COLLES SCALES AS ASSESSMENT CONSTRUCTS FOR A ROBUST AND INCLUSIVE LEARNING FOR UNIVERSITY TEACHER TRAINEES

By

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Abstract

This study investigated Constructivist On-Line Learning Environment Survey (COLLES) scales as assessment constructs for a robust and inclusive learning for university teacher trainees in the Faculty of Education, Benue State University, Makurdi. Benue Sate, Nigeria. In addition, the study examined access and ability level between male and female respondents to the online survey. The COLLES comprised an economical 24 statements grouped into six scales: relevance, reflection, interactivity, tutor support, peer support and interpretation. Each of which helped the assessors address key questions about the quality of the on-line learning environment – Modular object-oriented dynamic learning environment (Moodle). The survey received responses from a convenience sample of 341 out of a possible 429 teacher trainees over a period of 7 days who were students who enrolled online for EDU 205: Application of ICT in Education in the Faculty of Education, Benue State University, Makurdi. The study found that there was no significant difference in the mean access variable between the male and female teacher trainees; $F_{(1, 339)} = 0.049$ and $p = 0.826 > 0.05$. Also, there was no significant difference in the mean ability level between the male and female teacher trainees; $F_{(1, 338)} = 4.950$ and $p = 0.027 > 0.05$. The result showed that there was a significant relationship among the six subscales at 0.05 level of significance, with the strongest correlations existing between reflection and tutor support (0.617), interactivity and peer support (0.602), peer support and interpretation (0.601) and between interactivity and interpretation (0.605). The study concluded that male and female teacher trainees have similar access and ability levels to web-based learning and that there were significant correlations between their online learning activities. It was recommended among other things that e-learning and virtual education for teacher trainees should be supported by the necessary facilities and equipment to increase inclusivity and effectiveness.

Keywords: COLLES, teacher trainees, inclusive education, gender, online/web based learning

Background to the Study

Online teaching and virtual education has permeated the global space, especially post-COVID-19. Before now, the introduction of technology took quite a slow pace among institutions of learning in Africa. This seemed to drastically change occasioned by the force of nature. The emergence of the internet has accelerated the incorporation of online educational resources such as electronic textbooks and reading materials, e-libraries into the curricula of higher learning institutions. As a result of this, the application of e-learning continues to gain importance in higher education globally. At the moment, the integration of educational technology in tertiary education in West Africa has profoundly led to a new teaching and learning paradigm, with students and teachers more meaningfully engaged (Ada, Odey, Abuul, Agishi & Afaor, 2019; Sahooa, Mishra, & Reddy, 2020). Common among the platforms deployed has been the Modular object-oriented dynamic learning environment (Moodle) which is a free and open-sourcing learning management system for sharing and imparting knowledge. Moodle promotes cognitive existence for teachers to share ideas by initiating conversations, exploring solutions, and providing resolutions to problems. Moodle provides the environment in which participants can follow their course, whether it is during the face-to-face workshops, supported by the facilitator's encouragement, or during the online interaction.

Training constitutes an educational process that extends beyond the initial education, aims at people who are already in a particular professional context. Teachers' training is a key requirement for a successful education system (Stasinakis & Kalogiannnakis, 2017). EDU 205 was taught both online by reading e-documents, listening to audio materials as well as watching posted videos and through face-to-face lectures which hold for 2 hours every week. The assessments were also done online and offline, while encouraging student-student support and collaboration. The course was then evaluated using the Constructivist On-Line Learning Environment Survey (COLLES) which is a major component of Moodle used to support the use of the internet for delivering undergraduate professional development as a feedback mechanism. The COLLES comprised 24 statements grouped into six scales: relevance or how relevant is on-line learning to students' professional practices, reflection or how on-line learning stimulate students' critical reflective thinking; interactivity or the extent to which students engage on-line in rich educative dialogue; tutor support or how well tutors enable students to participate in on-line learning; peer support or the sensitive and encouraging support provided on-line by fellow students and interpretation or and how students and tutors make good sense of each other's on-line communications. Each of which helped the assessors address key questions about the quality of the on-line and general learning environment.

