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**Impact of Online Teaching on Students'
Aptitude Regarding Comprehension and
Cognition Process at Higher Education Level**

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Impact of Online Teaching on Students' Aptitude Regarding Comprehension and Cognition Process at Higher Education Level

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Abstract

Online education can give access to hundreds of qualities, accredited resources and provide a platform to understand individual attributes. In online instructions, there is minimal physical interaction between students and teachers. Because of this, many students don't pay attention to digital tasks and online classroom sessions. On the other hand, online teaching is becoming a feasible instructional strategy at all levels of education. This research purpose is to identify the impact of online teaching on students' comprehension and cognition process at a higher educational level. The survey was conducted by 400 students at different universities in Karachi. A structured questionnaire was created as a research tool for data collection. Descriptive analyses were utilized to find out the results. According to most of the students, they do not take a personal interest in online teaching. Although they have all the facilities, such as having access to safe resources provided by the teachers, easy access to contact the teachers, easy access to the network and device, they still do not give importance to online teaching. Furthermore, it was generally assumed that online teaching does not provide a better understanding of the students. However, this research discovered that online teaching has positive impacts on the students in terms of comprehension and cognition. Students can easily comprehend the knowledge provided by digital resources in online teaching, if some concepts are not clear, they can be searched simultaneously or later, which develops a sense of self-discipline or accountability that supports them in problem-solving. Moreover, it has been observed that different pedagogies or learning technologies should be used to grab the students' attention towards online learning process.

Keywords: Online teaching, Comprehension, Cognition, Higher Education

INTRODUCTION

The use of online education has improved intensely during the foregoing period. In academia, online learning has evolved from a unique experiment to an almost universal teaching tool (Khoso, et al., 2024). Today, more than three-quarters of college heads (77%) say their organization now offers online courses, online learning is going on a right path and becoming a

very famous way of teaching and learning. Due to its popularity, the enrolment has increased in online classes (Parveen, et al., 2020; ul haq, 2019; Ali & Haq 2017). Students enjoyed learning more during online learning and enhance their cognitive thinking and developed their skill faster than traditional method at higher education level and try to take at least one course online (Taylor, Parker, Lenhart & Moore, 2011 & Allen & Seaman, 2010).

Furthermore, according to Fry (2000), online learning is "the transfer of knowledge through networking activity (Naseer, et al., 2024; Shah et al., 2023; Aurangzeb, & Haq, 2012). This information may be collected through internet or e-book through modern technologies. Bellman (2004) stated that online learning is the direct teaching through networking, web connecting or data connecting through mobile phone or laptop. The latest definition of online learning is "the development of Internet and digital technology to create an experience that informs fellow human beings (Shaukat, et al., 2020; ul Haq & ur Rehman, 2017).

Garrison et al. created the framework to examine learner infrastructures and the procedure of knowledge creation using documented online deliberations (Khan, Haq, & Naseer, 2022; Shaukat, Rehman, & ul Haq, 2021). The Practical Inquiry Model (PIM), which incorporates four essential stages of cognitive presence that may be seen in students' online discussion postings, serves as the foundation (Sohail-Rehan, & Ul-Haq, 2018; Haq, 2017; ul Haq, 2012). These four stages are: (1) Triggering—by starting the inquiry process, becoming aware of an issue; (2) Exploration—by gathering pertinent data, reflecting, and exchanging explanations, exploring a problem. (3) Integration: creating context from many sources and proposing a prospective solution; (4) Resolution: putting forward or defending potential solutions with a fresh idea or notion (Imran, Zaidi, & Rehan, 2024).

