in every learning platform. In the next section, we briefly highlight the MOODLE, GOOGLE CLASSROOM and activities performed with the ZOOM system.

3.2. Moodle System

The institutions offering online have LMS (Learning Management System) on the private website filled with learning courses using Moodle, which is a free online system. It is a well-known and useful way for all sorts of tasks such as online learning for academic and industrial organizations. It possesses facilities such as provision for Chat Room, assignment, Quizzes and Questions data bank, etc. Using Moodle, every learner can easily obtain lecture material such as e-books and lecture slides and appear in Quizzes, submit assignments and appear in the examination. Each student is allocated a unique login for online work. Apart from being a user-friendly system, Moodle can be easily integrated with the LMS components and is a secure system. The features like course admiration, review option and customization make Moodle more attractive for online teaching. In order to overcome cheating by students, Zoom activity may be created to Moodle course space and a meeting room during the examination to watch them with a camera by screen sharing.

3.3. Google Classroom

It was developed by Google in 2014 which uses operating systems: Android, IOS and web available free. It handles the sharing files and grading assignments between learners and instructor and handles unlimited classroom size. A unique folder is created when the student submits their work, which is not used, scanned, or sent to other companies. It is easier to use and supports online learning efficiently.

3.4. Zoom

For audio/ video conferencing software, Zoom plays a very important role as a leader and reliable platform and is extensively used for chat, conferences and online seminars (webinars) for 100 participants. It uses Windows, macOS, IOS and Android.

3.5. Feasibility of Online Learning

The well-known benefits of online learning are a conversion of classroom lectures into Power-point Slides and electronic form with voice using Zoom Video has been very useful in connection with a framework, use of technology, design issues, assessment and evaluation of examinations. The roll

call of students can also be displayed and managed on an e-portal specially designed for this purpose.

The online learning systems provide prospects, ease, enhance access to the benefits of learning especially remote learning and updating skills of faculty.

Online learning systems are financially feasible being cost-effective. The quality, capacity and ability of the academic system are improved. There is a great deal of reduction manual work in online assessment and evaluation. Apart from manual labor, the cost is also reduced and security is enhanced. It saves student's expenses in traveling and residing in Hostels.

The provision of a quick training facility in a specified geographical area is the salient feature of e-learning, assuming the availability of requisite technology. We may improve further it by introducing international characteristics. The digital evaluation and assessment increases the confidence of the learners in the system and decreases their doubts about manual marking. The new methodologies can be formulated in digital orientation as for as online learning is concerned

3.5.1. Problems Confronted in Online Learning

The online lecture preparation requires more time as compared to the classroom environment where students are physically present. It is easier to postpone the class and reschedule. The online system develops a feeling of loneliness and segregation. The browser containing the databank can be hacked, if not properly protected. Some students or outsiders may interfere and disrupt the online class. However, there is a facility in Zoom to mute all or for a particular person causing the disturbance. Such activities may be controlled by ensuring the security of the browser.

The students living in remote areas where internet facility is either not available or have problems with bandwidth or not seamless (continuous). It then causes interruptions. There also exists inequality of internet in certain geographical areas, especially with context to Pakistan. The background of the student's family should also be kept in mind regarding their locations in remote areas as well as the financial position. The important issue is that of the faculty training regarding guidance of students to use online technologies.

3.5.2. Working with Online Examination System

In a manual system of examination, a written or typed question paper is given to students, they use a pen and paper approach to write a solution to the given problem. Whereas in an online system no stationary is involved. Every student may have a unique and different question paper. The system, for example, Moodle, develops different question papers for all students appearing in the examination, selecting a question from a Data Bank. The students have to complete the question paper within the stipulated time limit. The objective type questions

and multiple-choice questions are automatically graded by the system. Thus resulting in a lot of saving of time for the faculty.

The online conducting the examination remotely has been a wonderful experience during Covid-19 which guaranteed the continuousness of teaching and learning. One may calculate saving in the cutting of trees for preparing paper stationery around the world during covid-19. As for learning management systems are concerned, the use of Blackboard, Moodle and cloud technologies have been extensively used in recent times. The currently available system is advanced, comical, return quick over,

Moreover, the online examination system also possesses the following beneficial characteristics:

- It is user friendly and easy to use
- Inexpensive,
- Efficient and faster,
- Operationally and technically reliable
- Provides auto-grading mechanism,
- Computes and provides the evaluation,
- Assesses and compute overall grades
- Provides graphs on the performances of students

The online examination system is inclined and subject to possible fraud. An online exam system is a little bit more susceptible to fraud because the students sitting at home use their own devices. The vigilance is comparatively naïve. There are some difficulties faced by learners due to the implementation of requisite technologies in online teaching. The essay type question is marked by faculty most of the time personally. Sometimes students behave as if they are appearing in an open-book examination, if not permitted, it amounts to cheating and fraud. The use of smart i-phone and smartwatches can be used to support unfair means in the online examination.

