

A Qualitative Research Analysis of Online Teaching Strategies for Improving Students' Performance in Engineering Programs

Ms Preethy Ayyappan¹, Assoc. Prof. Ts. Dr. Rajamohan Parthasarathy²,
Dr. Ilangovan Perumal³

¹ Senior Lecturer & PhD Research Scholar, Centre for Advanced Electrical and Electronic Systems & Centre for Outcome Based Education Research, Faculty of Engineering, Built Environment and Information Technology, SEGi University, Kota Damansara, Malaysia.

² Associate Professor, Centre for Network Security and IoT, Faculty of Engineering, Built Environment and Information Technology, SEGi University, Kota Damansara, Malaysia.

³ Senior Lecturer, Faculty of Business, Accounting and Law, SEGi University, Kota Damansara, Malaysia.

E-mail address: ayyappan@segi.edu.my & preethyayyappan@gmail.com,
prajamohan@segi.edu.my, ilangovan@segi.edu.my

Abstract

Over the past few years, there has been a growing problem with how quality can be ensured in higher education institutions' online learning, particularly in engineering program courses. Although some research has concentrated on the views of lecturers and administrators, there has been a lack of studies carried out on the perceptions of students regarding the quality of online engineering programs. This research used qualitative approaches to analyse the engineering students' impression of the quality of online education based on their own online learning experiences. The aim of this qualitative theory, driven by the constructivist theory of Bruner, which emphasizes that learners are active participants who develop their knowledge, was to assess the behaviour of students and lecturers who could explain the difference in performance in the online sections and use the results of this research to identify methods to enhance online student performance. Semi-structured interviews were incorporated into this qualitative study with a preselected group of two online students who completed the course and with the two lecturers who are experienced in teaching online. The experiences of students and lecturers were coded to evaluate the emerging trends. The results showed that online students postponed submission as they had trouble finishing assignments. Better training study skills along with effective time management were suggested ways to improve the performance of the students. By offering a better understanding of approaches that could enhance educational outcomes, this research and project encourage quality improvement. The students, teachers, and course administrators will be assisted by the results of the study. The results of the research will benefit the students, instructors, and supervisors of classes.

Keywords: Face-to-Face Class, Online Class, STEM, Learning Process.

I. INTRODUCTION

1.1. Background of the Study

Most educational providers realize that online courses are essential for the long strategic mission of organization. Academicians are recognizing the significance of online learning for

institutional development and increasing access [1]. Increased registration of online learning programs has helped some organizations recover from the current recession and enhanced overall revenue streams [1]. In 2013, 5.5 million students were enrolled in distance learning courses [2], compared to 3.9 million students in 2007 [3] according to the National Centre for Education Statistics, representing an increase of almost 30 percent in online registration.

The Integrated Post-Secondary Education Data System (IPEDS) of NCES, which gathers and distributes information from all U.S. higher education institutions, stated that 71% of public degree-granting organizations have certain online learning programs as per the record of IPEDS in 2014. Allen and Seaman reported that 2.9 million students registered in higher education took all their courses online, while another 3 million students took certain other courses online. In the 2011–2012 academic year [4], [5] reported that 7.4 million-degree students took at least one online course. Higher education institutions have widely adopted online learning as an alternative method to conventional face-to-face classroom teaching, giving students the ability to access learning opportunities from every corner of the world, day, and night. In e-learning, the performance of students is an important factor in achieving good results.

This research focuses on improving the performance of students by examining the critical variables that have a major impact on academic performance.

Even though 80% of the course content offered in higher learning institutions was online [6], students in this study were still hesitant to take courses online as they scored lower final grades. One learner said, " The online class was very boring " (Personal communication, February 5, 2021). Another student said, " I felt lost constantly, and I don't feel that the instructor helped me a lot" (Personal communication, February 5, 2021). It showed that these learners were not satisfied with their earlier online learning courses. What prompted their adverse experiences? Was it the learner himself or the educators? What are the views of students on the quality of online learning, based on their own learning experiences? Are they pleased with the online education they have received or unhappy with it? What are the considerations that affect the online learning experiences of students? All those concerns encouraged the current study and its research to examine the expectations of students about the quality of online education.

