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A Model to Measure the Impact of Teacher's Student Communication and its Effects on the Student's Academic Performance

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ABSTRACT
Communication in the field of education is an imperative necessity for the transmission of ideas and information in various ways of communication, including oral and written communication, or the use of electronic communication through modern communication techniques to make optimal use and use of ICTs. We need to provide interactive learning features in the Private Colleges environment in Khartoum state because it lacks the benefits of effective education. Because it strengthens the survival of information in the minds of learners significantly by the exchange of views. A statistical analysis of multiple variables based on regression analysis using the Amos technique was used for the purpose of knowing the effect of TSC on academic performance, depending on the factors affecting the educational process (Students' communication with teachers, and the time spent in the Obtaining the content of the educational material). The result opinions of students in the total sample of all the colleges under study were gathered that students who use TSC to communicate with teachers and their colleagues get to the teacher all the time and also get the content of the educational material easily, that is improves from students 'academic performance. The opinions of students in the total sample of all the colleges under study were gathered and showed that; the students who use TSC to communicate with teachers and their colleagues get to the teacher all the time and also get the content of the educational material easily.
Keywords:- ID Academic Performance, Amos technique, TSC, Students, Goodness of Fit.

I. INTRODUCTION

Information and communication technologies (ICT) became the backbone for the current and future services. In the last decade, we witnessed major changes in the methods and operations of everyday life. ICT becomes the actual measure for progress and success of countries at all levels, where it could support communication, collaboration, cognitive development, creativity (Ishaq & Ijaz, 2020; Talukder, & Apu, 2015;).

The use of the TSC application helps to create effective communication in the educational process outside the official working hours between teachers and students.

Using the TSC application enables teachers to master communication skills with students.

The application of TSC positively affects the availability of educational materials longer for teachers and students.

II. LITERATURE REVIEW

Information and communication technology is one of the most important learning tools in education. Also, has a major impact on the quality of education (ASHRAF & GAJANI, 2019; Habes & Ghani, 2018).Technology helps enhance teacher-student interaction (Mew Lionel, 2009;Kaluyu & Ndiku 2020). As such, technology provides a platform by which programs can request student input, statistically analyze student input and help clarify misconceptions that students may have about a topic. On the one hand, technology allows teachers to experiment with pedagogical methods and analyze results to test their teaching effectiveness, but by contrast, teachers argue that technology can distract and possibly make cheating easier in the classroom (Anggeraini, 2018; Eickelmann & Vennemann, 2017). In 2020 a survey on the Impacts of ICT on Students' Academic Performance in Public-Private Sector Universities of Pakistan. The results showed that most students used ICTs in order to improve their essential skills and to carry out their learning effectively with much involvement. it has also been established that the productive use of ICTs has had a substantial significant impact on the students(Ishaq & Ijaz, 2020). In 2020, there were investigations about the impact of information and communication technology on the academic performance of students in the universities of the private public sector in Pakistan, and it was concluded that most of the respondents have enough ICT tools, such as laptops, personal computers in their homes and computers in Their universities, but printing and scanning facilities were less available at home,

but these facilities could be availed of at the university. The majority of students claim that they have used ICT to perform various tasks, such as preparing assignments, classroom activities and planning their lessons more efficiently (Ishaq & Ijaz, 2020). In 2016, the author attempts to highlight the gap in knowledge about the effects of ICTs on education in developing countries by presenting evidence from this region. A multi-level analysis was performed to measure the impact of ICT access and use on the attributes of students, universities and other educators that may affect academic performance. The results provided evidence of a distinctive, albeit negative, impact of ICT on performance. However, these results raise questions about the effectiveness of education policies in Tunisia. The results also indicate that comprehensive university support is necessary to increase the impacts of ICT learning(Karamti, 2016). The Students' experience with the use of selected ICT devices and applications and their academic performance was investigated. In general, the study shows a positive and statistically significant relationship between spending on some selected ICT tools and applications for learning and academic performance. It was also found that the use of email has a positive effect on academic performance. However, it is recommended to intensify the use of the academic activity email interface among students in order to harness its full potential in improving academic performance.

