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Virtual Learning Environments and Gendered Spaces in Higher Education in Pakistan: A Quantitative Approach

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Abstract: This paper aims to examine gender spaces in virtual learning environments in higher education in Pakistan. The evolution of gender spaces in higher learning has changed over time, expressing larger shifts in society. Historically, women were either excluded from or only enabled to pursue certain limited fields of study in colleges and universities, and early institutions were frequently male-dominated. A quantitative study has been conducted, and a sample of 316 students enrolled in the BS (4 Years) social sciences program in a public sector university has been selected. A cross-sectional study has been conducted, and a structured questionnaire has been used, consisting of different sections including socio-demographic, gender spaces, and virtual learning environment. Pilot testing has been done on 30 random students, and an attitudinal scale of (dis)agreement has been used. The Structural Equation Modelling (SEM) technique has been applied to measure the effects of the model. The study analysis pointed out that gender spaces, public spaces, private spaces, and gender-neutral spaces had positively affected the virtual learning environment. Further, the primary data concluded that, conditionally, web-based platforms and assessment methods had positively favourable effects on the virtual learning environment. However, the study analysis pointed out that online assessment also had positive effects on the virtual learning environment among students at tertiary levels.

Key Words: Gender Space, Public Space, Higher Education, Gender Dynamics, University

Introduction

The evolution of gender spaces in higher learning has changed over time, expressing larger shifts in society (Shoaib & Zaman, 2025). Historically, women were either excluded from or only enabled to pursue certain limited fields of study in colleges and universities, and early institutions were frequently male-dominated (Parker, 2015). As feminism acquired momentum, particularly in the 1960s and 1970s, women started campaigning for equal opportunities, which resulted in more inclusive spaces (Mayo & Stengel, 2010). Today, gender environments in higher education have grown to embrace not only women but also a wider range of groups including non-binary and trans students (Mckendry & Lawrence, 2020). However, virtual learning, known as online learning or e-learning, refers to the use of digital technologies to deliver educational content and facilitate the learning experience remotely (Shoaib et al., 2021; Shoaib et al., 2024; Bri et al., 2009). This type of learning began in the 1960s with the creation of initial technological devices and educational systems. More advanced systems were created in the 1980s and 1990s as a result of developments in desktop computers and the Internet (Shoaib & Ullah, 2019; Clarke, 2013). A major turning point was the introduction of learning management systems in the late 1990s, which included Blackboard before and Moodle. These systems offered complete course management and web-based learning opportunities (Shoaib & Ullah, 2021b; Li et al., 2024). In addition, expansion of capacity was made possible in the 2000s and later by the development of internet connectivity, online computing, and mobile technologies. Today, virtual learning continues to evolve with advancements in artificial intelligence, and virtual reality (Shoaib et al., 2021; Shoaib et al., 2021; Botero-Gómez et al., 2023).

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Famous computer scientist David Clark is well-known for his contributions to network protocols and the creation of the Internet. He has significantly influenced the conceptual framework of the Internet as well as the creation and development of the Transmission Control Protocol (TCP) (Shoaib & Ullah, 2021a; Clark et al., 1989). Clark's contributions to the Internet's end-to-end principle, which emphasizes that some operations are to be carried out at a network terminal rather than in its middle nodes are also well-known (Clark et al., 2023). During the pandemic, the remote education system developed rapidly and changed the physical settings into online forums (Shoaib et al., 2025). Virtual learning environments have a long history that begins with the earliest computer-based learning periods. As internet usage increased in the 1990s, organizations began experimenting with virtual education environments to enhance traditional classroom instruction (Trafford & Shirota, 2011). In the years that followed, this resulted in the creation of progressively sophisticated virtual learning settings that included methods of communication, evaluation, and course delivery (Abuhassna et al., 2020). Video conferencing, cooperative areas, and mobile access are just a few of the advanced features that virtual learning environments have added throughout time to make learning more versatile and affordable (Shoaib et al., 2025). Digital systems like online assessment methods, audio/video materials, web-based platforms, and digital aspects of courses all give a flexible schedule to students. On the other hand, students face connectivity, internet problems, harassment issues, and cost issues as well (Seeletso & Letseka, 2020). Virtual learning environments have evolved into an important part of learning at the tertiary level by offering students accessible and adaptable platforms. As these environments become more popular, it is essential to investigate how gender dynamics are affected and how gender spaces are created in these digital spaces (Shoaib et al., 2025). Hence, this paper aims to study gender spaces in virtual learning environments in higher education in Pakistan.

