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Impact of Online Teaching and Learning on Perception, Satisfaction and Learning Outcome During COVID-19

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Abstract

The study was conducted to find the Impact of Online Teaching and Learning (OTAL) during COVID-19. Moreover, the perception, satisfaction and outcome were the major factors of the study. Study consisted of four objectives and four hypotheses. The population of the study comprised of the undergraduate students of the University of the Karachi. The sample consisted of 100 respondents who were randomly selected from the different departments of the University of Karachi. A questionnaire, consisted of 30 items, was developed and used for collecting data with five points likert scale. The questionnaire was filled using interview method. Responses were recorded by the researcher and tabulated for interpretation. The collected data were tabulated, calculated, analyzed, and interpreted in the light of objectives of the study. The findings reveal that though online learning was introduced due to Covid, but it had a positive impact on teaching /learning approaches at universities academia as well as students' academic growth and development. The study will benefit all concerned stakeholders to improve teaching and develop students' motivation for online engagement at the higher education level. The implications, limitations, discussion, and recommendations for future research will be incorporated. New themes were discussed, such as the use of artificial intelligence (AI) and blended learning approaches to improve the OTAL. Moreover, recording and uploading the lectures would also be beneficial for further use.

***Keywords**: Online teaching, Student Online Engagement, Student computer/internet self-efficacy, Student motivation for learning, Student perception and satisfaction, Outcomes, COVID-19, Higher education level.*

Introduction

Online Teaching and Learning

Online teaching and Learning (OTAL) has been present in the service of distance education (DE) for the last almost two centuries. The emergence of digital technology has transformed the educational landscape, giving rise to online teaching and learning (OTAL) as a prominent mode of instruction (Allen & Seaman, 2017). OTAL encompasses a broad spectrum of activities facilitated through internet-based platforms and tools, offering flexibility and accessibility that traditional classroom settings may lack (Hodges et al., 2020). The inherent flexibility of online education makes it appealing to diverse learners, including working professionals, non-traditional students, and those in remote areas (Allen & Seaman, 2017).

COVID-19 and online Education

COVID-19 pandemic commenced from Wuhan, China (Zhong, et al, 2020). W.H.O. proclaimed it a pandemic on March 12, 2020. The Pakistan government took abundant actions to control the blowout of COVID-19 conveyance. These evaluations include: the initial termination of public places, educational institutions, business association and visitation (Rafique,at el, 2021). The pandemic is truly a thereat for Pakistan's social system, and especially education. The conventional teaching-learning mode was propelled to adopt Online Teaching and learning (OTAL). COVID-19 is pushing the case for transition to online academic (Rehman, A. U., & Khan, B. 2021) that argues in Pakistan, the challenge, include access to teaching materials, and techniques of teaching. They also stated that none stipulation of material leads to drop out rate of recruited students. Veneration of hybrid teaching method has somewhere contributed to meeting challenges of lack of access to technology and teaching material (Mumtaz, N., Saqulain, G., & Mumtaz, N., 2021).

Due to hazards of blowout of Corona virus, educational institutes are challenged with the impending threat of online structure, different types of software applications. Hence, an revitalized HEC, started imparting ideas and initiated the training of faculty and staff both. The field of online approaches provides the entire spectrum of undergraduate to doctoral level an enabling environment. This concept reinforced noteworthy development in test scores in language and different subject tests (Naik, G. L., et al., 2021).

Satisfaction over Teaching and OTAL approaches

Online Teaching and learning (OTAL) process during the COVID-19 has hut light on numerous aspects of isolated and amalgamation education. It was necessary to see the Students' satisfaction with remote learning platforms, course materials, instructor communication, and overall learning experiences during that time. Different factors such as clear interaction, communicating online resources, and prospects for teamwork positively affect student satisfaction (Resch et al., 2022).

