Sudan University of Science and Technology

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Faculty of Computer Science & Information Technology

A Model to Measure the Impact of Teacher-Student Communication and its Effects on the Educational Process

نموذج لقياس أثر التواصل بين المعلم والطالب وتأثيراته على العملية التعليمية

A thesis submitted by:

Mohamed Ibrahim Alsaid Hassan

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بسم الله الرحمن الرحيم

الآيـــــــــــة

بِسْمِ اللَّـهِ الرَّحْمَـٰنِ الرَّحِيمِ

قال تعالى:

قَالَ لَهُ مُوسَىٰ هَلْ أَتَّبِعُكَ عَلَىٰ أَن تُعَلِّمَنِ مِمَّا عُلِّمْتَ رُشْدًا ﴿66﴾

صدق الله العظيم

سورة الكهف

DEDICATION

For my mother and father,

My dear sisters.

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Thanks to Allah who enabled me to complete this research, and prayers and peace be upon the one who was sent as a mercy to the worlds.

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ABSTRACT

The revolutionary developments in the field of information and communication technology, especially the disciplines related to computers, mobile phones, and the Internet - have brought a renaissance in educational technology, and these web 2.0 technological applications aim to improve the educational process. Despite the advantages offered by Web 2.0 technologies in communicating in the learning process between the student and the teacher, it lacks the ability to schedule a pre-set time by the teacher to communicate with students. Therefore, the researcher developed a model TSC (Teacher-student communication) for communication between the teacher and the student that allows scheduling a time in advance for the communication, also enabling teachers to upload files to students and informing them of the latest events by placing them like a bulletin board, and the TSC model allows connecting students with each other through the chat screen. The descriptive approach was used to describe the study of factors affecting the educational process, and the study data were obtained using questionnaires for students and teachers 80 and 40, respectively. And the analytical approach of structural equations, path analysis, and building a better model through AMOS technology. One of the most important results of the research is that the students ’communication model with teachers in the educational process has good efficiency, and the results of the study showed that students in private colleges in Khartoum state possess the required features, skills, and knowledge to use information and communication technology, in addition to the current educational process in Sudanese universities it has evolved and become suitable for communication through information and communication technology. The study recommended the necessity to regulate the use of information and communication technology in teaching through an organized institutional effort and to provide the necessary elements to ensure the success of this method, including the provision of technical and financial support.

المستخلص

أحدثت التطورات الثورية في مجال تكنولوجيا المعلومات والاتصالات ، وخاصة التخصصات المتعلقة بأجهزة الكمبيوتر والهواتف المحمولة والإنترنت - نهضة في تكنولوجيا التعليم ، وتهدف تطبيقات الويب 2 التكنولوجية هذه إلى تحسين العملية التعليمية. على الرغم من المزايا التي توفرها تقنيات الويب 2 في التواصل في عملية التعلم بين الطالب والمعلم ، إلا أنها تفتقر إلى القدرة على جدولة وقت محدد مسبقًا من قبل المعلم للتواصل مع الطلاب. لذلك ، طور الباحث نموذج TSC (التواصل بين المعلم والطالب) للتواصل بين المعلم والطالب والذي يسمح بتحديد موعد مسبق للتواصل ، وكذلك تمكين المعلمين من تحميل الملفات إلى الطلاب وإبلاغهم بآخر الأحداث عن طريق وضع مثل لوحة الإعلانات ، ويسمح نموذج TSC بربط الطلاب ببعضهم البعض من خلال شاشة الدردشة. تم استخدام المنهج الوصفي لوصف دراسة العوامل المؤثرة في العملية التعليمية ، وتم الحصول على بيانات الدراسة باستخدام استبيانات للطلاب والمعلمين 80 و 40 على التوالي. والنهج التحليلي للمعادلات الهيكلية ، وتحليل المسار ، وبناء نموذج أفضل من خلال تقنية أماوس . من أهم نتائج البحث أن نموذج تواصل الطلاب مع المعلمين في العملية التعليمية له كفاءة جيدة ، وأظهرت نتائج الدراسة أن الطلاب في الكليات الخاصة بولاية الخرطوم يمتلكون الخصائص والمهارات والمعرفة المطلوبة. لاستخدام تكنولوجيا المعلومات والاتصالات ، بالإضافة إلى العملية التعليمية الحالية في الجامعات السودانية لقد تطورت وأصبحت مناسبة للتواصل من خلال تكنولوجيا المعلومات والاتصالات. وأوصت الدراسة بضرورة تنظيم استخدام تكنولوجيا المعلومات والاتصالات في التدريس من خلال جهد مؤسسي منظم وتوفير العناصر اللازمة لضمان نجاح هذه الطريقة بما في ذلك توفير الدعم الفني والمالي.

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Chapter One Introduction

1.1 Overview

With the beginning of the third millennium, the world witnessed an unprecedented boom in the field of information and communication technology, which had a great impact on the development of the educational process. It also led to the use of new methods and tools to keep pace with modern technologies and better use in the process of teaching and learning. The preparation of an academically qualified and professionally trained teacher in the information and communication revolution is an important step in advancing any educational system (Zhu, 2021).

Communication in the field of education is an imperative necessity for the transmission of information in various ways of communication, including oral and written communication, or the use of electronic communication through modern communication techniques that have proven to be able to facilitate communication between all parties involved in the educational process (Gafiatulina, 2020).

The concept of "Instructional Communication", which can be defined as: "The process of interaction of common verbal and non-verbal symbols between the teacher and the learner where the first provides educational experiences (cognitive, skills and emotional) through the appropriate channels in order to achieve satisfactory educational products". That the skills for analog communication have been developed for ages; however, the ICT options for communication just arrived on the evolutionary time scale and competencies to communicate with students, colleagues, management, and family (Rogers, 2000).

To make optimal use and use of ICTs, this is done through face-to-face interaction and engaging learners in the educational process beyond passive recipients. We need to provide interactive learning features in the university environment at East Nile College because it lacks the benefits of effective learning. Because it encourages learning, strengthens the survival of information in the minds of learners significantly by the exchange of views, and works to improve academic performance via communication and discussion between teachers and students.

In light of the above, for the sake of this Ph.D. study, a model (Teacher-Student Communication TSC) to help the teachers and students achieve educational communication skills, has been designed. TSC it is an electronic application (social network) that works on Android-based mobile devices that 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 opened by students, in order to be discussed according to the time that is predetermined by the teacher in the model (TSC).

1.2 Social Motivation

Through my work at the number of university in the state of Khartoum, I noticed that some of the university teachers do not deal with modern technology. Also, there is no actual practice of ICT in the instruction. They only use it as an additional use in the teaching process, For example, in the case of announcing an amendment to the time of a lecture or meeting, various social media are used.

This has led to a rise in questions about the impact of Social Networks (SNs) on academic performance and the possibility of using them as an effective communication tool. In this research, the researcher will examine some of the important issues related to the ICT, and how it affects the students and teachers in the educational process.

1.3 Statement of the Study Problem

Several studies and reports issued in recent years have shown the importance of information and communication technology in the field of education, as UNESCO considered it an essential tool for spreading knowledge in societies, and its adoption in the educational system helps to improve the quality of education.

Social networks found a lot of importance and became one of the most-visited sites, despite the spread of these sites and their benefits in linking communities with each other and there are some features that may help to make the communication between the teacher and students more smoothly and within the limits of educational purposes. However, it contains characteristics that may not be useful at the level of the educational environment such as:

- These sites are public and allow everyone to enter.

- Such sites also, use the personal data of the user for commercial purposes, which are contrary to privacy.

So, the research problem was the following:

- The lack of a model that allows the teacher to determine the appropriate time to communicate with students outside official working hours in the educational process.

- There is no model that allows students to choose the appropriate time to communicate with teachers in the educational process.

1.4 Research Hypotheses

1. Using the TSC model encourages students of Khartoum State private colleges to communicate with teachers in the educational process.
2. Using the TSC model enable teachers to communicate with students of Khartoum State private colleges in the educational process.
3. The use of the TSC model in student-teacher communication has an impact on educational process facilitation.

1.5 Research Objectives

1. To build a model for communication between students and teachers (TSC) allow scheduling meetings between students and teachers.
2. To facilitate the communication process between the teacher and student through use the TSC in the educational process.
3. To recognition the effectiveness of communication between the student and the teacher on the educational process facilitation in using the TSC model.

1.6 Limitations of the Study

The extent of the Study will be within the framework of providing communication possibilities between the students and the teachers, through making a model (TSC Teacher Student Communication) based on mobile applications. In the experience of practical research objectives, we will focus on students of East Nile College - School of Economics and Financial

Sciences - School of computer Sciences, during the academic year 2018-2019 are the sample of the study.

1.7 Contribution

The main contribution of this study are its attempt to achieve more effective communication between students and teachers outside office hours and to build a model for students' communication with teachers, raising educational communication skills in dialogue and discussion between students and teachers, by dealing with the proposed model (TSC) as an educational tool.

1.8 Methodology of the Study

The approach followed in this research utilizes two basic approaches, namely the descriptive approach and the analytical approach. The descriptive approach describes the study of factors affecting the educational 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. Data will be collected from East Nile College students and teachers. The data will be arranged in drawings and tables to study the factors affecting the educational process by estimating two models (a model for teachers and a model for students) and thus knowing the influencing factors depending on the indicators of congruence.

For the purpose of analyzing the data of the variables of the study, the analytical approach has been used, which is the modeling of structural equations for the sake of identifying the effect-size of the proposed model (TSC) on the communication in the educational process. These modeling of structural equations will explore the modern methods of communication in the educational process between teachers and students to provide an effective solution.

1.9 Thesis Structure

This study contains five chapters. Table (1-2) illustrates the approximate scheduled time to finish the study; it also gives a description of the contents of every chapter.

Table 1-1: Thesis structure

Chapters	Descriptions	Time

One	**Introduction**: This chapter include Overview, problem statement, research hypotheses and, research objectives, limitations of the Study, contribution, Methodology of the Study, and thesis Structure.	January 2018 - August 2019.
Two	**Literature Review**: This chapter include illustrates the background of the following concepts traditional education, Educational process, Elements of the educational process, Contemporary teaching principles, means of communication in the field of education, Concept of communication, Educational commutation, classroom communication and student relationship, communication between teachers, relationships and contacts between students and teachers, and presents related work.	January 2019 - August 2019.
Three	**Research methodology**: It provides information about the subjects, the methods of sampling, and information about the techniques of data collection, analysis, and interpretation.	August 2019 - November 2019.
_____	**Construction of the Prototype**	November 2019 - February 2020.
Four	**Data Analyses and discussion**: This chapter targets the analysis, evaluation, and interpretation of the data collected.	February 2020 - August 2020.
Five	**Conclusion**: This chapter gave the final conclusions for conducting communication between teacher and student and its effects on the educational process and suggested recommendations for further research.	August 2020 - January 2021.

Chapter Two Literature Review

1.10 Theoretical background

The current era has become dependent on modern technologies in education, and knowledge has become not only the process of transferring information from the teacher to the student but also how the student receives this knowledge as the focus of the educational process, where the education has become interactive and participatory. Information and Communication Technology (ICT) brings dynamic changes to society. They influence all aspects of life. The influences are being felt more and more often in education (Mikre, 2011; Lazar, 2015).

1.10.1 Educational process

In the educational process, the communication between the student and the teacher can be verbal or written. Both interlocutors and participants can express their emotions. A student can express emotions regarding the relation with the content of the lesson, and toward the kind of knowledge acquired. A teacher can express emotions related to the evolution of the student during the educational process. The educational process at Higher Educational is a set of foundations surrounded by conditions and rules that cannot be dispensed with, all of which ultimately aim to achieve educational goals and deliver messages to students (Olimovich, 2020).

1.10.2 Elements of the educational process

To complete the educational process, there must be a set of elements, that is known as the elements of the educational process, and the relationship between the quality of the educational elements and the quality of performance and results is positive, and the following is a detail of the most important elements of the educational process (Jabbarova, 2020):

1.10.2.1 The teacher and the student: There can be no educational process without there being an element of teacher and student who wants to learn and the teacher must take into account the student's specific levels, and possess the capabilities that qualify him to teach them the prescribed subjects.

1.10.2.2 Educational methods: Educational methods are considered one of the most important elements of the educational process. They make students learn creatively and intelligently, thus achieving the desired educational goals in the fields of knowledge and skills.

1.10.3 The foundations of a successful educational process

The presence of the elements of the educational process is not sufficient. Rather, these elements must be characterized by a set of essential basics through which it can be said that the educational process is successful, and these foundations are represented in the following (Clark, 2018; Razaque, 2017):

1.10.3.1 Taking into account individual differences: it is the difference in the psychological and mental qualities and characteristics of individuals, and in order for the educational process to be characterized as successful; the teacher should diversify training methods such as (dialogue - role-playing - story - brainstorming - problem solving).

1.10.3.2 Dialogue and discussion: The teacher should give the student the opportunity to express himself and his personal views on a topic, as well as open the field for discussion. This method helps to develop the personality of the learner in knowledge and skills

1.10.4 Contemporary Teaching Principles

Contemporary teaching aims as a positive process that is equivalent to the success of students by satisfying their desires and achieving their aspirations, not to punish them psychologically, physically, or pedagogically with failure and failure as is the case in traditional teaching and learning practices.

Contemporary teaching takes care of the principle of uniqueness in its interventions and practices, as it employs in this regard the following concepts (Carneiro, 2019):

1.10.4.1 The teacher's use of various educational means that motivate students to participate, and through which he decides the type and amount of student learning and the effectiveness of the educational process in general.

1.10.4.2 The teacher's permission for the students to each play the role that corresponds to their characteristics and abilities and then chooses the educational activity that is compatible with these characteristics and abilities.

1.10.5 Means of communication in the field of education

1.10.5.1 Improving the communication process: Communication using technology is faster than the traditional pattern, where the student can get the teacher and educational material easily and quickly.And also, the technology-facilitated the teachers' communication with students and parents, which made the educational system more smooth.

1.10.5.2 Increase the duration of information retention: It has been shown that the interaction achieved by the means of communication between students and with electronic devices in the classroom makes the information they receive enjoyable for them, and this helps to retain the information more efficiently and effectively in the long term.

1.10.6 Concept of communication

Communication might be defined as the transfer of – facts, information, ideas, suggestions, orders, requests, grievances, etc. from one person to another so as to impart a complete understanding of the subject matter of communication to the recipient thereof; the desired response from the recipient to such communication.

1.10.7 Educational communication

Educational communication is the process of transferring educational ideas and information from the school principal to the teachers or vice versa, or from a group of teachers to another group, or from the school to the educational administration and vice versa, by means of a written or oral method, which leads to unity of efforts to achieve the school's goals in order to achieve its mission.

1.10.8 Objectives of educational communication:

1.10.8.1 Providing teachers with various news, especially social ones, to support human ties between workers.

1.10.8.2 Providing the future with new experiences, skills, and new concepts in line with change and development in the world, increasing social interaction between teachers, and consolidating the human dimension between them.

1.10.8.3 Create a degree of job satisfaction and harmony and get rid of various pressures.

1.10.9 Classroom communication and student relationship

The relationship that develops between students and connects them with each other is clearly visible through social and human contacts, which are evident in the educational and social interactions and activities that they carry out inside or outside the classroom, that is, inside the educational institution. Where it is possible that such interaction and communication be positive, and takes manifestations of love, cooperation, participation and competition that are based on honest work and production. Such interaction can be negative and dominated by hatred, alienation, quarrels and destructive rivalries. It is also possible for the relationship between students to be established and determined on the basis of their chronological ages, different stages of development, and the important events and aspects of their development, as well as their mental and psychological needs, which all depend on the type of communication that occurs between them, negative or positive, verbal or non-verbal, Influential or non-influential, in this interaction they try to satisfy these needs in various ways and methods available to them, which lead to the achievement of their personal social and communication goals. For example, students need to acquire knowledge and obtain information through the questions that are asked during the communication that takes place between them themselves in the classroom educational situations, which aim to examine things and do research in them. Also, in most cases of communication between them, they seek to assert themselves and feel their appreciation and appreciation of the work that they do, which in turn leads to gaining the satisfaction of the other parties from the communication process and their admiration for these works, through which they reach a sense of security, reassurance and belonging to the groups with which they live and they interact with her on a permanent basis, also this contact helps

them to form relationships and friendships, which are necessary and indispensable and that also helps them to do physical movements and exercises and play, which is one of the characteristics of early childhood and the other stages that follow.

1.10.10Communication between teachers

At the beginning of each new academic year, in which most students, if not all, are raised to higher grades, during this period all files, information and personal, attainment and behavioral reports that are based on the various communications that occur between students with each other or with teachers, all these files are given. To the new class teacher [or supposed to happen every year] who, in turn, undertakes or is supposed to conduct a full study of these files and reports so that he can reach a clear picture of his students for the new year, in terms of their academic and achievement level, their interactive abilities and their interaction with others, even he can start a new academic year, and he is reassured about building his new plan, especially when the information he has is based on objective foundations, which talk about students 'behavior, communication skills, and distinct mental abilities - if they have such abilities - and their educational level in the educational materials and subjects that they have learned. In the past year, in addition to the possibility that it includes accurate information about the subject that students learned from the educational curriculum in all learning topics. The process of preparing and fully supplying all files and reports gives teachers who work together the opportunity to be as a team working jointly in planning teaching and learning and making contact with each other and with students and other workers, and this work provides each of them with the necessary and necessary information to carry out their future work, which depends on what other teachers provide him with information about new students, how true and realistic it is, especially when discussing students' conditions during the school year.

1.10.11Relationships and contacts between students and teachers

Communication, communication and the formation of relationships that occur and develop between students and teachers, in most cases depend on the process of educational give-and-take, where the teacher gives, teach and communicate with his students inside the classroom, and students from their side take all the information that is given to them by the teacher and receive all The messages that are sent to them while the teacher explains the lesson material, which is considered the content of the message that the teacher sends to them through

a means of communication or a communication channel through which it is possible to receive the message well, which means understanding in most cases. If some kind of lack of understanding of the topic of the message occurs, the teacher can be asked to refer to it again, meaning that the communication here is two-way and the teacher gets from him the reinforcement directly that enables him to make a correct assessment of the extent of understanding and assimilation of the information that was sent. This means fast adjustment. This means that the relationship between students and teachers can be defined on the basis of mutual respect and teachers' sympathy for students. The meaning of the teacher's role in the educational tender is for this teacher to be an educational and teaching leader. A wise and rational leader is one whose interaction with members of his group is positive and leads to the development of their abilities and works to renew their energies in addition to his work and interest in achieving their goals.

It is possible to achieve the correct professional, educational and social communication relations between the teacher and students in various ways and methods, including the following

1- The frequent interaction and communication between the student teacher in the classroom, through the teacher's use of teaching and communication methods that included the student's continuous participation with the teacher and students while discussing some scientific aspects. The same applies to interaction and communication in the school yard and other areas of activity, so that the teacher can follow up their activities and are able to appreciate their efforts and encourage them to continue by providing advice to them at the appropriate time.

2- Relationships and contacts between student teachers increase as a result of the increased availability of opportunities for conversations and discussions between them on important topics that are concerned with all workers inside and outside the school.

3- Increasing the opportunities for group meetings and human and social contacts that are of the type of fruitful contacts between teachers and students, by preparing for seminars, lectures and events that students participate in preparing and supervising them, and taking an active role in them in a way that enables them to start intellectually, and instills in their souls

and their personalities the right direction And proper to conduct dialogue, discussion and meaningful talk.

1.11 **Literature Review**

This section reviews the recent and previous research related to the use of modern methods in the learning process. It should be mentioned that the impact of modern means of communication on education is examined, and how they affect students and teachers in the educational process.

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, 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, 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.