Access in this study was measured in days and has to do with access to the internet and online learning particularly for male and female students. Open, flexible and online education is being adopted by institutions to enhance their efforts to achieve increased levels of access to inclusive learning opportunities. What remains scanty is disaggregation of the benefits by gender, which is still a strong paradigm of exclusion in education particularly (Morolong & Nage-Sibande, 2016). Oriji and Anikpo (2019) reported however that only 243 of their respondents which is 22.9% of the study actually used mobile devices for academic purposes, regardless of the fact that the students possess internet enabled mobile phones.

The ability level of the teacher trainees was also investigated while using gender as the intervening variable. Morolong and Nage-Sibande (2016) stated that during the delivery process, it became evident that the male students had more confidence to navigate the technology and the Moodle platform, compared to their female counterparts. This was evident in the submission of assignments, where about 75% - 80% of timely submissions would be from the male students. The pass rate for discussion forums indicated an estimated 70% for males and 30% for females. In contrast, Vázquez-Cano, Meneses and García-Garzón (2017), in the results for "Competences in the use of ICT…", observed that both male and female students feel they have a good level of competence in digital usage as well as in interpersonal competences. Also, Achor, Igyu and Ogah (2020) found no differences in the online learning activities of male and female students both at home and school. From the foregoing, there appears to be contrasting views on online education with regards to access and competence according to gender, especially for undergraduate education students.

Research Questions

The study was guided by the following research questions:

1. What is the mean difference in the access to the survey between male and female teacher trainees?
2. What is the mean difference in the ability level male and female teacher trainees to complete the survey?
3. What is the relationship among the rating scales of relevance, reflection, interactivity, tutor support, peer support and interpretation?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant mean difference in the access to the survey between male and female teacher trainees.
2. There is no significant mean difference in the ability level between male and female teacher trainees in the completion of the survey.
3. There is no significant relationship among the 6 scales of online education survey which are relevance, reflection, interactivity, tutor support, peer support and interpretation.

Materials and Methods

The survey received responses from 341 out of a convenience sample of 429 teacher trainees who registered for EDU 205: Application of ICT in Education in the 2020/2021 academic session. According to the office of the Registrar, Benue State University, Makurdi had a population of 27,712 undergraduate students in the 2020/2021 session.

The six COLLES scales of relevance, reflection, interactivity, tutor support, peer support and interpretation were graded as Never – 1, Seldom – 2, Sometimes – 3, Often – 4 and Almost always – 5, where the cut off mean was set at 3. Access was in measured over a period of 7 days on a 7-point scale using: Day One (5^{th}) – 7, Two (6^{th}) – 6, Three (7^{th}) – 5, Four (8^{th})– 4, Five (9^{th}) – 3, Six (10^{th}) – 2 and Seven (After 10^{th}) – 1. Ability was measured in minutes also on a 7-point scale using: 1m – 7, 1-2m – 6, 2-3m – 5, 3-4m – 4, 4-5m – 3, 5-10m – 2, Above 10m – 1. The mean cut off for time and duration was set at 4.

Data was analysed using means, standard deviations and graphs to answer the research questions while correlation coefficient and two-way Analysis of Variance (ANOVA) statistics from SPSS 16.0 was used to test the hypotheses at 0.05 level of significance. The methods of testing the hypotheses is preferred from other possible statistics like regression because the relationship among the subscales is seen as multidimensional and hardly one depends on another or one can be used as a predictor of another in its strict sense, but rather they tend to co-exist. The ANOVA was used to test the differences between the means of the two independent variables – male and female (Lund Research, 2018).

Results and Interpretation

The results of the study are presented using graphs and tables and interpreted accordingly across the objectives of the study which were access, ability and correlations among the scales of measurement.