The integration of AI in education gained significant attention due to its potential to enhance various aspects of the learning experience. AI technologies can personalize learning by adapting content to meet the individual needs of students, thereby increasing engagement and improving learning outcomes. (Holmes, W., Bialik, M., & Fadel, C., 2021). AI-driven platforms can provide personalized feedback, identify learning gaps, and suggest tailored resources to help students better understand complex concepts. Additionally, AI can assist educators in managing administrative tasks, allowing them to focus more on instruction and student support. (Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F., 2020)

Blended Learning Approach:

Blended learning, which combines online educational materials and opportunities for interaction online with traditional place-based classroom methods, emerged as a vital approach during the pandemic (Graham, C. R. 2006). This approach leverages the strengths of both online and in-person learning. Which providing flexibility and ensuring continuity of education. In the context of COVID-19, blended learning enabled institutions to adapt to fluctuating circumstances, such as shifting between fully remote and hybrid models as needed. By incorporating digital tools and platforms, blended learning supports varied instructional strategies and accommodates different learning styles, which can enhance student engagement and retention (Trust, T., & Whalen, J. 2021)

The discussion around AI and blended learning highlighted their potential to significantly improve OTAL. AI can enhance the efficiency and effectiveness of online learning platforms, making them more intuitive and responsive to the needs of both students and educators (Singh, J., Steele, K., & Singh, L. 2021). Blended learning approaches ensure that students receive a well-rounded education by integrating the best of both online and face-to-face interactions.

These methods not only support academic achievement but also foster skills such as self-regulation, digital literacy, and collaborative learning, which are crucial in the modern educational landscape. (Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. 2010).

Literature Review

The whole education system has significantly obstructed worldwide during the COVID-19 pandemic. This shutdown forcing a rapid shift towards remote and mixed learning models (Hodges, C., at el. 2020). The comprehensive outcomes of these changes effect the OTAL during the pandemic. To ensure the continuity, education system had to quickly shift to online learning forums to ensure continuity. Due to this shift both positive and negative outcomes were seen. Different challenges were seen while online forums offer flexibility and availability; many other challenges were seen, such as technological barriers, lack of student engagement, and discrepancies in access to resources (Hodges, C., at el., 2020). The pandemic has impaired existing dissimilarities in education, particularly use of technology, digital tools and the internet. Accessing the online resources my face many difficulties due to the students socio-economic position. Students from rural areas have problems to use of technology. These are the leading which cause differences in learning outcomes (Khan, M. A., at el., 2020).

During the pandemic, effective online teaching and learning (OTAL) has required suitable pedagogical strategies. Adaptation of the suitable pedagogical strategies and appropriate online platforms and amalgamation of traditional and online learning environments have to very clear and authentic. These strategies and learning environments play a vital role in online teaching and learning (OTAL). Bao. W., 2020 defines in his research those teachers were very successful who quickly adapt the online technologies and new teaching and learning methodologies. Quick response of the teachers was beneficial to engage and maintain learning outcomes. During remote learning it was a substantial challenge to maintain the learner engagement in new online environments.

Many strategies have explored by different studies. To enhance student engagement, many researches explored the different online environments, collaborating online platforms, diverse online classroom activities, and personalized feedback for learning patterns. (Moore, J. L., & Galyen, K. 2011).). Students' and teachers' mental health and well-being has had a significant

impact due to pandemic COVID-19. In virtual environment providing the social-emotional support and developing a sense of community to the learners is very important. In this way teacher address the challenges of new virtual environments.

The COVID-19 pandemic has totally different learning patterns. Pandemic started the discussions about the future of education and try to the find the role of technology in teaching and learning. Blended learning strategies were recommended by numerous researchers. These researches suggested the merging of online and traditional classroom teaching to maximize the advantages of virtual methods (Gopal, R., & Aggarwal, A2021).

Objectives of the study

1. To analyze basic features of OTAL impact during COVID-19.
2. To examine perception of teacher-student on OTAL impact during COVID-19.
3. To explore satisfaction of teacher-student with measures concerning OTAL impact during COVID-19.
4. To investigate teacher-students views on outcomes with regard to OTAL measures.