III. APPROACH

For the purpose of achieving the research objectives, a statistical analysis of multiple variables based on regression analysis using the Amos technique was used for the purpose of knowing the effect of TSC on academic performance, depending on the factors affecting the educational process (students' communication with teachers, and the time spent in the obtaining the content of the educational material).

The approach followed in this research depends on two basic approaches, namely the descriptive approach and the analytical approach, as the descriptive approach describes the study of factors affecting the learning process based on qualitative data (questionnaires) in order to identify the various aspects of the study to arrive at results that help in understanding the current reality to develop it in the future by collecting data from East Nile College and information about the educational process, and arranging the data in drawings and tables to study the factors affecting the learning process by estimating two models (a model for students) and thus, knowing the influencing factors depending on indicators of congruence. The analytical approach was also, used by analyzing the data for the study variables using models (modelling of structural equations) to identify the extent of the effect of the proposed model (TSC) on communication in the educational process and to explore modern methods of communication in the educational process between teachers and students that provide effective solutions that are made from Through it, expanding the benefits and applications of ICT and building a model appropriate to teachers 'data and students' data in terms of efficiency and ability to estimate the impact of using TSC on communication in the educational process, while choosing the best model from the comparison between the two models by using the ready-made statistical package represented in the package SPSS Statistics.

IV. DATA COLLECTION

The data collected, through observations, students' questionnaires.

V. THE PROPOSED METHOD

Teacher-Student Communication (TSC) is an Electronic Application that works on mobile devices supporting the Android system, helps teachers and students to achieve effective communication skills in the educational process outside the official working hours, and allows the teacher to add lessons to be displayed by students, and then be discussed according to the time that is predetermined by the teacher in the model (TSC). The app works as a supportive and booster of the educational process so that the teacher puts educational materials from lectures and exams and services e-supported material subjects on the website. It also facilitates communication between teachers and students by Set a schedule for communicating with students. It is goals that seek to achieve them publishing and providing courses, the follow-up energizes students, and the possibility of communication between students and teachers by chat and discuss the matters solving and tests. It also works to stimulate students on participation collective dialogue in lessons without shyness. This site can include on (chat - comment - download lessons) which increases the self-motivation of the students in education. The way the system works (Action): We can divide the users of the system according to their authentication and privileges with respect to their borders and powers, and the users are: System manager, professors, and Students. Each of them has certain powers different from the other and each of them has a username and a password, a user identifies the type of the authentication, is it a manager or teachers or student. With regards to the system, the managers have privileges for their own containing all control on the system which includes: tools to add, modify, delete, define the powers and the data they contain to modify or update. With regard to the teachers, in order to get at the expense of which allows him to enter the system of his own (such as Adam Eshag Adam He is a professor and wants to enter the sites to add lesson) you must follow these steps:

- The professor (Adam) creates an account (entries: full name, email, choose the type of entry as a teacher, password).

- After that, the access grant is granted as a university teacher.

- From the main page, the teacher (Adam) enters your login details to access the page controlling his data ((the lesson can be removed or added, set a time for communication via the application, the information is presented in the form of important notes or words that have been very carefully formulated, and written on presentation slides, such as in PowerPoint, for example, or in video presentations, electronic chats, or videoconferencing)).

- As for students (such as Alaa Ibrahim, she is a student who wants to review some of them.)

Lessons you must follow the following steps:

- Student (Alaa) enters the registration page, where she creates an account for herself (enter: Full name, email, choose the type of entry as a student, password)), allowing him to roam the site.

- The student (Alaa) enters the registration data (username and password) from the main page of the website Where the student page is accessed to download lessons and to know the time the teacher is on the application to communicate and inquire about questions).

VI. RESULT ANALYSIS AND DISCUSSION

- Analysis, evaluation, and interpretation of the data collected through the questionnaire from 80 respondents who represent the students' community in East Nile College.

- In order to come up with accurate results as much as possible, the researcher was keen to diversify the study sample in terms of its inclusion on the following:

- 1- Individuals from various colleges

- 2- Individuals from the different semester (semester)

- The following is a description of the study individuals according to the characteristics of the above variables of (the respondents).