Using social media to stay in touch with the other communities could have strong payoffs in terms of internships and education, and other opportunities. Many studies relied on soliciting mere views from students and teachers about their intentions to use or not to use social media to promote the educational process. Using social media in teaching students by some instructions will have positive outcomes in learning. However, higher education institutions are still primarily relying on traditional platforms such as course and learning management systems (CMS/LMS) that do not capitalize on the pedagogical affordances of social media, for example allowing learners to manage and maintain a learning space that facilitates their own learning activities and connections to peers and social networks across time and place (Alwagait, 2015; Dabbagh, 2012). One of the factors that stymies the adoption of social media in higher education is that the responsibility to use these technologies is left to a teachers with little or no interest from a university level should investigate university policies that are deliberately put in place to foster the take up and use of social media in formal learning contexts (Chawinga, 2017).

The social development factor has the highest influence in the social networking, Also, the Internet affect study and work behavior negatively. Since this was a cross-sectional study, it is not possible to determine whether a student's spends less time on social networks because she/he experienced its negative effects (Balakrishnan, 2016).

The author spotted the lights on the negative effects of social networking sites are considerable and abundant and it is crucial to proceed with caution and curb the excessive usage and dependence on social networking sites. Although there are many serious negative effects of social networking, but one cannot categorically conclude that. The social networking should be removed from our lives. Social networks offer numerous benefits and its negative impacts can be brought under control with careful planning and management (Sarkar, 2015).

In 2016 a survey was administered at a large public university located in the Mid-Atlantic region of the United States. Sixteen instructors from the College of Education were asked to

forward an email to their students asking them to complete an online survey regarding their use of social networking. The majority of the participants (56 %) reported spending less than one-hour social networking per day while 34% of the participants reported to spend up to five hours social networking per day. It is also reported that 67% of internet users in the U.S. whose age ranges between 18 and 29 use social networking sites (SNS) such as Facebook, Twitter, Interest, Instagram, and Tumblr, while only 44.1 % of faculty members in higher education use social media in their teaching with a higher percentage in the Humanities and Arts disciplines. Additionally, research also suggests that college students whose age ranges between 18 and 34 are using SNSs for long hours and that the adoption of mobile devices and mobile applications is a driving force for the increase in social networking and social media use. Data showed that social networking was helpful for communication; information gathering and that it positively influenced their academic work. However, students also reported that social networking had a negative impact on their social interactions, emotional health, and work completion (Kitsantas, 2016).

This paper investigated the questions about the impact of online social network OSN on academic performance and the possibility of using it as an effective teaching tool. Survey results were analyzed using structural equation modeling (SEM). The results revealed a statistically significant negative relationship between time spent by students on OSN and their academic performance. Further, attention span was found to be highly correlated with characteristics that predict or influence student behavior, such as their perceptions about society's view of social networking, their likes and dislikes of OSN, ease of use of OSN, etc. Conclusion, OSN could be viewed as a valuable pedagogical technology. Given the lack of credible evidence that students are willing to use OSN for academic purposes and the existence of credible evidence that increasing amounts of time spent on OSN negatively affects academic performance, faculty attempts to include OSN are rationally un-founded. Therefore, there is a need for further investigation into the types of OSN exercises and applications that enhance learning as well as the types of courses for which such exercises and applications would be most appropriate (Paul, 2012).

In this paper, we start working on using social networks to enhance teaching and learning experiences in higher learning institutions. Book2U was tested by the students and teachers

with Computer Science background, and hence they may be very adept at navigating and using Book2U. This was proven as the majority of them stated that Book2U was easy to use. It would be interesting to explore if students and lecturers who lack computer skill feel the same way about Book2U (Balakrishnan V. , 2014).

This study investigated the impact of teacher design teams as a professional development arrangement for developing technology integration knowledge and skills among in-service science teachers. Focus group discussion and reflection questionnaire data were used to assess teachers' experience of working in design teams at the end of the professional development arrangement. Findings showed an increase in teachers' technology integration knowledge and skills between pre and post-measurements. Collaboration in design teams had the potential for teachers to share knowledge, skills, experience and challenges related to technology-enhanced teaching. However, the findings presented in this study are based on one school with a specific technology infrastructure. Other schools might have a different technology infrastructure or different possibilities for working in design teams (Kafyulilo, 2016).

In this study, the Facebook group was used as a learning management system (LMS) in two courses for putting up announcements, sharing resources, organizing weekly tutorials and conducting online discussions at a teacher education institute in Singapore. This study explores using the Facebook group as an LMS and the students' perceptions of using it in their courses. Results showed that students were basically satisfied with the affordances of Facebook as the fundamental functions of an LMS could be easily implemented in the Facebook group, however, has certain constraints. It does not support other format files to be uploaded directly, and the discussion is not organized in a meaningful structure. In addition, the strong social connectivity of Facebook is a double-edged sword. It enables students to easily communicate and interact with peers and the teacher. However, it fails to provide a safe environment as students' perceived privacy is decreased. For effective use of Facebook in learning, many other factors like sound instructional design, positive teacher attitude and strong technical support are crucial, without which the potential will hardly be realized (Mammadova, 2020).

In 2017, a researcher conducted a study on how to facilitate the use of social media in teaching and learning. This study incorporated Twitter and blogs into two undergraduate

coursework in the Department of Library and Information Science at Mzuzu University. The data were collected in two ways: first, the blog posts and Twitter posts were analyzed by the students, and secondly, a questionnaire was sent to 64 students to find out their perception of the use of blogs and Twitter in a classroom environment. The results indicate that Twitter was welcomed mainly because of its timeliness, that is, students could receive instant messages on their cell phones as evidenced by the following comment by one of the respondents: “Mostly, the comments were instant, as at least some of the colleagues were online with what That's it transcripts' (Chawinga, 2017).

In 2019 a survey on enhancing the facilitation of online groups in higher education: a review of the literature on face-to-face and online group facilitation. The results of the study showed that the students see that at the forefront of the means that can be used to communicate with professors who are studying courses on social media is to send files among themselves, and in the same percentage create a page for the course on social media, followed by placing videos on the social network, followed by Posting posts for students, followed by posting posts for everyone, followed by posting photos, and finally communicating via chat (Thomas, 2019). However, these sites are public and allow everyone to enter. Such sites also, use the personal data of the user for commercial purposes, which are contrary to privacy.

This paper A model of factors affecting learning performance through the use of social media in Malaysian higher education investigated the attempted to mitigate the gap in the literature concerning the use of social media for active collaborative learning and engagement and its effect on the research students’ learning performance in the context of Malaysia. A questionnaire-based on Constructivism Theory and the Technology Acceptance Model was employed as the main data collection method, which was distributed to 723 research students in five Malaysian research universities. The study concludes that overall, active collaborative education and engagement through social media enriches the learning activities of students and facilitates group discussions, and hence, their use should be encouraged in learning and teaching processes in higher education institutions(Al-Rahmi, 2018.). This study was theoretical.

Postgraduate programs at the Masters' level in Nigeria Universities are a combination of course works and research activities. Most postgraduates are family and working-class students. They rarely have time to stay and study in the classroom due to pressures at home and the workplace. To enhance their outcomes in the program despite their tight schedule, the use of an online collaborative learning strategy was employed. Pretest-posttest, control quasi-experimental research design was used on 38 postgraduates in Science Education. Data generated were analyzed using descriptive and inferential statistics. The findings of the study showed that the use of the Online Collaborative Learning Strategy enhances undergraduates' learning outcomes and retention in Science Education(Ajayi, 2020). No specific program was used in the study.

In 2020, a researcher conducted a study on the role of social media in collaborative learning the new domain of learning. This study is an attempt to examine the application and usefulness of social media and mobile devices in transferring resources and interaction with academicians in higher education, this pilot study was based on a survey of 360 students from a university in eastern India. A latent variance-based structural equation model approach was followed for measurement and instrument validation. The study revealed that online social media used for collaborative learning had a significant impact on interactivity with peers, teachers and online knowledge sharing behavior. Grounded on this finding, it would be valuable to mention that the use of online social media for collaborative learning facilitate students to be more creative, dynamic and research-oriented (Ansari, 2020). It was a theoretical study.

This paper investigated the theoretical basis for SM's use as an educational tool in education, namely, HE. It concluded the investigation with a list of four major theories as follows UGT, TAM, connectives', and constructivism. Then, a description of SM's pedagogical usage within HE was provided. This study concludes that the use of SM in HE classrooms was predominantly associated with aims to enhance students' collaboration, engagement, and communication. SM's use by universities is also associated with addressing students' changing needs and overall learning goals in HE. The discussion of major literary papers in this field of study was concluded that SM is primarily being used as part of constructivist-based approaches, namely, CL methods. The results concluded that SM platforms were adopted to

supplement both in-class learning activities as well as offline activities. After a detailed integrative review, the emerged themes were used as a basis to develop the proposed SM integration framework. In conclusion, the proposed framework emphasizes SM's potentials as an effective educational tool in HE's classrooms, namely, in support of CL approaches. Thereby, SM can enhance student's learning process if implemented carefully in HE classrooms following CL principles. (framework-testing) research in this area of study (Hamadi, 2021). However, these sites are public and allow everyone to enter. Such sites also, use the personal data of the user for commercial purposes, which are contrary to privacy.

In light of the above and through a review of the later and more recent literature, as far as I know, all the previous studies were theoretical studies, and it's not supported by an specific development for an specific tool or an specific application, we can conclude and say this study is theory to practice study. In this study a dedicated application that allows students to communicate with teachers in the educational process outside the official working hours has been developed. All this made me think of making an application similar to social networks, through which the teacher can set a time for a meeting with students, and students can reach the teacher by reserving a specific time, this is done through a screen provided by the proposed application.

Chapter Three Methodology

3.1 Introduction

This chapter reports the methodology of the research. It provides information about the subjects, the methods of sampling, and information about the techniques of data collection, analysis, and interpretation.

3.2 The Methods

The approach followed in this research utilizes two basic approaches, namely the descriptive approach and the analytical approach. The descriptive approach describes the study

of factors affecting the educational 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. Data will be collected from East Nile College students and teachers. The data will be arranged in drawings and tables to study the factors affecting the educational process by estimating two models (a model for teachers and a model for students) and thus knowing the influencing factors depending on the indicators of congruence.

For the purpose of analyzing the data of the variables of the study, the analytical approach has been used, which is the modeling of structural equations for the sake of identifying the effect-size of the proposed model (TSC) on the communication in the educational process. These modeling of structural equations will explore the modern methods of communication in the educational process between teachers and students to provide an effective solution.

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).

3.2.1 Study sample

Intentional sampling is a sampling method in which not all members of the population have an equal opportunity to participate in the study, unlike probability sampling, researchers use this method in studies where random probability sampling is impossible due to considerations of time or cost(Elfaki,2019).

The sample was chosen by the intentional sampling method, where the study population was chosen from the East Nile College of Private Education place of study (School of Economics and Financial Sciences - Computer School), because most of the community (students - teachers) own Smartphone devices, which facilitates our application The proposed model, and also because I work in this college, it makes it easier for me to collect data.

The sample of this study consists of two groups, the first group (30) teachers from different specializations, who were studying in (Economics and Financial Sciences and Sciences Computer Science Department) at the College of East Nile - Khartoum State, to get acquainted with their views on the effectiveness and reality of using (TSC) in communication and the time spent in evaluation and appreciation in the educational process in East Nile College. The second group of subjects was chosen from universities. Students at these colleges during the academic year 2019 - 2020. 80 students were studying at different levels.

3.2.2 Instruments

This study depended mainly on one data collection instrument: a questionnaire for both teachers and the students. The first instrument is a questionnaire, which was designed for the teachers (Appendix A) and students (Appendix B). The items of the questionnaire were based on the theoretical discussion of the literature reviewed in (Chapter 2).

3.2.3 The first instrument is a questionnaire designed for the teachers (Appendix A).

The items of the questionnaire were grouped into three sections:

1- The first section (statements 1-3) basic information.

2- The second section (statements 4-6) focuses on teachers communicating with students (time scheduling).

3- The third section (statements 7-9) investigates the time spent by teachers in evaluation and valuation during the educational process.

4- The fourth section (statements 10-11) investigates academic performance.

The subjects were asked to mark their responses on a Liker scale of five degrees (Totally agree, agree to a bit, Neutral, disagree a bit, and strongly disagree). The respondents had to tick the appropriate alternative.

3.2.4 The second instrument is also a questionnaire designed for the students (Appendix B).

The items of the questionnaire were grouped into four sections:

1- The first section (statements 1-3) basic information.
2- The second section (statements 4-6) focuses on students communicate with teachers (time scheduling …etc.).
3- The third section (statements 7-9) investigates the time spent by students in evaluation and valuation during the educational process.
4- The fourth section (statements 10-11) investigates the way and the cost of getting the materials for the semester.

The subjects were asked to mark their responses on a Likert scale of five degrees (Totally agree, agree to a bit, Neutral, disagree a bit, and strongly disagree). The respondents had to tick the appropriate alternative.

3.2.5 Teachers' questionnaire

The researcher adopted the questionnaire as a suitable instrument through which to collect the appropriate data for this study, by questioning 30 university teachers about their opinion towards using (ICT) on communication and time spent in the evaluation and valuation in the educational process at Sudanese Universities.

The researcher started writing items of the questionnaire bearing in mind the questions and hypotheses of the study. The researcher wrote as many items as he could. Some of these items have been written by the researcher himself and others have been written out of a discussion with expert teachers in the related field. Discussion with some university teachers is among the sources from which items have been taken.

The process of revision and modifications has been restricted to 11 items questionnaire. The researcher used a scale of 5 degrees where the respondents could choose (Totally agree, agree to a bit, Neutral, disagree a bit, and strongly disagree).

The questionnaire was submitted to expert validation, before presenting it to the university teacher at the different universities. The expert teachers' comments and modifications were respecting, fully considered, and dealt with.

3.2.6 Students' questionnaire

In order to investigate the communication, evaluation, and valuation during the educational process by students, the researcher in this study has used a questionnaire as a second instrument for collecting data from the students in universities (study population).

The questionnaire was submitted to judge its appropriateness to the students' level. After the approval of the referees, which were four professional teachers who teach at East Nile College, 80 students present the study sample.

3.3 The validity and reliability

3.3.1 Content validity

Discussion with colleagues and experts was continuous through the construction of the two questionnaires. Items were revised, refined, and sometimes replaced on the basis of this discussion or debating. (Eight) professional teachers were requested to comment on the questionnaires in terms of clarity and validity of the items and their relevance. In the light of the experts' judgments about the relevance of the items to the purpose for which they were defined, the number of items was 18 and it was reduced to 11 items. The irrelevant statement was dropped, whereas complicated or ambiguous ones were reworded and simplified in order to make them concise and precise. After the approval of the expert validation, the questionnaires were administered to (10) teachers and (10) students. The questionnaires were then analyzed to discover their reliability.

3.3.2 The validity and reliability of the (Questionnaires)

Reliability is known as the stability or consistency of the assessment. There are many ways to prove the reliability and validity of the questionnaire; such as using, the internal consistency

method, the alternate test method, empirical method, testing, and re-testing method, and the Spilt-half method. The researcher adopted the internal consistency Method to decide the degree of the reliability of the instruments.

The number of items in the questionnaires was 11statements divided into 8 axes (four axes for teachers questionnaire – 4 axes for students questionnaire) the axes have differed numbers of statements; the questionnaires were five options scale (Totally agree, agree to a bit, Neutral, disagree a bit, and strongly disagree). After the questionnaires were judged and proved by proficient teachers and the supervisor. The questionnaire's reliability was calculated by (SPSS) statistical package for social sciences.

The validity and reliability of the teachers' questions

Table (3.1) Reliability statistics

Cronbach's Alpha	N of Items
0.6519	8

From Table (3.1) there is a question in the questionnaire that is tested for reliability, which its validity and reliability, and that the total value of the Cornbrash'sAlpha coefficient is equal to 0.651 and it is acceptable

Table (3.2) Item-Total Statistics

Questions	Cornbrash's Alpha if Item Deleted
Q_{11}	0.585
Q_{12}	0.638
Q_{13}	0.691
Q_{21}	0.632
Q_{22}	0.587
Q_{23}	0.630
Q_{31}	0.643
Q_{32}	0.533

Through Table (3.2), we find that all the values of the Cornbrash's alpha coefficient for these questions are less than the total value of the Cornbrash's alpha coefficient, which is equal to 0.651. Therefore, these questions must remain in the questionnaire because it increases the

reliability and reliability of the scale. Except for question Q13, the scale is weakened because its value (0.691) is greater than the value of the total Cornbrash's coefficient (0.651).

The validity and reliability of the student's questions

Table (3.3) Reliability statistics

Cornbrash's Alpha	N of Items
0.232	8

From Table (3.3) there are 8 questions in the questionnaire that are tested for reliability, which its validity and reliability, and that the total value of the Cornbrash's thousand coefficient is equal to 0.232 which is very weak.

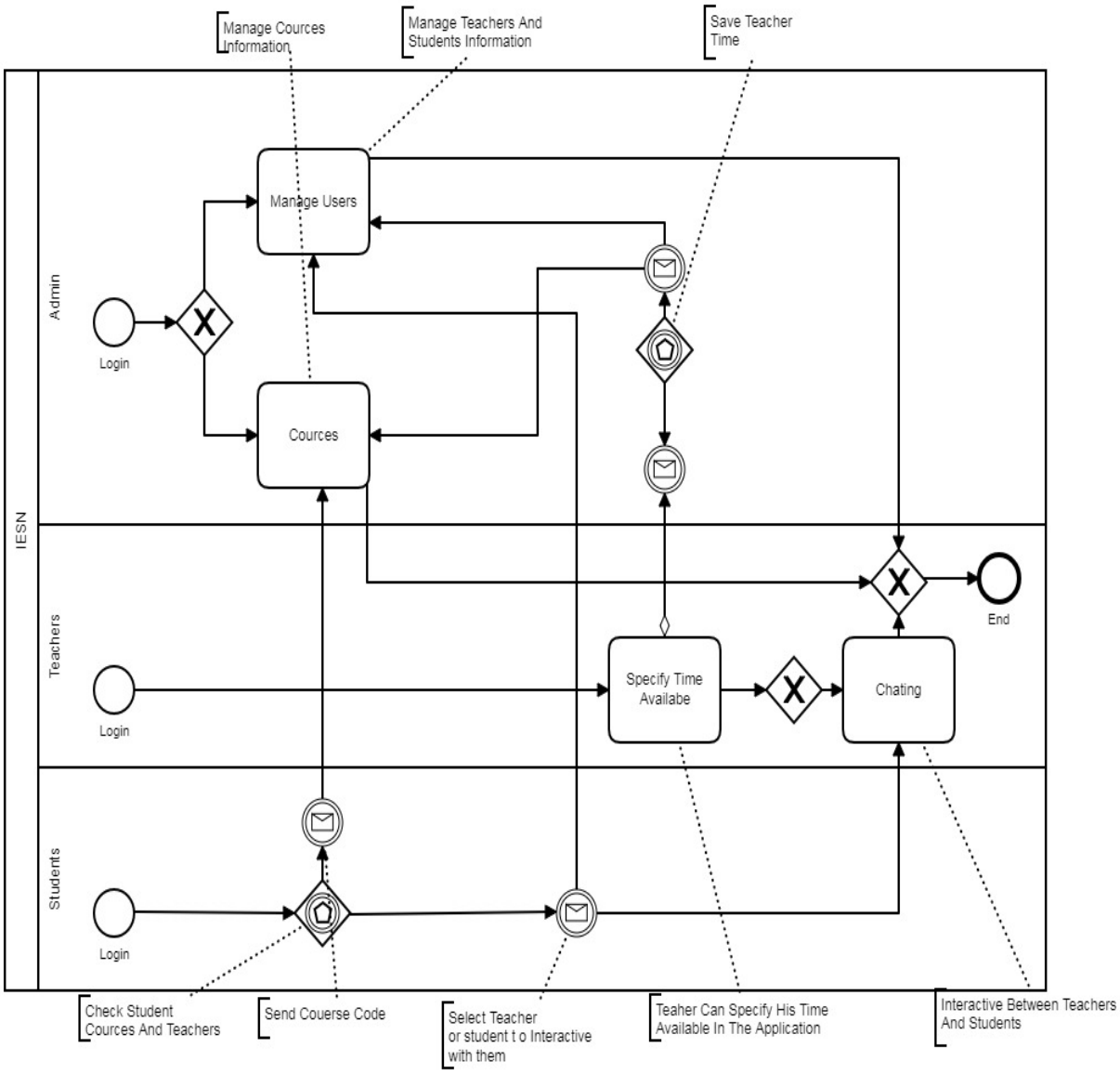
Table (3.4) Item-Total Statistics

Questions	Cornbrash'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 (3.4), we find that all the values of the Cornbrash's alpha coefficient for these questions are less than the total value of the Cornbrash's alpha coefficient, which is equal to 0.232. Therefore, these questions must remain in the questionnaire because it increases the reliability and reliability of the scale. Except for questions Q12 and Q23, 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).