Scope of the study

The study explores the Impact of Online Teaching and Learning (OTAL) during covid-19. This study also examines the perception, satisfaction, and outcomes for teacher and learner both. During COVID-19, these challenges possible the learning more accessible to a wider range of students. Those who might have faced barriers to traditional education, such as geographical distance, physical disabilities, or scheduling conflicts, found online platforms more accommodating. During COVID-19, traditional in-person education posed significant health risks to both students and educators. Online education provided a safe alternative, allowing learning to continue without the need for physical interaction. Closing schools and universities prevent the spread of the virus which disrupted the normal flow of education. This study defines the importance of online platforms used for continuity of learning, ensuring that students could still access educational materials and instruction.

The present study will be significant for all stakeholders to improve online teaching so that students' online perception, satisfaction and outcomes can be ensured at higher education level.

Therefore, the findings of present study will be useful for university teachers and students, university management, HoDs, policy makers, QECs, and HEC to find pragmatic strategies to ensure online quality education in HEIs, Pakistan.

Research Methodology

Pakistan higher education system facing the challenges including, insufficient funding, political intervention, and the need for curriculum reform align with international standards. Pakistani universities participate in associations and exchange programs with other globally. To enhance academic standards, universities providing training, facilitate faculty and student exchanges, their ideas with others. This type of programs promotes cross-cultural understanding. Government of Pakistan initiatives many programs to promote online education, particularly during days of COVID-19 pandemic. Many Efforts have been made to start digital programs and provide online environment to learners across the country. For effective use of the online resources and the better utilization of tools, government initiated the different digital literacy programs.

Population of the Study

Suitable population, for the current study was taken from the Karachi city. The population included the Teachers and Students from various departments of University of Karachi, who utilized online learning mode during teaching and learning process.

Description of the sample

The researcher used simple random method of selecting the sample for collection of the data. The participants were selected from the different departments of University of

Karachi. Both teachers and students comprised the sample of the study. A total of 50 teachers and 50 students were selected as a size of the sample of the study.

The breakdown is as under: For this study 50 teachers and 50 Students were selected randomly from ten departments of University of Karachi. The respondents were selected from ten different departments, they were; Physics, Mathematics, Chemistry, Biology, computer science, commerce, Education, Special Education, sociology and criminology.

Research Instrument

The breakdown is as under: For this study 50 teachers and 50 Students were selected randomly from ten departments of University of Karachi. The respondents were selected from ten different departments, they were; Physics, Mathematics, Chemistry, Biology, computer science, commerce, Education, Special Education, sociology and criminology.

A questionnaire of 30 items was designed by the researcher on the bases likert scale. All the activities, challenges and issues related to online teaching and learning (OTAL) during COVID-19 were covered in this questionnaire.

A questionnaire for OTAL, specially designed for this study was circulated among the respondents both teachers and students. Data collected was converted into tabular forms and tabulated.

Using percentage method, the results were analyzed. The interpretation of each table was given under each table.

The responses were tabulated, analyzed and interpreted by researcher, and presented in tabular form.. The hypotheses were tested through chi square test, and reflected in the study.

Discussion and Analysis

Basic Features of OTAL Impact During COVID-19

The studies shows that Smartphones given their extensive use in Pakistan, because smartphones are the easy available tool for accessing online classes.(Al Lily, A. E., at el.,2020). Different digital platforms have widely been used like Zoom and Microsoft Teams used by teachers to deliver their lectures and for communication with students (Jalil & Manan, 2020). .According to a study by Lloyd, S. A., (2012), most of the students reported that they like to use online device for online classes. This reliance highlights the importance of digital devices in maintaining educational steadiness during disasters.

Moreover, During the COVID-19 pandemic, teachers played a vital role in keeping educational continuity and students' well-being. In Online Teaching and Learning (OTAL) environment, their support became even more important. As stated by Lloyd, S. A., (2012), teachers during OTAL established adaptability by promptly transitioning to online platforms, ensuring nominal interruption to students' formal learning experiences (Dumford, A., 2018).

This study reveals that the majority of the respondents believe that OTAL is convenient than traditional classroom method while less number of respondents disagreed to the OTAL is convenient than classroom method. It shows that most of the learners love to use OTAL due to many reasons.