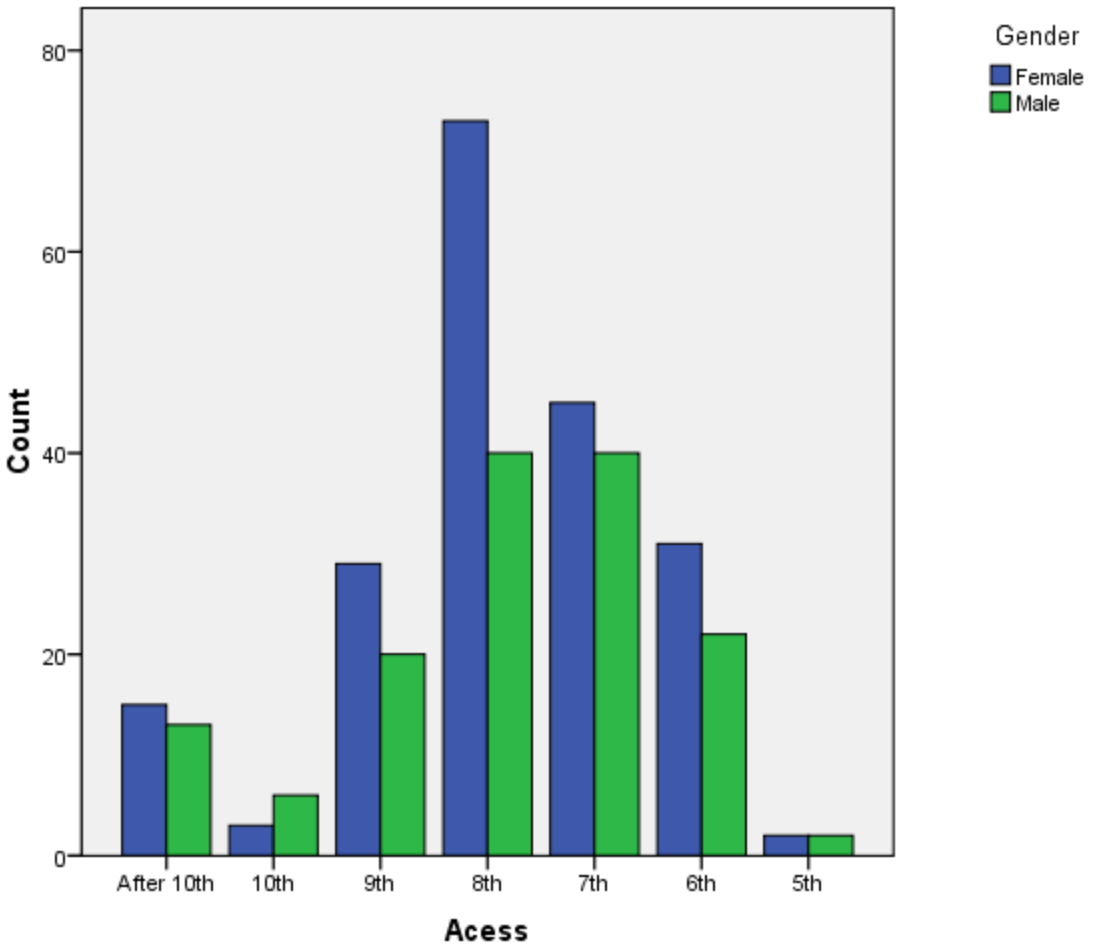

Figure 1: Bar chart showing male and female teacher trainees' access to the survey

Figure 1 shows the access to the survey from Day 1 (5th day of the month) which was the first day the survey was open to the students to Day 7 (After 10th day of the month) for female (blue bars) and male (green bars).

Table 1 Descriptive Statistics for the Variable Access

Gender	Mean	Std. Deviation	N
Female	4.17	1.347	198
Male	4.13	1.464	143
Total	4.15	1.395	341

Table 1 shows that there were 198 female and 243 male teacher trainees who responded to the survey with a mean completion time of 4.17 and standard deviation of 1.347 for the female students. The male students had a mean time of completion of 4.13 with a standard deviation of 1.464. Both groups of students met the cut of mean of 4. This indicates that both groups appeared to have equal access to the online learning platform. The analysis also indicated that both data were homogenous in nature with small standard deviations.