3.4 Implementation of the proposed solution

TSC is an electronic application that works on mobile devices that support 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.

Figure - 3.1: shows the business process diagram for the proposed Model

3.4.1.1 The way the system works (Action)

We can divide the users of the site according to their borders and their powers, and users are:

System manager, teachers, and students. Each of them has certain powers different from the other and each of them a username and a password, a user identifies the type Is it a manager or teachers or student. With regards to the system, managers have a page of their own containing all control on-site control tools to add, modify, delete, define the powers and the data they contain web pages Updated. With regard to the teachers, in order to get at the expense of which allows him to enter the pages 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:

- 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).

3.5 Construction of the Prototype

3.5.1 Overview

In this section, the researcher is going to write about the construction of the prototype, tools, and techniques which have been used. Many languages and tools are available and they

can be used for the purpose of developing a prototype to test the functionality of the suggested model and to demonstrate the idea clearly to all stakeholders, to give them the ability to understand the suggested system, and to allow the teachers to set the stages of the system and its milestone, allow students to how they can communicate with the teacher outside official working hours and give them the ability to choose the appropriate time to communicate via the TSC model.

The Php LARAVEL framework and the Angular framework were chosen as the development tool, as they are based on the MVC method by providing a client-side framework with MVC architectures that separate the model from the view from the controller, providing You have a smooth and easy working environment. And also, Ionic has also been used for smartphone operating systems to accelerate native hardware available in the browser (such as CSS animations), and improve rendering (avoiding expensive DOM processing). And also, been used Microsoft Structured Query Language (MySQL) as a backend for designing tables and the database MySQL server is characterized by its great speed, which made the ability to query the database very fast, and is characterized by the ease of linking its tables to the user interface that is designed in different programming languages.

3.5.2 Conceptual Model Design

The researcher started the process of developing the prototype by analyzing all the available information which is collected from the participants in spite of their status either are teachers or students, and also based on information which is collected from the literature, the researcher comes out by a mockup to show how the prototype of the system should be. For the stage of analysis and design, the researcher only used pen, pencil, and paper, no electronic tools or software are used.

3.5.3 Evolutionary prototyping

The type of prototype which has been developed by the researcher is an evolutionary prototype, which is built in a very strong and robust manner, but some components of the final system are still not perfectly clear, but at the same time, the components of the system which are essential and it’s for sure supposed to be included in the system, are well constructed. Mainly researcher focuses more on the design of the forms, because are used in the system for

inserting data, and at the same time, these forms are supposed to explain the purpose of the system.

3.5.4 Prototype's Final Product

A running prototype for TSC Model has been developed to provide effective education communication tools, for designing this prototype, Php LARAVEL, Angular, Ionic framework, and MySQL code are used for development. The development of the system follows the strategy of ease of use and a friendly user interface.

The developed system provides two different modes, teacher module, and student module.

3.5.5 Teacher Module

In the system, the role of the teacher will be mainly around helping the teacher to have a friendly environment that can help him in setting the appropriate time to communicate with the students outside working hours and then giving the ability for the teacher to follow up and monitor the performance of the student assessment process.

When you log into the system you will see the forms based on the role of you either you are a teacher or a student.

The teacher's activities mostly depend on determining the appropriate time to communicate with the students through the Screen for specifying appointments for

The teacher's presence in the TSC model, but in addition to this, the teacher can also insert the learning material code or perform some personal activities on the system such as conducting an assessment for any student.

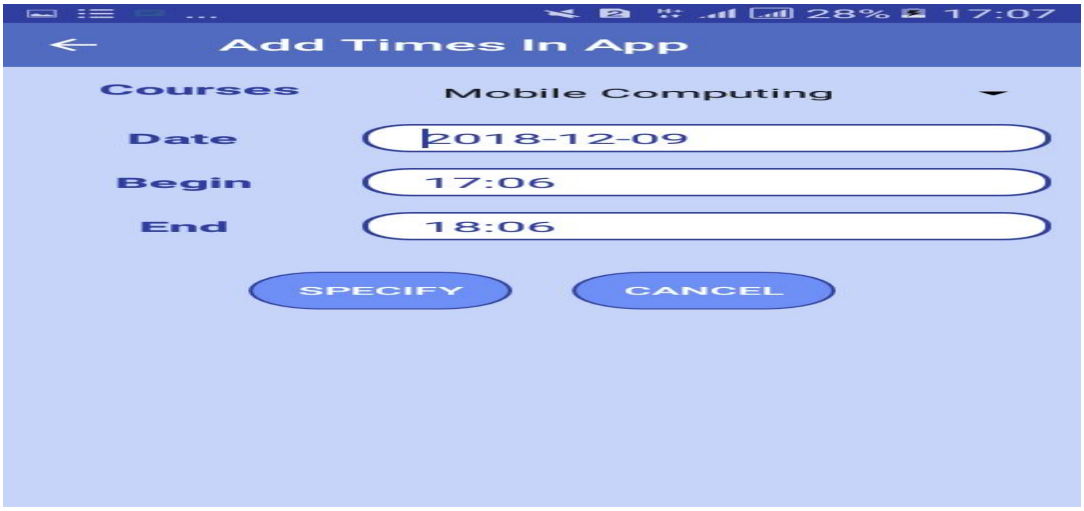


Figure - 3.2 shows the screen for determining the appointment of the teacher's presence in the TSC Model.

3.5.6 Student Module

Generally, the interface of the teacher's module and student module is designed in a semi-similar manner to allow both of them to share the knowledge and to communicate more effectively together.

Student activity mainly will be around choosing the learning material and the teacher who teaches it to know the time in which he is on the TSC model to choose the appropriate time to communicate with the him according to the time available on

the TSC model.

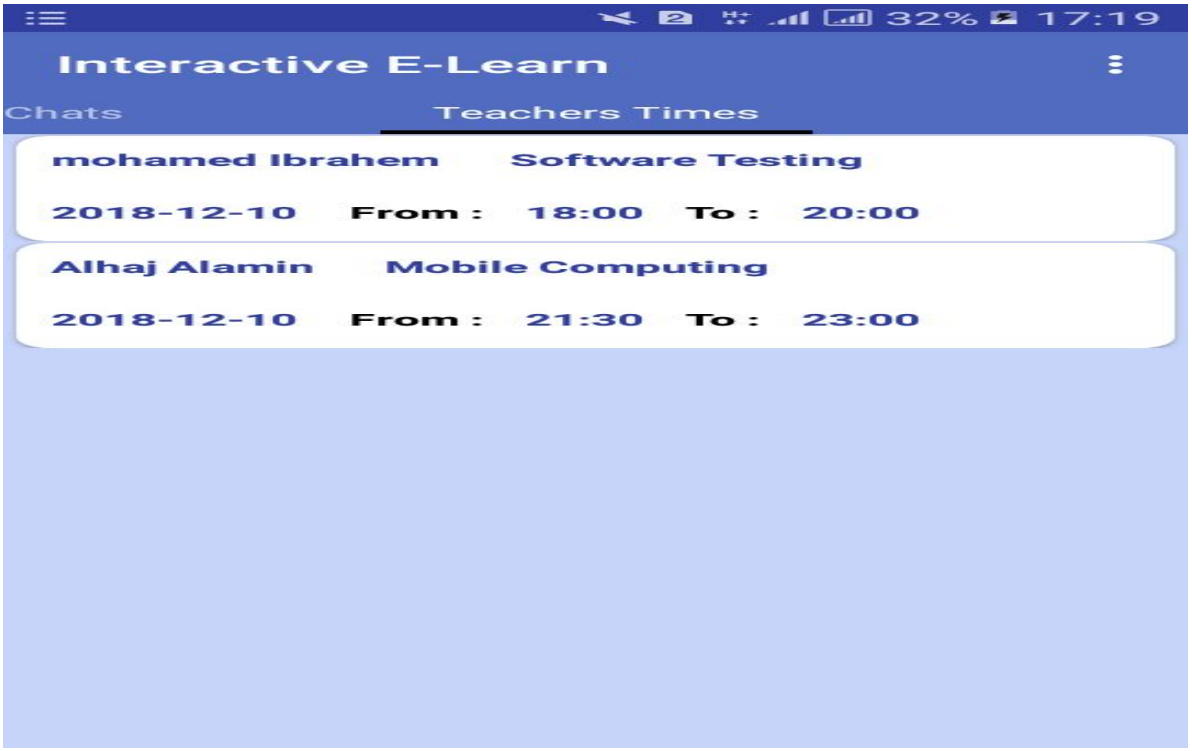


Figure - 3.3 the screen shows the dates for the teachers 'presence in the TSC Model

3.6 Challenges and Opportunities

3.6.1 Challenges:

3.6.1.1 The internet is totally weak at East Nile College because the subscription service is a lower package of internet.

3.6.1.2 East Nile College does not have a server with specifications that allow activating the TSC model.

3.6.1.3 No application in the state of Khartoum allows private colleges students to communicate with teachers via modern technology.

3.6.1.4 The difficulty of the data collection process, because the city of Khartoum contains a large number of private colleges.

3.6.1.5 Paper questionnaires (hand-delivered) consider the biggest challenge:

- The distribution process is tiring.
- Require data entry and analysis by computer.
- The student may be in a hurry, which reduces the accuracy of the answer.

3.6.1.6 Constrain the application for private colleges' students only.

What is the role of the teacher in the integration of the student's personality through informing him/her about the modern communication and technical methods, and proficiency of the usage of them in the educational process?

3.6.2 Opportunities:

3.6.2.1 The site works on motivating the students for communication with teachers and collective dialogue without shyness via the chat, questions.

3.6.2.2 The site allows the teachers to meet, provide the lessons, solutions for the exams and the tests, and discuss them with the students at any time via the TSC model.

Chapter Four: Data Analyses and Discussion

4.1 Introduction

This chapter targets the analysis, evaluation, and interpretation of the data collected through the questionnaire from 30 respondents stemming from the East Nile College teachers' community (see Appendix A) and Questionnaire for 80 respondents, from the East Nile College students' community (see Appendix B).

The SPSS statistical program was used to analyze the survey data to model the structural equations for the study model through the AMOS technique. The concept of modeling structural equations begins with a general theory based on the consulted literature, in which the researcher tests the interlink between a set of variables.

The interlink is formulated in a theoretical framework in the form of a model, where the model presents the hypotheses to be tested in the study and the variables involved are measured using A set of questions in the questionnaire.

1.11.1 The study seeks to investigate of the hypotheses

1. Using the TSC model encourages students of Khartoum State private colleges to communicate with teachers in the educational process.
2. Using the TSC model enable teachers to communicate with students of Khartoum State private colleges in the educational process.
3. The use of the TSC model in student-teacher communication has an impact on educational process facilitation.

1.12 The Teachers' Questionnaire

The responses to the questionnaires of the 30 teachers. 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.

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.

Table (4-1): Attending training course in using (ICT) in the educational process

	Frequency	Percentage
Yes	25	83.3%
No	5	16.7%
Total	30	100%

Displays the distribution of the respondents according to attending training courses on how to use ICT in the educational process, it was noticed that the most (83.3%) of them responded by (Yes), and (16.7%) have not. This result indicates that the majority of the teachers have background and knowledge on how to use ICT in the educational process.

Table (4-2): The effectiveness of (ICT) in raising students' academic performance.

	Frequency	Percentage
Yes	30	100%
No	0	-
Total	30	100%

Presents the distribution of the respondents according to their point of few regarding the effectiveness of (ICT) in raising students;' academic performance, it was noticed that almost (100%) of them responded that they think ICT contributes in raising students' academic performance.

1.12.1 Validity and Stability test

Is to increase the Cornbrash's-alpha coefficient, and thus increase the reliability of the data by reflecting the sample results on the study population.

Stability: It is the stability of the scale (the question) and not contradicting itself, meaning the scale gives the same results with a probability equal to the value of the parameter if it is re-applied to the same sample.

Validity: It is the standard that measures what was put to measure.

Reliability coefficient

A tool is consistently intended to measure the same results if the questionnaire is re-applied to the same sample under the same conditions, and it is measured by a method of calculating the Cornbrash's Alpha.

Validity and Stability of teachers' questions:

Table (4-3) Reliability statistics

Cornbrash's Alpha	N of Items
0.6519	8

From Table (4-3) there is a question in the questionnaire that is tested for reliability, which is validity and Stability, and that the total value of the Cornbrash's Alpha coefficient is equal to .0651 and it is acceptable Table (4-4) Item-Total Statistics

Questions	Cornbrash's Alpha if Item Deleted
Q_{11}	0.585
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Q_{31}	0.643
Q_{32}	0.533

Through Table (4-4), we find that all the values of the Cornbrash's Alpha coefficient for these questions are less than the total value of the Cornbrash's alpha coefficient, which is equal to 0.651. Therefore, these questions must remain in the questionnaire because they increase the reliability and reliability of the scale. Except for question Q13, the scale is weakened because its value (0.691) is greater than the value of the total Cornbrash's Alpha coefficient (0.651).

1.12.2 Teachers model variables

In the field of educational studies, Amos' drawings can be used to evaluate how the proposed model (TSC) affects the communication between teachers and

students and the time spent in assessment and evaluation of the academic performance in the educational process for East Nile College students. The above description was illustrated in Figure(4-1) below:

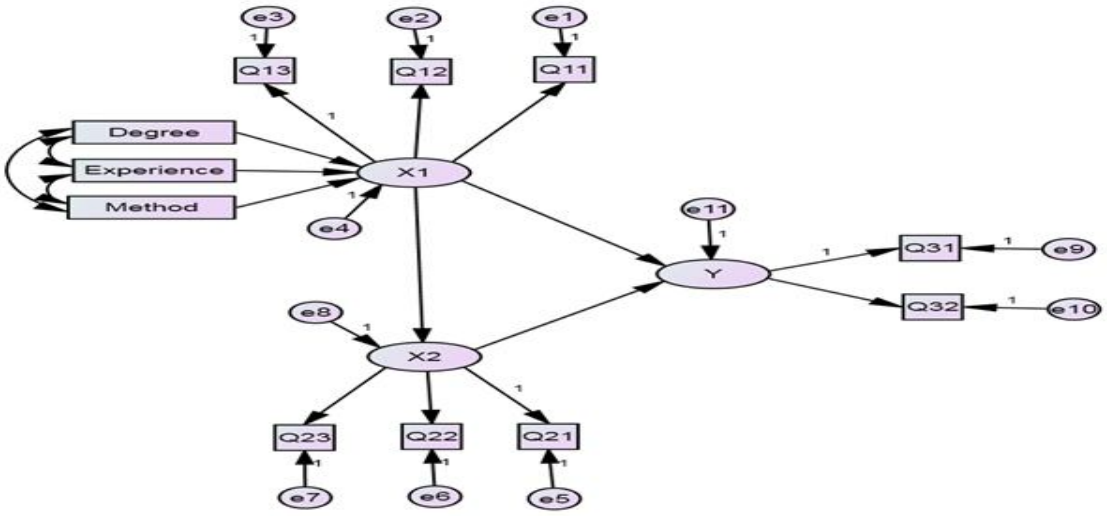


Figure (4-1) the theoretical model of the study

In the theoretical model shown in Figure (4-1), the variables are :

X1: Teachers 'communication with students is a latent variable that is measured by three variables and influenced by three measured variables (observation), which are the degree, experience, and method of communication with students.

X2: The time taken in the assessment and evaluation is measured by three variables.

Y: Educational process facilitation measured by two variables.

And Table (4-4) shows the elements of measuring variables.

Table (4-5) Elements for measuring the teachers' model variables

Variables	Variable type	Measurement elements (questions)
X_1	Independent	It is measured using three items in the questionnaire
X_2	Independent	It is measured using three items in the questionnaire
Y	Dependent	It measures two items in the questionnaire

Figure (4-1) clarifies the hypotheses of the teachers' model, which are:

H1: The Academic degree (Lecture, Associate, Ass-Professor, Other) has an impact on X1; the (amount of)? Teachers' communication with students.

H2: Teachers' years of experience (1 or less than 1 , less than 3, 3-4 years,etc) in education has an impact on X1; the teachers' communication with students.

H3: The used method of communication by ICT (Social media, Email,TSC,phone,platform) in the educational process has an impact on X1; Teachers communicate with students.

H4: X1; the teachers' communication with students has an impact on Y; the students' educational process facilitation.

H5: X2; the needed time for the assessment and evaluation has an impact on Y; the educational process facilitation.

H6: X2; the time spent in the assessment and evaluation mediates the relationship between X1; the teachers' communication with students and Y; the educational process facilitation.

And by conducting a statistical analysis to estimate the course of effects between the parameters of the variables in the teachers' model, we obtain the results in the model shown in Figure (4-2) below:

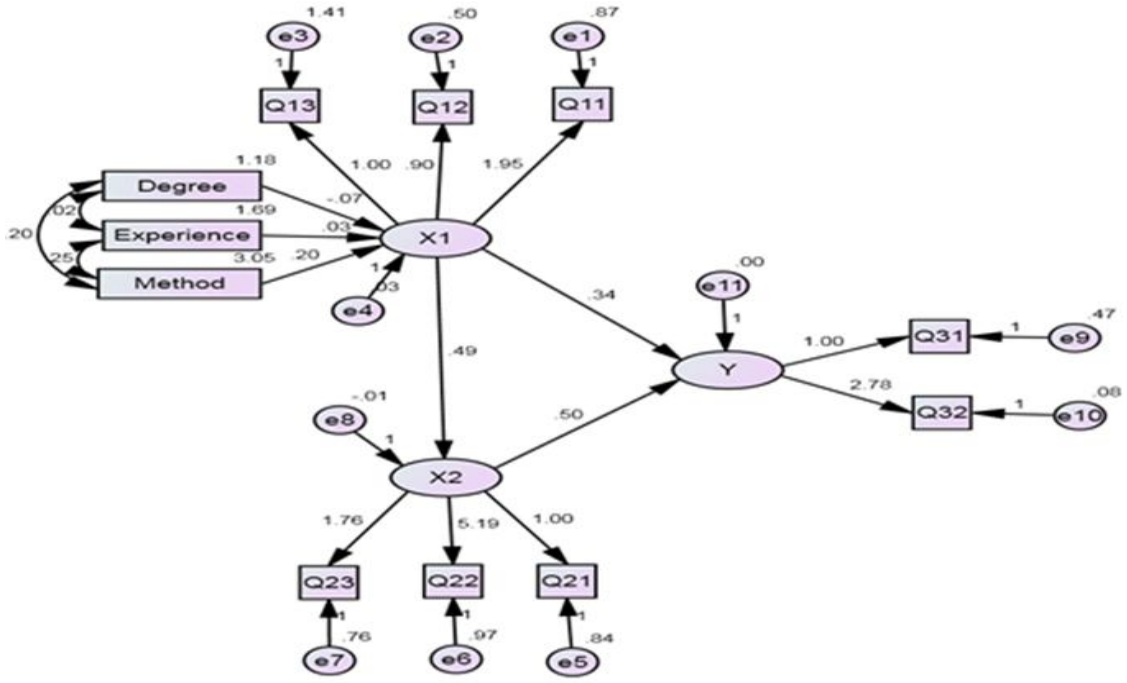


Figure (4-2) Estimating the regression path coefficients among the variables of the teachers' model

Table (4-6) Variances of the measured variables in the teachers' model

Variable	Estimate	S.E.	C.R.	P	Result
Degree	1.179	0.310	3.808	0.00	Significant
Experience	1.690	0.444	3.808	0.00	Significant
Method	3.049	0.801	3.808	0.00	Significant

In Table (4-6), we find that the variations of the observed variables, degree, experience, and method are all of significant statistical significance. This is effect is compatible with the expressed model.