3.6. Data Collection for Proposed Methodology

A survey using a questionnaire consisting of 16 questions given in Table 3 was provided online to 300 students who attended online classes throughout the covid-19 pandemic period. The number of total responses received was 270 and 30 students did not respond. Different questions regarding issues such as the usefulness of online classes, evaluation and assessment, use of Zoom, problems with internet faced by students at their home, availability of instructional material and comparative quality of theory and Lab instructions. All the questions are self-explanatory. Table 2 contains the codes of a variable used

Table 2: Codes of Variables

Code	SD	DA	N	A	SA
Variable name	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

The collected data were used to estimate various trends among the students during online learning, especially the level of satisfaction were estimated to know the confidence level of learners on the online education system.

4. RESULTS AND ANALYSIS

4.1. Data Analysis of Survey

The numerical entries of Table 3 show the number of responses for each question for the five variables given in table 2. That indicates the level of opinion for each category among students.

Table 3: Analysis of Advantages and Problems in Teaching and Assessment with the online system during Covid-19

Q#	QUESTION	SD	DA	N	A	SA
1.	I cannot concentrate on my studies, as I keep worrying and thinking about getting Covid-19	21	50	79	79	41
2.	Do you think teachers are more lenient in online classes while evaluation of your assignments and quizzes?	28	64	33	76	12
3.	Do you think teachers are more lenient in online classes while awarding your sessional marks?	29	72	89	70	10
4.	Are you satisfied with online classes on Zoom?	36	61	55	82	36
5.	Online classes make me comfortable during covid-19 pandemic	17	42	51	83	77
6.	Do you think online classes are more flexible than on campus classes?	53	75	48	51	43
7.	Do you think while online education, students can have more time for other activities?	33	42	40	97	58
8.	Do you think online classes save traveling time and provide an opportunity to students for self-study?	12	26	42	105	85
9.	Do you think interest is lost in study during online classes?	26	39	48	80	77
10.	Do you think interaction between teachers and students has significantly reduced during online classes?	15	31	67	104	60
11.	During online classes can teachers interact with students using various ways?	14	32	74	113	37
12.	Were you provided online e-books, lectures/slides and instructional videos for Lab/theory?	6	21	75	133	35
13.	Do you think up to some extent teaching is effective online?	24	41	104	66	35
14.	Do you think theoretical courses can be better explained in online classes?	28	39	64	84	55
15.	Do you think Lab Courses can be better explained in online classes	79	81	55	28	10
16.	should health be considered an important factor while deciding to reopen universities	6	10	43	95	116

Figure 3 shows a level of opinion for each category among all students who participated in the online survey.

Figure 3: Bar graph of overall response showing a various level of opinion

4.2. Estimation of Satisfaction Coefficient

It is beneficial to know the overall impact of online education and learning satisfaction of users (learners). To estimate the satisfaction and dissatisfaction coefficients from the data, the SPSS Statistics Software was used. SPSS Statistics is used to manage and analyze quantitative data based on statistical analysis. Following mathematical estimations were established to calculate the satisfaction coefficient.

$$X_i = \frac{1}{270} * \sum_{i=0}^{16} [(A_i + k * SA_i) + (\frac{N_i}{N_i + A_i})] \quad \dots(1)$$

$$Y_i = \frac{1}{270} * \sum_{i=0}^{16} [(D_i + k * SDA_i) + (\frac{N_i}{N_i + D_i})] \quad \dots(2)$$

Where X_i and Y_i are satisfaction and dissatisfaction coefficients, respectively. A_i is the total agreed responses to each i^{th} question, D_i is the total disagreed responses to each i^{th} question, SA_i is the total strongly agreed responses to each i^{th} question, and SDA_i is the total strongly disagreed responses to each i^{th} question. The k is the constant to give an additional 10% multiplicative weight to satisfaction and dissatisfaction coefficients based on a total of strongly agree and disagree responses.

Table 4: Satisfaction and dissatisfaction coefficients

Q #	Satisfaction Coefficient (Xi)	Dissatisfaction Coefficient (Yi)
1.	0.46	0.27
2.	0.33	0.35
3.	0.30	0.39
4.	0.45	0.37
5.	0.62	0.23
6.	0.37	0.50
7.	0.60	0.29
8.	0.74	0.15
9.	0.61	0.25
10.	0.63	0.18
11.	0.57	0.18
12.	0.64	0.11
13.	0.39	0.25
14.	0.54	0.26
15.	0.15	0.62
16.	0.83	0.06

Figure 4 shows the overall trend of both the satisfaction and dissatisfaction coefficient

Figure 4: Satisfaction and dissatisfaction coefficient

The satisfaction coefficient calculated in figure 4 was compared with Cronbach's Alpha Coefficient for the results of 11 questions and the comparison shows the consistency. Table 5 presents the Cronbach's Alpha Coefficient for satisfaction coefficient.

