A Comparative Study on Traditional Face-to-Face Assessments Versus Online Assessments

***Loo Ee Ng**

University College of Yayasan Pahang
Kuantan, Malaysia

Chin Kuo Ren

University College of Yayasan Pahang
Kuantan, Malaysia

Mohd Khairil Abdul Karim

University College of Yayasan Pahang
Kuantan, Malaysia

Nooradelana Mohd Ruslim

University College of Yayasan Pahang
Kuantan, Malaysia

Received	Revised	Accepted
28 August 2021	28 October 2021	15 November 2021

Abstract. This research aims to find an answer to the ongoing debate about the effectiveness of online learning. In this study, students' academic performance based on continuous assessments and examination results were the indicator of effectiveness in learning. Descriptive analysis was used to compare students' academic performance in grade point average (GPA) calculation in traditional face-to-face assessments and online assessments. Researchers also interested to find out about the attitudes of students and lecturers towards assessments in these two modes. Hence, a set of questionnaire is prepared with questions related to user's experience, perceptions and preference while comparing traditional face-to-face assessments and online assessments. Findings from this study showed better academic performance in grade point average calculation where online assessments were conducted. Students' responses in the questionnaire indicated online assessments are easier to do and easier to score; online assessments encourage independent learning and majority prefer online assessments. However, lecturers' responses in the questionnaire indicated otherwise; higher percentages of lecturers preferred traditional face-to-face assessments to online assessments. From lecturers' point of view, the traditional face-to-face assessments are fairer and less opportunity for cheating, hence, they are more confident in students' answers and the results would reflect more accurately students' actual learning achieved. This study concluded that online platform is an effective tool of learning and is well received and preferred among students.

Keywords: Traditional Face-to-Face Assessments; Online Assessments; Grade Point Average (GPA)

* Corresponding Author: Loo Ee Ng, nloo_ee@ucyp.edu.my

©Authors

This work is licensed under a Creative Commons Attribution-Non-commercial-No Derivatives 4.0 International License (CC BY-NC-ND 4.0).

1. Introduction

In light of the outbreak of the deadly disease called Corona Virus also known as COVID-19, in which the WHO has now declared as a pandemic. This situation has caused many issues in the different sectors within a country, in this particular situation, the education sector. Students of higher learning institute were also affected as they struggle to deal with this pandemic while still studying at the same time. University faculties were having issues in dealing with how to teach and also assess the students. With that in mind, this disease has prompted many institutions of higher learning in Malaysia to shift from face-to-face learning to online learning.

From the shift, the students are now also subjected to assessment via the online method. Assessment is an integral component in the education system in order to find out whether the learning outcome has been reached. Valid and reliable assessment improves the quality of teaching and learning, and academic programs (Dermo, 2009; Rastgoo & Namvar, 2010). By undergoing assessments, students are able to see that their learning is validated. With the situation of the world being as it is right now, the need for online assessments is gradually growing. An online assessment is defined as a test that conducted through the internet by using available web technologies.

With online assessments, there is ongoing debate about whether it is seen as an effective measuring tool of learning and whether students actually do perform when faced with assessments online. The purpose of this particular research to determine whether students perform better in a face to face class context or whether they perform better from an online learning perspective. In this particular situation, the researchers are looking towards how the students perform in their grade point average (GPA) Grade point average is the academic result within a semester while cumulative grade point average (CGPA) is the overall academic result for a student.

The first part of the research carried out by the university is to compare students' academic performance in term of GPA, prior to the COVID-19 pandemic where traditional face-to-face classes were conducted and online classes during the COVID-19 pandemic. This comparison is to determine whether there are any marked differences when classes and assessments were conducted on campus via face-to-face interaction compared to when classes and assessments were conducted via the online platform.

The second part of the research deals primarily with the attitude of the university students and lecturers in traditional face-to-face assessments and online assessments respectively. A set of questionnaire was prepared for student and lecturer respectively. Questionnaire for students poses questions related to their perceptions, satisfaction and preferences pertaining to traditional face-to-face and online assessments The other set of questions was targeted to lecturers to gage their responses with regards to perceptions, efficiency and preferences when giving assessments from a face-to-face context as compared to when giving assessments online.

