

Learning Agency and Empowerment in Digital Learning Environments: A Study of Collaborative Knowledge Construction in Pakistani Higher Education

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Abstract

This study examines learning agency and empowerment in digital learning environments and their role in fostering collaborative knowledge construction among female students in Pakistani higher education institutions. The increasing integration of digital technologies in academic settings has redefined teaching and learning processes by promoting learner-centered pedagogies that emphasize autonomy, interaction, and shared knowledge creation. The study employed a quantitative research design, using a cross-sectional survey method. A sample of 198 female students enrolled in BS (4 Years) programs in a public sector university was selected through proportionate random sampling. Data were collected using a structured questionnaire based on an attitudinal scale of agreement and disagreement. The reliability of the instrument was ensured through pilot testing, with Cronbach's Alpha values ranging from .719 to .842. Descriptive statistical techniques, including frequency distribution and percentages, were applied for data analysis. Findings indicate that digital learning environments significantly enhance students' learning agency by enabling autonomy, active participation, and self-regulated learning. Furthermore, empowerment through digital tools encourages collaborative knowledge construction by facilitating peer interaction, group engagement, and shared problem-solving. The study concludes that effective integration of digital learning practices strengthens academic engagement and collaborative learning outcomes. However, disparities in digital access and pedagogical support remain key challenges in optimizing these benefits in Pakistani higher education contexts.

Keywords: Learning Agency, Empowerment, Digital Learning Environments, Collaborative Knowledge Construction, Higher Education, Female Students

Introduction

The rapid integration of digital technologies in higher education has transformed traditional teaching and learning practices (Shoaib, Srosh, Mobeen, & Abdullah, 2026a; Shoaib & Ullah, 2026), emphasizing learner-centered approaches that promote active participation, autonomy, and collaboration (Shoaib, Shamraiz, Noor, & Abdullah, 2026; Shoaib, Srosh, Mobeen, & Abdullah, 2026b). Inside this context, learning agency and empowerment have emerged as critical constructs that enable students to take control of their learning processes and engage meaningfully in knowledge construction (Shoaib, Shamraiz, Baneen, & Abdullah, 2026c, 2026d). In Pakistani higher education, particularly among female students, digital learning environments provide new opportunities for collaborative engagement through online platforms (Shoaib, Shamraiz, Baneen, & Abdullah, 2026a, 2026b), interactive tools, and shared academic spaces (Shoaib, Shahzadi, Shamraiz, & Abdullah, 2026a; Shoaib, Shamraiz, Abbas, & Abdullah, 2026). These environments facilitate peer interaction, critical dialogue (Shoaib, Shahzadi, Shamraiz, & Abdullah, 2026b, 2026c), and collective problem-solving, thereby strengthening collaborative knowledge construction (Shoaib, Shahzadi, & Abdullah, 2026; Shoaib, Shahzadi, Iqbal, & Abdullah, 2026). However, the extent to which digital learning fosters agency and empowerment among students remains an important area of inquiry (Shoaib, Sarfraz, Kausar, & Abdullah, 2026a, 2026b), given contextual challenges such as digital divide (Shoaib, Sarfraz, & Kausar, 2026a, 2026b), varying levels of technological access, and pedagogical adaptation (Shoaib, Noor, Iqbal, & Abdullah, 2026; Shoaib, Noor, Mir, & Abdullah, 2026). This study, therefore, explores how learning agency and empowerment in digital learning environments contribute to collaborative knowledge construction among female students in Pakistani higher education institutions.