Table 5: Data reliability test using Cronbach's Alpha Coefficient

Index	Cronbach's Alpha Coefficient	N of Questions
Degree Of Satisfaction	0.699	11

4.2.1. Students Satisfaction based on Comfort and Grading for Online Education on Zoom

In figure 4 the slope from points 3 to 5 shows an increasing trend that indicates the strengthening of satisfaction coefficient among the students getting their online education on Zoom. While learning on Zoom

users can aspects higher grades in a comfortable and convenient environment. Figure 5(a-c) supports the evidence by presenting the percentage of responses against questions 3 to 5. The green and purple portions of the pie-charts shows the percentage of agree and strongly agree for overall responses in the survey from 3 to 5.

Figure 5: Percentage of responses against questions 3 to 5

To verify the correlation between multiple factors of the online education system for user satisfaction, Chi-Square Tests were performed using SPSS Statistics Software. The Chi-Square Test is a nonparametric test that is used to verify the association between categorical variables and to check the dependence of correlated variables with each other. For this purpose, the strategy of [20] was followed up to compute Chi-Square Test results of questions 3 to 5 and questions 6 to 8. Table 6 shows the results of the Chi-Square Test performed on the results of questions 3 to 5 to verify the students' satisfaction based on comfort and grading for online education on Zoom:

Table 6: Chi-Square Test for questions 3 to 5

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	277.316	25	.000
Likelihood Ratio	34.607	25	.096
Linear-by-Linear Association	0.835	1	.361
N of Valid Cases	256		

Table 6 checks the student satisfaction based on comfort and grading for online education on zoom. According to the table results, it is evident that there is a statistically significant association.

4.2.2. Students Satisfaction based on Flexibility of Online Education System

In figure 4, the slope from point 6 to 8 shows an increasing trend that indicates the strengthening of the satisfaction coefficient for online education based on the flexibility of the online education system. Users' data convince that a higher percentage of learners agree that the online education system provides flexibility and

various approaches to adopt for the learning that could also save much time. Figure 6(a-c) supports the evidence by presenting the percentage of responses against questions 6 to 8, respectively. The green and purple portions of the pie-charts shows the percentage of agree and 'Strongly Agree' for the overall responses in the survey from Figure 6 to 8.

Figure 6: Percentage of responses against questions 6 to 8

Similarly, the Chi-Square Test was performed on the results of questions 6 to 8 to verify the student's satisfaction based on the flexibility of the online education system. The table shows the results of the Chi-Square Test performed on the results of questions 6 to 8.

Table 7: Chi-Square Tests for questions 3 to 5

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	420.086	25	.000
Likelihood Ratio	173.178	25	.000
Linear-by-Linear Association	25.497	1	.000
N of Valid Cases	256		

Table 7 checks the students' satisfaction based on the flexibility of online education. From the results, of table 7 it is evident that there is a statistically significant association.

4.3. Recommendations for Online Education System

- The online system is more economical, time-saving and easily usable

- The working experience of successful implementation of online communications arranged by organizations in case of websites, video conferencing, Google Classroom and Zoom must share and told to learners.
- More emphasis must be on the skills development for online education in case of university students undergoing towards degree or diplomas.
- The body language of faculty must be exhibited through the online camera during teaching
- It is strongly recommended that the faculty and student must get full benefits of advanced online courses projected by various foreign universities and non-profitable private organizations discussed in detail by [11]. The important organizations are Coursera, edX and Ted-Ex.
- The concerns of the World Bank about online and distance learning must be kept into consideration.
- While switching on online teaching teachers lost tools such as body language and facial impression be managed by making the video live.
- The course library may consist of all lectures date-wise along with video Zoom Lecture files.
- The use of anti-cheating software makes the examination secure.

- j. In Pakistan online education for Medical and Dental students is not suitable as compared to on-campus classes and it is recommended that the Management and faculty must take adequate steps to improve the quality of online classes.
- k. The requirement of learning such as self-registration, reporting regarding examination, attendance, course-library and 'databank of questions' of every course to be taught.