The college:

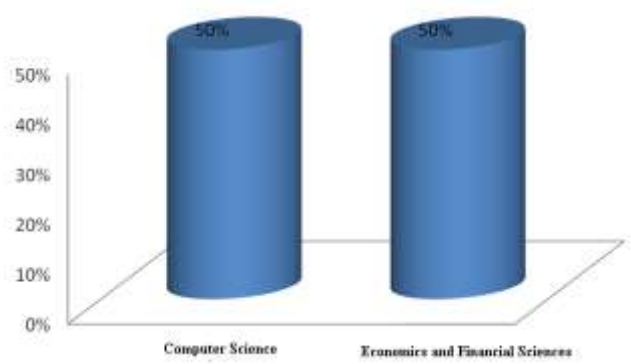
Table No. (1-1) and Fig. (1-1) show the frequency distribution of the study sample according to the college

Table No. (1-1)

College	Frequency	Percentage
Computer Science	40	%50
Economics and Financial Sciences	40	%50
Total	80	%100

Source: Researcher's preparation, from the field study, spss program, 2019

Figure (1-1)



Source: Researcher's preparation, from the field study, spss program, 2019

It is clear from Table No. (1-1) and Fig. No. (1-1) that the study individuals in the faculty variable, the College of Computer Science, totaled (40), and by (50%), We find that the College of Economics and Financial Sciences numbered (40), and the percentage (50%).

The semester:

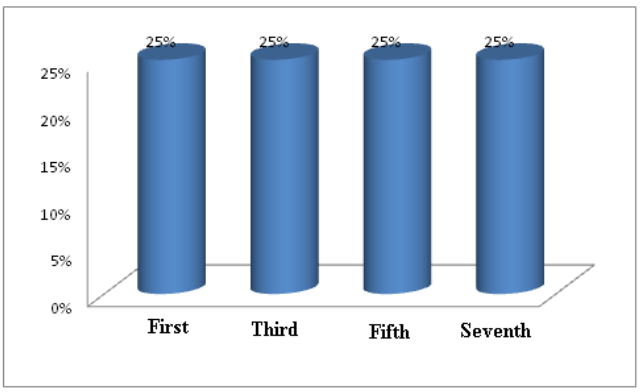
Table No. (1-2) and Fig. No. (1-2) show the frequency distribution of the study sample according to semester

Table No. (1-2)

Semester	Frequency	Percentage
First semester	20	%25
Third semester	20	%25
Fifth semester	20	%25
Seventh semester	20	%25
Total	80	%100

Source: Researcher's preparation, from the field study, spss program, 2019

Figure (1-2)



Source: Researcher's preparation, from the field study, spss program, 2019

It is clear from Table No. (1-2) and Fig. No. (1-2) that the study members are in the variable of the semester, the students of the first semester numbered (20) and the percentage (25%). (25%), and we find that the number of students in the third semester reached (20) at a rate of (25%), and we find that the number of students in the fourth semester reached (20) and at a rate of (25%).

VII. STABILITY AND STATISTICAL VALIDITY

The reliability of the test is intended to give the scale the same results if it is used more than once under similar conditions, and reliability is also known as the extent of accuracy and consistency of the measurements that are obtained from what the test measures and validity are a measure used to know the degree of validity of the respondents through their answers on the scale Specific, truthfulness is calculated in many ways, the easiest of which is that it represents the square root of the reliability coefficient, and the value of both honesty and reliability ranges between zero and the correct one.

Where the researcher calculated the reliability coefficient of the scale used in the questionnaire through the Cronbach's Alpha equation

Table (3) Reliability statistics

Cronbach's Alpha	N of Items
0.232	8

From Table (3) there are 8 questions in the questionnaire that are tested for reliability, which is validity and reliability, and that the total value of the Cronbach's thousand is equal to 0.232, which is very weak.

Table (4) Item-Total Statistics

Questions	Cronbach's Alpha if Item Deleted
Q_{11}	0.232
Q_{12}	0.252
Q_{13}	0.232
Q_{21}	0.239
Q_{22}	0.101
Q_{23}	0.265
Q_{31}	0.127
Q_{32}	0.184

Through Table (4), we find that all the values of the Cronbach alpha coefficient for these questions are less than the total value of the Cronbach alpha coefficient, which equals 0.232. Therefore, these questions must remain in the questionnaire because it increases the reliability and reliability of the scale. Except for questions Q_{12} and Q_{23}, they double the scale because their value (0.252) and (0.265), respectively, is greater than the total value of the Cronbach's alpha coefficient (0.232).