Review of Literature

The study findings outlined a particular focus on courses during the COVID-19 pandemic. This study investigated how social presence improves online learning environments (Shoaib, 2021). It offered proof of how fostering social presence, such as conversation and involvement, raises the standard of online learning settings (Kurbakova et al., 2020). However, the study findings examined that goals and equity in tertiary educational level and gender had been found at a South African university (Walker, 2018). Besides, the argument of the study revealed that creating the status of gender and creating changes in authority, inequity, or organizational development at a Canadian university had been found in gender spaces (Shoaib et al., 2025; Gender, 2002). Further, the study of Cheryan et al (2011) asserted that classrooms are essential and that gender differences in computer science courses at higher levels are influenced by the structure of online learning environments. In a nutshell, the study findings showed that racism and gender as conflicting disparities in UK higher education institutions had been found among male and female students (Shoaib, 2023a; Bhopal & Henderson, 2021). Contently, the study of Ausburn et al. (2009) indicated that a comparative examination of gender-related concerns in the computer virtual world in educational institutions at the tertiary level also found digital aspects of sources. Nonetheless, the study findings concluded that the development of online education and emerging new patterns at higher educational institutions create spaces among male and female students (Shoaib, 2023b; Bezovski & Poorani, 2016).

The study findings outlined how electronic devices affected students' achievements at the tertiary level, providing examples of social media devices and virtual learning environments (Shoaib et al., 2025; Lacka & Wong, 2021). Moreover, the study findings examined the educational performance of male and female students in virtual environments at the tertiary level in Punjab, Pakistan, and also found gender spaces (Shoaib & Ullah, 2019). Besides, the argument of the study revealed that the masculine society considered male traits rather than female and had found gender spaces among students at higher levels (Shoaib et al., 2025; Stets & Burke, 2000). Further, the study of Bhandari (2023) asserted that the analysis of feminist movements is that these movements bring many changes in all aspects of society and have found gender equality in virtual learning. In a nutshell, the study findings showed that the four feminist waves are a gift for humankind as an entire nation because females get rights in many aspects of social settings, being found in gender inclusivity in digital education (Shoaib, 2025; Mohajan, 2022). Contently, the study of Abu-Rabia-

Queder and Arar (2011) indicated that the tertiary educational attainment and gender in diverse national settings are Palestinian women enrolled at Israeli and Jordanian institutions. Nonetheless, the study findings concluded that in Pakistan, higher learning institutions explored the gender spaces among male and female students in virtual learning environments (Shoaib, 2025; Batool et al., 2013).

The argument of the study asserted that examining and interrogating educational identity in higher education through a queer perspective found gender inclusivity at the tertiary level (Shoaib, 2024c; Maritz & Prinsloo, 2015). However, the study findings outlined that evaluating gender inequalities in satisfaction with learning within educational institutions also found gender spaces in online classes at higher levels (Shoaib, 2024b; Marques et al., 2024). Nonetheless, the study of Martínez Cartas (2012) asserted that higher education students used an improved virtual learning environment and found gender-neutral spaces in virtual learning environments. Moreover, the study findings showed that the impact of gender on the engagement of students with virtual universities was found at a higher level (Shoaib, 2024a; Martínez-Romera et al., 2021). Contently, the study findings concluded that assessment of education within a video game online setting had been found in higher educational institutions (Shoaib, 2023a; Mayer et al., 2013). Besides, the study of McGuire et al. (2022) indicated that gender-segregated restrooms affect transgender people's justice, security, and medical conditions in virtual learning education at the tertiary level. However, the study findings examined whether the public and private separation is more clear in our society or whether eliminating it had been found during the study of public/private settings (McOmber, 2001).