More Universities are offering online engineering program courses. A worldwide study on online education recorded an increase in enrolment in online engineering courses [6]. Examining and recognizing how local factors lead to low success rates for online students in the engineering courses programs resulted in the identification of interventions in the online version of the course to enhance student performance. While online education research is growing, there is limited research on the quality of online education. There is, therefore, a need to examine the expectations of students about the quality of online education. This research aimed to evaluate the quality of current online education courses that use the Internet as the primary method of delivery of instructions.

This research centered on exploring the expectations of students about the quality of online education. In terms of quality assurance, the results of this study can contribute to the literature on online education. The results should ideally encourage online education organizations to assess their programs based on the findings and recommendations in this report.

1.2. Research Questions

In this study, answers were pursued to the following research questions. The leading research question was: What are students' concerns and recommendations for enhancing online courses for the Engineering program? For this research, the main questions were:

1. What are the lecturers' assumptions about the difficulties of students that led to lower online course grades?
2. What are the recommendations of the lecturers to increase the students' grades in the online course?
3. What are the views of the students on their difficulties leading to lower grades in online courses?
4. What are the feedbacks from students to enhance their grades in online courses?

Based on the above questions, further, sub-questions were created for the interview.

For students, universities, and stakeholders in the education industry, this research is very relevant. The Introduction to Computer Engineering course learned by engineering students is chosen for this study. For degree pursuing students in higher education to graduate from any engineering program, the Introduction to Computer Engineering course is necessary. All students, therefore, must pass the course successfully. To prepare them for employment, the university needs to provide students with specific skills. The findings of this research will provide a framework for suggested approaches to enhance the passing rates in the Introduction to Computer Engineering online course. By implementing the suggested approaches, the institution will also benefit students as they will receive their degree faster and incur fewer tuition costs; the institution may increase revenue by raising rates of participation, retention, and graduation. Furthermore, constructive methods may also lead to an enhanced image of the university. The demand for job markets in the college service area can also be met by a rise in institution graduates.

II.Literature Review

2.1. Introduction

Several databases were accessed for the literature review. Education Total, ERIC, Sage Premier, ProQuest Central, and Google Scholar were among those outlets. Key terms or phrases used to classify study-relevant literature included: student performance, online versus face-to-face, final grades, face-to-face, and online education. Except for pioneering research on the conceptual framework and online learning, the search was limited to sources from 2010-2020. The emphasis was on student performance in an online course, online education development, online learning in institutional environments, and student pass rate factors in online learning. The literature review includes several studies pertaining to internal issues.

2.2. Theories and Models Related to the Study

For this analysis, the conceptual structure was the constructivist theory of Bruner. Bruner believed that students should receive close support while they develop skills, knowledge, and experience in their coursework. The researchers showed that a downturn in economic growth leads to fewer opportunities for jobs and improves online course enrolment for students.

According to the study, for both profit-making and non-profit institutions, nearly two-thirds of the higher education institutions surveyed recorded that enrolment in online courses was higher than the previous year [6]. A regional research review and analysis of failure rates in online and face-to-face courses in 2013. In the online math course, the study showed a 25% failure rate for students, compared to a 12% failure rate in the face-to-face course [7]. Allen and Seaman reported an increase in enrolment in computer courses offered online in a national study on online education. Furthermore, survey findings from the study showed that 9.8 percent of online courses identified by institutions were lower than face-to-face courses, while 49.4 percent reported that the courses were the same [6].

2.3. Relevant Past Studies to the Current Study

In a survey conducted for this report from the years 2003 through 2011, academic officers were optimistic that online course learning results were somewhat inferior to those compared to face-to-face courses. A change of opinion among academic officers surveyed in 2012 [8] is reported by the results of the study, with measures of online course learning outcomes reduced to somewhat lower than 23.0% in 2013. Academic leaders have agreed that online learning could not be adequate for all students [8].