Rohwer claims that, in 2017 most educators in the globe gave their approval to e-learning strategies. E-learning is the process of delivering educational content both inside and outside of the classroom using information and communication technology, including the internet, CD-ROMs, DVDs, smartphones, and other media (Kai Ruggeri, 2013). According to Seble Frehywot (2013), active learning can be provided online without the constraints of time and place. Topics can be managed through a variety of learning exercises with the aid of e-learning, and the caliber of instruction can be raised (Ahmad, et al., 2024; Mohammad, et al., 2024; Rehan, et al., 2024). Learning management systems, for instance, can encourage students to interact with their surroundings, alter teamwork and communication, and make learning materials more accessible (Esin Ergün, 2020). As a last point, it is clear; the practicality of using e-learning can be evaluated with the help of reading comprehension teaching and learning process. According to the Azhar, Iqbal and Imran (2025) a good understanding of the text requires consistent representation of the text in memory (Machida, 2011). The use of expertise

has made communication and collaboration more convenient and affordable than ever before. In this context, e-learning has been progressively used in the educational atmosphere, especially in the last two periods. From this perspective, it appears that Cooperative Learning Theory (CLT) supports e-learning to increase collaboration between students. In e-learning media, academic literacy theory supports the claim that learning literacy skills with learning management systems can lead to increased student achievement (Fageeh & Mekheimer, 2013). In short, students change their academic writing skills by considerate and practicing communally placed academic knowledge in e-learning situations.

RESEARCH OBJECTIVES

- 1.To examine higher education students' perceptions regarding the impact of online teaching on gender differences.
- 2.To observe students' perceptions regarding the impact of online teaching on students' comprehension at the higher education level.
- 3.To determine students' perceptions about the impact of online teaching on students' cognition level.

HYPOTHESES

- 1.There is no significant difference between male and female students' perceptions about online teaching impact on gender differences at higher education level.
- 2.There is no significant difference between the male and female students' perception about online teaching impact on students' comprehension at higher education level.
- 3.There is no significant difference between the male and female students' perception about online teaching impact on students' cognition at higher education level.

LITERATURE REVIEW

Humid & Lytras, 2002 described that online education is a web-based strategy that associates multimedia with courseware. With the help of the technology the person can understand and easily use devices in a wide range (Azhar & Imran, 2024; Shah, et al., 2025; Imran, et al., 2023). A considerable important point of research has provided useful perceptions into providing better knowledge through online and will be able to do better work with the help of cognitive development. It is very interesting to know that some very famous researchers and educators have pointed out that online learning is real base learning. The learner does involve themselves in online learning and get knowledge through real experience of the life and moldings themselves for future life in ground and try their best to solve problems (Guo et al. 2021; Kilis & Yildirim, 2019; Sadaf, Kim, & Wang, 2021; Sadaf & Olesova, 2017).

Amemado & Manca, 2017 described that the learner and educators can develop their own intended online topics and send it to other learners for further research in online learning. It

can experience and develop helpful social networks. Likewise, Darabi et al. (2011) described that the old method / approach of questions & answers session strategies are also gives good sense for raising questions that focus on proceeding the discussion towards for finding a solution and to facilitate cognitive presence.

According to Sadaf et al., 2021, the real knowledge gained for helping of profounder cognitive appointment of online students is very important to understand the impact of cognitive occurrence on real learning consequences. Most of the researchers tried to focus on learning more within given time. They faced many problems during online processes. (Zhang, & Franklin, 2013; Hew & Cheung, 2014; Nandi, Hamilton, & Harland, 2012). Moreover, they described that the expensive courses are out of range of students as well as facilitators can't manage time and classes on low-income schedule. In the online process, cognitive development and presence of mind is very important. Learners will have to be attentive through discussion methods and activities base instructions.

The practical work and inquiry method will play a better role in the presence of Cognitive activities. Online learning helps in understanding the important topics and make sure to integrate teaching style for explained the different subjects and topics practically. The critical thinking literature (Garrison et al., 1999; 2001) acts as the foundation for cognitive presence. (Garrison, 2007; Gibson et al., 2012). Online courses are particularly relevant because they stress the value of the virtual community that has been established. (Abe, 2020; Fiock, 2020). While students' live indications of understanding, such as their body language and facial expressions, can be seen during lectures, it can be more interesting to prove that they are paying attention online. (Moore, 2016).