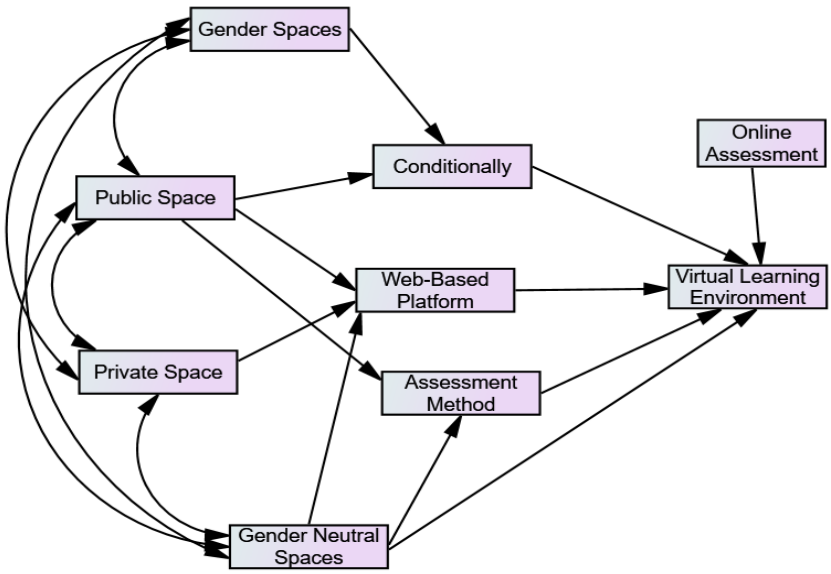
The argument of the study asserted that an overview of the postgraduate and further education in Scotland based on gender spaces had been found in higher-level universities (McTavish & Thomson, 2007). However, the study findings outlined that the development of online networks by young students as secure places based on their identities, movement, and participation found in the virtual learning environment at the tertiary level (Miño-Puigcercós et al., 2019). Nonetheless, the study by Misiaszek (2017) asserted that at a higher level, online education explored masculinities and ideologies that had been found in remote learning at a higher level. Moreover, the study findings showed that the use of videos during virtual learning time has turned into profound learning and also found the application of audio materials to facilitate advanced learning (Mitra et al., 2010). Contently, the study findings concluded that putting sexual orientation back into the forefront of postgraduate learning, professional opinions had been found in a case analysis from the United Kingdom (Morris et al., 2022). Besides, the study of Naimi-Akbar et al. (2024) indicated that the problem of imposed adjustments regarding student involvement in virtual learning settings had been found in higher institutions. However, the study findings examined the effects of the COVID-19 lockdown on universities in Africa's zone (Nyashanu et al., 2023).

Theoretical Framework

Gender interactions with digital educational spaces were better understood by applying gender space theory to virtual learning environments (Beebe et al., 2017). This evaluation could help in the establishment of virtual learning methods and policies that are more fair, accessible, and effective, helping all students. The gendered space theory is linked with the researcher's work, in which the researcher examined to find gender spaces in virtual learning among students at the tertiary level. Evaluated that the learning is affected due to gender spaces. The researcher explored the areas of the gendered space and found how these spaces ruin the students' academic performance, interactions, and behaviours. These spaces created discrimination among both genders (male and female). The researcher examined how gender spaces in virtual learning environments develop inferiority among female students. For instance, after ending the lecture, the male students ask any questions freely on mobile phones, or via WhatsApp with their male teachers, but on the other hand, females feel insecure about asking any queries related to lectures. Males have access to visit male teachers' offices alone, but females have fewer spaces to visit alone. Hence, the following conceptual framework has been developed on gender spaces in virtual learning environments in higher education.