Review of Literature

The study findings asserted that find out co ownership of learning in higher education (Owusu-Agyeman & Fourie-Malherbe, 2019). Similarly, the analysis of the study findings articulated that concluding black space environment for young student learning practices (Shoaib, Kausar, Sarfraz, & Abdullah, 2026b, 2026c). Besides, the analysis based results pointed out that public teaching practice in public universities. Moreover, the study conclusion clinched that factor which improves learning outcomes of students at university level (Shoaib, Iqbal, Baneen, & Abdullah, 2026c; Shoaib, Kausar, Sarfraz, & Abdullah, 2026a). Furthermore, the analysis of the study pointed out that politics behind equity and its effect on earning outcomes in students in higher education (Shoaib, Iqbal, Baneen, & Abdullah, 2026a, 2026b). In a similar way, argument of the study outlined that exploring the perception of student for learning practices regarding online learning through cell phone (Shoaib, Iqbal, Iqbal, & Abdullah, 2026a, 2026b). Additionally, the study outplayed that stated that comparing learning practices and their outcomes in students (Shoaib, Ali, Ditta, & Abdullah, 2026; Shoaib, Ali, Hassan, & Abdullah, 2026). It is worth to mention here that the study findings highlighted that theory of learning and detail set of learning

indicators (Leiber, 2019). Besides, the analysis of the data indicated that comparing online and physical learning (Shoaib, Ahmed, Iqbal, & Abdullah, 2026b, 2026c). The study on the subject commissioned that students' perceptions and exploring different personality traits and their effects on learning outcomes (Shoaib, Abdullah, & Baneen, 2026a, 2026b, 2026c; Shoaib, Ahmed, Iqbal, & Abdullah, 2026a).

The study findings asserted that effects of colonialism teaching practices and mutual support in higher education of students (Shoaib, Abbas, Shamraiz, & Abdullah, 2026; Shoaib, Abdullah, & Ali, 2026). Similarly, the analysis of the study findings articulated that challenges for academic performance of students (Shamraiz, Shoaib, Baneen, & Shahzadi, 2026a; Shoaib, Abbas, Ali, & Abdullah, 2026). Besides, the analysis based results pointed out that learning outcomes in international students in higher education (Shahzadi, Shoaib, Iqbal, & Abdullah, 2026; Shamraiz, Shoaib, baneen, & Shahzadi, 2026b). Moreover, the study conclusion clinched that analysis learning outcomes of student through e- learning (Shahzadi, Shoaib, & Abdullah, 2026; Shahzadi, Shoaib, Baneen, & Abdullah, 2026). Furthermore, the analysis of the study pointed out that connecting science and humanities approaches at higher level of education (Sarfraz, Shoaib, & Sheraz, 2026a, 2026b). In a similar way, argument of the study outlined that school of thought of students for their needs and support in e learning at higher level (Sarfraz, Shoaib, & Kausar, 2026; Sarfraz, Shoaib, Kausar, & Abdullah, 2026). Additionally, the study outplayed that stated that overcoming conflicts through negotiation between learning practices and linguistics (Sarfraz, Kausar, Shoaib, & Abdullah, 2026; Sarfraz, Sheraz, Shoaib, & Abdullah, 2026). It is worth to mention here that the study findings highlighted that manifesting anxieties in male students at higher education (Ali, Shoaib, Shamraiz, & Abdullah, 2026; Larijani, Shoaib, & Abedi, 2026). Besides, the analysis of the data indicated that long lasting teaching and learning outcomes design (Ali, Abdullah, & Shoaib, 2026a, 2026b). The study on the subject commissioned that effects of assessment for learning practices o outcomes of students (Ahmed, Shoaib, Iqbal, & Abdullah, 2026b; Ali, Abdullah, & Shoaib, 2026).

The study findings asserted that the interconnectedness of teaching practices and students' retention (Ahmed, Shoaib, Iqbal, & Abdullah, 2026; Ahmed, Shoaib, Iqbal, & Abdullah, 2026a). Similarly, the analysis of the study findings articulated that redefining students position in academic success (Waris, Shoaib, Sharif, & Abdullah, 2025a, 2025b). Besides, the analysis based results pointed out that higher education through technological sources (Waris, Shoaib, Iqbal, & Abdullah, 2025; Waris, Shoaib, Sharif, & Abdullah, 2025c). Moreover, the study conclusion clinched that student point of view on criminal behavior and community interaction (Shoaib & Zaman, 2025; Shoaib, Zaman, & Abdullah, 2025). Furthermore, the analysis of the study pointed out that redefining physical learning (Shoaib, Waris, Zaman, & Abdullah, 2025a, 2025b). In a similar way, argument of the study outlined that special learning design for e learning teaching practices in education (Shoaib, Waris, & Iqbal, 2025c; Shoaib, Waris, Iqbal, & Abdullah, 2025). Additionally, the study outplayed that stated that fostering learning through transformative learning model (Shoaib, Waris, & Iqbal, 2025b; Shoaib, Waris, & Iqbal, 2025b). It is worth to mention here