Emerging Trends of Online Teaching and Learning (OTAL)

During the COVID-19 pandemic, online teaching and learning have undergone significant transformations, reflecting both challenges and opportunities. Several developing trends have designed this prospect:

in the adoption of educational technology platforms during COVID-19, pandemic different modes became essential for facilitating discussions, and conducting assessments, like virtual

classrooms, learning management systems (LMS), and video conferencing tools like Zoom and Google Meet. (Bao, W., 2020).Many hybrid learning models were introduced by the educational institutions for combining online and face-to-face instructions. This approach provides continuity of education during pandemic (Hodges et al., 2020).OTAL platforms allow personalized learning experiences by using algorithms, analytics, and AI-recommendations. Teachers can adapt content presentation as per student needs, encouraging engagement and academic achievement (Zawacki-Richter et al., 2020).

Study in hand shows that by the inspection of the responses it is elaborated that many respondents accepted that the personalized learning gives positive effects of online teaching and learning (OTAL), while as very less number of respondents disagreed by this statement. When respondents asked about the question that Gamification enhances the OTAL. Most of the responses were very positive and they were agreed with this statement. They were also accepted that learning content on mobile platforms is beneficial only few have the clear concept that they were not beneficial.In this study 41% respondents show their intension and they agreed about resolving the conflicts that can be treated easily. Very few respondents disagreed. Mostly respondents believe that solving conflicts within online class groups can become more convenient and straightforward, fostering a optimistic and creative learning environment for all learners. Respondents accepted that during online teaching and learning, facilitating knowledge sharing among students is effortless. Only 18% disagreed the idea. This result shows that by implementing suitable approaches and raising a helpful and cooperative learning environment, facilitating knowledge sharing among students can become effortless and pleasant, elevating the educational experience for everyone.

Perception of Quality in OTAL Framework

Corrections or the students' misunderstandings in online classes can be solved, but it requires many strategic approaches. One effective method is through immediate feedback. Like real-time chat or discussion forums (Coman, C., at el., (2020). When teachers dynamically engage with students during online lectures, they can quickly identify misunderstandings and provide intensification. Moreover, employing interactive activities like quizzes can help comprehension levels and address misunderstandings on time (Means, B., et al., 2019). In teaching and learning process, most effective and common strategies during the online or physical classrooms are the

questions of the learners (Kim, K. J, 2006). Asking the questions is an art. Close interactions and keen observations of the teacher play important role to answer the questions. The use of facilitation strategies are important to create critical thinking. (Besalti, M., & Satici, S. A. 2022). The study indicates that during online classes' questions modification techniques may increase the critical thinking that take place among students.

Research findings show the very important results about students' classroom learning. In the learning process, course design and the curriculum both are very important factors. The role of communication is very important for online classes. Another role is knowledge share to the learners. (Chen, T., at el. 2020). In our study large number of respondents believe during online teaching and learning (OTAL) it is possible that teachers easily address students' problems. Very small number of respondents does not think like this. In another question the researcher want to know the effectiveness of online classes and physical classes in an educational environment is important. Respondents of the study in hand disagreed and said that it is not effective as online classes are more effective than physical classroom. Only 12% agreed for the effective class.

Satisfaction Over OTAL Approaches

According to Ananga, P., & Biney, I. K. (2017) learning experiences have the quality which is an important indicator for student satisfaction. It is very important to investigate student satisfaction in online learning environment. In this new learning setting, students intermingle with their teachers and classmates due to new digital technologies. (Bonk, C. J., & Khoo, E. 2020)
The digital technology tools utilized for OTAL interrupts the quality of the online environment. Students learning Quality of interaction during the OTAL enhance if the quality and degree of the digital technology improved. Students' quality of satisfaction may decrease if the digital technology level is low. Using unreliable digital learning tools or unreliable learning platforms may decrease the quality of confidence of the learner (Appel, C., & Fernández, S. S., 2022).
In this study most of the respondents disagreed with the frequency of 52(52%), while only 12% were strongly agreed in response to the statement that" students are open new ideas in OTAL" which endorse the literature overview. In online environment learner faced different problems to share new ideas. It depends on different factors, including personal character, professional contextual, institutional training, and peer encouragement.