Assessment of cognitive capacity is one of the most important aspects of the learning process. All tasks, be they very simple or highly difficult, require cognitive abilities, which rely on the functionality of the brain. They put a lot of effort into learning, recalling, and solving problems, as well as paying attention (Plomin, 1999). Cognitive abilities are viewed as the driving force behind goal-oriented learning, positively affecting academic success (Winne & Nesbit, 2010). Teachers are presumed to know their students' cognition since the teacher style of teaching and feedback are the main sources for the students to know how to develop their cognition practices. Consequently, less exposure to disadvantageous information (negative information) is a must because quick judgements and judgements should drive the growth of cognitive processes. To this end, teachers must make a particular effort to monitor their students' cognitive abilities as they mature, as these abilities can vary from pupil to pupil. It is important to focus on student involvement in online learning (Chiu, 2022). According to Giusti et al., 2021, students' emotional and behavioral requirements play a vital role in online learning.

There are so many methods and strategies that are very important in online learning like discussion methods play a vital role in development of critical thinking and its very from learner to learner. There must be a learning environment with the help of educators and family. The collaboration of students and teachers is better for discovering the new opportunities in online process, (Garrison, Anderson, & Archer, 2001; Jeong, 2001; Angeli & Bonk, 2003). Critical thinking is explained as the learner think actively and by using their skills apply it on real life experiences after that assess how much it gives good results then generalize it on others' real life. Then observed carefully and make it sure to find reasons then try to give better reflection on reasoning based on evaluation, (Paul & Elder, 2001). These processes will develop their critical thinking as well as other skills.

Duffy, Dueber, & Hawley (1998) suggested that the learner centered online process is good in new era. With the help of these processes, they will be able to solve puzzles, riddles and analytical reasoning questions in an easy way and quickly. Garrison, Anderson, and Archer (2000) created a "community of inquiry" model that offers a theoretical outline to study learning in online settings and places critical thinking in the special reference of collective work. Critical thinking is typically described as an individual cognitive process.

This model focused on the mental presence of the learner. If the learners show their physical and mental presences in the learning process, they can get better outcomes in cognitive development and perform in a broad sense. They will connect their work with others' works in a critical style of inquiry method, (Garris on et al., 2001).

In online process the cognitive development is a core part for achieving their goals and perceived an integrated learning for future research and implication a broad sense in learning, (Haavind, & Tinker, 2000; Richardson & Swan, 2003). There must be guidelines for blended learning to achieve the best results for facilitating online learning.

Multiple facilitation techniques to encourage critical thinking in online environments were discovered by Collison et al. in 2000. These approaches specify that organizers should encourage cognitive presence in two ways: in the first way, the facilitator applies different techniques to help learners in explaining their ideas. The facilitator helps learners in the second stage by explaining more comprehensive debates on the shared ground, which helps learners to deepen their ideas and negotiation. In this situation, the facilitator serves as a mentor and experienced learner rather than a subject matter expert.

RESEARCH METHODOLOGY

This research is quantitative in nature, involves survey-based design. A questionnaire was used as a tool to collect information from a sample of individuals through their responses to questions.

POPULATION AND SAMPLING

The sampling technique of this study is convenient. All the students at public sector universities of Karachi are the population of this research. Students at the two public sector Universities of Karachi were the samples of this research study. The survey was conducted with 400 students as a sample. Four hundred students at above-mentioned universities of Karachi participated in this survey.

RESEARCH INSTRUMENT

Survey research design is the most suitable one for quantitative research to acquire the opinion of commonalities on a topic of general interest (Hoddinott, 1986). This research was conducted by using a structured questionnaire using Five Point Likert scale. Basic demographic information was collected initially and then the questionnaire was divided into three parts separately to identify the impact of online teaching on students' comprehension and cognition process.

DATA COLLECTION AND ANALYSIS

Data collection has been done through questionnaire. The survey was conducted from 400 respondents to compile the statistical analysis. One useful piece of software, SPSS version 22, was used in this study for data analysis.

STATISTICAL PROCEDURE

Descriptive analysis of the basic characteristics of the population was taken and then the mean and standard deviation of the responses of the audience for all questions related to the impact of online teaching on students' comprehension and cognition level have been described and shared separately and then the overall result has been explained at the end of the research. The Major Hypotheses were tested by Independent Sample t-test through SPSS.

DEMOGRAPHIC INFORMATION:

TABLE 1

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	148	3.2041	.91174	
Female	252	3.0865	.86728	.05463

INTERPRETATION

The table # 1 labeled Samples Statistic describes descriptive statistics for both, male and female (400) students of public and private universities of Karachi.