that the study findings highlighted that teaching practices along with other application like Pinterest effect students (Shoaib, Waris, & Iqbal, 2025a; Shoaib, Waris, & Iqbal, 2025a). Besides, the analysis of the data indicated that impacts of advancing racial equity teaching practices (Shoaib, Tariq, & Iqbal, 2025b; Shoaib, Tariq, Rasool, & Iqbal, 2025). The study on the subject commissioned that effects of using web based or flexile education programs on education (Shoaib, Shamsher, & Iqbal, 2025; Shoaib, Tariq, & Iqbal, 2025a).

The Data and Methods

The study employed a quantitative research design to examine learning agency and empowerment in digital learning environments among female students in Pakistani higher education. The population of the study comprised female students enrolled in a public sector university. A sample of 198 female students from BS (4 Years) programs was selected through a proportionate random sampling technique to ensure equal representation from different academic departments and semesters. Data were collected through a cross-sectional survey method using a structured questionnaire. The questionnaire consisted of close-ended statements measured on an attitudinal scale of agreement and disagreement to assess students’ perceptions regarding collaborative knowledge construction, empowerment, and digital learning practices. A pilot testing of the instrument was conducted to determine its reliability. The Cronbach’s Alpha values ranged from .719 to .842, indicating satisfactory internal consistency and reliability of the instrument. Descriptive statistical techniques, including frequency distribution and percentages, were applied to analyze the data, validate responses, and draw meaningful results and conclusions.

Results and Discussion

Learning Agency and Empowerment: Table 1 asserted the frequency distribution and percentages of variable named as learning agency and empowerment. The data collected from the field presented that 49.0 percent of female students strongly agreed and 53.5 percent of student were agreed with the statement as mentioned in the table “you are engaged with learning agency”. Similarly, there had been proportion of the student in the category of strongly disagree (05.6%) and only 16.2 percent of student were in the category of strongly disagree with statement “you are engaged with learning agency”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

Table 1
Response towards Learning Agency and Empowerment
 SA=Strongly Agree to Strongly Disagree=SD

Sr. No.	Statements	SA %	A %	D %	SD %
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		(f)	(f)	(f)	(f)
i	You are engaged with learning agency	49.0 (24.7)	53.5 (106)	16.2 (32)	05.6 (11)
ii	You have capacity to take ownership	20.2 (40)	61.1 (121)	16.7 (33)	02.0 (04)
iii	You have clear learning goals	24.2 (48)	56.1 (111)	16.2 (32)	03.5 (07)
iv	You easily make choices in your life	22.7 (45)	54.5 (108)	19.7 (39)	03.0 (06)
v	You have only focus on your study progress	18.2 (36)	56.1 (111)	19.2 (38)	06.6 (13)
vi	You have strong self-efficacy during study	26.8 (53)	51.0 (101)	17.7 (35)	04.5 (09)
vii	You critically analyze the phenomenon	19.2 (38)	56.1 (111)	20.2 (40)	04.5 (09)
viii	You are energetic to achieve educational goals	20.2 (40)	52.0 (103)	22.2 (44)	05.6 (11)