The during online classes the challenges faced by students needs a collective efforts from teachers, supervisors and technology providers. We can make more effective online classes by arranging availability, engagement, and support to students to succeed.

To know about the problems during online classes, question was" I have trouble using the online classes", the most of the respondents were agreed with the researcher statement. During the COVID-19 epidemic for continuity of education played a crucial role. The effective implementation of technical setups for OTAL observed very important. However, challenges such as the digital divide, access to digital devises used for OTAL and internet connections, and capacity building for teachers and students are the main factors for technical setup. It is also very much clear that appropriate technology is very important for OTAL, and majority of the respondents endorse this statement.

Outcomes Towards Effective Teaching

Different research describe the results that the learning outcomes of the students in OTAL may be increase using online learning approaches. These approaches give positive and effective effects. (Khan, M. A., at. el., 2020). In active learning, students participate in these learning sessions by mentally and physically both. These learning strategies give a pleasant environment to the online learner. Using these strategies learning outcomes might be enhanced. These strategies also extend the OTAL process. (Vélez, M., at el.,2020).

Effective utilization of educational technology is critical for optimizing online teaching outcomes. Research by Hodges et al. (2020) underscores the significance of selecting appropriate digital tools and platforms to enhance instructional delivery and student engagement. From multimedia presentations to interactive learning management systems, incorporating relevant technologies can enrich the online learning experience and support achievement of learning objectives. Building a sense of community and support among online learners is instrumental in facilitating positive teaching outcomes (Picciano, 2017). By fostering peer collaboration, providing timely feedback, and offering accessible resources, instructors can nurture a supportive learning environment conducive to academic success and student satisfaction. Research highlights the correlation between strong social presence and improved learning outcomes in online settings, underscoring the importance of interpersonal connections in virtual classrooms.

Study in hand respondents are presenting different level of responses. They are not clear about the question" Do not take online classes seriously". The statistical way shows that the majority of the respondents were agreed with the frequency of 36(36%), while only 14% were strongly disagreed in response to the statement that during OTAL does not take online classes seriously. Due to pandemic crises there was lack of seriousness towards online. It could be attributed to various factors. Here are a few possible reasons: Disruption of routine, technical challenges, lack of accountability, destructions at homes, zoom problems, social isolation, perceived low quality.

During online classes managing group interaction can be quite challenging, especially during the COVID-19 pandemic when most educational activities have shifted to remote settings. Common difficulties and potential strategies to address them: technical issues: lack of engagement difficulty in monitoring, participation distractions, unequal participation, group dynamics, time management, social isolation.

Analysis and Results

1. The first null hypothesis was that the teachers' roles in online teaching have no significant impact on student motivation for learning during COVID-19 at higher education level.

H₀: $f_1=f_2=f_3=f_4=f_5$ **H 1** : $f_1\neq f_2\neq f_3\neq f_4\neq f_5$ **α** = 0.05

Test Statistic: $\chi^2 = \frac{\sum (fo - fe)^2}{Fe}$

The degree of freedom (df) = K – 1 = 5 – 1= 4

Decision Rule: Reject H_0 if computed $\chi^2 \geq 9.49$

Table 1

Computation of χ^2 for testing the H_1

S.N.	Responses of Q. No.3,4,5	f_o	f_e	f_o-f_e	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{fe}$
1	Strongly Agree	63	60	3	9	0.15
2	Agree	170	60	110	12100	201.66
3	Neutral	11	60	-49	2401	40.01
4	Disagree	37	60	-23	529	08.81
5	Strongly disagree	19	60	-41	1681	28.01
	Total	300	300			χ^2=278.67

Referring to table of χ^2 we find that tabulated $\chi^2 = 9.49$ with df = 4 at $\alpha = 0.05$ is smaller than the computed $\chi^2 = 278.67$. Hence, the H_0 is rejected and it is concluded. Teachers' role in online teaching has a significant impact on student motivation for learning during COVID-19 at Higher Education Level.