Table 2: ANOVA for Variable Access Between Male and Female Teacher Trainees

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.095	1	.095	.049	.826
Within Groups	661.976	339	1.953		
Total	662.070	340			

Table 2 shows that there is no significant difference in the mean completion time between the male and female teacher trainees; $F_{(1, 339)} = 0.049$ and $p = 0.826 > 0.05$. This led to the rejection of hypothesis one which means that both male and female teacher trainees had equal access to the web-based learning of EDU 205 in the faculty.

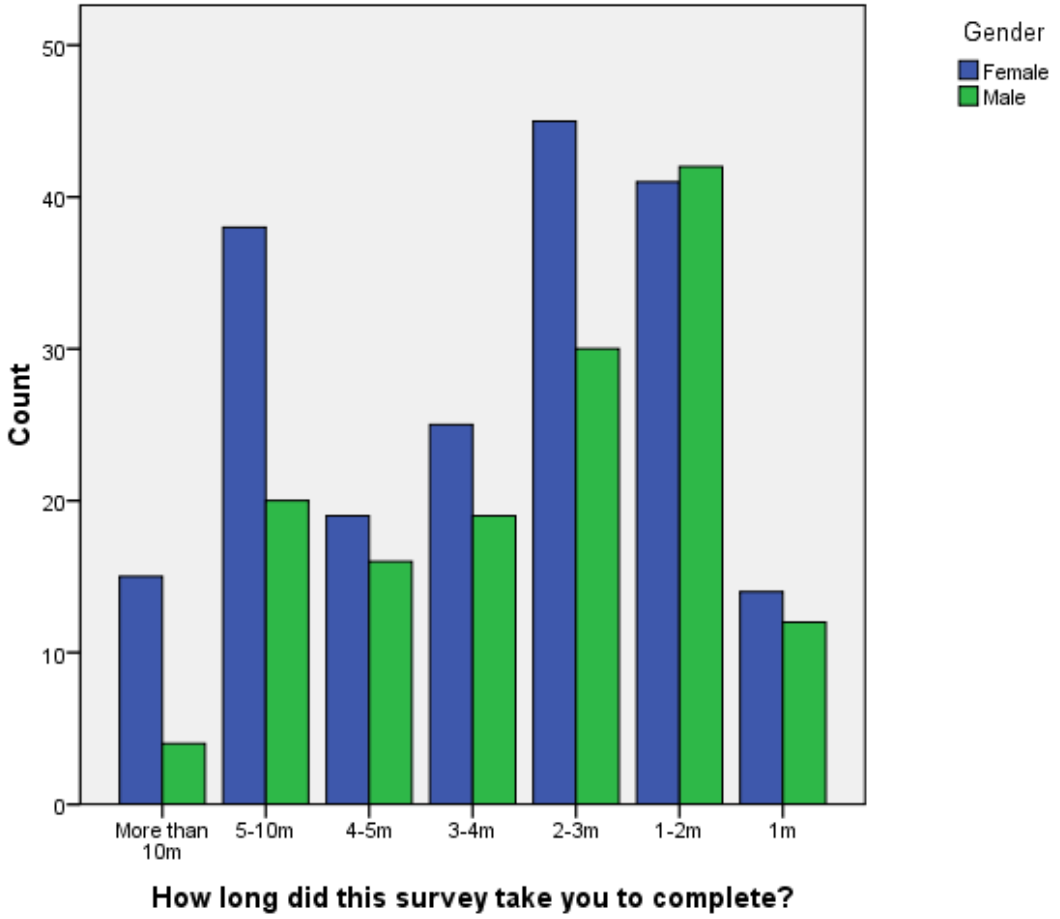

Figure 2: Bar chart showing how long it took male and female teacher trainees to complete the survey

Figure 2 shows the bars for female (blue) and male (green) students ability level in terms of time spent to complete the survey ranging from 1 – 10 minutes.

Table 3: Descriptive Statistics for the Ability Level of the Survey

Gender	Mean	Std. Deviation	N
Female	4.15	1.802	197
Male	4.57	1.659	143
Total	4.33	1.754	340

Table 3 shows that there were 197 female students with a mean duration in completing the survey of 4.15 and standard deviation of 1.802. The male students were 143 in total and had a mean of 4.57 with a standard deviation of 1.659. Going by the grading criteria, the higher the mean completion rate, the smaller the time it took the students to complete the survey. Therefore, it would seem that the male students may have completed the survey faster than their female counterparts.