With these two goals in mind, the researchers hope to find how students fare academically in terms of face-to-face learning as compared to online learning. On the other hand, the researchers also hope to gage the general attitude of the students and lecturers towards online assessment during this time of the COVID-19 pandemic. By understanding how students fare in online assessments and how online learning is perceived in tertiary education, it is hoped that the university will be able to implement a better and more holistic online learning experience for students and lecturers in the university.

Research questions are:

1. How is students' performance in online assessment?
2. How is students' performance in traditional face-to-face assessment?
3. What are students' experience and satisfaction with online assessment in comparison with traditional face-to-face assessment?
4. What are lecturers' experience and satisfaction with online assessment in comparison with traditional face-to-face assessment?

2. Literature Review

During this time of pandemic, there has been a lot of research on assessments and how various educational institutes are currently implementing these assessments through online platforms. In this first section of the literature review, the researchers will first introduce and define what are traditional assessments and what are online assessments.

2.1. Definition of traditional assessments and online assessments

In any learning institution, assessment is considered as one of the crucial components in a student's journey of learning. People within the educational community, i.e. policymakers, educators, administrators, students and parents, have different ideas regarding the implementation of assessment strategies (Dietel et al., 1991). However, we do understand that assessment is a very important component within the teaching and learning process. Students use it to direct and drive their learning (James et al., 2002; Kendle & Northcote, 2000). It provides instructors with means to evaluate the quality of their instructions (Kerka et al., 2000). It is also essential in maintaining standards related to certification (Buchdahl, 1968).

Traditional assessments are characterized with the use of testing tools such as multiple-choice tests, true/false tests, short answers, and essays. One of the biggest strengths in traditional assessment is the ease in which they are designed and scored. In certain situations, textbooks do provide instructors with test banks or sample tests in which they can administer the exams while saving time. However, one of the weaknesses within the traditional assessment methods is that it creates a rift between students as it is characterized by students working alone and having competitions with one another. This leads to a solitary experience and squelches the self-affirming possibility of shared interaction (Helmericks, 1993). Furthermore, traditional assessments need to be conducted in a face-to-face setting and with the current pandemic situation, it is an option that we do not have.

According to Harris, et al. (Harris & Beevers, 2002), online assessment is "an entirely automated process of delivering and marking assessments using Web or Internet resources". Using this definition as a guideline, online assessment can either be formative or summative. Summative assessment refers to assessment that is primarily used to evaluate a student's performance and contributes to their final grade (Bull & McKenna, 2004). On the other hand, formative assessment refers to assessment that is used primarily to provide feedback and further instruction to the student or inform the instructor of the student's progress (Bull & McKenna, 2004). The advantage of using online assessment is the fact that once it has been set up, the students are able to utilize the formative assessment resources numerous times without the interference of the instructors. This then leads to better learning outcomes (Buchanan, 2000; Kerka et al., 2000).

In summary, with the current condition of the world due to the pandemic, it is imperative that better understanding and handling of online assessments is critical as traditional assessment methods do not seem to be the way forward.

2.2. Researches Done on Academic Performance via Online Assessment

Studies have been carried out with regards to the effectiveness of E-assessment. This section focuses on researches that look into students' performance when compared between traditional assessment and E-assessment.

A research carried out in the University Transilvania of Brasov, Romania, the researcher investigated the differences between online evaluation of learning as compared to traditional evaluation. The result shown there was no difference regarding the academic performances, which is the grades of the test, between the two groups of students (Cazan & Indreica, 2014).

In another study carried out in from 2009 to 2016 by Jasmine Paul, it was concluded that in this 8-year period, there was no significant difference in the student's performance between online and face-to-face learners (Paul & Jefferson, 2019).

Furthermore, a research was carried out in Qassim University, Medina, Saudi Arabia during the COVID-19 pandemic, with a newly established e-assessment committee in charge of arranging online assessments. The students' grades between face-to-face assessment and online assessment were compared. Result showed that there was a significant increase in female students' grades for the online assessments (Elzainy et al., 2020).