The data collected from the field presented that 20.2 percent of female students strongly agreed and 61.1 percent of student were agreed with the statement as mentioned in the table “you have capacity to take ownership”. Similarly, there had been proportion of the student in the category of strongly disagree (02.0%) and only 16.7 percent of student were in the category of strongly disagree with statement “you have capacity to take ownership”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have capacity to take ownership”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 24.2 percent of female students strongly agreed and 56.1 percent of student were agreed with the statement as mentioned in the table “you have clear learning goals”. Similarly, there had been proportion of the student in the category of strongly disagree (03.5%) and only 16.2 percent of student were in the category of strongly disagree with statement “you have clear learning goals”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have clear learning goals”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 22.7 percent of female students strongly agreed and 54.5 percent of student were agreed with the statement as mentioned in the table “you easily make choices in your life”. Similarly, there had been proportion of the student in the category of strongly disagree (03.0%) and only 19.7 percent of student were in the category of strongly disagree with statement “you easily make choices in your life”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement

with the statement “you easily make choices in your life”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 18.2 percent of female students strongly agreed and 56.1 percent of student were agreed with the statement as mentioned in the table “you have only focus on your study progress”. Similarly, there had been proportion of the student in the category of strongly disagree (06.6%) and only 19.2 percent of student were in the category of strongly disagree with statement “you have only focus on your study progress”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have only focus on your study progress”. Hence the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 26.8 percent of female students strongly agreed and 51.0 percent of student were agreed with the statement as mentioned in the table “you have strong self-efficacy during study”. Similarly, there had been proportion of the student in the category of strongly disagree (04.5%) and only 17.7 percent of student were in the category of strongly disagree with statement “you have strong self-efficacy during study”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have strong self-efficacy during study”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 20.2 percent of female students strongly agreed and 52.0 percent of student were agreed with the statement as mentioned in the table “you are energetic to achieve educational goals”. Similarly, there had been proportion of the student in the category of strongly disagree (05.6%) and only 22.2 percent of student were in the category of strongly disagree with statement “you are energetic to achieve educational goals”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you are energetic to achieve educational goals”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

Collaboration Knowledge Construction:

Table 2 asserted the frequency distribution and percentages of variable named as collaboration knowledge construction. The data collected from the field presented that 29.8 percent of female students strongly agreed and 53.0 percent of student were agreed with the statement as mentioned in the table “you share your perspective to others”. Similarly, there had been proportion of the student in the category of strongly disagree (04.5%) and only 12.6 percent of student were in the category of strongly disagree with statement “you share your perspective to others”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you share your perspective to others”.

Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

Table 2

Response towards Collaboration Knowledge Construction:

SA=Strongly Agree to Strongly Disagree=SD

Sr. No.	Statements	SA % (f)	A % (f)	D % (f)	SD % (f)
i	You share your perspective to others	29.8 (59)	53.0 (105)	12.6 (25)	04.5 (09)
ii	You create new understanding regarding phenomenon	22.2 (44)	59.6 (118)	14.6 (29)	03.5 (07)
iii	You acquire individualistic knowledge	25.8 (51)	49.5 (98)	19.7 (39)	05.1 (10)
iv	You explore new things in normal routine life	24.7 (49)	55.1 (109)	15.2 (30)	05.1 (10)
v	You negotiate with others in the issues	18.2 (36)	55.6 (110)	18.7 (37)	07.6 (15)
vi	You have strong visual thinking regarding learning	20.7 (41)	58.1 (115)	17.2 (34)	04.0 (08)
vii	You engaged yourself in deep discussion	20.7 (41)	50.0 (99)	23.2 (46)	06.1 (12)
viii	You work on joining constructive knowledge	19.7 (39)	55.6 (110)	19.7 (39)	05.1 (10)