Online learning deprives [9] of learning educational resources for students and the quality of online courses lacks merit. More research is needed, according to the authors, to study how students develop online learning knowledge and skills. The observation of online education by faculty is still dissatisfied with teaching and learning activities [10]. The authors have said that online learning is less efficient than face-to-face learning, and in face-to-face education, the learning process is much simpler [11].

They concluded that the passing rate was low for undergraduate students studying online relative to face-to-face learners [12]. Wladis et. al noted that there were higher attrition rates in online versus seated courses in science, technology, engineering, and mathematics (STEM). Thus, there is a need to identify factors that may affect STEM student pass rates in the online environment [13].

The objective of qualitative data analysis is to turn feedbacks into information patterns that provide a better understanding of the issue.[14][15]. In the Introduction to Computers course, the internal problem is lower pass rates for online students. The outcome of the research will help to identify the key factors to enhance the grades of the introduction to Computer Engineering course which is thought online. The study suggests that online lecturers may need additional training in multiple areas to enhance student performance. The local professional development deliverable from this research may potentially be used by the institution at state and national conferences. Findings in the online version of the course can also help improve student retention, persistence, and satisfaction. Finally, the results can also be used by other academic fields to promote progress in online and face-to-face classes.

III. Research Methodology

3.1. Introduction

In the Introduction of Computer Engineering online course, students fail to a greater extent than in the face-to-face course. The research question was designed to address lecturers' opinions about students' problems and students' opinions about their problems and recommendations for performance improvement in an online course. In this chapter, the rationale of the research design, choice of participants, methods of data collection, data analysis, and methods to ensure the study participants' confidentiality are discussed. The study's quality and conclusions are also discussed. Qualitative researchers examine social phenomena, the emotions, and the expectations of the respondents [16] Qualitative researchers also want to understand the link between knowledge and experiences and how respondents communicate those experiences [17].

3.2. Research Design

In the Introduction to Computers Engineering online course, the qualitative research method was used to evaluate: (a) the opinion of students, and (b) the opinion of lecturers who teach the course online. For this research, to collect the opinion of two students six questions were asked and for two lectures, seven questions were framed to find the answers to enhance the performance of the students. Using interviews, observations, and transcripts, the design chosen for this research study was qualitative in nature. Triangulation may lead to a better analysis or interpretation of a situation, bringing together different types and pieces of information. Semi-structured interviews, observations, and paperwork were the data collection methods used in this study.

3.3. Research Framework

The opinions of students enrolled in the Introduction to Computer Engineering online course were associated with their expectations and understanding of the course.

A practical account of phenomena inside a group of people is endorsed by qualitative research methods. [17][18][19]. In the Introduction to Computer Engineering online course, student and lecturer expectations of students' success were discussed in this research.

In qualitative research, the sample size is calculated when another researcher analyses studies of similar interest, and the sampling sizes are based on the intent and phenomenon of a study [20].

As this study was for a mini project, only 4 samples were considered. They were two online students and two lecturers who taught the course online and took part in this research. Saturation is another aspect of data collection for qualitative research.

In qualitative studies, saturation is important because it is the stage where no new or applicable data collection knowledge occurs regarding newly constructed theory [21].

First, when researching an unexplored phenomenon, the qualitative analysis offers rich knowledge and provides real words from subjects interested in a specific case using open-ended questions.

Secondly, the qualitative analysis gives a deeper interpretation of an incident through which the researcher acquires knowledge of the event. Finally, qualitative analysis recognizes behaviour, events, and their experiences [22].

By choosing the qualitative design for this review, trends relevant to students taking the course online were discovered.

3.4. Participant and Setting

Students who completed the course online and lecturers with three or more years of teaching experience in an online course are the research participants in the Introduction to Computer Engineering course. The participant organization is shown in Figure 1.