Table (4-7) Covariance's of measured variables in teacher model

Variable	Relation	Variable	Estimate	S.E.	C.R.	P	Result
Experience	<-->	Method	0.247	0.424	0.582	0.561	Not-Significant
Degree	<-->	Method	0.202	0.354	0.571	0.568	Not-Significant

Through Table (4-7), we found that the common variance between the two variables years of Experience and the used Method reaches 0.247, meaning that they change together by 58% with a Standard Error (S.E) of 0.424 and that relationship is not significant because the p-value is 0.56 greater than the level of significant significance 0.05, we also, found the common variance between the two variables, the academic degree and the method used, reached 0.202, meaning that; they change together at a rate of 57% with a Standard Error (S.E) of 0.354. This relationship is not significant because the p-value is greater than the level of significant significance 0.05

Table (4-8) Correlations between the measured variables for the teachers' model.

Variable	Correlation	Variable	Estimate
Experience	<-->	Method	0.109
Degree	<-->	Method	0.107

From Table (4-8) we noticed that all the values of the correlations between the measured variables (observed) are less than 0.90, which indicates the lack of similarity between the variables and that each variable in the model represents itself. And that there is no overlap or

similarity, that is, there is no “interaction effect” between the chosen independent variables. Table (4-8) shows the results of the path of regression coefficients (beta) for each external variable (independent) dependent on an internal variable (dependent) extracted from Figure (4-2).

Table (4-9) estimating the regression coefficient between the variables and its statistical significance

Table (4-9) Estimate of regression weights

Dependent Variable	Path	Independent Variable	Estimate	S.E.	C.R.	P	Results
X_1	<---	Academic degree	-0.066	0.049	-1.346	0.178	Not-Significant
X_1	<---	Years of Experience	0.028	0.030	0.906	0.365	Not-Significant
X_1	<---	Method	0.198	0.116	1.703	0.089	Marginally-Significant
X_2	<---	X_1	0.488	0.537	0.908	0.364	Not-Significant
Y	<---	X_2	0.497	0.746	0.666	0.505	Not-Significant
Y	<---	X_1	0.342	0.392	0.873	0.383	Not-Significant

Table (4-9) concludes that the value of the relationship between the academic degree workers and X1 teachers 'communication with students (influential and affected) direct effect is equal to -0.07 and this evidences that; the academic degree has only little effect on teachers' communication with students. This means when the academic degree increases by one unit, teachers' communication with students decrease by 0.07 with a standard error of 0.05, this is evidence that TSC encourages communication between teachers and students in the learning process, and the communication process decreases as the degree of academic increases (Lecture, Associate, and Ass-Professor).

And that this relationship between workers is not significant because the acceptance rate is CR 1.35 less than 1.96 and the P-value (0.18) is greater than the level of significance 0.05. And we found that the value of the relationship between experienced workers and X1 teachers'

communication with students(influential and affected) is equal to 0.03, and this is evidence that experience has a weak effect on teachers' communication with students, and this means when experience increases by one year, teachers' communication with students increases by an amount 0.03 with a standard error of 0.03 and that; this relationship between the two workers is not significant, because the acceptance ratio CR 0.91 is less than 1.96 and the P-value (0.37) is greater than the level of significance 0.05.

And we found that; the value of the relationship between the two variables, the method used in communication, and X1 teachers' communication with students (influential and affected) is equal to 0.20, this is evidence that the method used to communicate has an impact on teachers' communication with students. This means that when the method used increases by one unit, teachers' communication with students increase by 0.20 and with a standard error of 0.12 and that this relationship between the two workers is significant because the acceptance rate is CR 1.70 Greater than 1.96 and the P-value (0.09) is less than the level of significance 0.05. And we also noticed that; the value of the relationship between the two variables, X1 teachers communicating with students, and X2, the time spent in evaluation and evaluation (influential and affected) equal 0.49 and this is evidence that teachers 'communication with students has an effect on the time spent in assessment and evaluation, and this means when teachers' communication with students increases in one unit, the time is taken in the assessment and evaluation increases by 0.49 and with a standard error of 0.54. This relationship between the two workers is not significant because the acceptance rate of C.R 0.91 is less than 1.96 and the P-value (0.36) is greater than the level of significance 0.05.

We noticed that; the value of the relationship between the two variables X2, the time is taken in the evaluation and evaluation, and Y academic performance (influential and affected) is equal to 0.50 and this is evidence that the time spent in evaluation and assessment has an impact on educational process facilitation, and this means that when the time spent in evaluation and evaluation increases one-time unit, educational process facilitation increases by 0.50 and a standard error of 0.75. This relationship between employees is not significant because the acceptance rate of C.R of 0.67 is less than 1.96 and the P-value (0.51) is greater than the level of significance 0.05.

We noticed that; the value of the relationship between the two variables X1 teachers' communication with students and Y educational process facilitation (influential and affected)

equals 0.34 and this is evidence that X1 teachers 'communication with students has an impact on educational process facilitation, which means when teachers' communication with students increases in one unit, educational process facilitation increases by 0.34 and a standard error of 0.39. This relationship between employees is not significant because the acceptance rate of C.R of 0.87 is less than 1.96 and the P-value (0.38) is greater than the level of significance 0.05.

And through Fig. (4.3) and Table (4-9), we found that the equation of the estimated teacher's model is:

$$Y = 0.34\,X_1 + 0.50\,X_2 \text{..... ..... .(1)}$$

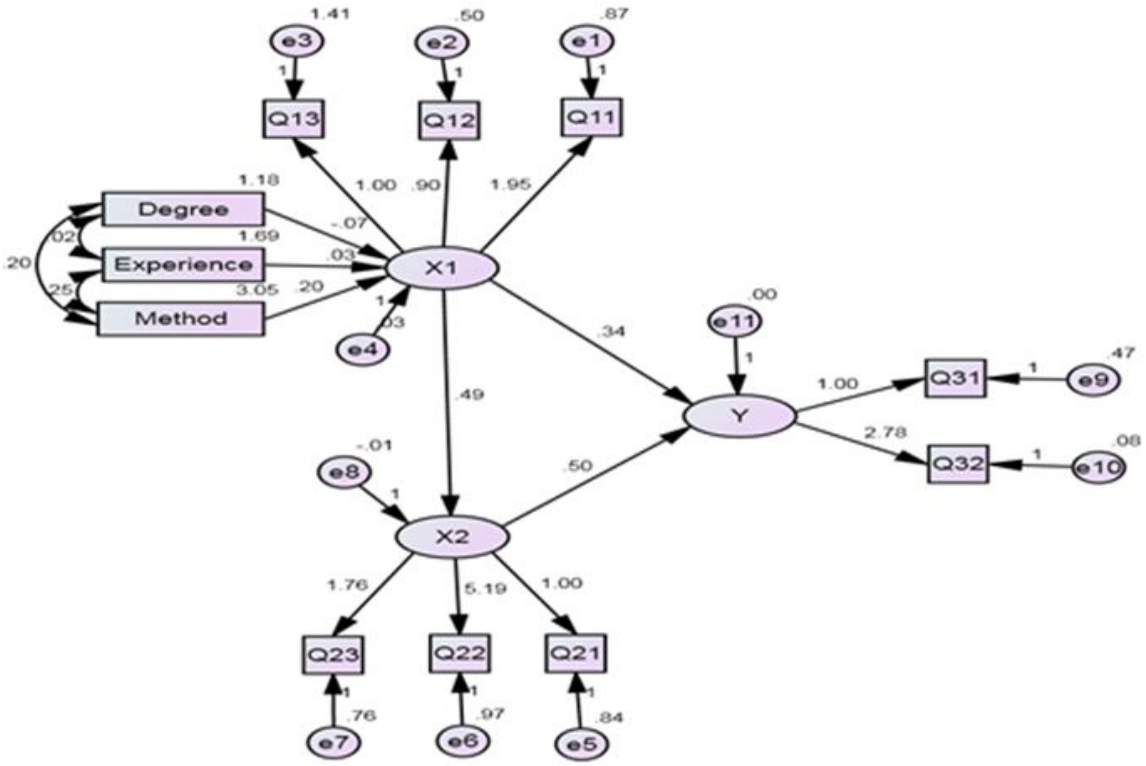


Fig. (4-3) the estimated teacher's model

Table (4-10) Indirect effects of the teachers' model variables

Variable	Method	Years of Experience	Academic Degree	X1	X2	Y
X1	0.000	0.000	0.000	0.000	0.000	0.000
X2	0.097	0.013	-0.032	0.000	0.000	0.000
Y	0.116	0.016	-0.039	0.242	0.000	0.000

Table (4-10) shows the extent of the relationship value of the variable with another variable in an indirect way, so we found the value of the relationship between X1 and the variable Y equal to 0.24.

This means that the direct relationship between X1, teachers 'communication with students, and the variable Y, educational process facilitation is stronger and succeeded in value more than the indirect relationship. Therefore, the variable X2, the time spent in assessment and evaluation, is not a mediator in the relationship between X1 teachers' communication with students, and the Y factor educational process facilitation.

1.12.3 Modification Indices (MI)

Table (4-11) Indicators for modifying the teachers' model

From	Relation	To	M.I.	Par Change
Years of Experience	--- >	Q_{21}	5.094	-0.294
Academic degree	--- >	Q_{12}	9.836	0.382
Q_{13}	--- >	Q_{12}	4.547	-0.226
Q_{12}	--- >	Q_{13}	4.033	-0.559

Through Table (4-11) we noticed that there is a strong relationship between the degree and Q12 Communication with students that help in knowing how well the lesson objectives have been achieved? Whereas, M.I. It is equal to 9.84, 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 educational process facilitation and the improvement that will occur in reading the results by adding this share by 0.38.

We also, note that there is a relationship between Experience and Q12 Communication with students that helps in knowing how well the lesson objectives have been achieved? Whereas, M.I. It is equal to 5.09, which means that creating a new share 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 educational process facilitation and the improvement that; will occur in reading the results by adding this share amounted to 0.29.

1.12.4 Matching the quality of the teachers' model (Goodness of Fit)

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

Table (4-12) Quality of matching the teachers' model (The goodness of fit index)

Measures for quality of conformity	Values	Fit index
RMSEA (Root Mean Square Error of Approximation)	0.19	Weak match
CFI(Comparative Fit Index)	0.71	A good match
TLI(Tucker-Lewis Index)	0.46	Weak match

From Table (4-12) we find the RMSEA value is equal to 0.19 and this value ranges from 0.08 to 0.10 and it indicates an insufficient match, and also we found that the GFI value is equal to 0.715 it indicates a good match, and the TLI value is equal 0.464 it indicates an insufficient match.

Through Table (4-12), we find that the 'poor match' is repeated more than the 'good match', and we conclude from this that the quality of the match is weak in the teachers model.

1.13 The student's Questionnaire

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. 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).

1.13.1 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 (4-13) Reliability statistics

Cornbrash's Alpha	N of Items
0.232	8

From Table (4-13) there are 8 questions in the questionnaire that are tested for reliability, which is validity and reliability, and that the total value of the Cornbrash's thousand is equal to 0.232, which is very weak.

Table (4-14) 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 (4-14), 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).

1.13.2 Students model variables

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(4-4) below:

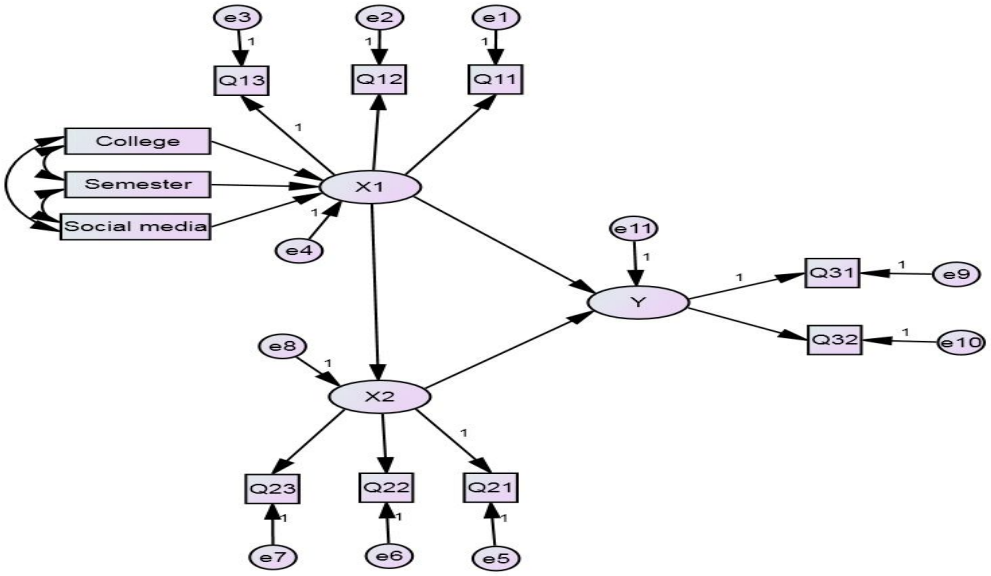


Figure (4-4) the theoretical model for studying students

In the theoretical model shown in Figure (4-4), the variables are:

X1: 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.

X2: The time taken in the evaluation and assessment is measured by three variables.

Y: Educational process facilitation measured by two variables. And Table (4-9) 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 educational process facilitation.
H2: X2 the time spent in assessment and evaluation has an impact on Y educational process facilitation.
H3: X2 the time taken in assessment and evaluation mediates the relationship between X1 student communication with the teacher and Y educational process facilitation.

Table (4-15) 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 (4-5) the following:

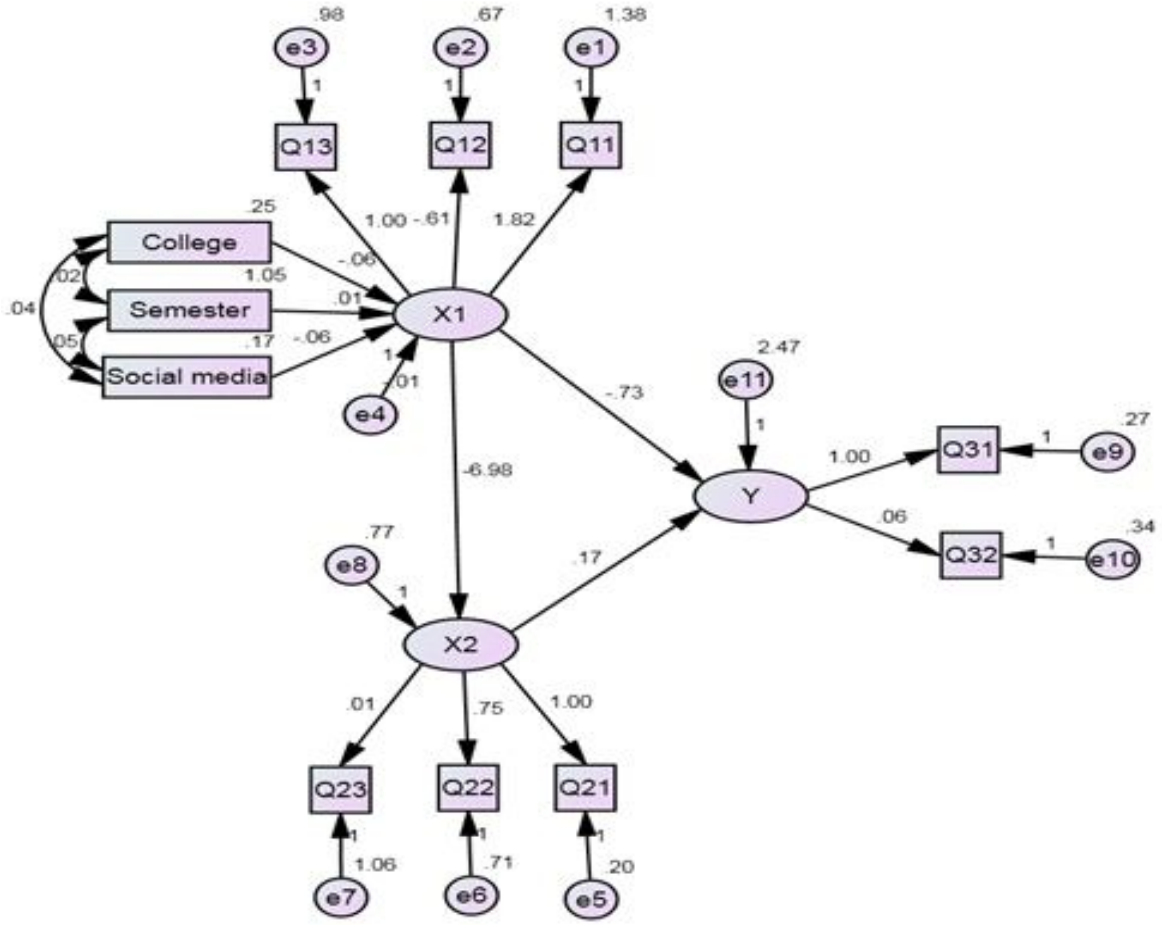


Figure (4-5) Estimating the coefficients of the regression path between the variables of the student model.

Table (4-16) 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 (4-16), 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 (4-17) Correlations relations between the variables measured in the Student Model

Variable	Correlation	Variable	Estimate
Semester	<-->	Social media	0.122
College	<-->	Social media	0.180

From Table (4-17), 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 (4-17) shows the results of the path of regression coefficients (beta) for each external variable (independent) dependent on an internal variable (dependent) extracted from Figure (4-5).

Table (4-18) estimating the regression coefficient between variables and its statistical significance, students' model

Table (4-18) Estimate of regression weights

Variable	Path	Variable	Estimate	S.E.	C.R.	P	Result
X2	-->	X1	-6.983	9.671	-0.722	0.470	Not-Significant
Y	-->	X2	0.172	0.543	0.316	0.752	Not-Significant
Y	-->	X1	-0.727	0.814	-0.893	0.372	Not-Significant

Table (4-18) 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 X2, the time spent in evaluation and evaluation, and Y educational process facilitation (influential and affected) is 0.17, and this is evidence that the time spent in evaluation and evaluation has an impact on educational process facilitation, and this means when the time spent in Evaluation and evaluation are one unit of time. Educational process facilitation 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 X1 student communication with the teacher and Y educational process facilitation(influential and affected) is equal to 0.73 - and this is evidence that X1 students ‘communication with the teacher has an impact on educational process facilitation, which means when students' communication with the teacher increases alone One, the educational process facilitation 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.