The data collected from the field presented that 22.2 percent of female students strongly agreed and 59.6 percent of student were agreed with the statement as mentioned in the table “you create new understanding regarding phenomenon”. Similarly, there had been proportion of the student in the category of strongly disagree (03.5%) and only 14.6 percent of student were in the category of strongly disagree with statement “you create new understanding regarding phenomenon”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you create new understanding regarding phenomenon”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 25.8 percent of female students strongly agreed and 49.5 percent of student were agreed with the statement as mentioned in the table “you acquire individualistic knowledge”. Similarly, there had been proportion of the student in the category of strongly disagree (05.1%) and only 19.7 percent of student were in the category of strongly disagree with statement “you acquire individualistic knowledge”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you acquire individualistic knowledge”. Hence, the overall

response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 24.7 percent of female students strongly agreed and 55.1 percent of student were agreed with the statement as mentioned in the table “you explore new things in normal routine life”. Similarly, there had been proportion of the student in the category of strongly disagree (05.1%) and only 15.2 percent of student were in the category of strongly disagree with statement “you explore new things in normal routine life”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you explore new things in normal routine life”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 18.2 percent of female students strongly agreed and 55.6 percent of student were agreed with the statement as mentioned in the table “you negotiate with others in the issues”. Similarly, there had been proportion of the student in the category of strongly disagree (07.6%) and only 18.7 percent of student were in the category of strongly disagree with statement “you negotiate with others in the issues”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you negotiate with others in the issues”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 20.7 percent of female students strongly agreed and 58.1 percent of student were agreed with the statement as mentioned in the table “you have strong visual thinking regarding learning”. Similarly, there had been proportion of the student in the category of strongly disagree (04.0%) and only 17.2 percent of student were in the category of strongly disagree with statement “you have strong visual thinking regarding learning”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have strong visual thinking regarding learning”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 20.7 percent of female students strongly agreed and 50.0 percent of student were agreed with the statement as mentioned in the table “you engaged yourself in deep discussion”. Similarly, there had been proportion of the student in the category of strongly disagree (06.1%) and only 23.2 percent of student were in the category of strongly disagree with statement “you engaged yourself in deep discussion”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you engaged yourself in deep discussion”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 19.7 percent of female students strongly agreed and 55.6 percent of student were agreed with the statement as

mentioned in the table “you work on joining constructive knowledge”. Similarly, there had been proportion of the student in the category of strongly disagree (05.1%) and only 19.7 percent of student were in the category of strongly disagree with statement “you work on joining constructive knowledge”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you work on joining constructive knowledge”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

Use of Digital Learning Practices:

Table 3 asserted the frequency distribution and percentages of variable named as use of digital learning practices. The data collected from the field presented that 33.8 percent of female students strongly agreed and 40.4 percent of student were agreed with the statement as mentioned in the table “you are engaged in online learning environment”. Similarly, there had been proportion of the student in the category of strongly disagree (04.0%) and only 21.7 percent of student were in the category of strongly disagree with statement “you are engaged in online learning environment”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you are engaged in online learning environment”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

Table 3
Response towards Use of Digital Learning Practices
 SA=Strongly Agree to Strongly Disagree=SD

Sr. No.	Statements	SA % (f)	A % (f)	D % (f)	SD % (f)
i	You are engaged in online learning environment	33.8 (67)	40.4 (80)	21.7 (43)	04.0 (08)
ii	You have your own learning spaces	17.7 (35)	64.6 (128)	14.6 (29)	03.0 (06)
iii	You are using library digital resources	24.7 (49)	47.5 (94)	22.7 (45)	05.1 (10)
iv	You have joint chat group for discussion	20.0 (40)	52.5 (104)	21.7 (43)	05.6 (11)
v	You are using online digital learning resources	28.3 (56)	51.5 (102)	14.6 (29)	05.6 (11)
vi	You are linked with digital technology	21.2 (42)	64.1 (127)	12.1 (24)	02.5 (05)
vii	You choose digital tool to learn	30.8 (61)	50.0 (99)	15.7 (31)	03.5 (07)
viii	You have technological access	23.2	57.6	15.2	04.0