Figure 1

Conceptual Framework of the Model



The Data and Methods

A quantitative study has been conducted, and a sample of 316 students enrolled in the BS (4 Years) social sciences program in a public sector university has been selected. A cross-sectional study has been conducted, and a structured questionnaire has been used, consisting of different sections including socio-demographic, gender spaces, and virtual learning environment. Pilot testing has been done on 30 random students, and an attitudinal scale of (dis)agreement has been used. The Structural Equation Modelling (SEM) technique has been applied to measure the effects of the model. In the model, there are four independent variables (including gender spaces, public spaces, private spaces, and gender-neutral spaces), three path variables (including conditionally, web-based platform, and assessment method), one intervening variable (online assessment), and one dependent variable (including virtual learning environment). The scale has been pretested and the results are as follows;

Table 1

Reliability Test

Variable	Code	Items	Alpha value
Conditionally	COND	7	.716
Public Space	PUSP	7	.705
Private Space	PRSP	7	.714
Gender Neutral Spaces	GENS	7	.723
Gender Spaces	GESP	7	.815
Online Assessment	ONAS	7	.706
Web-Based Platform	WEBP	7	.711
Assessment Method	ASME	7	.717
Virtual Learning Environment	VILE	7	.863
Overall		63	.972

Results and Discussion

The data showed that 33.5 percent of students are from from 19 age group. Similarly, 37.4 percent of students are from the 20-21 age group. 22.5 percent of students are from the 22-23 age group. However, 5.1 percent of students are from the 24-25 age group. 1.5 percent of students are from the 26 and above age group. Similarly, the data analysis showed that the gender of 19.3 percent of students were male and the remaining 80.7 percent of students were

female. However, the data analysis pointed out that the family occupation of the students is labor with the highest percentage of 28.2. Similarly, the government job holders with a medium percentage of 18.3, and the last one with the lowest percentage of 11.4 is private.

Table 2

Direct Effects of the Model

Variables			Standardized Regression Weights	Estimate	S.E.	C.R.	P
PUSP	--->	WEBP	.273	.356	.069	5.162	***
PUSP	--->	ASME	.241	.234	.052	4.490	***
PUSP	--->	COND	.106	.107	.058	1.851	.064
PRSP	--->	WEBP	.097	.130	.068	1.912	.056
GESP	--->	COND	.218	.232	.061	3.828	***
GENS	--->	WEBP	.313	.433	.072	6.047	***
GENS	--->	ASME	.302	.310	.055	5.612	***
ONAS	--->	VILE	.417	1.467	.086	17.081	***
ASME	--->	VILE	.360	1.172	.086	13.567	***
COND	--->	VILE	.059	.184	.076	2.421	.015
WEBP	--->	VILE	.590	1.428	.066	21.788	***
GENS	--->	VILE	.062	.208	.096	2.174	.030
Covariances							
GESP	<-->	GENS		2.510	.757	3.315	***
PUSP	<-->	GESP		4.321	.826	5.232	***
PUSP	<-->	PRSP		4.002	.832	4.810	***
PRSP	<-->	GENS		2.610	.769	3.393	***
PRSP	<-->	GESP		3.116	.786	3.964	***
PUSP	<-->	GENS		4.804	.823	5.836	***
Variances							
PUSP				14.636	1.166	12.550	***
PRSP				13.805	1.100	12.550	***
GESP				13.401	1.068	12.550	***
GENS				13.007	1.036	12.550	***
e1				13.982	1.114	12.550	***
e3				10.992	.876	12.550	***
e2				18.210	1.451	12.550	***
ONAS				11.745	.936	12.550	***
e4				27.303	2.176	12.550	***

Model Fit Summary: IFI=.972, CFI=.936, NFI=.982, AGFI=.917, RMSEA=.073, Chi-square = 284.371, df = 18, Probability level = .000