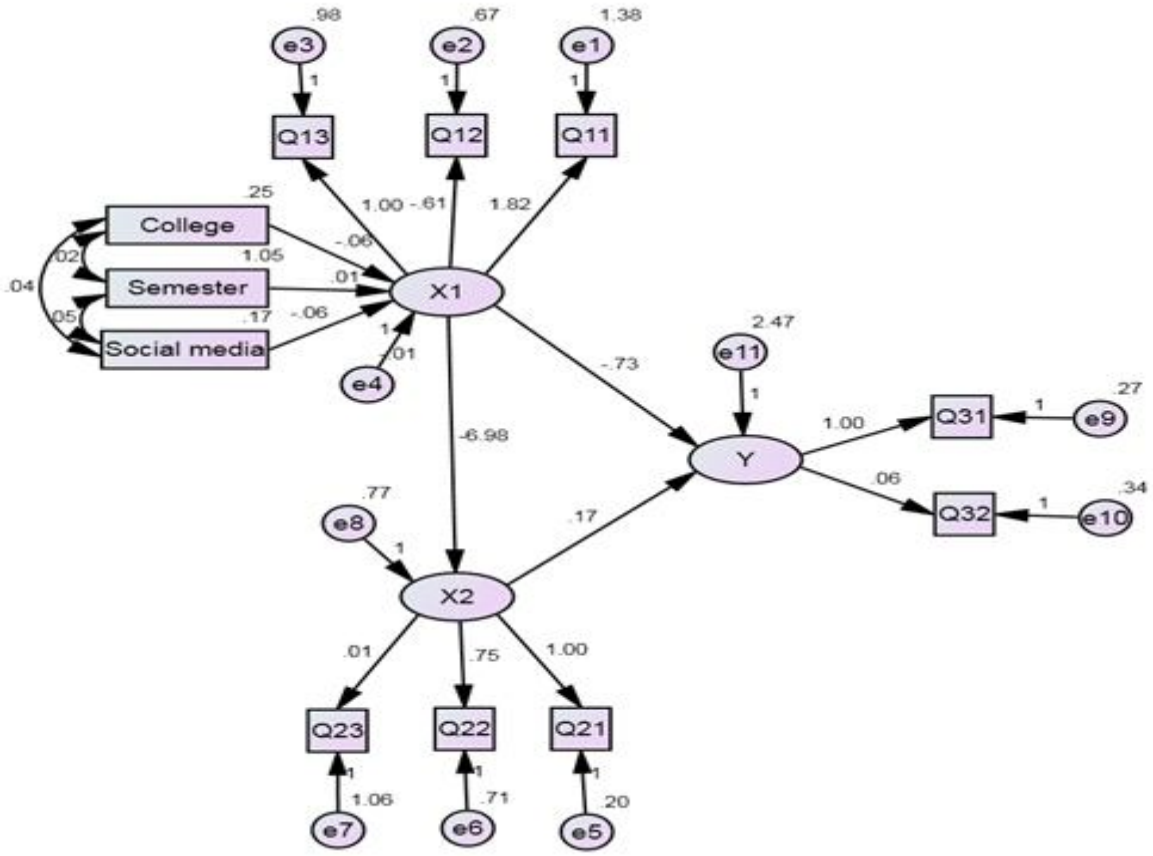
The result from this study showed that the majority of the university teachers agreed that, students at University have difficulties in discussion, communicating with their teachers when using the traditional educational methods. But these problems have been solved when using the (ICT) in the educational process; however, it helps teachers to manage their official time through devoting a specific time to communicating with students. This result obtains from the table (4-18) it is similar to that obtained by (Oyaid,2009;Akpan, 2019). in addition, teachers

always try to find the effective methods or ways that improve or enhance the educational process.

The revealed results verify that the time taken by teachers for Assessment and Evaluation was minimized to the lowest level, also the use of (ICT) helps in saving time and efforts for both teachers and students in university education because Setting a time to communicate with students strengthens the relationship between the two sides of the educational process and also help students to solve inhibition problems which may face them when communicating with their teacher directly table (4-18). (Sulaiman, 2020) reported that communicating via social media programs helps some students who ashamed to speak or discuss or ask in front of people. Also, the mere lecture time is not enough for teaching and the educational process. Students and teachers need different attractive ways to motivate them to learn. (ICT) help teachers to improve their performance skills. Perhaps students might not give enough chance to learn from the lectures. The time of the lectures also is not enough for teachers to evaluate and evaluate their performance, and to find out the extent of achieving lessons' goals. these results were typical of that obtained by (Zlatkin-Troitschanskaia, 2019).

Through Figures (4-6) and Table (4-18), we find that the equation of the estimated student model is

$$Y = -0.73X_1 + 0.17X_2 \text{.....(2)}$$



Figures (4-6)

Table (4-19) 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 (4-19) 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 X1 and the variable Y equal to -1.12. This means that the direct relationship between X1 students' communication with the teacher and the variable Y educational process facilitation is weak in value and less than the

indirect relationship. Therefore, the variable X2 is the time spent in evaluation and evaluation mediating the relationship between X1students'communication with the teacher and the variable Y academic performance.

1.13.3 Modification Indices (MI)

Table (4-20) 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 (4-20) 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 educational process facilitation 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 Q12: 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 educational process facilitation 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 Q23 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 educational process facilitation and the improvement that will occur in reading the results by adding this share by 0.66.

The students in this study have good knowledge about using (ICT) application which was offered by the current study easily and comfortably. Also, the majority of the study students prefer the use of (ICT) in the educational process to traditional methods (figure 4-6).

The study revealed that (ICT) provides an effective way for students to communicate with their teachers because the process of communicating is very important in achieving the educational goals, this leads to the need for transferring to (ICT) in university education (figure 4-6). Also, the use of (ICT) provided program help students getting their teachers and communicating with them during the evening periods. These results contribute to solving many educational problems faced by students at university such as (a specific time and place, scheduling teachers' official time, shying in communicating in front of big numbers of people. This result is similar to those obtained by (Liu, 2015;Graham, 2019). In another hand the (ICT) provided program by the current study give students specific time for discussing, explaining the complex parts of the lessons with their teachers without feeling shy from speaking in front of other classmates (Mean1.10 ±0.30)(TABLE 4) .

The time spent by students to get the course content Due to the use of ICT in the educational process is short comparing with that spent in getting them when using traditional educational ways. A similar result was reported by (Davidson, Phillip.2019; Livingstone, S. 2012). But sometimes they faced one more complex problem related to the weakness of internet service which obstacle the download process of sources and contents. The cost of getting materials in (ICT) provided program was quite little comparing with the cost due to the use of traditional educational methods (figure 4-6). This result is similar to (Cakici, 2016; Livingstone, 2012). Student’s marks that the content is, of course, materials due to (ICT) provided program need to develop to be compatible with the teaching way.

1.13.4 Matching the quality of the Goodness of Fit student model

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

Table (4-21) 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 (4-21), 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.

1.13.5 Summary of results in term of hypotheses:

The purpose of this section of the chapter is to discuss the statistical results as they related to the hypotheses. Each hypothesis is restated and discussed the results that relate to it, is following.

In chapter one three hypotheses were addressed and in chapter three they were stated with the expected outcome of each, in this chapter, the three hypotheses are listed below with a description the outcomes of each in a form of summary.

Hypothesis 1

H1: Using the TSC model encourages students of Khartoum State private colleges to communicate with teachers in the educational process.

Through the table (4-9), the proportion of communication in the method used in communication between students and teachers is 0.20, and this is evidence that the method used to communicate has an impact on teachers' communication with students. This means that when the method used increases by one unit, teachers' communication with student's increases

by 0.20 and with a standard error of 0.12 and that this relationship between the two factors is significant because the acceptance rate is CR 1.70 greater than 1.96 and P-value (0.09) less than the significance level of 0.05.

In summary, the use of (TSC) provided solutions to communication problems between students and teachers outside official working hours in an easy way, which confirms the validity of the hypothesis.

Hypothesis 2

1. Using the TSC model enable teachers to communicate with students of Khartoum State private colleges in the educational process.

Table (4-9) in general, for section 3 of the questionnaire for teachers were highly accepted by the respondents, they agreed that

The use of TSC helps in communicating between teachers and students strengthen the relationship between them, besides discussing the educational issues via (TSC) promote confidence and release the feeling of shying for those students who shy to speak in front of teachers or classmates during the official working hours; this is due to the behavioral and psychological nature of some students. However, communication by TSC is restricted between the student and the teacher only, but helps teachers to master and evaluate their performance. The average mean scored by teachers for section 3 was (1.54).

In summary, both teachers and students benefited from the use of (TSC) in the educational process. However, teachers manage to master their time and evaluate their performance due to the use of TSC in the educational process. It high by the respondents consequently, hypothesis 2 is attested by the findings.

Hypothesis3

2. The use of the TSC model in student-teacher communication has an impact on educational process facilitation.

Table (4-9) and The value of the relationship between the two variables X1 teachers' communication with students and the facilitation of the educational process Y (influential and affected) equals 0.34 and this is evidence that teachers' communication X1 with students has

an effect on facilitating the educational process. Table (4-18), We note that the value of the relationship between the two variables X2, the time spent on assessment and evaluation, and Y, the facilitation of the educational process (influencing and affected) is 0.17, and this is evidence that the time spent on assessment and evaluation has an impact on facilitating the educational process . And also, the result in (Figure 4-2): explains how the use of (TSC) affect the process of educational process facilitation , however, most (73.8%) of the respondents get the content of the course in 10 minutes or less, this time is considered very little comparing to that was spent when using the traditional method. Also, the cost of getting the materials was low compared to the traditional method, and the syllabus of the course is offered at anytime and anywhere ; hence the students can be reviewed and feedback the information easily.

In summary, the use of TSC in communication enables the teacher to meet a number of students in an easy way, and also helps teachers to store educational materials and their contents in a positive way. It also allows students to communicate with the teacher outside official working hours, and to obtain the scientific material at a lower cost and in an easy and fast way. Thus, hypothesis 3.

Chapter Five Conclusion

1.14 5.1 Introduction

This chapter has the final conclusions for conducting communication between teacher and student and its effects on the educational process and suggested recommendations for further research.

In our conclusion, 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. The results indicated a variation in the use of the ICT between faculty members, and from one department to another, according to personal efforts and initiatives. ICT can play a major role in improving the educational process in Sudanese universities.

1.15 5.2 The outcome from this study involves

- The model (TSC) has been built and its various functions have been tried in linking teachers with students and enabling them to write the appropriate time to communicate with students outside official working hours.
- The process of communication in the educational process took place in an easy and fast way through the schedule set by the teacher in advance on the model (TSC).
- Through tests of quality matching indicators, it was found that the (TSC) model has a weak effect when used by the teacher in facilitating the educational process, and a strong effect when used by students.

5.3 Recommendations and future work

- Adding a module for the administrators to the model (TSC) to enable them to communicate in various ways in order to facilitate the administrative process.
- The model (TSC) should be developed by adding video technology to the communication process.

- Adding security services to this model (TSC) to make it more confidential.
- Making a group room (groups for communication) in a model (TSC).

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APPENDIX A

A Model to Measure the Impact of Teacher-Student Communication and its Effects on the Educational Process

With reference to the above topic, I ask you to kindly complete this questionnaire to measure the Impact of Teacher-Student Communication and its Effects on the Educational Process through effective communication between the teacher and students. This data is to study only, and thank you for your cooperation.

Information about the Teacher:

Academic degree

☐ Diploma ☐ Bachelor ☐ M.A. ☐ Doctor ☐ Co-professor

Years of Experience

☐ 1 year or less

☐ 2 years or less - 3 years

☐ 3 years - 4 years

☐ 4 years - 5 years

☐ 5 years or more

Method of communication

☐ Social media ☐ E. Mail ☐ Phone ☐ Educational platforms ☐ The office

1. The teacher communicates with the students

Statement	Strongly agree	I agree	Neutral	Disagree a bit	Strongly Disagree
Q_{11}. A specific time must be devoted to communicating with students during office hours					
Q_{12}. Communication with students helps in knowing how well the lesson objectives have been achieved					

Q_{13}. Students are allowed to communicate over the phone during the evening periods					

2. Assessment and evaluation of the time spent in the educational process

Q_{21}. Some students feel ashamed to ask questions and inquiries when communicating with teachers - (face to face) during the official working hours; this is due to the behavioral and psychological nature of some students. However, communication by TSC is rest?

☐ Strongly agree ☐ gree ☐ Neutral ☐ Disagree a bit ☐ Strongly Disagree

Statement	Less than 5 mint	6-10	11-15	16-20	More than 20 mint
Q_{22}. Meeting duration during the official working hours for each student					
Q_{23}. How long does the evaluation process take?					

1. Educational process facilitation

Statement	Strongly agree	I agree	Neutral	Disagree a bit	Strongly Disagree
Q_{31}. Communicating via TSC with students helps to get benefits such as get the teacher all the time?					
Q_{32}. Setting a time to communicate with students strengthens the relationship such as chat between the two sides of the educational process?					

APPENDIX B

A Model to Measure the Impact of Teacher-Student Communication and its Effects on the Educational Process

With reference to the above topic, I ask you to kindly complete this questionnaire to measure the Impact of Teacher-Student Communication and its Effects on the Educational Process through effective communication between the teacher and students. This data is to study only, and thank you for your cooperation.

Information about the Students

College

☐ Economics and Financial Sciences ☐ Computer sciences Semester

☐ First ☐ Second ☐ The Third ☐ Fourth Method ofcommunication Social

☐ media ☐ Mail P☐ E☐ional platforms T☐ffice

2. The students communicates with the teacher

Statement	Strongly agree	I agree	Neutral	Disagree a bit	Strongly Disagree
Q_{11}. The teacher allows a specific time to communicate during the official working hours					
Q_{12}. The specific time to communicate with the teacher during the official working hours needs to be scheduled					
Q_{13}. Communication with teachers during the evening periods helps in getting the teacher all the time?					

3. Assessment and evaluation of the time spent in the educational process

Statement	Less than 5 mint	6-10	11-15	16-20	More than 20 mint
Q_{21}. How much time is allocated for each student to communicate with the teacher during the official working hours?					
Q_{22}. How long does it take to get the course content Due to the use ofICT in the educational process?					
Q_{23}. How long does the Evaluation process take?					

4. Educational process facilitation

Q_{31}. How do you get the content of the educational materials in the traditional method?

- ☐ Writing directly from the blackboard
- ☐ Work papers
- ☐ Education media (CD)
- ☐ Internet
- ☐ Others

Q_{32}. Getting educational material content is costly?

- ☐ 1 to 10 SDG for each semester
- ☐ 10 to20SDG for each semester
- ☐ 20 to 50SDG for each semester
- ☐ 50 to100SDG for each semester
- ☐ More than 100 SDG for each semester

APPENDIX C

Analysis Summary

- **Title**
  Teacher: Wednesday, December 02, 2020 9:06 PM
- **Notes for Group (Group number 1)**

The model is recursive.
Sample size = 30

- **Variable Summary (Group number 1)**

Your model contains the following variables (Group number 1)

Observed, endogenous variables
Q13
Q12
Q11
Q31
Q32
Q21
Q22
Q23
Observed, exogenous variables
Degree
Experience
Method
Unobserved, endogenous variables
X1
X2
Y
Unobserved, exogenous variables
e4
e11
e8
e9
e10
e1
e2
e3
e7
e6
e5

- **Parameter Summary (Group number 1)**

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	14	0	0	0	0	14
Labeled	0	0	0	0	0	0
Unlabeled	11	3	14	0	0	28
Total	25	3	14	0	0	42

- **Sample Moments (Group number 1)**

Sample Covariances (Group number 1)

	Method	Experience	Degree	Q_{23}	Q_{22}	Q_{21}	Q_{32}	Q_{31}	Q_{11}	Q_{12}	Q_{13}
Method	3.049										
Experience	.247	1.690									
Degree	.202	.023	1.179								
Q23	.527	-.253	-.120	.827							
Q22	1.718	.070	.214	.140	1.57						
Q21	.324	-.427	-.149	.180	.18	.86					
Q32	.916	.247	-.131	.227	.48	.19	.44				
Q31	.331	.143	.121	-.013	.19	-.05	.13	.51			
Q11	1.038	.313	-.376	.127	.496	.37	.53	.34	1.45		
Q12	.827	.147	.413	.193	.41	-.05	.19	.12	.193	.63	
Q13	.453	.043	-.257	.220	.130	.26	.32	-.01	-.08	-.21	1.56

Condition number = 91.699
Eigenvalues
5.376 2.138 1.898 1.535 .806 .740 .522 .337 .204 .152 .059
Determinant of sample covariance matrix = .006

Sample Correlations (Group number 1)

	Method	Experience	Degree	Q23	Q22	Q21	Q32	Q31	Q11	Q12	Q13
Method	1.000										
Experience	.109	1.000									
Degree	.107	.017	1.000								
Q23	.332	-.214	-.122	1.000							
Q22	.786	.043	.158	.123	1.00						
Q21	.200	-.353	-.148	.213	.151	1.00					
Q32	.783	.283	-.180	.372	.578	.307	1.00				
Q31	.265	.154	.156	-.020	.207	-.077	.273	1.00			
Q11	.494	.200	-.287	.116	.329	.330	.667	.397	1.00		
Q12	.598	.143	.481	.269	.411	-.073	.365	.212	.203	1.00	
Q13	.208	.027	-.189	.194	.083	.224	.383	-.011	-.053	-.216	1.00

Condition number = 35.547
Eigenvalues 3.560 1.934 1.442 1.075 .879 .803 .601 .297 .204 .105 .100

- **Estimates (Group number 1 - Default model)**

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
X1	<---	Degree	-.066	.049	-1.346	.178	par_1
X1	<---	Experience	.028	.030	.906	.365	par_2
X1	<---	Method	.198	.116	1.703	.089	par_3
X2	<---	X1	.488	.537	.908	.364	par_4
Y	<---	X2	.497	.746	.666	.505	par_5
Y	<---	X1	.342	.392	.873	.383	par_6
Q13	<---	X1	1.000				
Q12	<---	X1	.902	.622	1.449	.147	par_7
Q11	<---	X1	1.953	1.211	1.613	.107	par_8
Q31	<---	Y	1.000				
Q32	<---	Y	2.779	1.704	1.631	.103	par_9
Q21	<---	X2	1.000				
Q22	<---	X2	5.193	5.015	1.036	.300	par_10
Q23	<---	X2	1.758	1.873	.939	.348	par_11

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
X1	<---	Degree	-.186
X1	<---	Experience	.092
X1	<---	Method	.891
X2	<---	X1	1.273
Y	<---	X2	.341
Y	<---	X1	.612
Q13	<---	X1	.311
Q12	<---	X1	.443
Q11	<---	X1	.630
Q31	<---	Y	.303
Q32	<---	Y	.901
Q21	<---	X2	.160
Q22	<---	X2	.618
Q23	<---	X2	.288

Covariance's: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Experience	<-->	Method	.247	.424	.582	.561	par_12
Degree	<-->	Experience	.023	.262	.089	.929	par_13

Degree	<-->	Method	.202	.354	.571	.568	par_14

Correlations: (Group number 1 - Default model)

			Estimate
Experience	<-->	Method	.109
Degree	<-->	Experience	.017
Degree	<-->	Method	.107

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
Degree	1.179	.310	3.808	***	par_15
Experience	1.690	.444	3.808	***	par_16
Method	3.049	.801	3.808	***	par_17
e4	.027	.034	.811	.417	par_18
e8	-.014	.027	-.501	.616	par_19
e11	-.001	.016	-.062	.951	par_20
e9	.465	.123	3.778	***	par_21
e10	.084	.121	.697	.486	par_22
e1	.873	.237	3.685	***	par_23
e2	.504	.133	3.774	***	par_24
e3	1.406	.370	3.795	***	par_25
e7	.758	.202	3.752	***	par_26
e6	.968	.440	2.200	.028	par_27
e5	.840	.220	3.826	***	par_28

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
X1	.818
X2	1.619
Y	1.021
Q23	.083
Q22	.382
Q21	.026
Q32	.812
Q31	.092
Q11	.397
Q12	.196
Q13	.097

Total Effects (Group number 1 - Default model)

	Method	Experience	Degree	X1	X2	Y
X1	.198	.028	-.066	.000	.000	.000

X2	.097	.013	-.032	.488	.000	.000
Y	.116	.016	-.039	.585	.497	.000
Q23	.170	.024	-.057	.857	1.758	.000
Q22	.502	.070	-.168	2.532	5.193	.000
Q21	.097	.013	-.032	.488	1.000	.000
Q32	.322	.045	-.108	1.625	1.382	2.779
Q31	.116	.016	-.039	.585	.497	1.000
Q11	.387	.054	-.130	1.953	.000	.000
Q12	.179	.025	-.060	.902	.000	.000
Q13	.198	.028	-.066	1.000	.000	.000