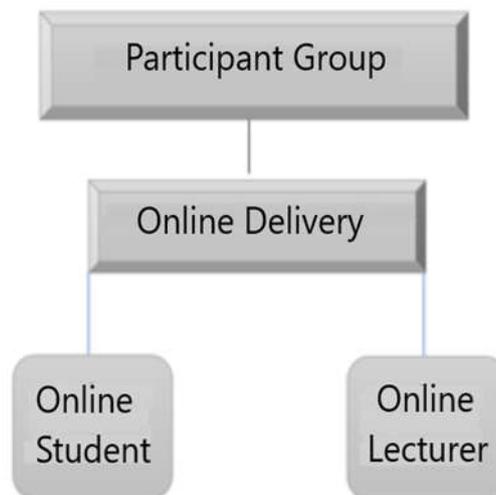


Figure 1. Research study participant groups

3.4.1. Participants Selection

The participants in the study were two students and two lecturers from the Faculty of Engineering.

3.4.1.1 Students:

The selection criteria of student participants were done in two stages.

First, the students from two different universities who have taken the Introduction to Computer Engineering course online in the year 2019-2020 were considered. The students were sent an email invitation to take part in the research. Purposeful sampling helps the investigator to discover and understand the insight gained from the data of individuals who have common opinions [17].

In the second stage, random sampling was used to select two students from different engineering programs who had accepted the invitation to take part in the research. A one-to-one interview with the randomly selected students to participate in the research was scheduled upon acceptance of the invitation. Random purposeful sampling is used in qualitative analysis, where individuals are chosen and analysed to obtain detailed and relevant knowledge about the situation.

3.4.1.2 Lecturers:

Using criterion sampling, lecturers with three or more than three years of teaching experience to teach the Introduction to Computer Engineering course online were selected for the research. The methods of teaching a course adopted by the lecturer's added relevance to the research questions [17]. For the two lecturers who teach this online course, an invitation was sent by email. Upon accepting the invitation, a one-to-one interview was scheduled with the lecturer.

Experienced lecturers in online teaching were asked to participate in the study as they have good experience and knowledge in teaching, which contribute to the better performance of the students. The views of the lecturer involved in this study proposed difficulties faced by the students and suggestions to enhance the completion of the course and graduation rates among online learners. A live video interview was conducted using the zoom application. It was made sure that it was a one-to-one conversation and occurred at the convenience of the participants. This interview was recorded with the consent of the participants.

3.5. Data Collection

For my research, data collection involved interviews with two students and two lecturers from the Faculty of Engineering from two different universities. Interviewing is an essential way to verify the accuracy of the impressions obtained by a researcher through observations [23].

The interviews were conducted in different time slots to accommodate the needs and convenience of the participants. The lecturers were interviewed in the faculty office and the students were interviewed via an online platform using the Zoom application.

3.5.1. Students' Interview

An invitation was created and sent to the five students requesting to take part in the interview. A protocol for students' interviews was created, defining the students who were skilled enough to take part in the review.

This student's protocol was sent to two students who accepted the invitation. For the research, open-ended and semi-structured questions were created before the interview, and the same questions were asked to both students. Open-ended questions include a topic's insights, thoughts, and understanding. For students who have finished the Introduction to Computer Engineering online course, information on their experiences, problems, and recommendations

were obtained on how to boost their exam grades by interviewing them online via the Zoom application.

Recorded interviews, reflective note-taking, and penned notes were used to collect data. Interviews lasted for 30 minutes, enabling the researcher to generate inquiry-based conversations that gathered rich and complete research-related information.

In reflective note-making, the problems that confirmed the internal difficulty of the learners were carefully penned down, which enriched the research thinking development for analysis.

3.5.2. Lecturers' Interviews

An invitation was created and sent to two lecturers teaching the course online, requesting to take part in the interview. A lecturer interview protocol was created which elaborates the need for the research and defines the lecturers who were skilled enough to take part in the interview. This lecturer protocol was sent to two lecturers who accepted the invitation. For the research, semi-structured questions were created before the interview, and the same questions were asked to both lecturers. The face-to-face interviews lasted for 30 minutes, which enabled the researchers to understand lecturers' opinions on students' performance in an online course and the key factors to enhancing the pass rates. Recorded interviews, reflective note-taking, and penned notes were used to collect data.