VIII. THE STATISTCAL METHODS USED

To achieve the objectives of the study and to verify its hypotheses, the following statistical methods were used:

- Structural Equation Model
- Estimation theory (Estimate)
- Standard error of regression weights (S.R)
  It is the percentage of error in the relationship or regression between the two factors (Influential and affected).
- Critical ratio regression weights (C.R)

It is the critical and accurate ratio of the value of the regression or the relationship between the two factors (Influential and affected), which determines the success or rejection of the hypothesis through that the result in order to be accepted must exceed 1.96, and the C.R is calculated through CR = SE / Estimate.

- Goodness of Fit :
  - Root Mean Square Error of Approximation (RMSEA).
  - Comparative Fit Index (CFI).
  - Tucker-Lewis Index (TLI).

IX. PRESENTATION AND DISCUSSION OF STUDY RESULTS:

The following is an analytical interpretation and discussion of the findings regarding different points related to the objectives and hypotheses of the study. Each item in the questionnaire is analyzed statistically and discussed.

One of the most important objectives of the study is how to verify evidence that students communicate with teachers using TSC to help improve the academic performance of East Nile College students and evaluate and evaluate the educational process in terms of time spent through influencing variables students' communication with the teacher and the time spent on evaluation, assessment and academic performance. As it has been explained in Figure 3 below:

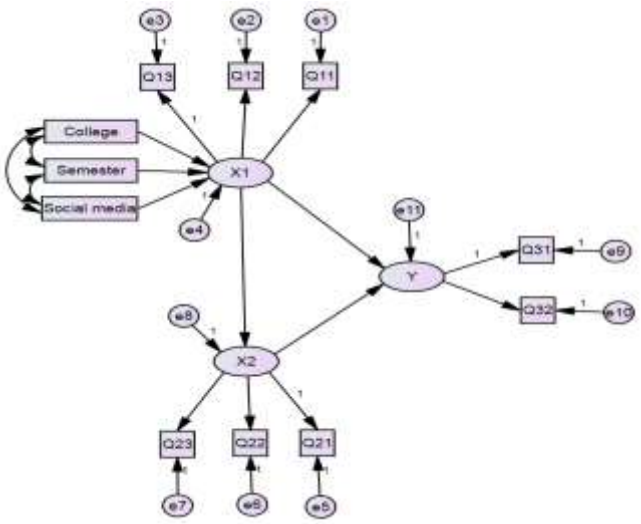


Figure (3) the theoretical model for studying students

In the theoretical model shown in Figure (3), the variables are:

X_1: Student communication with the teacher is a latent variable that is measured by three variables, and three measured variables affect it (observation), which are the college, semester, and the way of communicating with the teacher.

X_2: The time taken in the evaluation and assessment is measured by three variables.

Y: Academic performance measured by two variables. And Table (5) following shows the elements of measuring variables.

(Q11) The teacher allows a specific time to communicate during the official working hours?
(Q12) The specific time to communicate with the teacher during the official working hours needs to be scheduled?
(Q13) Communication with teachers during the evening periods helps in getting the teacher all the time?
(Q21) How much time is allocated for each student to communicate with the teacher during the official working hours?
(Q22) How long does it take to get the course content Due to the use of ICT in the educational process?
(Q23) How long does the Evaluation process take?
(Q31) How do you get the content of the educational materials in the traditional method?
(Q32) Getting educational material content is costly?
Figure (3) also shows the assumptions of the students' model, which are:
H1: X1 Student communication with the teacher has an impact on Y academic performance.
H2: X2 the time spent in assessment and evaluation has an impact on Y academic performance.
H3: X2 the time taken in assessment and evaluation mediates the relationship between X1 student communication with the teacher and Y academic performance.