Hypothesis 1: *Public Space, Private Space, and Gender-Neutral Spaces had Direct Effects on Web-Based Platforms.*

Table 2 pointed out that had direct positive effects on public space (β = .273), private space (β = .097), and gender-neutral spaces (β = .313) on web-based platforms. The argument of the study asserted that the grading system and anonymity fairness and equity had been found gender neutral spaces in virtual learning environments at higher institutions (Zipf, 2024). However, the study findings outlined that in remote learning the negotiations are analyzed between students and also had been found in private spaces in the higher educational organizations (Biesenbach-Lucas & Weasenforth, 2002). Nonetheless, the argument based on the study findings revealed that in the virtual learning classes, gender is negotiated by the opposite gender at the university level, and also had been found gender negotiation and contrasting issues at a higher level (D'Agostino et al., 2020). Contently, the study findings concluded and linked with

the assumption that the students faced challenges and problems in virtual learning classes while they negotiated the things related to teachers had been found during remote learning at the tertiary level (Fuchs, 2016). The empirical evidence based on the study findings highlighted that views of students regarding semester-long classes are effective applications of using Google in a higher education lecture had been found through online learning (Hagge, 2021).

Hypothesis 2: *Public Space and Gender-Neutral Spaces had Direct Effects on the Assessment Method.*

Table 2 portrayed that had direct significant effects of public space ($\beta = .241$), and gender-neutral spaces ($\beta = .302$) on assessment methods. The argument of the study asserted that providing new participants with digital classroom monitoring programs at the tertiary level had been found gender-neutral places during online assessment methods (Juarez & Critchfield, 2021). However, the study findings outlined that the design of the virtual classrooms is inspired by the physical classrooms also been found gender neutral spaces in web education at higher level (Nicholls & Philip, 2012). Nonetheless, the argument based on the study findings revealed that during COVID-19 the teachers' perspective on the virtual learning classroom and also on distance instruction had been found in gender spaces at the tertiary level (Radwan et al., 2022). Contently, the study findings concluded and linked with the assumption that during COVID-19 the engagement and focus of students in virtual learning environments had been found to gender inclusivity at a higher level (Chiu, 2023). The empirical evidence based on the study findings highlighted that integrated virtual class learning outcomes and effective teaching techniques had been found gender neutral spaces at higher institutions (Heilporn et al., 2024).

Hypothesis 3: *Public Space and Gender Spaces had Direct Effects on Conditionally.*

Table 2 described that had direct significant effects of public space ($\beta = .106$), and gender spaces ($\beta = .218$) on conditionally. The argument of the study asserted that digital learning affected the student's self-regulated education at the tertiary level and also had web-based platforms for learning easier at higher level (Hensley et al., 2022). However, the study findings outlined that throughout COVID-19 instructional methods and students' opinions had been found in gender spaces completely in flipped education (Ma & Luo, 2022). Nonetheless, the argument based on the study findings revealed that views and perspectives of university learners on instructor caring in the context of distance education had been found in conditions during online classes (Tang et al., 2024). Contently, the study findings concluded and linked with the assumption that the benefits of a peer-reviewed worked-out virtual educational settings on students' ability to write arguments and obtain specialized knowledge had been found in previous studies related to gender spaces in virtual learning (Valero Haro et al., 2019). The empirical evidence based on the study findings highlighted that an analysis of the differences between male and female instructors who engage in sexual assault with their students had been found in gender discrimination in virtual classes (Christensen & Darling, 2020).