This implies that the actions, strategies, and engagement of teachers in the online teaching environment play a crucial role in influencing and fostering student motivation amidst the challenges posed by the pandemic. This implies that teachers are not merely content deliverers; they are pivotal in shaping the online learning experience to keep students motivated and engaged despite the numerous obstacles that have emerged due to the shift from traditional to virtual classrooms.

2. The second null hypothesis was that the online teaching approaches have no significant impact on student motivation for learning during COVID-19 at higher education level.

H_0: $f_1=f_2 = f_3 = f_4 = f_5$ $H_1 : f_1 \neq f_2 \neq f_3 \neq f_4 \neq f_5$ $\alpha = 0.05$

Test Statistic: $\chi^2 = \dfrac{\sum (fo - fe)^2}{fe}$

The degree of freedom (df) = K – 1 = 5 – 1= 4

Decision Rule: Reject H_0 if computed $\chi^2 \geq 9.49$

Table 2

Computation of χ^2 for testing the H_2

S.N.	Responses of Q. No.6,7,8	f_o	f_e	f_o-f_e	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{fe}$
1	Strongly Agree	57	60	-3	9	0.15
2	Agree	161	60	101	10201	170.02
3	Neutral	15	60	-45	2025	33.75
4	Disagree	42	60	-18	324	5.40
5	Strongly disagree	25	60	-35	1225	20.42
	Total	300	300			χ^2=229.73

Referring to table of χ^2 we find that tabulated $\chi^2 = 9.49$ with df = 4 at $\alpha = 0.05$ is smaller than the computed $\chi^2 = 229.73$. Hence, the H_0 is rejected and it is concluded that online teaching approaches have a significant impact on student motivation for learning during COVID-19 at

higher education level.

This result suggests that these approaches play a crucial role in fostering and sustaining students' enthusiasm and engagement in learning amidst challenging circumstances such as the global health crisis. This underscores the importance of leveraging effective online pedagogical strategies to support and enhance student motivation, thereby contributing to the overall quality of education delivery during unprecedented times.

3. The third null hypothesis was that student satisfaction for learning has no significant impact on student online engagement during COVID-19 at higher education level.

H_0: $f_1=f_2=f_3=f_4=f_5$ $H_1: f_1 \neq f_2 \neq f_3 \neq f_4 \neq f_5$ $\alpha = 0.05$

Test Statistic: $\chi^2 = \dfrac{\sum (fo - fe)^2}{fe}$

The degree of freedom (df) = K – 1 = 5 – 1= 4

Decision Rule: Reject H_0 if computed $\chi^2 \geq 9.49$

Table 3

Computation of χ^2 for testing the hypothesis No.3

S.N.	Responses of Q. No.19,20,21	f_o	f_e	f_o-f_e	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{fe}$
1	Strongly Agree	73	60	13	169	2.82
2	Agree	145	60	85	7225	120.4167
3	Neutral	06	60	-54	2916	48.6
4	Disagree	48	60	-12	144	2.4
5	Strongly disagree	28	60	-32	1024	17.07
	Total	300	300			χ^2=191.30

Referring to table of χ^2 we find that tabulated $\chi^2 = 9.49$ with df = 4 at $\alpha = 0.05$ is smaller than the computed χ^2 =191.30. Hence, the H_0 is rejected and it is concluded that student satisfaction for learning has a significant impact on student online engagement during COVID-19 at higher education level.

By the testing of the hypothesis, the H_0 is rejected and alternative hypothesis is accepted. Hence, Student satisfaction for learning has a significant impact on student online engagement during COVID-19 at higher education level.

This finding underscores the importance of considering student satisfaction as a contributing factor to online engagement, highlighting its relevance in designing effective online learning environments during times of crisis. This emphasizes the importance of prioritizing and enhancing student satisfaction to foster greater engagement and effectiveness in the online learning environment, especially during times of crisis such as the COVID-19 pandemic.