Table (5) elements for measuring the variables of the study model (students 'model)

Variables	Variable type	Measurement elements (questions)
X1	Independent	It is measured using three items in the questionnaire
X_2	Independent	It is measured using three items in the questionnaire
Y	Follow	It is measured using two items in the questionnaire

And by conducting statistical analysis to estimate the path of effects between the parameters of the variables in the students' model, we obtain the results shown in the model shown in Figure (4) the following:

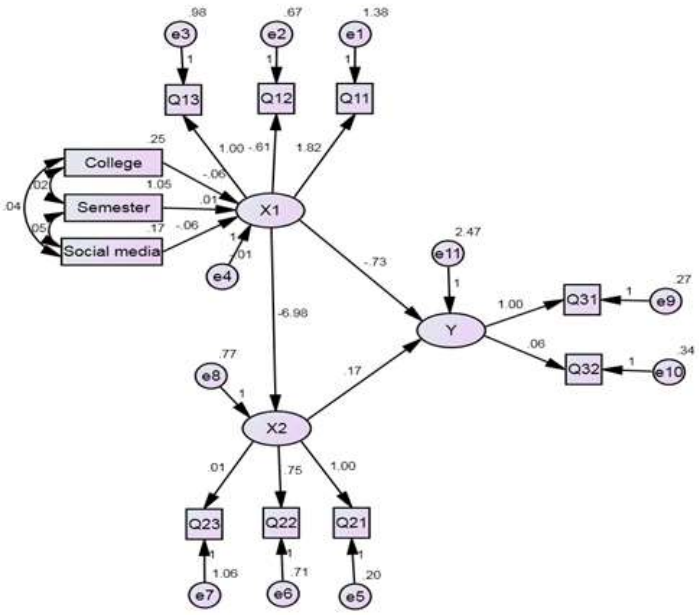


Figure (4) Estimating the coefficients of the regression path between the variables of the student model.

Table (6) Covariance between the measured variables for the student model

Variable	Relation	Variable	Estimate	S.E.	C.R.	Result
Semester	<-->	Social media	0.05	0.05	1.07	Not-Significant
College	<-->	Social media	0.04	0.02	1.57	Significant

Through Table (6), we find that the Covariance between the two variables, semester and communication method, amounted to 0.05, meaning that they change together by 0.1% with an error of 0.05, and that this relationship is not significant, and we find that the Covariance between the two variables overall and the method of communication reached 0.04 i.e. They change together by 0.4% with an error of 0.02 and that this relationship is significant.

Table (7) Correlations relations between the variables measured in the Student Model

Variable	Correlation	Variable	Estimate
Semester	<-->	Social media	0.122

Variable	Correlation	Variable	Estimate
College	<-->	Social media	0.180

From Table (13), we find that the values of the correlations between the measured variables (seen) Social media and Semester are 0.122, and this indicates that the method used has no effect on the classroom. And that there is no overlap or similarity, that is, there is no overlap problem between the measured independent variables

Table (7) shows the results of the path of regression coefficients (beta) for each external variable (independent) dependent on an internal variable (dependent) extracted from Figure (4).

Table (7) estimating the regression coefficient between variables and its statistical significance, students' model

Table (7) Estimate of regression weights:

Variable	Path	Variable	Estimate	S.E.	C.R.	P	Results
X_2	-->	X_1	-6.983	9.671	-0.722	0.470	Not-Significant
Y	-->	X_2	0.172	0.543	0.316	0.752	Not-Significant
Y	-->	X_1	-0.727	0.814	-0.893	0.372	Not-Significant

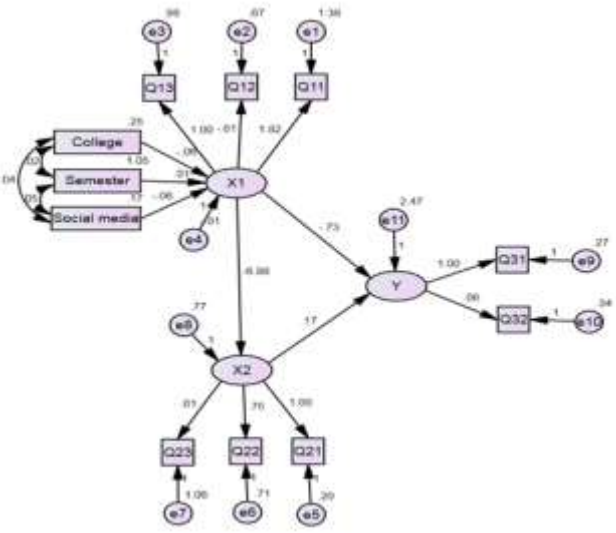
Table (7) we find that the value of the relationship between the two variables X_1 student communication with the teacher and X_2 the time spent in evaluation and evaluation (influential and affected) is equal to 6.98- and this is evidence that students' communication with the teacher has an impact on the time spent in the evaluation And evaluation, which means when students' communication with the teacher increases in one unit, the time spent in evaluation and evaluation decreases by 6.98 and a large standard error of 9.67, and that this relationship between the two variables is not significant because the acceptance rate is CR 0.72 - less than 1.96 and the P-value (0.47) is greater than the level of significance 0.05.