Hypothesis 4: *Online Assessment and Assessment Methods had Direct Effects on the Virtual Learning Environment.*

The data analysis shown in Table 2 illustrated that had direct favorable effects of online assessment ($\beta = .417$), and assessment method ($\beta = .360$) on the virtual learning environment. The argument of the study asserted that an examination into the first perceptions and expectations of instructors among male and female pupils had been found in gender spaces in assessment methods (Batten et al., 2013). However, the study findings outlined that violent harassment threats and sexual orientation identity standard enforcement in male and female participants had been found to have gender differences at higher institutions (Depraetere et al., 2021). Nonetheless, the argument based on the study findings revealed that women's and men's differing opinions on family and career had been found in gender spaces among higher educational learners (Kaufman, 1999). Contently, the study findings concluded and linked with the assumption that distinguishing between the observed gender identity of students had been found at the university level (Plante et al., 2009). As the empirical evidence based on the study findings highlighted that is the settings used for assessments gendered a study examining how male and female learners perform in various evaluation settings and also had been found gender-neutral spaces in remote learning (Turner & Gibbs, 2010).

Hypothesis 5: *Conditionally, Web-Based Platforms and Gender-Neutral Spaces had Direct Effects on the Virtual Learning Environment.*

Table 2 represented that had direct positive effects of conditional (β = .059), web-based platforms (β = .590), and gender-neutral spaces (β = .062) in the virtual learning environment. The argument of the study asserted that the graduate male and female students faced different experiences and also found gender inclusivity during virtual education at the tertiary level (Brownson et al., 2011). However, the study findings outlined that university students during the COVID-19 pandemic felt anxiety and durability it's a multi-group comparison of online and offline participation among both gender students (Chu & Rose-Ackley, 2023). Nonetheless, the argument based on the study findings revealed that making use of students' participation level to build managerial online courses and also been found inclusive learning at the university level (Das & Bhuwandeep, 2022). Contently, the study findings concluded and linked with the assumption that students' performance level differences in online and physical education had been found during digital learning at higher educational organizations (Dendir, 2019). The empirical evidence based on the study findings highlighted that students' married life and gender affected how they managed stress and also found gender spaces in virtual education at the tertiary level (Ermasova et al., 2022).

Figure 2

Model Fit Diagram

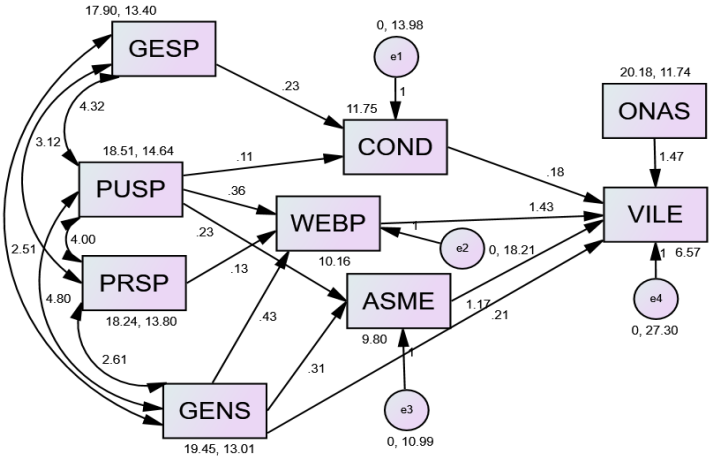


Table 3

Indirect Effects of the Model

Indirect Path	Unstandardized Estimate	Lower	Upper	P-Value	Standardized Estimate
GENS --> ASME --> VILE	0.363	0.229	0.519	0.001	0.109***
GENS --> WEBP --> VILE	0.618	0.413	0.837	0.001	0.185**
GESP --> COND --> VILE	0.043	0.012	0.095	0.016	0.013*
PRSP --> WEBP --> VILE	0.185	0.005	0.388	0.093	0.057†
PUSP --> COND --> VILE	0.020	0.001	0.061	0.074	0.006†
PUSP --> ASME --> VILE	0.274	0.151	0.405	0.001	0.087***
PUSP --> WEBP --> VILE	0.508	0.286	0.720	0.002	0.161**

Hypothesis 6: *Gender Neutral Spaces and Public Space had an Indirect Effect on Virtual Learning Environment Through The Mediation of Assessment Method.*