Standardized Total Effects (Group number 1 - Default model)

	Method	Experience	Degree	X1	X2	Y
X1	.891	.092	-.186	.000	.000	.000
X2	1.133	.117	-.236	1.273	.000	.000
Y	.931	.096	-.194	1.046	.341	.000
Q23	.326	.034	-.068	.366	.288	.000
Q22	.700	.072	-.146	.786	.618	.000
Q21	.182	.019	-.038	.204	.160	.000
Q32	.839	.087	-.175	.942	.307	.901
Q31	.283	.029	-.059	.317	.103	.303
Q11	.561	.058	-.117	.630	.000	.000
Q12	.394	.041	-.082	.443	.000	.000
Q13	.277	.029	-.058	.311	.000	.000

Direct Effects (Group number 1 - Default model)

	Method	Experience	Degree	X1	X2	Y
X1	.198	.028	-.066	.000	.000	.000
X2	.000	.000	.000	.488	.000	.000
Y	.000	.000	.000	.342	.497	.000
Q23	.000	.000	.000	.000	1.758	.000
Q22	.000	.000	.000	.000	5.193	.000
Q21	.000	.000	.000	.000	1.000	.000
Q32	.000	.000	.000	.000	.000	2.779
Q31	.000	.000	.000	.000	.000	1.000
Q11	.000	.000	.000	1.953	.000	.000
Q12	.000	.000	.000	.902	.000	.000
Q13	.000	.000	.000	1.000	.000	.000

Standardized Direct Effects (Group number 1 - Default model)

	Method	Experience	Degree	X1	X2	Y
X1	.891	.092	-.186	.000	.000	.000
X2	.000	.000	.000	1.273	.000	.000
Y	.000	.000	.000	.612	.341	.000
Q23	.000	.000	.000	.000	.288	.000

Q22	.000	.000	.000	.000	.618	.000
Q21	.000	.000	.000	.000	.160	.000
Q32	.000	.000	.000	.000	.000	.901
Q31	.000	.000	.000	.000	.000	.303
Q11	.000	.000	.000	.630	.000	.000
Q12	.000	.000	.000	.443	.000	.000
Q13	.000	.000	.000	.311	.000	.000

Indirect Effects (Group number 1 - Default model)

	Method	Experience	Degree	X1	X2	Y
X1	.000	.000	.000	.000	.000	.000
X2	.097	.013	-.032	.000	.000	.000
Y	.116	.016	-.039	.242	.000	.000
Q23	.170	.024	-.057	.857	.000	.000
Q22	.502	.070	-.168	2.532	.000	.000
Q21	.097	.013	-.032	.488	.000	.000
Q32	.322	.045	-.108	1.625	1.382	.000
Q31	.116	.016	-.039	.585	.497	.000
Q11	.387	.054	-.130	.000	.000	.000
Q12	.179	.025	-.060	.000	.000	.000
Q13	.198	.028	-.066	.000	.000	.000

Standardized Indirect Effects (Group number 1 - Default model)

	Method	Experience	Degree	X1	X2	Y
X1	.000	.000	.000	.000	.000	.000
X2	1.133	.117	-.236	.000	.000	.000
Y	.931	.096	-.194	.434	.000	.000
Q23	.326	.034	-.068	.366	.000	.000
Q22	.700	.072	-.146	.786	.000	.000
Q21	.182	.019	-.038	.204	.000	.000
Q32	.839	.087	-.175	.942	.307	.000
Q31	.283	.029	-.059	.317	.103	.000
Q11	.561	.058	-.117	.000	.000	.000
Q12	.394	.041	-.082	.000	.000	.000
Q13	.277	.029	-.058	.000	.000	.000

- **Modification Indices (Group number 1 - Default model)**

Covariance's: (Group number 1 - Default model)

			M.I.	Par Change
e5	<-->	Experience	5.213	-.499
e2	<-->	Degree	9.111	.431
e3	<-->	e10	4.251	.151
e3	<-->	e2	5.050	-.353

Regression Weights: (Group number 1 - Default model)

			M.I.	Par Change
Q21	<---	Experience	5.094	-.294
Q12	<---	Degree	9.836	.382
Q12	<---	Q13	4.547	-.226
Q13	<---	Q12	4.033	-.559

- **Model Fit Summary**

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.160	.715	.505	.412
Saturated model	.000	1.000		
Independence model	.372	.510	.412	.425

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.196	.136	.256	.000
Independence model	.268	.223	.314	.000

APPENDIX D

Analysis Summary

- **Title**Student : Thursday, November 26, 2020 8:27 PM
- **Notes for Group (Group number 1)**

The model is recursive.
Sample size = 80

- **Variable Summary (Group number 1)**

Your model contains the following variables (Group number 1)

Observed, endogenous variables
Q23
Q22
Q21
Q41
Q42
Q31
Q32
Q33
Observed, exogenous variables
Q11
Q12
Q13
Unobserved, endogenous variables
X1
Y
X2
Unobserved, exogenous variables
e3
e2
e1
e9
e10
e6
e7
e8
e11
e4
e5

- **Parameter Summary (Group number 1)**

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	14	0	0	0	0	14
Labeled	0	0	0	0	0	0
Unlabeled	11	3	14	0	0	28
Total	25	3	14	0	0	42

- **Sample Moments (Group number 1)**

Sample Covariances (Group number 1)

	Q13	Q12	Q11	Q33	Q32	Q31	Q42	Q41	Q21	Q22	Q23
Q13	.174										
Q12	.052	1.055									
Q11	.037	.019	.250								
Q33	.119	.066	-.012	1.063							
Q32	.090	.046	.031	.184	.787						
Q31	.078	-.005	.125	-.056	.105	.334					
Q42	.012	.083	.013	.056	.097	-.022	.349				
Q41	.060	.052	-.038	-.038	.067	-.063	.135	2.715			
Q21	.022	.291	.019	-.334	.188	.183	-.009	.357	1.337		
Q22	-.010	.235	.037	.063	-.067	-.113	.040	.247	-.120	.665	
Q23	-.066	.075	-.081	.122	.122	-.002	.015	.005	-.072	-.043	.969

Condition number = 27.627
Eigenvalues
2.855 1.616 1.323 1.071 .905 .559 .435 .384 .302 .145 .103
Determinant of sample covariance matrix = .002

Sample Correlations (Group number 1)

	Q13	Q12	Q11	Q33	Q32	Q31	Q42	Q41	Q21	Q22	Q23
Q13	1.00										
Q12	.122	1.00									
Q11	.180	.037	1.00								
Q33	.276	.062	-.024	1.00							
Q32	.244	.051	.070	.202	1.00						
Q31	.324	-.008	.432	-.094	.204	1.00					
Q42	.048	.137	.042	.092	.184	-.064	1.00				
Q41	.087	.031	-.046	-.022	.046	-.066	.139	1.00			
Q21	.046	.245	.032	-.281	.183	.273	-.013	.188	1.00		
Q22	-.029	.281	.092	.074	-.093	-.239	.083	.184	-.127	1.00	
Q23	-.160	.074	-.165	.120	.139	-.003	.026	.003	-.063	-.053	1.00

Condition number = 5.414
Eigenvalues
1.919 1.599 1.415 1.283 1.026 .935 .857 .672 .526 .414 .354

- **Estimates (Group number 1 - Default model)**

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
X1	<---	Q11	-.057	.075	-.762	.446	par_6
X1	<---	Q12	.007	.011	.642	.521	par_7
X1	<---	Q13	-.058	.077	-.757	.449	par_8
X2	<---	X1	-6.983	9.671	-.722	.470	par_9
Y	<---	X1	-.727	.814	-.893	.372	par_10
Y	<---	X2	.172	.543	.316	.752	par_11
Q23	<---	X1	1.000				
Q22	<---	X1	-.613	.468	-1.310	.190	par_1
Q21	<---	X1	1.823	1.052	1.732	.083	par_2
Q41	<---	Y	1.000				
Q42	<---	Y	.055	.324	.170	.865	par_3
Q31	<---	X2	1.000				
Q32	<---	X2	.753	.286	2.633	.008	par_4
Q33	<---	X2	.013	.325	.040	.968	par_5

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Y	<---	X2	.041
Q41	<---	Y	.949
Q42	<---	Y	.146
Q31	<---	X2	.644
Q32	<---	X2	.316
Q33	<---	X2	.005

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Q12	<-->	Q13	.052	.049	1.074	.283	par_12
Q11	<-->	Q12	.019	.058	.324	.746	par_13
Q11	<-->	Q13	.037	.024	1.571	.116	par_14

Correlations: (Group number 1 - Default model)

			Estimate
Q12	<-->	Q13	.122
Q11	<-->	Q12	.037
Q11	<-->	Q13	.180

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
Q11	.250	.040	6.285	***	par_15
Q12	1.055	.168	6.285	***	par_16
Q13	.174	.028	6.285	***	par_17
e4	-.015	.022	-.662	.508	par_18
e5	.771	1.015	.759	.448	par_19
e11	2.469	14.235	.173	.862	par_20
e3	.982	.159	6.164	***	par_21
e2	.670	.108	6.224	***	par_22
e1	1.380	.233	5.928	***	par_23
e9	.271	14.227	.019	.985	par_24
e10	.342	.070	4.912	***	par_25
e6	.196	.066	2.983	.003	par_26
e7	.709	.117	6.036	***	par_27
e8	1.062	.169	6.285	***	par_28

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
X1	-.128
X2	-4.555
Y	-.010
Q33	.000
Q32	.100
Q31	.415
Q42	.021
Q41	.900
Q21	-.032
Q22	-.007
Q23	-.013

Total Effects (Group number 1 - Default model)

	Q13	Q12	Q11	X1	X2	Y
X1	-.058	.007	-.057	.000	.000	.000
X2	.406	-.050	.399	-6.983	.000	.000
Y	.112	-.014	.110	-1.926	.172	.000
Q33	.005	-.001	.005	-.090	.013	.000
Q32	.306	-.038	.301	-5.257	.753	.000
Q31	.406	-.050	.399	-6.983	1.000	.000
Q42	.006	-.001	.006	-.106	.009	.055
Q41	.112	-.014	.110	-1.926	.172	1.000
Q21	-.106	.013	-.104	1.823	.000	.000
Q22	.036	-.004	.035	-.613	.000	.000

Q23	-.058	.007	-.057	1.000	.000	.000

Standardized Total Effects (Group number 1 - Default model)

	Q13	Q12	Q11	X1	X2	Y
X1	.000	.000	.000	.000	.000	.000
X2	.455	-.138	.536	.000	.000	.000
Y	.030	-.009	.035	.000	.041	.000
Q33	.002	-.001	.003	.000	.005	.000
Q32	.144	-.044	.169	.000	.316	.000
Q31	.293	-.089	.345	.000	.644	.000
Q42	.004	-.001	.005	.000	.006	.146
Q41	.028	-.009	.033	.000	.039	.949
Q21	-.038	.012	-.045	.000	.000	.000
Q22	.018	-.006	.021	.000	.000	.000
Q23	-.025	.007	-.029	.000	.000	.000

Direct Effects (Group number 1 - Default model)

	Q13	Q12	Q11	X1	X2	Y
X1	-.058	.007	-.057	.000	.000	.000
X2	.000	.000	.000	-6.983	.000	.000
Y	.000	.000	.000	-.727	.172	.000
Q33	.000	.000	.000	.000	.013	.000
Q32	.000	.000	.000	.000	.753	.000
Q31	.000	.000	.000	.000	1.000	.000
Q42	.000	.000	.000	.000	.000	.055
Q41	.000	.000	.000	.000	.000	1.000
Q21	.000	.000	.000	1.823	.000	.000
Q22	.000	.000	.000	-.613	.000	.000
Q23	.000	.000	.000	1.000	.000	.000

Standardized Direct Effects (Group number 1 - Default model)

	Q13	Q12	Q11	X1	X2	Y
X1	.000	.000	.000	.000	.000	.000
X2	.000	.000	.000	.000	.000	.000
Y	.000	.000	.000	.000	.041	.000
Q33	.000	.000	.000	.000	.005	.000
Q32	.000	.000	.000	.000	.316	.000
Q31	.000	.000	.000	.000	.644	.000
Q42	.000	.000	.000	.000	.000	.146
Q41	.000	.000	.000	.000	.000	.949
Q21	.000	.000	.000	.000	.000	.000
Q22	.000	.000	.000	.000	.000	.000
Q23	.000	.000	.000	.000	.000	.000

Indirect Effects (Group number 1 - Default model)

	Q13	Q12	Q11	X1	X2	Y
X1	.000	.000	.000	.000	.000	.000
X2	.406	-.050	.399	.000	.000	.000
Y	.112	-.014	.110	-1.199	.000	.000
Q33	.005	-.001	.005	-.090	.000	.000
Q32	.306	-.038	.301	-5.257	.000	.000
Q31	.406	-.050	.399	-6.983	.000	.000
Q42	.006	-.001	.006	-.106	.009	.000
Q41	.112	-.014	.110	-1.926	.172	.000
Q21	-.106	.013	-.104	.000	.000	.000
Q22	.036	-.004	.035	.000	.000	.000
Q23	-.058	.007	-.057	.000	.000	.000

Standardized Indirect Effects (Group number 1 - Default model)

	Q13	Q12	Q11	X1	X2	Y
X1	.000	.000	.000	.000	.000	.000
X2	.455	-.138	.536	.000	.000	.000
Y	.030	-.009	.035	.000	.000	.000
Q33	.002	-.001	.003	.000	.000	.000
Q32	.144	-.044	.169	.000	.000	.000
Q31	.293	-.089	.345	.000	.000	.000
Q42	.004	-.001	.005	.000	.006	.000
Q41	.028	-.009	.033	.000	.039	.000
Q21	-.038	.012	-.045	.000	.000	.000
Q22	.018	-.006	.021	.000	.000	.000
Q23	-.025	.007	-.029	.000	.000	.000

- **Modification Indices (Group number 1 - Default model)**

Covariances: (Group number 1 - Default model)

	M.I.	Par Change
e8 <--> Q13	6.077	.117
e1 <--> e8	4.486	-.264
e2 <--> Q12	6.320	.231

Regression Weights: (Group number 1 - Default model)

	M.I.	Par Change
Q33 <--- Q13	5.903	.675
Q33 <--- Q21	6.307	-.252
Q21 <--- Q33	4.477	-.248
Q22 <--- Q12	6.010	.215

- **Model Fit Summary**

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.096	.890	.810	.513
Saturated model	.000	1.000		
Independence model	.107	.810	.773	.675

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.090	.046	.129	.064
Independence model	.116	.086	.146	.001

APPENDIX E

1.15.1 Relevant data

- Table of users: Be a record contain username and password to enable Authorize him to enter.

Field_name	No_user	Username	Password
Field Type	Number	Text	Text

- Table of teachers: Be a record contain all teachers data registered site.

Field_name	No_Prof	Name_Prof	Name_Subject
Field Type	Number	Text	Text
Properties	Primary Key		

- Table of students

Field_name	No_Stud	Name_Stud	Years	No_class	Address	Phone_No
Field Type	Number	Text	Text	Number	Text	Number
Properties	Primary Key					

- Table of subject

Field_name	No_subject	Name_Prof	Name_Subject
Field Type	Number	Text	Text
Properties	Primary Key		

- Table of class

Field_name	No_ class	Name_ class
Field Type	Number	Text
Properties	Primary Key	

- Table of notes

Field_name	No_Prof	Name_subject	No_stud	No_class
Field Type	Number	Text	Number	Number
Properties	Foreign Key		Primary Key	Foreign Key

- Table of lessons

Field_name	No_ lessons	Path	Type	No_subject	Year
Field Type	Number	Text	Text	Text	Date & time
Properties	Primary Key				

- Table of visual lesson

Field_name	No_ lessons	Path	Type	No_subject	Name	Year	
Field Type	Number	Text	Text	Number	Text		Date & time
Properties	Foreign Key			Foreign Key			

- Table of guardian

Field_name	No_ gua	Name_gua	Address	Relative relation	No_stud	No_Phone	Type
Field Type	Number	Text	Text	Text	Number	Number	Text
Properties	Primary Key				Foreign Key		

- Table of Supervisors

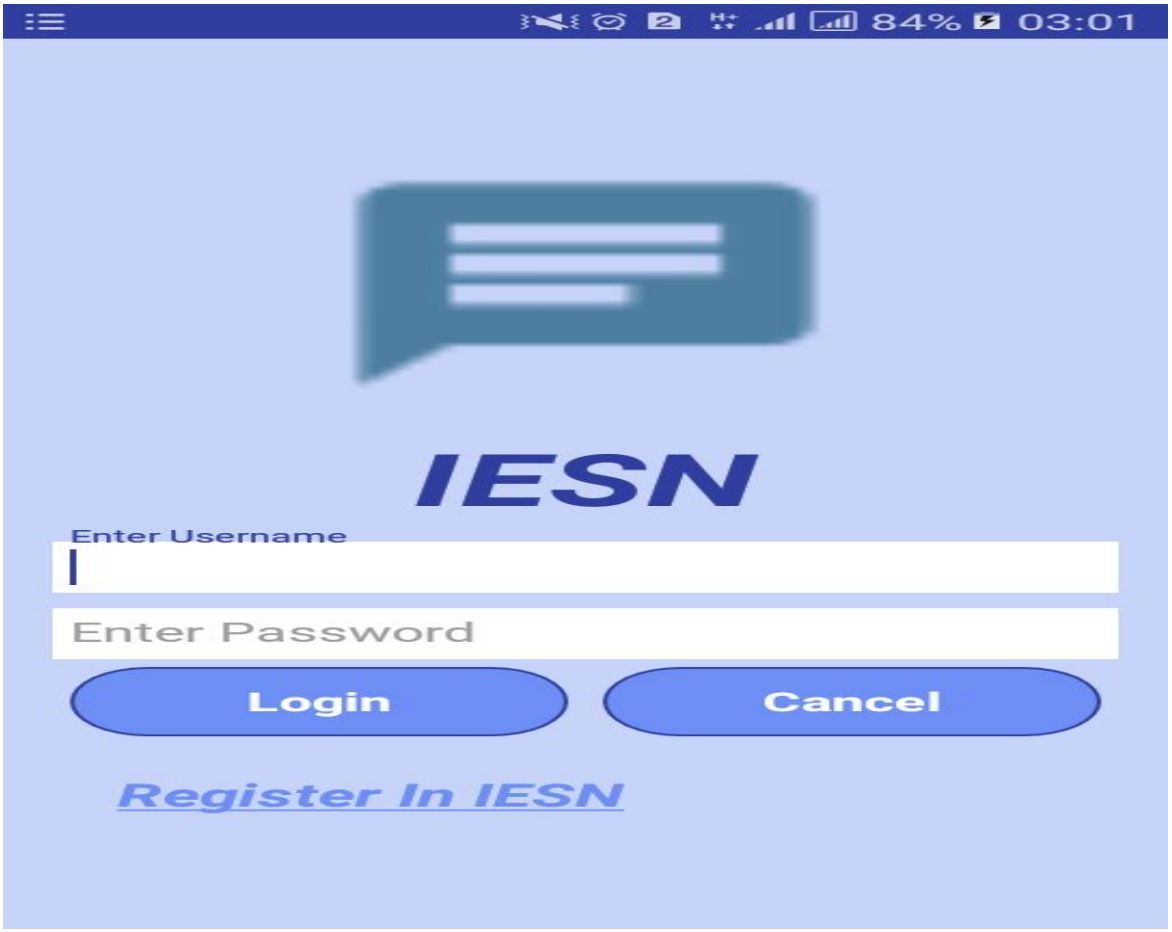
Field_name	No_ Sup	Name_Sup	No_Phone	Address
Field Type	Number	Text		Text
Properties	Primary Key			

- Table of Timetable

Field_name	No_Tit	Path	Type	Years	No_sup	No_Phone	Type
Field Type	Number	Text	Text	Date & time	Number	Number	Text
Properties	Primary Key				Foreign Key		