As it was shown by the researches above, there does not seem to be much of a difference when it comes to face-to-face assessments compared to online assessments

2.3. General Attitude Towards Online Assessment

Other than looking into the performance of the students when it comes to traditional face-to-face assessment and online assessment, there were also researches that were conducted to have an understanding on the students' and lecturers' attitude towards the implementation of online assessments. In most of these researches, surveys and interviews were conducted to gauge the students' and lecturers' feelings and opinions towards the use of online assessment in their learning.

In one study carried out in the University of Rwanda, a 5-point Likert scale web-based questionnaire was created by the researchers to examine what was the students' satisfaction level when it came to formative online assessment strategies that was embedded in a virtual course. The results from the study showed that, in general, the students were satisfied with the quality of their engagement and the quality of feedback across all formative online assessment learning activities (Bahati et al., 2019).

A state university in Turkey investigated the academic achievement of online examination compared to traditional examination and students' perception towards online examination. It was shown that learners reported positive attitudes towards online examinations and no statistically significant difference in the students' academic achievement in online and traditional examinations (Ilgaz & Afacan Adanır, 2020).

A research carried out in the UAE (Ali & Dmour, 2021) found that a majority of survey participants agreed that it is easier to take an online assessment than a physical assessment in the university and about half of the participants would like all future exams to be conducted online.

Another research carried out in a medium-sized private metropolitan university in Turkey, aimed to find out how gender, computer usage and level of education have an effect on the students' attitude towards online assessment. The result showed that students with better computer knowledge score higher as compared to those who use the computer less. Furthermore, it showed that male students tend to have a more positive attitude towards online assessment as compared female students. The level of education,

however, did not have much influence students' attitude towards online assessment (Bahar & Asil, 2018).

There were studies on the advantages and challenges in online assessment. The main advantages to students are immediate feedback thus improve students' performance; while saving time and effort for lecturers (Howe, 2020; Rolim & Isaias, 2018; et al., 2018). There are many challenges faced in online assessment and steps to overcome are being taken. Plagiarism and cheating are two commonly identified disadvantages in online learning and measures to tighten security are being taken (Doğan et al., 2020; Hassan & Adam, 2018; Kocdar et al., 2018).

With the research above, the paradigm shifts from traditional assessment methods to online assessment methods seem to be viewed in a positive light. In lieu of the current events, the move towards online assessment will be something that most universities are looking into in order to stay competitive and be relevant in the field of higher education

3. Method

3.1. Research Context

The study aims to identify students' academic performances with online assessment and traditional face-to-face assessment. The second objective is to identify students and lecturers' perceptions, experiences and satisfactions with assessments in these two modes.

3.2. Participants

This study is carried out among students registered in eleven diplomas and five bachelor degrees in year 2019 and 2020. 1148 diploma students and 83 bachelor degree students attended traditional face-to-face assessments in 2019; while 1049 diploma students and 105 bachelor degree students attended online assessments in 2020. A convenience and non-sampling samples of 182 students and 21 lecturers responded the questionnaire on experience and satisfaction with traditional face-to-face assessment and online assessment.

3.3. Instruments

In a semester, the effectiveness of teaching and learning is measured through formative and summative assessments. Formative assessments include quizzes, tests, assignments and projects during the semester. Final examination is the summative assessment carried out upon completion of studies at the end of semester. These assessments make up to the overall examination result. In order to gauge the difference of performance between traditional face-to-face assessment and online assessment, the grade point average (GPA) of the students after each semester is calculated.

A questionnaire is designed to gather information on students' and lecturers' experiences and satisfactions with traditional face-to-face assessment and online assessment. Questions such as 'which assessment method requires more preparation work?', 'which assessment method is easier to score higher grade?' and 'which assessment method encourages independent learning?' are listed in the questionnaire to compare experiences. For satisfaction comparison, questions include 'which assessment method has less stress?', 'which assessment method is more enjoyable?', 'which assessment method is more rewarding?', 'which assessment method is fairer?' and 'which assessment method is your choice?'. A pilot study on the questionnaire has been conducted for content validity. This questionnaire was prepared using Google Form and the link was forwarded to all deans of faculties for dissemination.