The data collected from the field presented that 17.7 percent of female students strongly agreed and 64.6 percent of student were agreed with the statement as mentioned in the table “you have your own learning spaces”. Similarly, there had been proportion of the student in the category of strongly disagree (03.0%) and only 14.6 percent of student were in the category of strongly disagree with statement “you have your own learning spaces”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have your own learning spaces”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 24.7 percent of female students strongly agreed and 47.5 percent of student were agreed with the statement as mentioned in the table “you are using library digital resources”. Similarly, there had been proportion of the student in the category of strongly disagree (05.1%) and only 22.7 percent of student were in the category of strongly disagree with statement “you are using library digital resources”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you are using library digital resources”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 20.0 percent of female students strongly agreed and 52.5 percent of student were agreed with the statement as mentioned in the table “you have joint chat group for discussion”. Similarly, there had been proportion of the student in the category of strongly disagree (05.6%) and only 21.7 percent of student were in the category of strongly disagree with statement “you have joint chat group for discussion”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have joint chat group for discussion”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 28.3 percent of female students strongly agreed and 51.5 percent of student were agreed with the statement as mentioned in the table “you are using online digital learning resources”. Similarly, there had been proportion of the student in the category of strongly disagree (05.6%) and only 14.6 percent of student were in the category of strongly disagree with statement “you are using online digital learning resources”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you are using online digital learning resources”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 21.2 percent of female students strongly agreed and 64.1 percent of student were agreed with the statement as

mentioned in the table “you are linked with digital technology”. Similarly, there had been proportion of the student in the category of strongly disagree (02.5%) and only 12.1 percent of student were in the category of strongly disagree with statement “you are linked with digital technology”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you are linked with digital technology”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 30.8 percent of female students strongly agreed and 50.0 percent of student were agreed with the statement as mentioned in the table “you choose digital tool to learn”. Similarly, there had been proportion of the student in the category of strongly disagree (03.5%) and only 15.7 percent of student were in the category of strongly disagree with statement “you choose digital tool to learn”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you choose digital tool to learn”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

The data collected from the field presented that 23.2 percent of female students strongly agreed and 57.6 percent of student were agreed with the statement as mentioned in the table “you have technological access”. Similarly, there had been proportion of the student in the category of strongly disagree (04.0%) and only 15.2 percent of student were in the category of strongly disagree with statement “you have technological access”. It is important to mentioned here that major proportion of male and female student were in the response category of agreement with the statement “you have technological access”. Hence, the overall response was in the favor of the variable and response category of agreement as mentioned above.

Discussion

Learning Agency and Empowerment: The study findings clinched that female students are engaged with learning agency. The study findings argued that female students have capacity to take ownership. In the same fashion, the analysis of the study outlined that female students have clear learning goals. Identically, the analysis pointed out that female students easily make choices in their life. Comparably, the field data asserted that female students have only focus on their study progress. Besides, the analysis revealed that female students have strong self-efficacy during study. Similarly, the primary data pointed out that female students critically analyze the phenomenon. The study findings reported that female students are energetic to achieve educational goals. The study findings had been aligned with several researches conducted in different countries learning agency plays a central role in online, networked theories, and connects students to guide and support them in enhancing learning outcomes (Shoaib, Rasool, & Zaman, 2025a, 2025b, 2025c; Shoaib, Rasool, Zaman, & Abdullah, 2025; Shoaib, Rasool, Zaman, & Ahmed, 2025; Shoaib, Shamsher, & Iqbal, 2025). The study findings asserted that students online learning abilities for educating in public university (Shoaib, Rasool, Iqbal, &

Abdullah, 2025b; Shoaib, Rasool, Kalsoom, & Ali, 2025). Besides, the analysis based results pointed out that online learning is a solution for betterment of basic skill development in adults (Shoaib, Rasool, & Iqbal, 2025b; Shoaib, Rasool, Iqbal, & Abdullah, 2025a). Furthermore, the analysis of the study pointed out that the effects of online pedagogy on students' entrepreneurship (Shoaib, Rasool, & Iqbal, 2025a, 2025c). Additionally, the study outplayed that stated that teacher is main element for society based experiences and third space education (Shoaib & Kausar, 2025; Shoaib, Kausar, Ali, & Abdullah, 2025). Besides, the analysis of the data indicated that digital empowering students through personalized learning promotes students learning capacity and ability (Tsai, Perrotta, & Gašević, 2020).