3.6 Data Analysis

Qualitative data analysis aims to convert feedback into data patterns that provide a better understanding of the problem. For getting data patterns, pre-recorded videos are used.

3.6.1. Transcription

The pre-recorded videos were heard multiple times for translation. A text document was created into which the diction was typed as accurately as possible. Translations of recorded interviews were checked against the original recordings for accuracy within a week. Data analysis started after translation. The confidentiality of the transcript was ensured. The transcript was checked by participants for accuracy. Reading the whole script of the participants multiple times gave new ideas on how to increase the passing rate of the students.

3.6.2. Data Coding

Coding captures the data centre and its meaning. Coding also helps data processing evolve into data analysis. After reading the transcripts, the process of coding started. In Microsoft word, the table was created to generate codes from transcripts. Codes were assigned for various participants' responses. Once these codes have been created, a better understanding has been developed of why there is a lower passing rate in the Introductions to Computers online course.

In the online Introductions to Computers course, the codes have helped to comprehend faculty expectations of student success. Confirmability requires techniques to ensure the consistency of the analysis that contribute to the quality and credibility of the results [18].

The aim is to present the results of participants instead of the views of researchers. Confirmability helps researchers to show how with rich explanations of the evidence, which in my case would be quotations, notes, and feedback from participant interviews held in a reflective journal, they arrive at conclusions.

IV. Findings and Discussions

4.1. Introduction

This study aimed to investigate the opinions of students and lecturers about the Introduction to Computer Engineering online course based on their experiences. The results from the lectures and students' interviews are listed in this section. The fundamental basis for the report was its research questions and interview results. The transcripts made of recorded interviews were checked multiple times. While listening to the interview, reflective notes were revised. This transcript was sent to the participant to check for accuracy. Coding was done from the transcripts.

4.2. Interview Findings

To analyze this feedback from the participants, topic codes were created in various colors. Poor communication, poor performance, time management, knowledge, poor preparation, presentation skill, and remote access were the codes created.

4.3. Discussion

In the lecturer's interview, seven questions helped to determine the lecturer's opinion on difficulties faced by the students that contributed to their lower grades, and another six questions would provide suggestions to enhance their grades in the Introduction to Computer Engineering online course.

Research Study Question 1: What are the lecturers' assumptions about the difficulties of students that lead to lower online course grades?

According to both the lecturers, students have a mindset that the course is child's play as the new generation is very user-friendly with computers, and that is valid to some degree. It was difficult for students to understand this course because it deals with task-oriented applications, which use software to program.

The second lecturer stated that non-computer students did not have any prior knowledge of software applications, and hence they would have difficulty coping with the course.

Time management was the second issue addressed by the lecturers. They mentioned that the students waited till the due date to work on the assignment. Hence, a few of them managed to finish on time, some of them finished halfway and others could not submit at all. The student who did not submit the assignment failed the course. Lecturers also stated that as the syllabus and assignment are posted to the Blackboard at the beginning of the semester, hence, students should plan to do their assignments on time.

Participation was the third issue that both lecturers mentioned. Some students never responded to the questions asked, and there was a lack of interaction. During the group activities, some of the students didn't actively participate in the discussions held.

The fourth issue observed by the lecturer was that the online students did not have the software necessary to do the assignment due to which they received low grades.

Research Study Question 2: What are the recommendations of the lecturers to increase the students' grades in an online course?

The second lecturer recommended that the students should have basic knowledge of computers and software before enrolling in the Introduction to Computer Engineering online course. Hence, training for non-computer science students who have less knowledge about the basics of computers could increase their performance.

Both lecturers suggested that students enroll in communication skills and time management training in which the student will learn to efficiently handle tasks given to them, coordinate with other students and identify habits that need to be changed which will enhance the student's performance.

The second lecturer recommended that the students could be permitted to access the software from remote locations.

Research Study Question 3: What are the views of the students on their difficulties leading to lower grades in online courses?