We note that the value of the relationship between the two variables X_2, the time spent in evaluation and evaluation, and Y academic performance (influential and affected) is 0.17, and this is evidence that the time spent in evaluation and evaluation has an impact on academic performance, and this means when the time spent in Evaluation and evaluation are one unit of time. Academic performance increases by 0.17 and with a standard error of 0.54. This relationship between the two variables is not significant because the acceptance rate CR 0.32 is less than 1.96 and the P-value (0.75) is greater than the level of significance 0.05.

We note that the value of the relationship between the two variables X_1 student communication with the teacher and Y academic performance (influential and affected) is equal to 0.73 - and this is evidence that X1 students 'communication with the teacher has an impact on academic performance, which means when students' communication with the teacher increases alone One, the academic performance decreases by 0.73 and by a standard error of 0.81 and that this relationship between the two variables is not significant because the acceptance rate CR 0.89 is less than 1.96 and the P-value (0.37) is greater than the significance level 0.05.

Through Figures (4) and Table (7), we find that the equation of the estimated student model is:

$$Y = -0.73X_1 + 0.17X_2 \ldots\ldots\ldots\ldots\ldots\ldots (2)$$



Figures (4)

Table (9) Indirect Effects of the Student Model Variables

Variable	Social media	Semester	College	X_1	X_2	Y
X_1	0.000	0.000	0.000	0.000	0.000	0.000
X_2	0.406	-0.050	0.399	0.000	0.000	0.000
Y	0.112	-0.014	0.110	-1.199	0.000	0.000

Table (9) shows the extent of the relationship value of the variable with another variable in the indirect way. We find the value of the relationship between X_1 and the variable Y equal to -1.12. This means that the direct relationship between X_1 students' communication with the teacher and the variable Y academic performance is weak in value and less than the indirect relationship. Therefore, the variable X_2 is the time spent in evaluation and evaluation mediating the relationship between X_1 students 'communication with the teacher and the variable Y academic performance.

Modification Indices(MI)

Table (10) Indicators for modifying the students 'model

To	Relation	From	M.I.	Par Change
Q_{23}	<---	Social media	5.903	0.675
Q_{23}	<---	Q_{11}	6.307	-0.252
Q_{11}	<---	Q_{23}	4.477	-0.248
Q_{12}	<---	Semester	6.010	0.215

From Table (10) we can notice that there is a strong relationship between the questions Q_{11}: The teacher allows a specific time to communicate during the official working hours? And question Q_{23}How long does the Evaluation process take? Where M.I. It is equal to 6.31, which means that creating a new arrow (path) connected between the two variables directly will increase the strength of the theoretical framework (the model) and its effectiveness in predicting the variables that affect academic performance and the improvement that will occur in reading the results by adding this relationship of 0.25.

We also note that there is a relationship between Semester and Question Q_{12}: The specific time to communicate with the teacher during the official working hours needs to be scheduled? Where M.I. It is equal to 6.01, which means that creating a new arrow connected between the two variables directly will increase the strength of the theoretical framework (the model) and its effectiveness in predicting the variables that affect academic performance and the improvement that will occur in reading the results by adding this relationship to 0.23.

And to note that there is a strong relationship between Social media and Q_{23} How long does the Evaluation process take? Where M.I. It is equal to 5.9, which means that creating a new arrow (path) connected between the two variables directly will increase the strength of the theoretical framework (the model) and its effectiveness in predicting the variables that affect academic performance and the improvement that will occur in reading the results by adding this share by 0.66.