3.4. Data Collection and Analysis

In this study, the grade point average (GPA) of students for year 2019 are compared to year 2020. For traditional face-to-face assessment, the academic results for diploma programs are taken from two academic sessions: December 2018 and June 2019; while academic results for bachelor programs are taken from the September 2019 session. As for online assessment, the academic results in November 2019 session and June 2020 session for diploma programs and February 2020 session for bachelor programs are used.

Descriptive analysis is used to compare academic performance based on GPA for the year 2019 and 2020. The Grade Point Average (GPA) for each diploma and bachelor program is divided into five categories: below 2.00, from 2.00 to 2.49, from 2.50 to 2.99, from 3.00 to 3.49 and at least 3.50. Frequency distributions of GPA categories are presented using multiple bar charts to reflect the differences in academic performance between traditional face-to-face assessments and online asynchronous assessments. The findings are analyzed using Microsoft Excel and IBM SPSS Statistics (version 26).

4. Findings and Discussion

4.1. Findings

Part I. Academic performance based on GPA for bachelor and diploma programs.

A. Overall GPA for all bachelor programs and GPA difference between online mode and traditional face-to-face (F2F) mode

Since September 2019, five bachelor programs are offered: Bachelor in Business Administration, Sarjana Muda Pengurusan Islam Dengan Perniagaan Halal, Bachelor of Software Engineering, Bachelor of Visual Arts in Creative Design and Bachelor in Early Childhood Education.

Chart 1: GPA categories for bachelor programs in February 2020 (online) compared to September 2019 (F2F)

From Chart 1, online mode has higher percentage in the category GPA 3.00 and above as compared to F2F mode. Even though there is a drop in the percentage of students scoring GPA 3.00 to 3.49 via online mode, this is explained by the surge in the percentage in category GPA 3.00 and above via online mode.

B. Overall GPA for diploma programs and GPA difference between online mode and traditional face-to-face (F2F) mode

Examination results of nine diploma programs offered in five faculties are taken. Faculty of Islamic Civilization offers Diploma in Islamic Finance and Diploma in Islamic Institution Management. Faculty of Creative Arts & New Media offers Diploma in Journalism. Faculty of Management offers Diploma in Accounting, Diploma in Marketing, Diploma in Tourism Management and Diploma in Executive Secretaryship. Faculty of Science & Engineering offers Diploma in Maintenance Management and Faculty of Human Development offers Diploma in Early Childhood Education.

Chart 2: GPA categories for diploma programs in November 2019 and June 2020 (online) compared to December 2018 and June 2019 (F2F)

From Chart 2, the percentages in categories GPA less than 2.00, between 2.00 to 2.49, between 2.50 to 2.99 and between 3.00 to 3.49 are higher in sessions where F2F mode were conducted. However, the percentages in category GPA more than 3.49 are the higher in sessions where online mode were conducted.

Chart 3: Difference in GPA between online mode and physical mode for diploma programs in November session and June session within 2019 & 2020

From Chart 3, negative values appeared in the first four categories of GPA show that the percentages by online mode are lower than the percentages by F2F mode. Positive difference in the category of GPA above 3.49 in both sessions indicate much higher increase in the percentage of students obtaining GPA above 3.49 via online mode.

Part II. Experience and Satisfaction towards traditional face-to-face assessments versus online assessments among students and lecturers.

C. Questionnaire analysis – Reliability Test

Besides the section on demographic information, students answered questions related to experiences and satisfactions in answering online assessments and traditional face-to-face assessments. Lecturers answered questions related to experiences and satisfactions in handling (preparing and marking) online assessments and traditional face-to-face assessments. SPSS is used to run reliability test. Table 1 tabulated Cronbach's Alpha values for each subset and overall number of items for students and lecturers respectively. Cronbach's Alpha coefficients for Experience and Satisfaction are more than 0.70 and the overall coefficient for students and lecturers are 0.93 and 0.85 respectively, suggesting adequate reliability.

Table 1: Reliability Statistics

Cronbach's Alpha Reliability Statistics				
Subset	Students	Number of items	Lecturers	Number of items
Experience	0.91	13	0.82	14
Satisfaction	0.86	8	0.74	9
Overall	0.93	21	0.85	23

D. Questionnaire analysis – Students' responses

A total of 182 responses is collected among students within three weeks. Students' demographic information is listed in Table 2.