Table 4: ANOVA for Variable Ability Level between Male and Female Teacher Trainees

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.052	1	15.052	4.950	.027
Within Groups	1027.710	338	3.041		
Total	1042.762	339			

Table 4 shows that there is no significant difference in the mean duration of completing the survey between the male and female teacher trainees; $F_{(1, 338)} = 4.950$ and $p = 0.027 > 0.05$. This led to the rejection of hypothesis two which means that there was no significant difference in the ability levels of male and female teacher trainees in working online for the study of EDU 205 in the Faculty of Education, Benue State University, Makurdi.

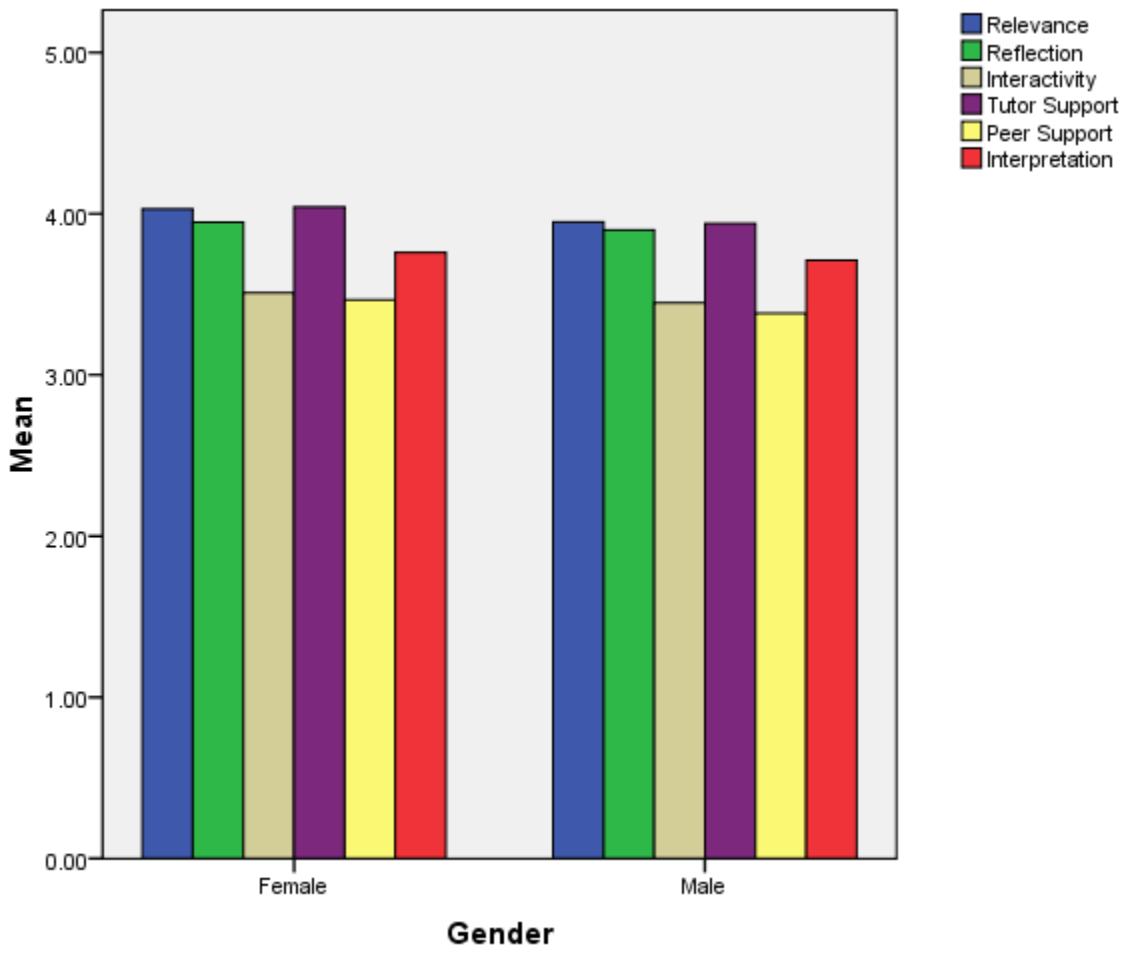

Figure 3: Bar chart for the mean responses of students to the subscales of relevance, reflection, interactivity, tutor and peer support as well as interpretation