4. The fourth null hypothesis was that the online learning outcomes have no significant impact on student online engagement during COVID-19 at higher education level.

H_0: $f_1=f_2 = f_3 = f_4 = f_5$ $H_1 : f_1 \neq f_2 \neq f_3 \neq f_4 \neq f_5$ $\alpha = 0.05$

Test Statistic: $\chi^2 = \frac{\sum (fo - fe)^2}{fe}$

The degree of freedom (df) = K – 1 = 5 – 1= 4

Decision Rule: Reject H_0 if computed $\chi^2 \geq 9.49$

Table 4

Computation of χ^2 for testing the H_4

S.N.	Responses of Q. No.26,27,28	f_o	f_e	f_o-f_e	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{fe}$
1	Strongly Agree	49	60	-11	121	2.02
2	Agree	121	60	61	3721	62.02
3	Neutral	04	60	-56	3136	52.27
4	Disagree	89	60	29	841	14.02
5	Strongly disagree	37	60	-23	529	8.82
	Total	300	300			χ^2=139.133

Referring to table of χ^2 we find that tabulated $\chi^2 = 9.49$ with df = 4 at $\alpha = 0.05$ is smaller than the computed χ^2 =139.133. Hence, the H_0 is rejected and it is concluded that online learning outcomes have a significant impact on student online engagement during COVID-19 higher education level.

These findings show that the online learning outcomes do indeed influence student engagement, highlighting the importance of effective online instructional strategies in maintaining student participation and involvement in academic pursuits during challenging times. As educational institutions continue to navigate the complexities of remote learning, these findings emphasize the need for ongoing investment in optimizing online learning experiences to enhance student engagement and overall educational outcomes.

Discussion and conclusion

These findings show that the online learning outcomes do indeed influence student engagement, highlighting the importance of effective online instructional strategies in maintaining student participation and involvement in academic pursuits during challenging times. As educational institutions continue to navigate the complexities of remote learning, these findings emphasize the need for ongoing investment in optimizing online learning experiences to enhance student engagement and overall educational outcomes.

This study has provided valuable comprehensions into the impact of the OTAL during the COVID-19 epidemic. This study highlights the extensive implementation of OTAL as the results of the challenges by the COVID-19 epidemic. With traditional classroom teaching presenting substantial health risks, online settings seemed as a safe and feasible alternative. OTAL allows the continuation of learning without the need for physical interaction. This study also explores the prominence of OTAL perceptions and satisfaction of participants. By examining the experiences and feedback of teachers and students, teachers and administrators can identify strategies for improvement in the implementation of OTAL.

Moreover, the study presented the outcomes of online teaching and learning. It includes academic performance, social interaction and skill acquisition. Teachers can evaluate and assess the effectiveness of the OTAL by achieving its envisioned goals and objectives.Overall, this study contributing understanding of the role OTAL during the COVID-19 epidemic. As educational institutions continue to facing the learning problems, it is important to improve the quality and effectiveness of OTAL.

Recommendations

1. To provide comprehensive technical support to address any issues or challenges students/

teachers may encounter during online learning and teaching

2. Arrangement of training and resources to help students/teachers develop essential digital literacy skills necessary for successful online learning/teaching..

3. Explore alternative assessment methods such as project-based assessments, portfolios, and peer evaluations to provide a more comprehensive evaluation of student learning outcomes

4. Teachers may use various online collaboration tools, discussion forums, and group activities to promote learning process.

5. Hybrid learning blends online and physical classroom teaching, offering flexibility for students and teachers. This approach combines the advantages of online education with in-person engagement, accommodating diverse learning preferences and situations.
6. Utilize multimedia content as well as web resources such as videos, animations, and simulations to enhance teaching learning processes for better understanding and engagement with course materials.

Way Forward

Online learning has introduced a new method of teaching and learning, both nationally and globally. The study has identified several important issues that need to be addressed to achieve optimal results. Future research should focus on developing teaching and learning modules for online education, training teachers and students, and enhancing website development.

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