The first student is registered for the Bachelor's in Mechanical Engineering. The student felt that as he did not have prior knowledge of computer software applications, he could not understand task-driven applications as compared to computer engineering students. This student had a problem getting the software for the assignment and could not finish the task given, which resulted in lower grades. The student felt lost all the time as he was shy to clarify his doubts.

The second participant is a Computer Engineering degree student. He felt that Introduction to Computer Engineering is an easy course as he had basic computer knowledge. But then later, he realized that he was lacking programming skills as he was not motivated to learn the subject in the online course. Due to these reasons, his grade was low.

Both students felt that the portions covered in the online course were not reviewed regularly, resulting in a lot of studies during the examination period. They also mentioned in common that even though the assignment was posted online at the beginning of the semester, they did not manage their time properly to finish it. They delayed the assignment work till the due date and started working on it towards the near end of the due date. Due to this, they could not answer all the questions.

Research Study Question 4: What are the feedbacks from students to enhance their grades in online courses?

The first student recommended that he should put extra effort into learning the basics of software applications so that he can cope with the lecturer's teachings in the online course. He also felt that if he had regularly studied the course materials provided by the lecturers, his performance could have been enhanced. According to him, it would be beneficial if the lecturer had included more videos to demonstrate the theories of the course.

The computer engineering student felt that if he were attentive during the regular lectures from the beginning of the course, he would have had enough time to clear his doubts with the lecturer.

This would have increased his grades. He suggested that if the lectures were made more interesting by adding visuals and graphics, the students would be more attentive.

Common feedback from the students was that if they had worked on the assignment from the beginning of the course, they could have performed better as they would have had enough time to clarify their doubts with the lecturer and finish the assignment on time.

The summary observed from the lecturers' interview was lack of prior knowledge, poor preparation, poor time management, less interaction, and no access to the application were considered as the reasons why the Introduction to Computers Engineering online course was less effective. From the student's perspective, delayed preparation for the online course, monotonous instructional methods, and mismanagement of time leading to late assignment submission are the difficulties faced due to which students' grades are low.

V. Conclusion

In this research, strategies for improving the grades of the introduction to Computer Engineering online course were addressed. To improve their grades, students have to be motivated to undergo training to improve time management, and communication skills, and instructors to undergo professional development. The outcomes of this research can also be used to increase the performance of engineering programs globally. As a researcher, implementation of the collection of data, participant selection criteria, data interpretation, and ethical considerations have been done. The strategies for success for online students in this qualitative analysis were explored. The recommendations from the analysis were to attend different training to get a more basic knowledge of the prerequisite course, proper time management skills, self-motivation, enhanced interactions for students, and lecturers' enhanced teaching methodology.

From this research, the performance of online students can be improved, which will increase the reputation of the institution and hence will bring in more students. For future research, a data review of this online course may be used. This research provides valuable information from students' and lecturers' opinions on how to improve the grades of online students. From the findings, recommendations for improving the performance of the Engineering program include attending training on (1) Basics of Computers; (2) Time Management Skills; (3)

Communication Skills for students, and (4) Professional Development Courses for Instructors.

Acknowledgment

The authors are profoundly grateful to the Post Graduate Studies, Faculty of Engineering, Built Environment and Information Technology (FoEBEIT), SEGi University, Malaysia for supporting this research paper and publication work in a well-reputed highly indexed journal highly appreciated.