Figure 3 illustrates that male and female students had their mean ratings between sometimes (3) and often (4), thus meeting the cut-off criteria, which appears to be good for inclusive education. The highest mean responses were for relevance (blue bars) and tutor support (purple bars). The least mean responses were received under the subscale of peer support (yellow bars) and interactivity (brown bars). It would seem that since online learning is relatively new in the university, students were still coming to terms with the use and flexibility of the learning platform. Reflection (green bars) which is how on-line learning stimulate students' critical reflective thinking also had relatively high responses from the students. It is interesting to see however, that interpretation (red bars) had higher bars than reflection, peer support and interactivity, perhaps due to the level of tutor support. These mean descriptions and assumptions are investigated further by the correlations among the various scales of the survey.

Table 5: Correlations Among the Scales of Relevance, Reflection, Interactivity, Tutor Support, Peer Support and Interpretation

		Relevance	Reflection	Interactivity	Tutor Support	Peer Support	Interpretation
Relevance	Pearson Correlation	1	.586**	.435**	.542**	.353**	.429**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	341	341	341	341	341	341
Reflection	Pearson Correlation	.586**	1	.542**	.617**	.497**	.541**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	341	341	341	341	341	341
Interactivity	Pearson Correlation	.435**	.542**	1	.409**	.602**	.605**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	341	341	341	341	341	341
Tutor Support	Pearson Correlation	.542**	.617**	.409**	1	.434**	.543**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	341	341	341	341	341	341
Peer Support	Pearson Correlation	.353**	.497**	.602**	.434**	1	.601**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	341	341	341	341	341	341
Interpretation	Pearson Correlation	.429**	.541**	.605**	.543**	.601**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	341	341	341	341	341	341

**. Correlation is significant at the 0.05 level (2-tailed).

From Table 5 shows that there is a significant relationship between relevance and reflection, interactivity, tutor support, peer support and interpretation. Also the table reveals that the correlation coefficient between relevance and reflection, interactivity, tutor support, peer support and interpretation was 0.586, 0.435, 0.542, 0.353 and 0.429 respectively. This indicates relevance and peer support have the weakest relationship, while reflection had the highest relationship with relevance. This can further be explained that online training and professional practice have a strong correlation.

Results from Table 5 with respect to the relationship between reflection and relevance (0.586), interactivity (0.542), tutor support (0.617), peer support (0.497) and interpretation (0.541). This means that reflection had the highest relationship with tutor support and the least relationship with peer support. The interpretation is further that all the relationships are significant at 0.05 level of significance.

On the correlation between interactivity and relevance, reflection, tutor support, peer support and interpretation, Table 5 indicates correlation coefficients of 0.435, 0.542, 0.409, 0.602 and 0.605 respectively. Which shows that the relationship is strongest between interactivity and peer support as well as interpretation; and least between interactivity and tutor support. The result suggests that teacher trainees' online engagement in rich educative dialogue has a strong and positive relationship with the encouragement and support provided by fellow teacher trainees as well as how good they make sense of each other's on-line communications.

Tutor support had a correlation coefficient of 0.542 with relevance, 0.617 with reflection, 0.409 with interactivity, 0.434 with peer support and 0.543 with interpretation as shown in Table 5. Tutor support has the highest correlation with reflection which is how on-line learning stimulated teacher trainees' critical reflective thinking and lowest correlation with interactivity which is the extent to which the students engaged on-line in rich educative dialogue. However, tutor support correlated significantly with all other five subscales at 0.05 level of significance.