Table 2: Demographic of respondents (students)

Item	Category	%
Gender	Male	12
	Female	88
Citizenship	Malaysia	99.5
	Foreign	0.5
Program	Diploma	80
	Bachelor	20
Semester	1	5
	2	29
	3	17
	4	25
	5	19
	6	5

Chart 4: Experience in doing continuous assessment – comparison between online and F2F modes

From Chart 4, more than 50% of the respondents say online assessments are easier to do and easier to score. 43% of respondents agree that online assessments encourage independent learning. However, there is slightly higher percentage of respondents indicate that F2F assessment reflect actual learning better than online assessment.

Chart 5: Experience in doing final examination –comparison between online and F2F modes

From Chart 5, more than 50% of the respondents agree that final examination conducted via online is easier to do and easier to score. In term of preparation for final examination and the final examination reflecting actual learning, the percentages are fairly evenly distributed.

Chart 6: Experience in doing the final evaluation – comparison between final examination and final assessment

Virtual teaching and learning process is fully implemented due to lock down to overcome the spread of COVID-19; final examination that is conducted within a prescribed duration, according to a time table scheduled by the examination unit is replaced by final assessment. This final assessment is scheduled and conducted by respective course lecturer at the end of the semester, independent of the examination unit. Even though both final examination and final assessment are conducted via online, students' perceptions on these two ways are investigated.

From Chart 6, it is interesting to note that majority of respondents say final assessment requires more preparation but is easier to score as compared to final examination. 44% of the respondents say final examination is easier to do.

Chart 7: Satisfaction in overall assessments – comparison between online and F2F modes

From Chart 7, majority of the respondents say online assessment is more relax and they have more confident to answer the assessment. Also, online assessment is more enjoyable to complete and more rewarding in result.

Chart 8: Consideration in overall assessments – comparison between online and F2F modes

From Chart 8, majority of respondents' choice is online mode as compared to F2F mode.

E. Questionnaire analysis – Lecturers' responses

A total of 21 responses is collected among lecturers within two weeks. Classification according to gender, race, faculty, specialization and years of teaching experience for these respondents is presented in Table 3.

Table 3: Demographic of respondents (lecturers)

Item	Category	%
Gender	Male	14
	Female	86
Race	Malay	80
	Chinese	10
	Indian	10
Faculty	Center for Integrated Knowledge	48
	Faculty of Management	29
	Faculty of Science & Engineering	19
	Faculty of Human Development	4
Specialization	Mathematics & Statistics	14
	Social Sciences	19
	Language	14
	Business & Management	14
	Engineering	9.5
	Education	5
	Computer Studies	9.5
	Accounting	5
	Law	5
	Economics	5
Teaching experience	Less than 1 year	5
	1 to 5 years	19
	5 to 10 years	9.5
	More than 10 years	66.5

Chart 9: Experience in conducting continuous assessment – comparison between online and F2F modes

From Chart 9, more than 50% of the respondents indicate online assessments require more preparation work, though assessments in this mode have higher passing rate and encourage independent learning among students. But majority of the respondents agree that F2F assessments reflect actual learning outcome achieved by students.

Chart 10: Experience in conducting final examination –comparison between online and F2F modes

From Chart 10, majority of the respondents agree that the final examination preparation work in either online or F2F mode are the same. Even though 52% of the respondents say final examination conducted online has higher passing rate but only 10% of the respondents agree that online final examination reflects actual learning outcome achieved

by students. 67% of the respondents say that online final examination encourages students to learn independently.

Chart 11: Experience in conducting the final evaluation – comparison between final examination and final assessment

As mentioned earlier (explanation for Chart 6), final examination is conducted according to a scheduled time table prepared by the examination unit; while final assessment is conducted by respective course lecturer towards the end of the semester. Both final examination and final assessment are delivered online.

From Chart 11, more than 50% of the respondents agree that there is no difference in final examination and final assessment in terms of preparation and handling work, passing rate and reflection of actual learning by students.

Chart 12: Satisfaction in overall assessments – comparison between online and F2F modes

From Chart 12, there is clear indication that lecturers favor F2F to online assessments. This is shown from the majority percentages in F2F mode for each item.