The outcomes of model 2 represented that there is an indirect significant effect of gender-neutral spaces (β = 0.363), and public space (β = 0.274) on virtual learning environment through the mediation of the assessment method. The argument of the study asserted that comparing virtual and within-the-classroom methods for assessing high and bottom achievement attributes of the students had been found during online assessment methods at the tertiary level (Fendler

et al.2016). However, the study findings outlined that in digital education social and cultural hurdles had been found for female learners struggling to survive at the university level (Foli, 2022). Nonetheless, the argument based on the study findings revealed that disparities between genders had been found in the impact of absence on healthcare learning (Hakami, 2021). Contently, the study findings concluded and linked with the assumption that assignments utilizing the internet boost female students' confidence found in the use of digital aspects of sources in web learning (Kalaf-Hughes & Cravens, 2021). The empirical evidence based on the study findings highlighted that student-estimated performance advantages of using software had been found in predictable and web-based courses (Kuyatt & Baker, 2014).

Hypothesis 7: *Gender-Neutral Spaces, Private Spaces, and Public Spaces had an Indirect Effect on The Virtual Learning Environment Through The Mediation of A Web-Based Platform.*

The outcomes of model 2 represented that there is an indirect significant effect of gender-neutral spaces ($\beta = 0.618$), private space ($\beta = 0.185$), and public space ($\beta = 0.508$) on the virtual learning environment through the mediation of web-based platform. The argument of the study asserted that the impact of isolation and digital dependency on behavioral obsession had been found in learners as well as gender differences at higher levels (Lawal & Idemudia, 2018). However, the study findings outlined that the impact of COVID-19 on academic plans for learners had been found in businesses switching to online education (Liao et al., 2023). Nonetheless, the argument based on the study findings revealed that gender affected learners' digital academic performance and peer review and knowledge education and also found gender spaces in online education at the tertiary level (Noroozi et al., 2020). Contently, the study findings concluded and linked with the assumption that the success of students in online and physical education was found ineffective in virtual learning platforms (Reuter, 2009). The empirical evidence based on the study findings highlighted that the effects of internet technology satisfaction and application encouraged students' performance and also found gender-neutral spaces in web-based learning methods at higher levels (Akhter, 2015).

Hypothesis 8: *Gender Spaces and Public Space had an Indirect Effect on The Virtual Learning Environment Through The Mediation of Conditionally.*

The results of model 2 represented that there is an indirect favorable effect of gender spaces ($\beta = 0.043$), and public space ($\beta = 0.020$) on the virtual learning environment through the mediation of conditionally. The argument of the study asserted that accessibility and constrained disconnected navigating had been found online across the global spectrum (Aouragh, 2017). However, the study findings outlined that the impact of online education on the behavior of students had been found in gender differences at higher organizations (Anduiza et al., 2010). Nonetheless, the argument based on the study findings revealed that five types of web users' online conduct and addition in society had been found in web-based platforms for learning at the tertiary level (Borg & Smith, 2018). Contently, the study findings concluded and linked with the assumption that making progress in the digital age a long-term examination had been found of how usage of the internet and economic accessibility are related (Eynon et al., 2018). The empirical evidence based on the study findings highlighted that problems and inspiration for remote instruction centered on security and confidentiality problems and also harassment issues at the tertiary level (Kim, 2023).

Conclusion

The study analysis concluded that gender spaces, public spaces, private spaces, and gender-neutral spaces had positively affected the virtual learning environment. Further, the primary data concluded that conditionally, web-based platforms and assessment methods had positively favorable effects on the virtual learning environment. However, the study analysis pointed out that online assessment had also positive effects on the virtual learning environment among students at tertiary levels. The evolution of gender spaces in higher learning has changed over time expressing larger shifts in society. Historically women were either excluded from or only enabled to pursue certain limited fields of study in colleges and universities and early institutions were frequently male-dominated. The overall conclusion of the study indicated that gender spaces have been linked with virtual learning environments among students in higher education in Pakistan.

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