Peer support correlated positively with relevance (0.353), reflection (0.497), interactivity (0.602), tutor support (0.434) and interpretation (0.601) from the results in Table 5. This shows that peer support had the strongest relationship with interactivity and interpretation. It then follows that the encouraging support provided on-line by fellow teacher trainees help in rich educative dialogue and good sense of each other's on-line communications. The relationship between peer support was significant across all subscales.

Table 5 also show that interpretation has a positively skewed relationship with relevance, reflection, interactivity, tutor support and peer support with a correlation coefficient of 0.429, 0.541, 0.605, 0.543 and 0.601 respectively. The result show that there was a significant relationship between interpretation and the other five subscales at 0.05 level of significance.

On the whole, the strongest correlations existed between reflection and tutor support (0.617), interactivity and peer support (0.602), peer support and interpretation (0.601) and between interactivity and interpretation (0.605).

Discussions and Conclusions

This study found that access and ability seemed not to be big challenge among the students, however, Sahooa, Mishra and Reddy (2020) asserted that undergraduate students experienced challenges when using the MOODLE-LMS. Concerning these challenges encountered, poor internet connectivity, lack of computer skills, the inability of students owning their personal computers among others may go a long way to hinder the effective employ of MOODLE-LMS. In addition, Ahmad (2010) also found that a person's gender, race and ethnicity, and parental educational background are all associated with use. While other results imply that more than 93% of the respondents can access the internet for their learning in their private time, which was very promising. Nearly 90% of respondents accessed the internet through mobile devices and 67% via wireless technologies (Kamya & Otim, 2019).

This study found no significant differences according to the gender variable with regards to the COLLES scale. It was averred however by Vázquez-Cano, Meneses and García-Garzón (2017) that women tend to prefer attending tutorials with a teacher than men do. But found no evidence of any other gender differences. Moreover, there were no gender differences among students on the experience and frequency of accessing the internet. In contrast, a significant gender gap was found in motives of internet usage. Female students tend to use internet more for academic tools while male students use it more for entertainment (Suana, 2018).

According to Svab (2007), the highest ratings were given to relevance, tutor support and also interpretation, which agrees with the present study except for interpretation. Also, peer support and interactivity received lower ratings as with the present study. Interactivity could be enhanced by preparing more activities which imply planning and evaluation, as these may prove to stimulate critical thinking and discussion among peers. More so, Meneses and García-Garzón (2017), reported that learners resorted to their peers at university than when deciding to wait and ask for assistance from their tutor. Furthermore, Stasinakis and Kalogiannnakis (2017), asserted that indicators of COLLES research achieved high performance (very good performance) at the scales "Relevance", "Tutor Support", "Interpretation", a relatively good performance at the scale "Peer Support". But in scales "Reflective Thinking" and

"Interactivity", there was an inability, which was same for the current study except for reflective thinking which had high replies. It would seem that there is the need to include more face-to-face small group meetings, aiming to have the best acquaintance among participants and develop a team spirit. This suggestion is supported by Bissessar, Black and Boolaky (2019) who found that when a correlational matrix was calculated among the total score for the three variables, it was found that Relatedness and Competence share a significantly strong relationship.

The authors concluded that the digital techniques provided by Moodle through COLLES provide robust options for monitoring and evaluation for male and female teacher trainees. The authors further emphasize the need to provide the needed ICT integration features in a gender inclusive manner for a successful e-learning for university teacher trainees.

Limitations and Recommendations

The course EDU 205 is taught both online and face-to-face, therefore it is unclear if the students were responded strictly to the online environment alone, and this could have false negative or positive effects on their responses even though the survey instruction was clear about the intended study. The study also took a convenience sample which could affect the general extrapolation of its findings to other universities and regions not only in Nigeria, but in Africa in general. Based on the findings of the study, the following recommendations have been made:

1. Teachers in education faculties should be well equipped with online teaching skills to serve the teaming students who seem to have access and abilities to cope with the emerging trend.
2. If time is judiciously allocated students would actually prove their mettle with the use of web based learning platforms.
3. It would seem advisable that universities do not leave e-learning to chance by providing a potent learning environment through fast-paced internet services as well as computer laboratories on campus for use by learners.

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