Collaborative Knowledge Construction:

The study findings clinched that female students share their perspective to others. The study findings argued that female students create new understanding regarding phenomenon. In the same fashion, the analysis of the study outlined that female students acquire individualistic knowledge. Identically, the analysis pointed out that female students explore new things in normal routine life. Comparably, the field data asserted that female students negotiate with others in the issues. Besides, the analysis revealed that female students have strong visual thinking regarding learning. Similarly, the primary data pointed out that female students engaged yourself in deep discussion. The study findings reported that female students work on joining constructive knowledge. The study findings had been aligned with several researches conducted in different countries students learning collaborative knowledge construction in indoor environment effected students' learning outcomes and on intuition of experience of students (Shoaib, Iqbal, & Iftikhar, 2025; Shoaib, Iqbal, Rasool, & Abdullah, 2025). The study findings asserted that effects of multi-cultural collaboration with digital storytelling on student cognitive understanding (Shoaib, 2024e, 2025a, 2025b; Shoaib, Amina Iqbal, et al., 2025; Shoaib, Iqbal, et al., 2025). Besides, the analysis based results pointed out that mind relaxation and learning burnout are mediators between informal digital learning and communication. Furthermore, the analysis of the study pointed out that opportunities for learning and teaching in education (Shoaib, 2024b, 2024d). Additionally, the study outplayed that stated that the importance of online project based knowledge improve female students' academic achievement. Besides, the analysis of the data indicated that digital learning experiences effects students learning and attitude toward virtual reality (Shoaib, 2024a, 2024c).

Use of Digital Learning Platforms:

The study findings clinched that female students are engaged in online learning environment. The study findings argued that female students have their own learning spaces. In the same fashion, the analysis of the study outlined that female students are using library digital resources. Identically, the analysis pointed out that female students have joint chat group for discussion. Comparably, the field data asserted that female students are using online digital learning resources. Besides, the analysis revealed that female students are linked with digital technology. Similarly, the

primary data pointed out that female students choose digital tool to learn. The study findings reported that female students have technological access. The study findings had been aligned with several researches conducted in different countries learning content, tools for multiple learning styles, and quiz that helps students to learn at their own pace (Shah, 2024; Shoaib, 2023a, 2023b, 2023c). The study findings asserted that highlight major causes that affect the bachelor students in online unsynchronized course. Besides, the analysis based results pointed out that e learning system is online interaction and learning outcomes of students (Shoaib, 2021; Shoaib & Ullah, 2021b). Furthermore, the analysis of the study pointed out that the experimental education and socialization of international students in Australia. Additionally, the study outplayed that stated that third space pedagogy in supporting complications in diverse cultures and early education system. Besides, the analysis of the data indicated that social movement and student activism for learning Pakistan (Shoaib & Ullah, 2019, 2021a).

Conclusion

The study concludes that learning agency and empowerment in digital learning environments significantly enhance collaborative knowledge construction among female students in Pakistani higher education institutions. The findings reveal that digital learning practices encourage students to become active participants in the educational process by promoting autonomy, self-regulation, critical engagement, and shared learning experiences. Female students demonstrated greater confidence and participation when digital platforms enabled interactive communication, peer collaboration, and access to diverse learning resources. The study further highlights that collaborative knowledge construction is strengthened through technology-mediated interaction, discussion forums, group assignments, and online learning communities. These practices foster mutual learning, intellectual exchange, and collective problem-solving, which contribute to improved conceptual understanding and academic growth. Moreover, empowerment through digital learning environments supports students' decision-making abilities, creativity, and independent learning capacities. The research also indicates that supportive institutional infrastructure, digital accessibility, and faculty guidance are crucial factors in maximizing the benefits of learning agency and collaborative engagement. However, challenges such as unequal access to technology, limited digital literacy, and inconsistent pedagogical integration still affect the effectiveness of digital learning practices. Overall, the study emphasizes that empowering female students through learner-centered digital environments strengthen collaborative learning cultures and improve educational outcomes in Pakistani higher education institutions.

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