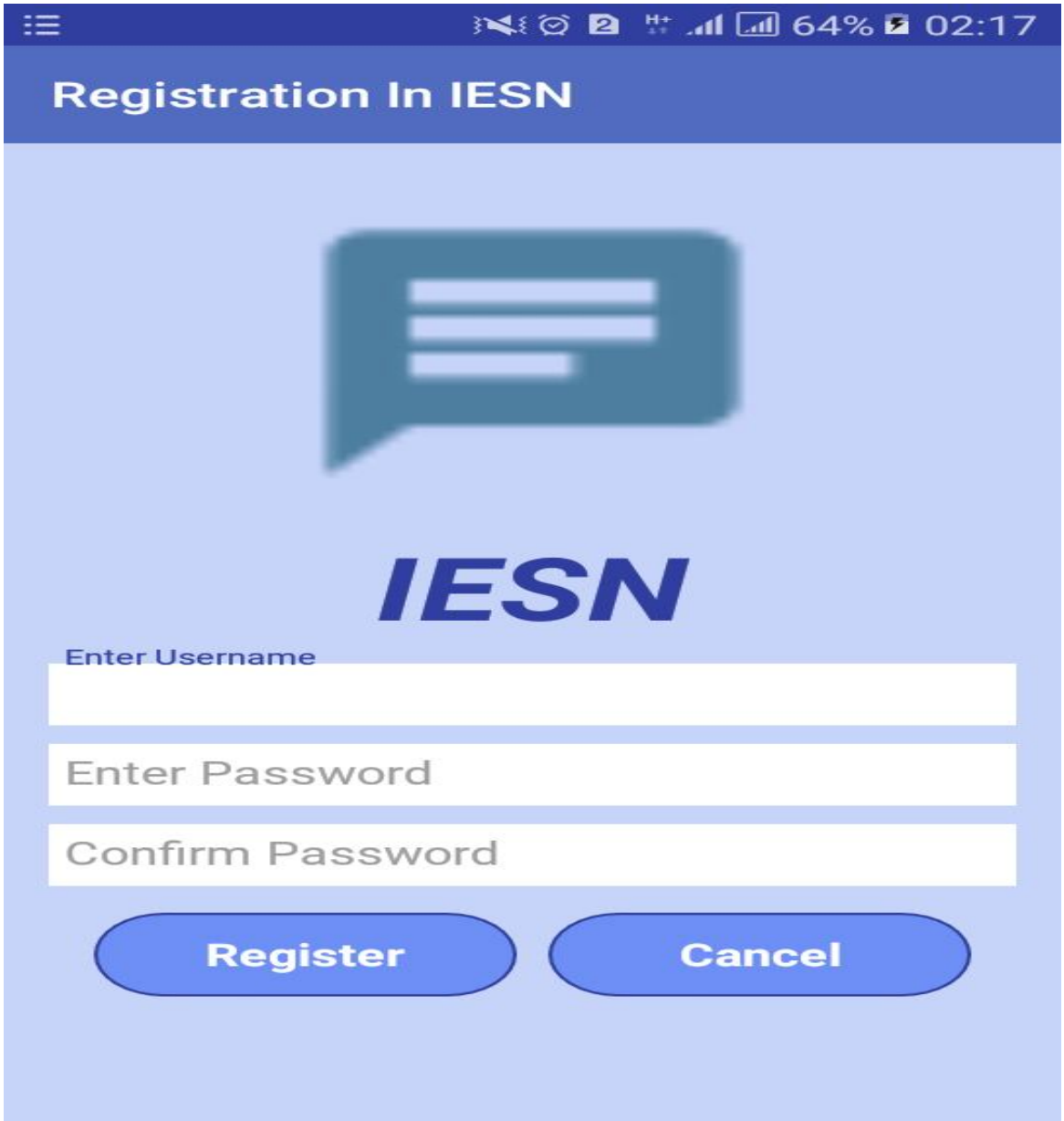
APPENDIX F

Login Screen



Shows the login screen that requires the user to type his username and password, and then the login data is sent to the server to ensure that the user has access to the application. If it has permission the user is moved to the home page.

Registration screen in the application



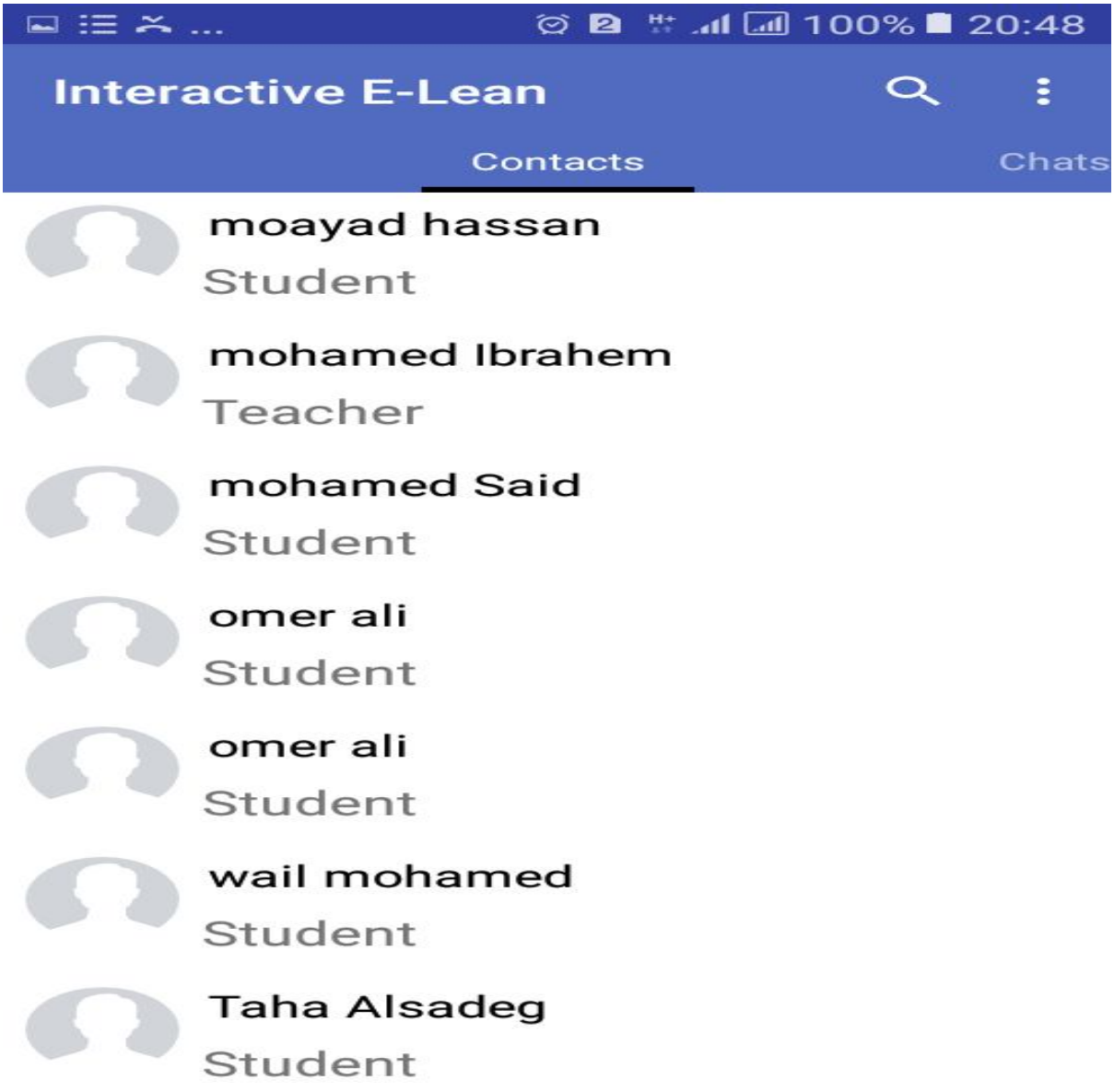
Shows the registration screen in the application, which enables students to create accounts to log into the application and communicate through it.

Home Screen

Shows the main screen of the application

Shows the main screen of the application, as it contains three screens of the chats that took place recently between the user and other users, and it also contains the contacts screen and the screen of the appointments of professors within the application. From it, you can move to the user data screen and the application management screen.

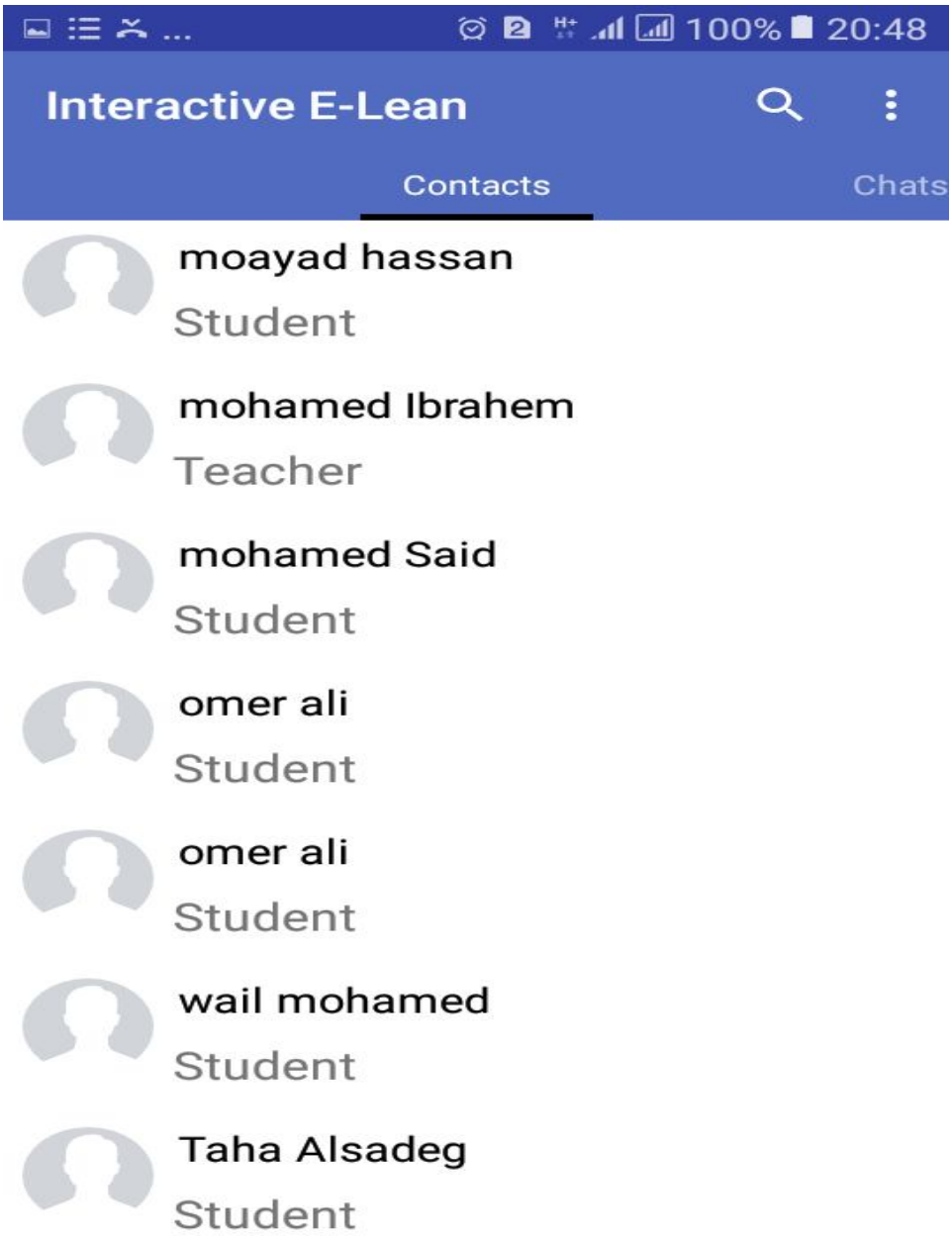
Contacts screen



Shows the Contacts screen

Shows the contacts screen, which contains other users with whom the current user can communicate directly or indirectly (Online or Offline) with them (students who participate with them in the courses and the professors who teach the courses).

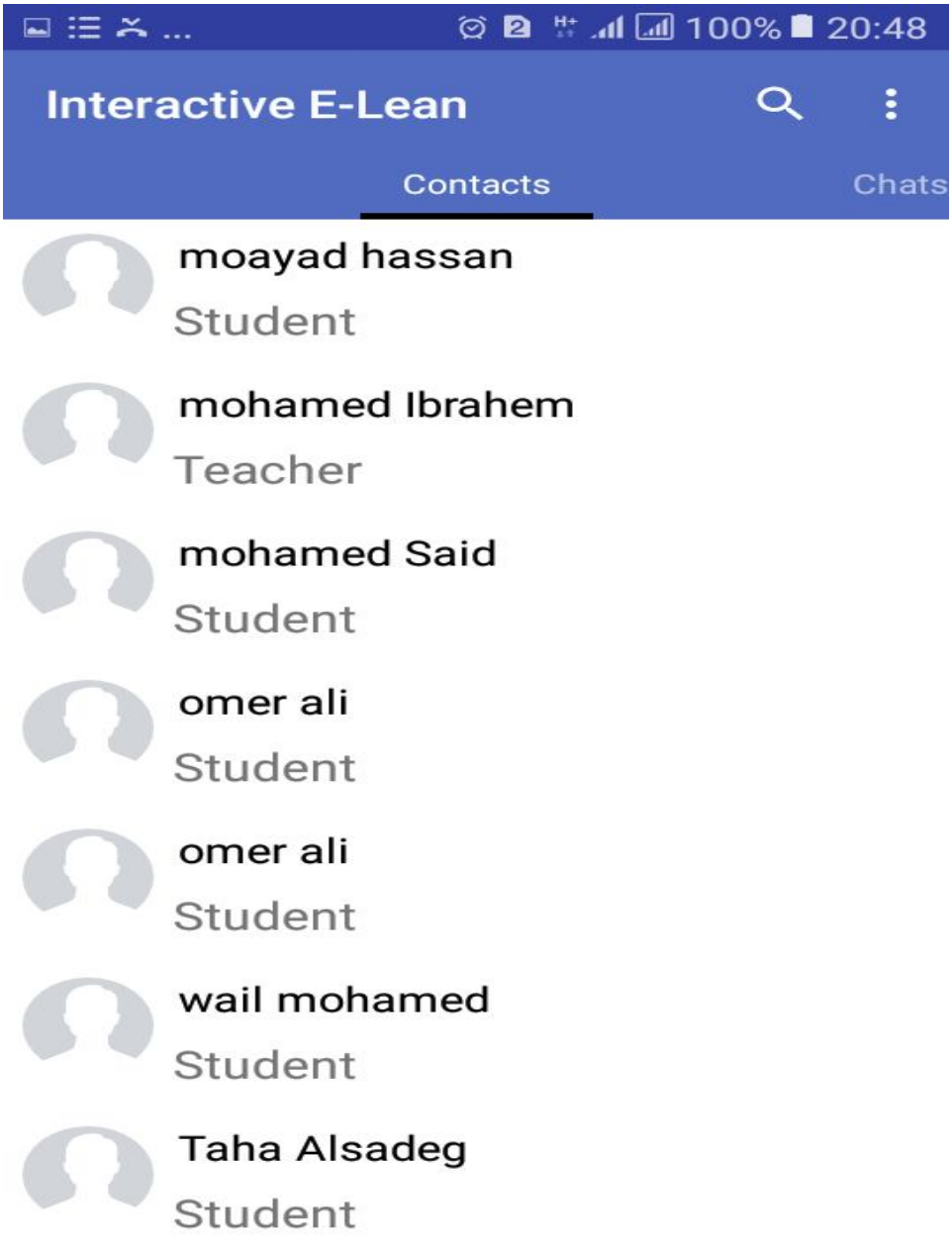
Contacts screen



Shows the Contacts screen

Shows the contacts screen, which contains other users with whom the current user can communicate directly or indirectly (Online or Offline) with them (students who participate with them in the courses and the professors who teach the courses).

Contacts screen



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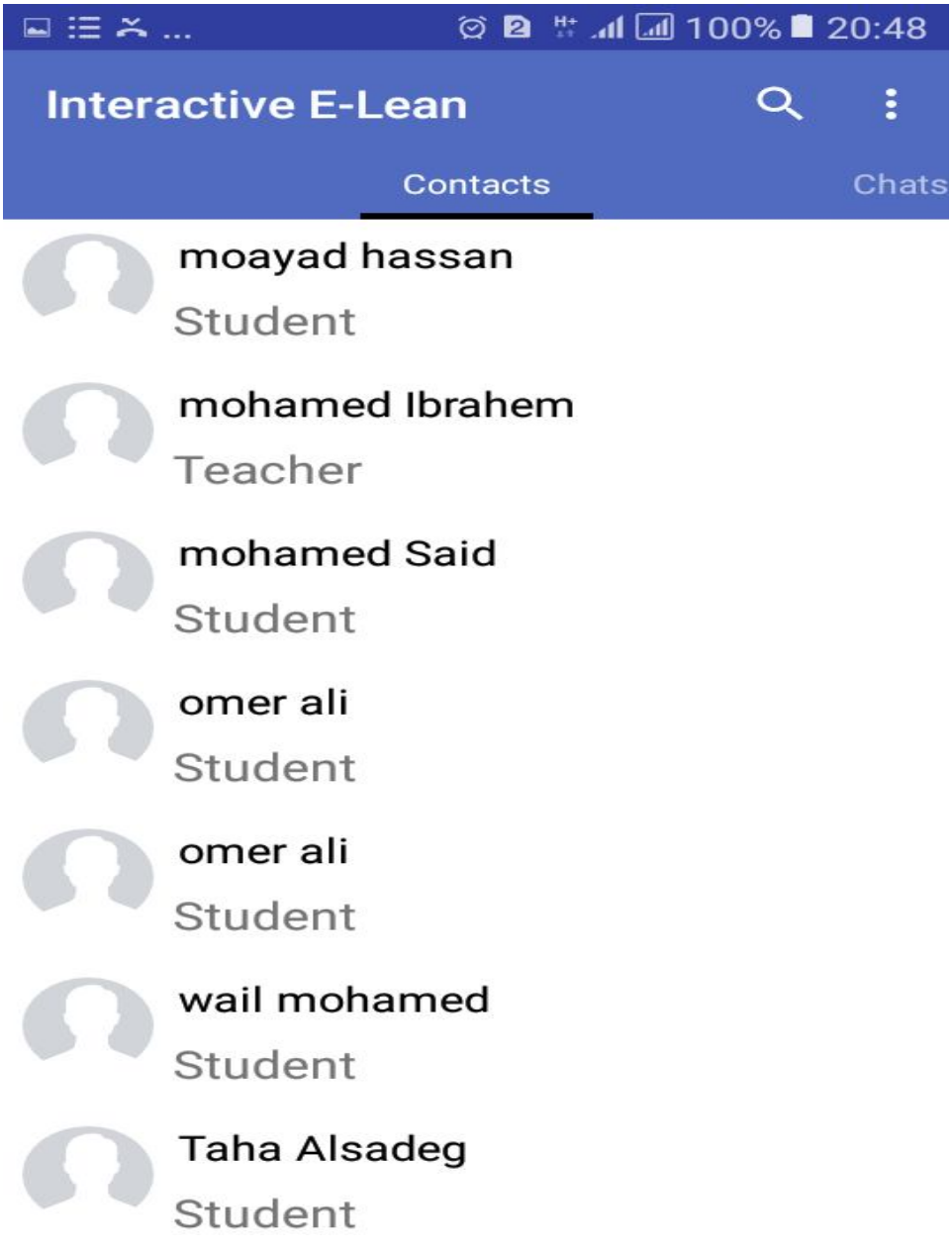
Shows the contacts screen, which contains other users with whom the current user can communicate directly or indirectly (Online or Offline) with them (students who participate with them in the courses and the professors who teach the courses).