DATA ANALYSIS

H1. There is no significant difference between male and female students' perceptions about online teaching impact on gender differences at higher education level.

INDEPENDENT SAMPLE T TEST

TABLE: 2

	Mean Difference	Std. Error Difference	Computed value of t	Df	Tabulated value of t
Online teaching has an impact on gender	.11755	.09154	1.284	398	1.9768

INTERPRETATION: It is referred to using t-test analysis with degree of freedom (df) = 398 and = 0.05. The calculated value of t = 1.284 is less than the tabulated value of t = 1.9768. It is stated that there is no significant difference between male and female students' perceptions about online Teaching has impact on gender at higher education level.

H₂: There is no significant difference between the male and female students' perception about online teaching impact on students' comprehension at higher education level.

INDEPENDENT SAMPLE T TEST

TABLE: 3

	Mean Difference	Std. Error Difference	Computed value of t	Df	Tabulated value of t
Online teaching has an impact on students' comprehension	-.04399	.08625	.510	398	1.9768

INTERPRETATION: It is referred to using t-test analysis with degree of freedom (df) = 398 and = 0.05. The computed value of t = 510 is less than the tabulated value t = 1.9768. The alternative hypothesis is therefore rejected, and it is discovered that there is no discernible difference between the perceptions of all students regarding the influence of online teaching on students' comprehension at the higher education level.

H₃: There is no significant difference between the male and female students' perception about online teaching impact on students' cognition at higher education level.

INDEPENDENT SAMPLE T TEST

TABLE: 4

	Mean Difference	Std. Error Difference	Computed value of t	Df	Tabulated value of t
Online teaching has an impact on students' cognition	-.13889	.08602	1.615	398	1.9768

INTERPRETATION: It is referred to using t-test analysis with degree of freedom (df) = 398 and = 0.05. The calculated value of $t = 1.615$ is less than the tabulated value of $t = 1.9768$. The alternative hypothesis is rejected, and it is discovered that there is no discernible difference between the perceptions of (male and female) students regarding the influence of online instruction on students' cognitive abilities at the higher education level.

FINDINGS

1. The null hypothesis no 1 is accepted, and it is found that male and female students' perceptions on how gender affects online teaching at the higher education level are not noticeably different.
2. The null hypothesis no 2 is accepted, and it is found that male and female students' perceptions on the impact of online teaching on students' comprehension at the higher education level are identical.
3. The null hypothesis no 3 is accepted, and it is found that male and female students' perceptions on the impact of online instructions on students' cognitive skills at the higher education level are not significantly different.

CONCLUSION

This research supported the understanding level of students regarding online teaching and learning. The main purpose of the study was to identify the students' perspective towards the impact of online teaching on students' comprehension and cognition level. This research was carried out by using questionnaires as the instrument of study, 400 students shared their opinion about liking or taking interest in online teaching. Furthermore, most of the students do not like online teaching, however majority students shared that the effects of online teaching are rather positive than negative. In conclusion, this research reveals that online education is efficient and has favorable effects, but new pedagogies or learning technologies should be employed to engage students because it also affects their capacity to communicate with instructors and ask questions for fast assistance. Second, avoid taking long online classes in a single day because they become dreary and students will easily lose their interest because most of the online classes are PowerPoint based, and nobody wants to listen 40-50 slides explanation in a row or simple teachers' lecture are delivered in audio. Furthermore, it has been observed through this research that students are capable of reasoning and understanding the online resources and content so utilize their abilities during online classes in a creative way. Try to involve the students as much as possible during online classes.

RECOMMENDATIONS

1. It is recommended that since gender isn't a key differentiator, there is also other factors that might influence students' perceptions and experiences in online learning.

2. Given the horror of the online experience, it is suggested that higher education teachers and institutions acknowledge the power of the online teaching. Pedagogically, this allows for online learning environments to be created with all students' needs in mind with no specific gender.
3. It is recommended that in future research it should be examined that what kind of effect of online instruction can promote students' cognitive skills in higher education contexts. It should consider other factors in addition to the gender of male and female students, as they do not show significantly different perceptions.

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