References

REFERENCES

- [1] Bichsel, J, “The state of e-learning in higher education: An eye toward growth and increased access”. Louisville CO: Educause center for analysis and research, 2013.
- [2] National Center for Education Statistics (NCES), “The condition of education”. Retrieved from <https://nces.ed.gov/pubs2014/2014083.pdf>, 2014.
- [3] National Center for Education Statistics (NCES), “Distance education at degree-granting postsecondary institutions: 2006-2007 (Report No. NCES 2009-044)”. Washington, DC: U.S. Department of Education, National Center for Education Statistics, 2008.
- [4] Allen, I. E., & Seaman, J, “Tracking online education in the United States”. Retrieved from <https://files.eric.ed.gov/fulltext/ED572777.pdf>, 2016.
- [5] National Center for Education Statistics (NCES), “Distance education in postsecondary institutions”. Retrieved from http://nces.ed.gov/programs/coe/indicator_sta.asp., 2015
- [6] Allen, I. E., & Seaman, J, “Changing course: Ten years of tracking online education in the United States”. Retrieved from http://sloanconsortium.org/publications/survey/changing_course.pdf, 2013.
- [7] Jaggars S. S., Edgecombe N., Stacey G. W, “What we know about online course outcomes: Research overview. Community College Research Center, Columbia University, New York, NY”. Retrieved from <http://ccrc.tc.columbia.edu/media/k2/attachments/What-We-Know-About-Online-Course-Outcomes.pdf>.
- [8] Allen, I. E., & Seaman, J, “Tracking online education in the United States”, Grade change. Retrieved from <http://www.onlinelearningsurvey.com/reports/gradechange.pdf>, 2014.
- [9] Bowen, W. G., Chingos, M., Lack, K., & Nygren, T, “Interactive learning online at public universities: Evidence from a six-campus randomized trial”. *Journal of Policy Analysis and Management*, vol. 33, no. 1, pp. 94-111. doi:10.1002/pam.21728, 2014.
- [10] Baran, E., & Correia, A.P, “A professional development framework for online teaching”, *TechTrends*, vol. 58, no. 5, pp. 96-102, 2014.

- [11] Arkorful, V., & Abaidoo, N, “The role of e-learning, advantages and disadvantages of its adoption in higher education”, *International Journal of Instructional Technology and Distance Learning*, vol. 12, no. 1, pp. 29-42, 2015.
- [12] Shea, P., & Bidjerano, “T. Does online learning impede degree completion? A national study of community college students. *Computers & Education*, vol. 75, pp. 103-111, Retrieved from <https://doi.org/10.1016/j.compedu.2014.02.009>, 2014.
- [13] Wladis, C., Hachey, A. C., & Conway, K, “Are online students in STEM (science, technology, engineering and mathematics) courses at greater risk of non-success?”, *American Journal of Educational Studies*, vol. 6, no. 1, pp. 65-84, 2013.
- [14] “Doing qualitative data analysis”, Better Evaluation.org, Retrieved from https://www.betterevaluation.org/sites/default/files/EA_PM%26E_toolkit_module_5_QDA_f_or_publication.pdf, 2018.
- [15] Taylor, S. J., Bogdan, R., & DeVault, “Introduction to qualitative research methods: A guidebook and resource”, Hoboken: NJ. John Wiley and Sons, 2015.
- [16] Lodico, M., Spaulding, D. & Voegtler, K, “Methods in Educational Research: From Theory to Practice”, 2nd Edition. San Francisco, CA: Jossey-Bass, 2010.
- [17] Merriam, S. B., & Tisdell, E.J “Qualitative research: A guide to design and implementation (4th ed.)”. San Francisco. Jossey-Bass, 2016.
- [18] Creswell, J, “Qualitative inquiry & research design: Choosing among five approaches”, (3rd ed.). Los Angeles, CA: SAGE Publications, 2012.
- [19] Yin, R. K, “Case study research design and methods”, (5th ed.). Thousand Oakes CA: Sage Publications Inc, 2014.
- [20] Marshall, Bryan., Cardon, Peter., Poddar, Amit., & Fontenot, Renee, “Does sample size matter in qualitative research? A review of qualitative interviews in IS research”, *Journal of Computer Information Systems*, vol. 54, no. 1, pp. 11–22, 2013.
- [21] Nelson, J, “Using conceptual depth criteria: addressing the challenge of reaching saturation in qualitative research”, *Qualitative research*, Queen’s University Belfast, pp. 1-17. doi:10.1177/1468794116679873, 2016.
- [22] Brinkmann, S., & Kvale, S “Interviews: Learning the craft of qualitative research interviewing”, (3rd ed.). Thousand Oaks, CA: Sage, 2015.
- [23] Fraenkel, J. R. & Wallen, N. E, “How to design and evaluate research in education”, (5th ed.). New York: McGraw-Hill, 2003.