Chart 13: Consideration in overall assessments – comparison between online and F2F modes

From Chart 13, 52% of the respondents agree that online assessments require more serious attention. Majority acknowledge that F2F assessments are fairer to all as compared to online assessments. Even though 48% of the respondents indicate no preference for assessments to be conducted either via online or F2F mode, still there is higher percentage of lecturer prefers F2F assessments.

4.2. Discussion

For bachelor degree programs, majority scored in GPA at least 3.50 category for online assessment (88%) and face-to-face assessments (71%); it was 17% higher recorded in online assessments. As for diploma programs, the academic performance with face-to-face assessments showed almost equal proportions of students scored GPA between 3 to 3.49 category (33% & 30%) and GPA at least 3.50 category (34% & 39%) respectively; whereas the academic performance with online assessments showed majority scored GPA at least 3.50 category (66% & 70%). This recorded 32% and 31% increase in GPA at least 3.50 category when students performed online assessments. Finding from this study showed overall better academic performance online assessments were conducted. This finding contradicted with past studies (Cazan & Indreica, 2014; Paul & Jefferson, 2019) but in agreement with (Elzainy et al., 2020).

Students' responses in questionnaire indicated online assessment encourage independent learning, easier to score thus recorded better results. Majority of them indicated online assessments are more relax, more confident to answer, more enjoyable to complete and more rewarding in results, hence majority prefer online assessments. This finding is supported by past research (Romeu Fontanillas et al., 2016). However, lecturers' responses in the questionnaire indicated otherwise. From lecturers' point of view, the traditional face-to-face assessments are less stress in preparation, fairer and less opportunity for cheating, hence, they are more confident in students' answers and the results would reflect more accurately students' actual learning achieved. Therefore, higher percentages of lecturers preferred traditional face-to-face assessments to online assessments. This outcome is mainly due to the issue of security in online assessment as highlighted in many studies (Doğan et al., 2020; Hassan & Adam, 2018).

5. Conclusion

Pandemic COVID-19 has impacted massively to the education sector globally. Due to the pandemic outbreak started in March 2020, almost all institutions switched the teaching and learning method to online mode. Students who are not well equipped with facilities such as laptop and internet connection will face difficulties. However, education institutions, government and many other parties are relentlessly trying to come up with solution to support teaching and learning process in this new era.

The initial stage of online assessment implementation faced many challenges especially in terms of security. Measures and steps have been taken to overcome them. (Kocdar et al., 2018) highlighted students' acceptance of online assessment yet showed concern on security issue such as cheating and plagiarism. With the advancement in technology that able to provide tighter security and increase the credibility of assessment, hence, the online assessment offers a promising alternative to traditional face-to-face assessment.

References

- Ali, L., & Dmour, N. A. H. H. Al. (2021). The shift to online assessment due to covid-19: An empirical study of university students, behaviour and performance, in the region of UAE. *International Journal of Information and Education Technology*, 11(5), 220-228. <https://doi.org/10.18178/ijiet.2021.11.5.1515>
- Alruwais, N., Wills, G., & Wald, M. (2018). Advantages and Challenges of Using e-Assessment. *International Journal of Information and Education Technology*, 8(1), 34-37. <https://doi.org/10.18178/ijiet.2018.8.1.1008>
- Bahar, M., & Asil, M. (2018). Attitude towards e-assessment: influence of gender, computer usage and level of education. *Open Learning*, 33(3), 221-237. <https://doi.org/10.1080/02680513.2018.1503529>
- Bahati, B., Fors, U., Hansen, P., Nouri, J., & Mukama, E. (2019). Measuring learner satisfaction with formative e-assessment strategies. *International Journal of Emerging Technologies in Learning*, 14(7), 61-79. <https://doi.org/10.3991/ijet.v14i07.9120>
- Buchanan, T. (2000). The efficacy of a World-Wide Web mediated formative assessment. *Journal of Computer Assisted Learning*, 16(3), 193-200. <https://doi.org/10.1046/j.1365-2729.2000.00132.x>
- Buchdahl, G. (1968). The nature of physics. In *Contemporary Physics* (Vol. 9, Issue 5). <https://doi.org/10.1080/00107516808205821>
- Bull, J., & McKenna, C. (2004). *A blueprint for computer-assisted assessment*. RoutledgeFalmer.
- Cazan, A.-M., & Indreica, S. E. (2014). Traditional Assessment of Learning Versus Online Assessment. *Let's Build the Future Through Learning Innovation!*, Vol Iii, January, 96-101.
- Dermo, J. (2009). e-assessment and the student learning experience: A survey of student perceptions of e-assessment. *British Journal of Educational Technology*, 40(2), 203-214. <https://doi.org/10.1111/j.1467-8535.2008.00915.x>
- Dietel, R. J., Herman, J. L., & Knuth, R. A. (1991). What does research say about assessment? *North Central Regional Educational Laboratory*, Oak Brook.
- Doğan, N., Kibrislioğlu Uysal, N., Kelecioğlu, H., & Hambleton, R. K. (2020). An overview of e-assessment. *Hacettepe Eğitim Dergisi*, 35(Special Issue), 1-5. <https://doi.org/10.16986/HUJE.2020063669>