Matching the quality of the Goodness of Fit student model

The following table shows the results of the model matching quality measures:

Table (11) Goodness of fit indices for students

Measures	Values	Fit index
RMSEA	0.09	A good match
GFI	0.89	A good match
TLI	0.40	Weak Match

Through Table (11), we find that the RMSEA value is equal to 0.09, less than the value 0.05, which indicates a good match, and that the CFI value is equal to 0.89 and that this value is less than 0.95 indicates a suitable match. As for the TLI value of 0.40, this value is weak. This indicates that the quality of the match is good.

X. CONCLUSION

The current study came up with the following results:

For the optimal use of information and communication technology and benefiting from it, we find that we need to provide the advantages of interactive learning in the university environment because it lacks the benefit from the characteristics of effective learning because it encourages learning, and strengthens the retention of information in the minds of learners significantly due to the exchange of views, and works to Strengthening communication and discussion skills between students and teachers, and this leads to improving academic performance.

The study recommended the necessity of regulating the use of the ICT in teaching through an organized institutional effort and providing the necessary elements to ensure the success of this method, including the provision of technical and financial support.

Also, the results of the study showed East Nile College students possess the features, required skills and knowledge necessary for the use of ICT, in addition to the fact that the educational process currently followed in Sudanese universities has developed and became suitable for communicating through ICT.

And that the model (TSC) provides the student with access to the teacher all the time. Also, and facilitates access to the educational material easily and in a short time.

REFERENCES

1. Anggeraini, Y. (2018). Interactive Teaching: Activities and the Use of Technology in EFL Classroom. Language Circle: Journal of Language and Literature, 13(1).
2. ASHRAF, F., & GAJANI, G. A. G. (2019). A STUDY ON THE EFFECTS OF USE OF ICT ON STUDENT'S ACADEMIC ACHIEVEMENTS AT UNIVERSITY LEVEL AMONG UNDERGRADUATE FEMALE STUDENTS'IN SIALKOT. Pakistan Journal of Social and Behavioral Sciences (PJSBS), 1(1), 43-59.
3. Eickelmann, B., & Vennemann, M. (2017). Teachers 'attitudes and beliefs regarding ICT in teaching and learning in European countries. European Educational Research Journal, 16(6), 733-761.
4. Habes, M., Alghizzawi, M., Khalaf, R., Salloum, S. A., & Ghani, M. A. (2018). The relationship between social media and academic performance: Facebook perspective. Int. J. Inf. Technol. Lang. Stud, 2(1), 12-18.
5. Ishaq, K., Azan, N., Zin, M., Rosdi, F., Abid, A., & Ijaz, M. (2020). The impact of ICT on students' academic performance in public private sector

universities of Pakistan. International Journal of Innovative Technology and Exploring Engineering (IJITEE), 9(3), 1117-1121.

6. Ishaq, K., Azan, N., Zin, M., Rosdi, F., Abid, A., & Ijaz, M. (2020). The Impact of ICT on Students' Academic Performance in Public Private Sector Universities of Pakistan. International Journal of Innovative Technology and Exploring Engineering, 9(3), 1117–1121. https://doi.org/10.35940/ijitee.c8093.019320
7. Kaluyu, V., & Ndiku, J. M. (2020). Pedagogy and Information Technology Integration, As Strategies for Improving Academic Performance in Stem Subjects: A Critical Literature Review. Pedagogy, 11(21).
8. Karamti, C. (2016). Measuring the impact of ICTs on academic performance: Evidence from higher education in Tunisia. *Journal of Research on Technology in Education*, *48*(4), 322-337.
9. Mew, L. Q. (2009). Online social networking: a task-person-technology fit perspective (Doctoral dissertation, The George Washington University).
10. Talukder, M. S., Alam, M. J., & Apu, M. A. I. (2015). THE IMPACT OF ICT ON STUDENTS'PERFORMANCE: A CASE STUDY ON UNDERGRADUATE UNIVERSITY STUDENTS. Manarat International University Studies, 4(1), 137-147.
11. Nketiah-Amponsah, E., Asamoah, M. K., Allassani, W., & Aziale, L. K. (2017). Examining students' experience with the use of some selected ICT devices and applications for learning and their effect on academic performance. Journal of Computers in Education, 4(4), 441-460.