5. CONCLUSION

The entire success of online classes depends mainly on the experience of faculty, organizational standing, status, faculty receptiveness and special care of learners, efficiency and reliability of involved technologies. The experiments of authors using Moodle, Goodloe Classroom and Zoom for online education have been encouraging and successful. The advantages and disadvantages of online assessment and evaluation and teaching have been discussed in this paper. With the advancement of Computer and Communication Technology, the instructional techniques and procedures of imparting instructions have improved with the right online systems. More secure, authentic, vigorous and latest systems are available for use for this purpose.

The elegant, stylish and well-designed lectures have a more effective impact on the learner. There exist no experimental, pragmatic, realistic, or empirical evidence that the delivery of online education has been 100% fruitful and beneficial around the world. In the future, there may be experiments to enhance, achieve and adoption of valuable systems for online teaching.

REFERENCES

- [1] G. Noreen¹, Dr. Aftab Ahmad Malik, Dr. M. A. Fahiem, "Selecting a Right Online Educational Paradigm in Covid-19 Pandemic, Pakistan.", *Journal of Science*. Vol. 72 No. 3, PP:164-168, 2020.
- [2] Sun, A., & Chen, X., "Online education and its effective practice: A research review.", *Journal of Information Technology Education*, 15, PP157-190, 2016.
- [3] Dawadi, S., Giri, R., & Simkhada, P., "Impact of COVID-19 on the Education Sector in Nepal-Challenges and Coping Strategies.", Sage Submissions. Preprint. doi: <https://doi.org/10.31124/advance.12344336>, v1, 2020.
- [4] UNESCO, "COVID-19 Impact on Education," UNESCO, Jan. 25, 2021.
- [5] "Total Coronavirus Cases in Pakistan", Jan. 25, 2021. Accessed on: Feb, 2021.
- [6] Shehzadi, S., Nisar, Q. A., Hussain, M. S., Basheer, M. F., Hameed, W. U., & Chaudhry, N. I., "The role of digital learning toward students' satisfaction and university brand image at educational institutes of Pakistan:" a post-effect of COVID-19. *Asian Education and Development Studies*, 2020.
- [7] Abbasi, S., Ayoob, T., Malik, A., & Memon, S. I., "Perceptions of students regarding E-learning during Covid-19 at a private medical college." *Pakistan Journal of Medical Sciences*, 36(COVID19-S4), 2020.
- [8] Adedoyin, O. B., & Soykan, E., "Covid-19 pandemic and online learning: the challenges and opportunities. *Interactive Learning Environments*," pg 1-13, 2020.
- [9] Adnan, M., & Anwar, K., "Online Learning amid the COVID-19 Pandemic: Students' Perspectives.", *Online Submission*, 2(1), 45-51, 2020.
- [10] Ali, W., "Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic.", *Higher Education Studies*, 10(3), pg 16-25, 2020.
- [11] Sun, A., & Chen, X., "Online education and its effective practice:", A research review. *Journal of Information Technology Education*, 15, PP-157-190, 2016.
- [12] Schroeder, H., "The importance of human resource management in strategic sustainability: An art and science perspective." *Journal of Environmental Sustainability*, 2(2), 2012.
- [13] Affounch, S., Salha, S., & Khlaif, Z. N., "Designing quality e-learning environments for emergency remote teaching in coronavirus crisis.", *Interdisciplinary Journal of Virtual Learning in Medical Sciences*, 11(2), 135-137, 2020.
- [14] Nie, D., Panfilova, E., Samusenkov, V., & Mikhaylov, A., "E-Learning financing models in Russia for sustainable development.", *Sustainability*, 12(11), 4412, 2020.
- [15] Guidance Note on Remote Learning and COVID-19 (English), 2020.
- [16] Chen, T., Peng, L., Yin, X., Rong, J., Yang, J., & Cong, G., "Analysis of user satisfaction with online education platforms in China during the

COVID-19 pandemic.”, in Healthcare (Vol. 8, No. 3, p. 200). Multidisciplinary Digital Publishing Institute.,2020.

- [17] Zhang, W., “Entering the 3rd Generation of e-Learning: Characteristics and Strategies.”, Journal of Educational Technology Development and Exchange (JETDE), 6(1), 2,2013.
- [18] Kumar, P., Keserwani, P. K., & Samaddar, S. G., “e-Learning Web Services and Their Composition Strategy in SOA.”, In Smart Computing Paradigms: New Progresses and Challenges (pp. 291-302),2020.
- [19] Freire, L. L., Arezes, P. M., & Campos, J. C., “A literature review about usability evaluation methods for e-learning platforms.”,Work, 41(Supplement 1), 1038-1044,2012.
- [20] Munyoka, W., & Maharaj, M., “The effect of UTAUT2 moderator factors on citizens’ intention to adopt e-government: the case of two SADC countries.” Problems and perspectives in management, (15, Iss. 1), 115-123,2017.