- Elzainy, A., El Sadik, A., & Al Abdulmonem, W. (2020). Experience of e-learning and online assessment during the COVID-19 pandemic at the College of Medicine, Qassim University. *Journal of Taibah University Medical Sciences*, 15(6), 456-462. <https://doi.org/10.1016/j.jtumed.2020.09.005>
- Harris, R. A., & Beevers, C. (2002). *ENCOURAGING RESEARCH INTO ON-LINE*.
- Hassan, S., & Adam, M. (2018). *E-Assessment in Higher Education Benefits , Challenges And Principles*. 1-9.
- Helmericks, S. G. (1993). Collaborative Testing in Social Statistics: Toward Gemeinstat. *Teaching Sociology*, 21(3), 287. <https://doi.org/10.2307/1319027>
- Howe, E. L. (2020). Perceptions of e-assessment by students and lecturers. *International Journal of Education and Research*, 8(4), 143-152. www.ijern.com
- Ilgaz, H., & Afacan Adanır, G. (2020). Providing online exams for online learners: Does it really matter for them? *Education and Information Technologies*, 25(2), 1255-1269. <https://doi.org/10.1007/s10639-019-10020-6>
- James, R., McInnis, C., & Devlin, M. (2002). Assessing Learning in Australian Universities: Ideas, Strategies and Resources for Quality in Student Assessment. *University of Melbourne. Centre for the Study of Higher Education, Australian Universities Teaching Committee*, 67. <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Assessing+Learning+in+Australian+Universities#0>
- Kendle, A., & Northcote, M. (2000). The struggle for balance in the use of quantitative and qualitative online assessment tasks. *Ascilite*, 9-13. http://www.ascilite.org.au/conferences/coffs00/papers/amanda_kendle.pdf%5Cnhttp://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.17.9678&rep=rep1&type=pdf
- Kerka, S., Wonacott, M. E., Grossman, C., & Wagner, J. (2000). Assessing Learners Online. In *Practitioner File*. <http://www.cete.org/acve/docs/pfile03.pdf>
- Kocdar, S., Karadeniz, A., Peytcheva-Forsyth, R., & Stoeva, V. (2018). Cheating and Plagiarism in E-Assessment: Students' Perspectives. *Open Praxis*, 10(3), 221. <https://doi.org/10.5944/openpraxis.10.3.873>
- Paul, J., & Jefferson, F. (2019). A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course From 2009 to 2016. *Frontiers in Computer Science*, 1(November). <https://doi.org/10.3389/fcomp.2019.00007>
- Rastgoo, A., & Namvar, Y. (2010). Assessment approaches in virtual learning. *Turkish Online Journal of Distance Education*, 11(1), 42-48. <https://doi.org/10.17718/tojde.88955>
- Rolim, C., & Isaias, P. (2018). Examining the use of e-assessment in higher education: teachers and students' viewpoints. *British Journal of Educational Technology*, 0(0), 1-16. <https://doi.org/10.1111/bjet.12669>
- Romeu Fontanillas, T., Romero Carbonell, M., & Guitert Catasús, M. (2016). E-assessment process: giving a voice to online learners. *International Journal of Educational Technology in Higher Education*, 13(1). <https://doi.org/10.1186/s41239-016-0019-9>