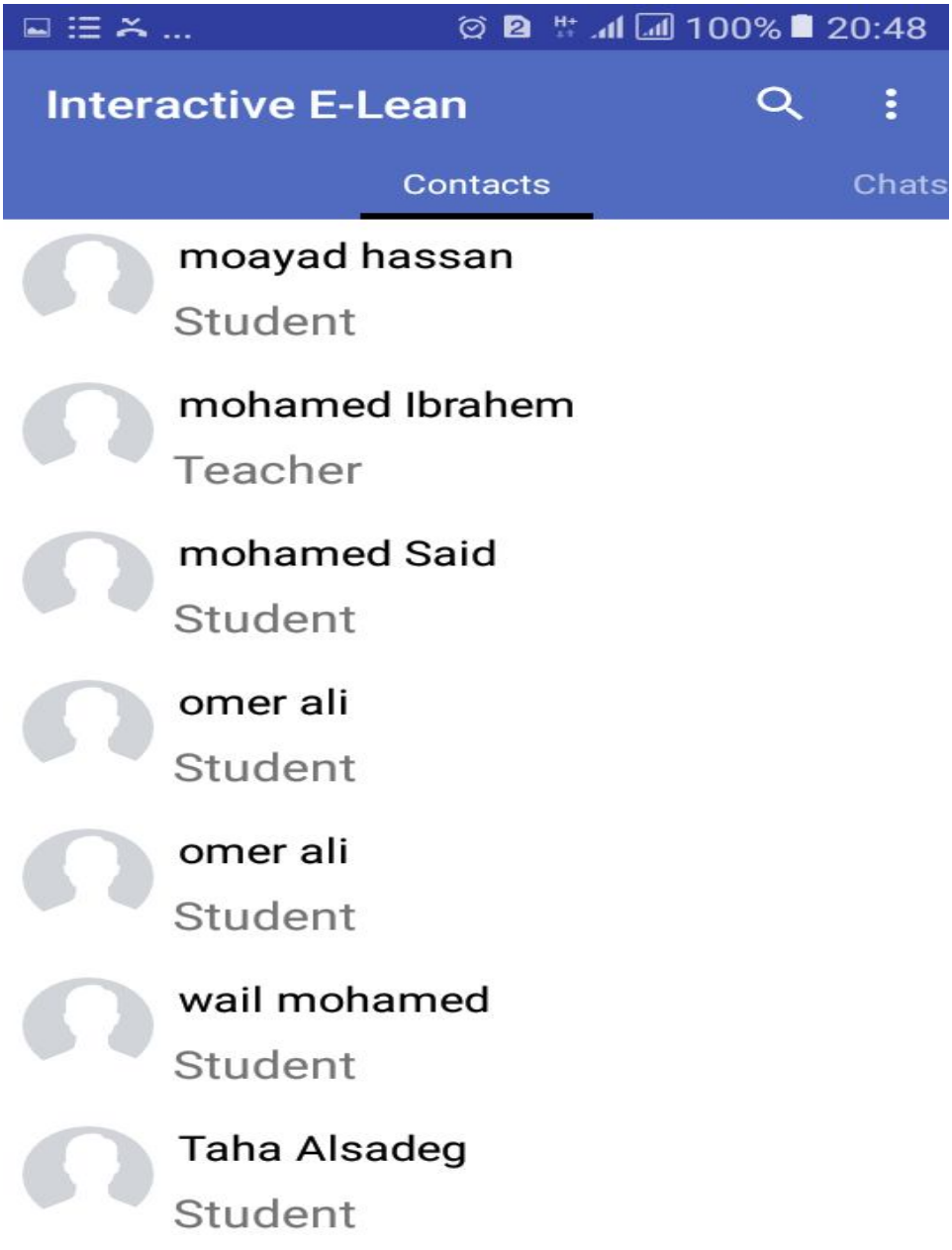
Contacts screen



Shows the Contacts screen

Shows the contacts screen, which contains other users with whom the current user can communicate directly or indirectly (Online or Offline) with them (students who participate with them in the courses and the professors who teach the courses).

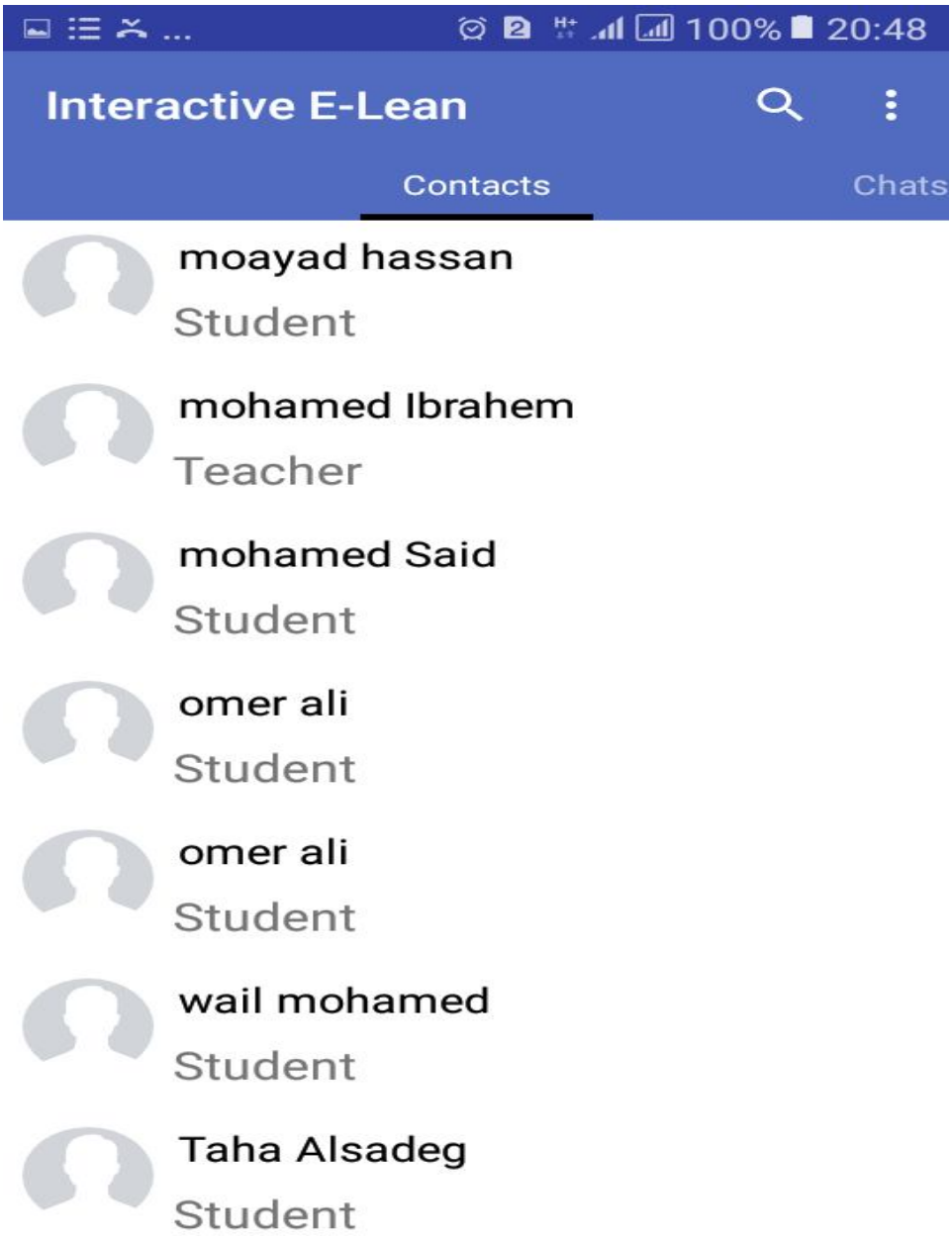
Contacts screen



Shows the Contacts screen

Shows the contacts screen, which contains other users with whom the current user can communicate directly or indirectly (Online or Offline) with them (students who participate with them in the courses and the professors who teach the courses).

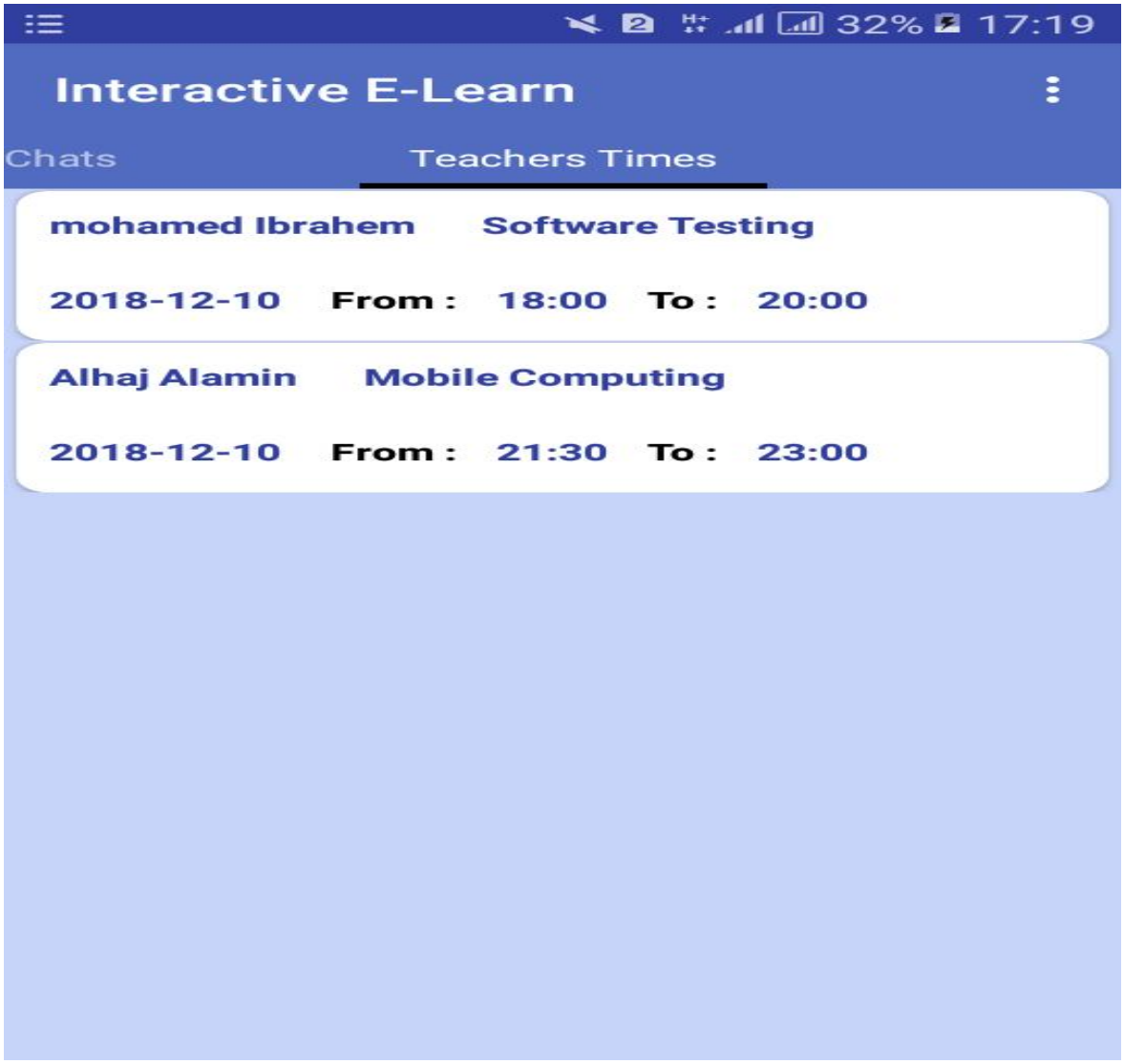
Contacts screen



Shows the Contacts screen

Shows the contacts screen, which contains other users with whom the current user can communicate directly or indirectly (Online or Offline) with them (students who participate with them in the courses and the professors who teach the courses).

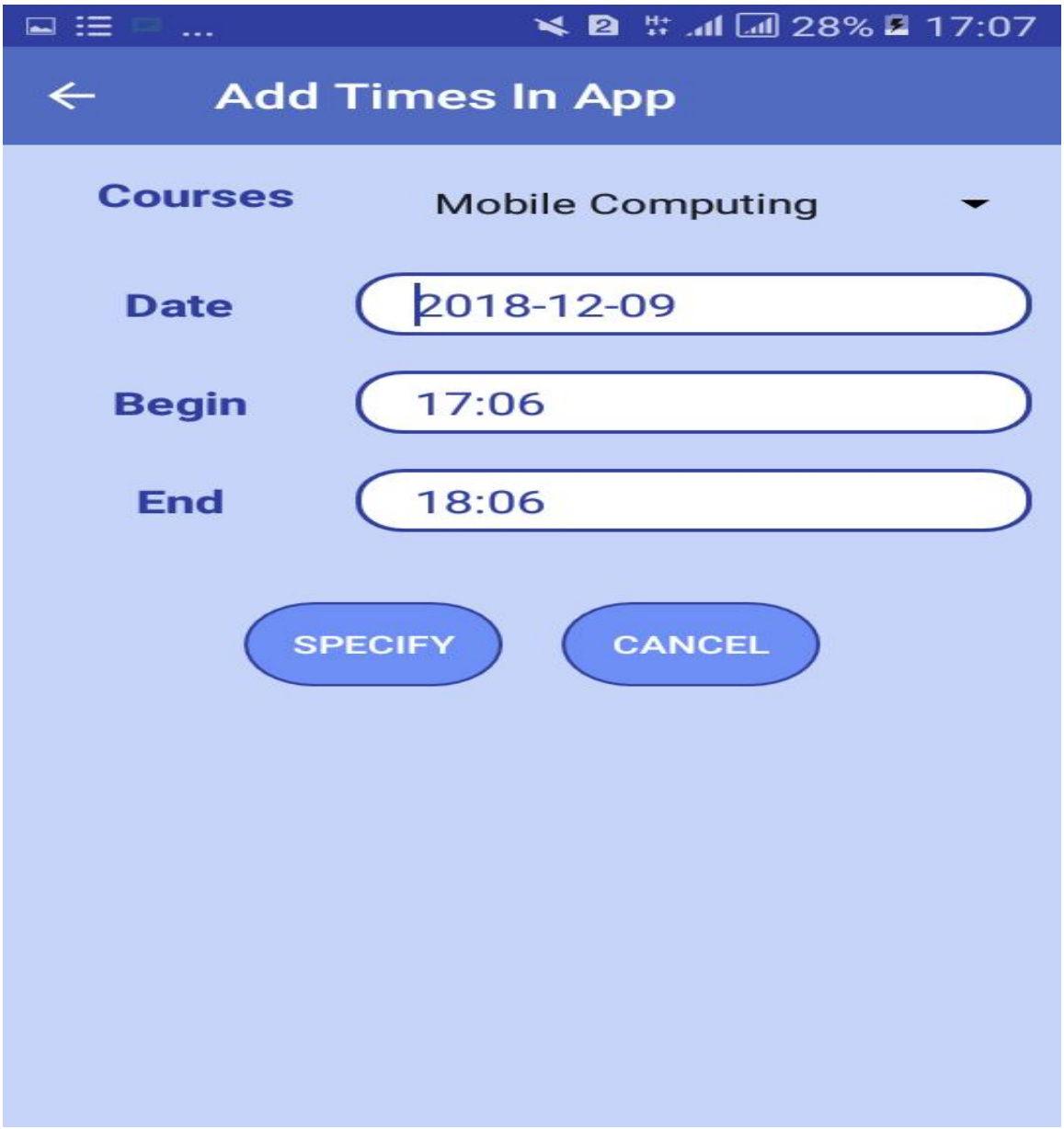
Teacher's appointment screen in the application



The screen shows the dates for the teachers 'presence in the application

Shows the screen of the professors ’presence in the application, enabling students to know the times of each professor’s presence to communicate with him directly (Online).

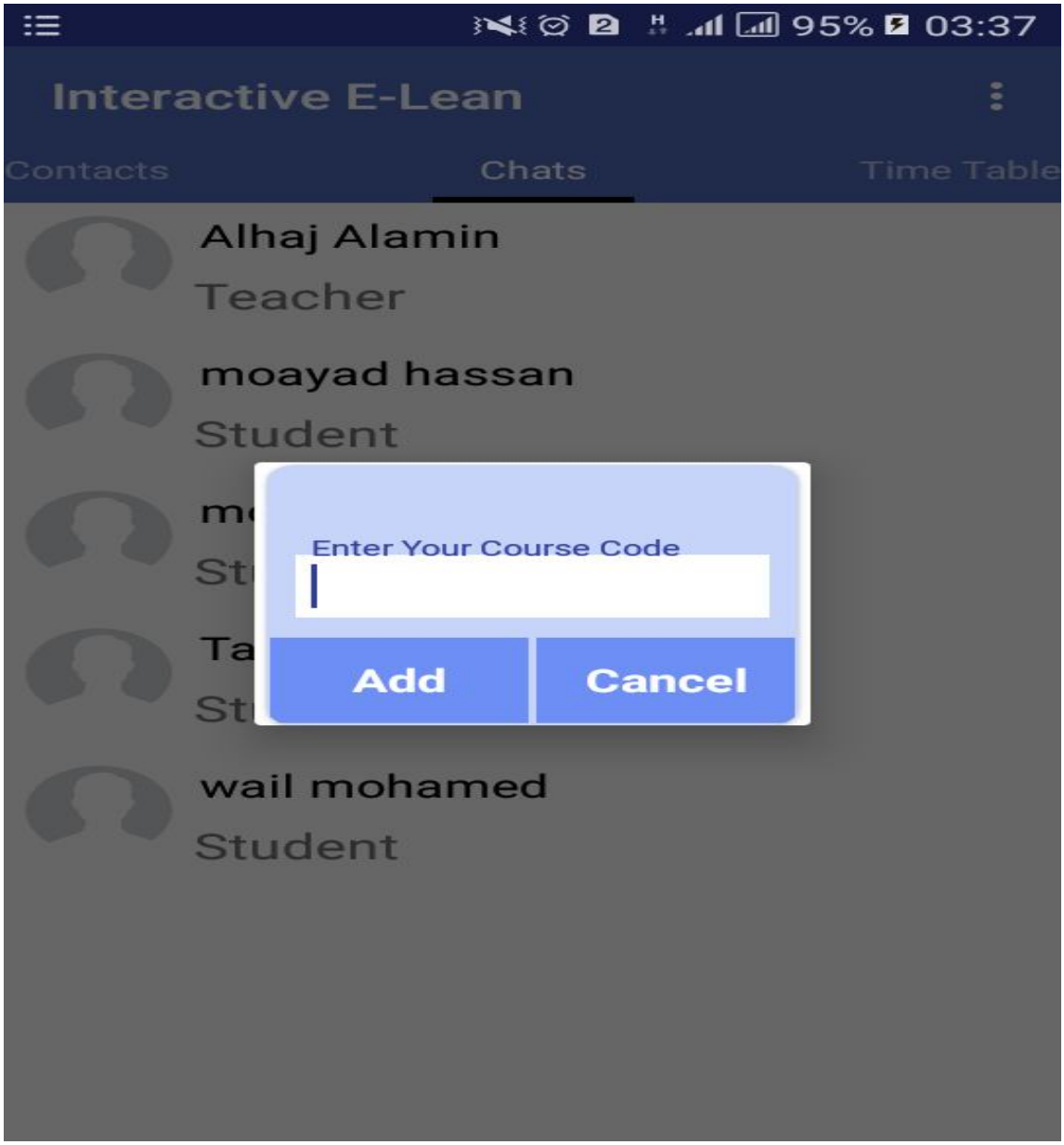
Screen for specifying appointments for the professor’s presence in the application



Shows the screen for determining the appointment of the professor’s presence in the application

Shows the screen for determining the appointment of the professor's presence in the application, which enables the teacher to determine the time of his presence in the application, to enable students to communicate directly (Online) with him.

The course registration screen



Shows the course registration screen

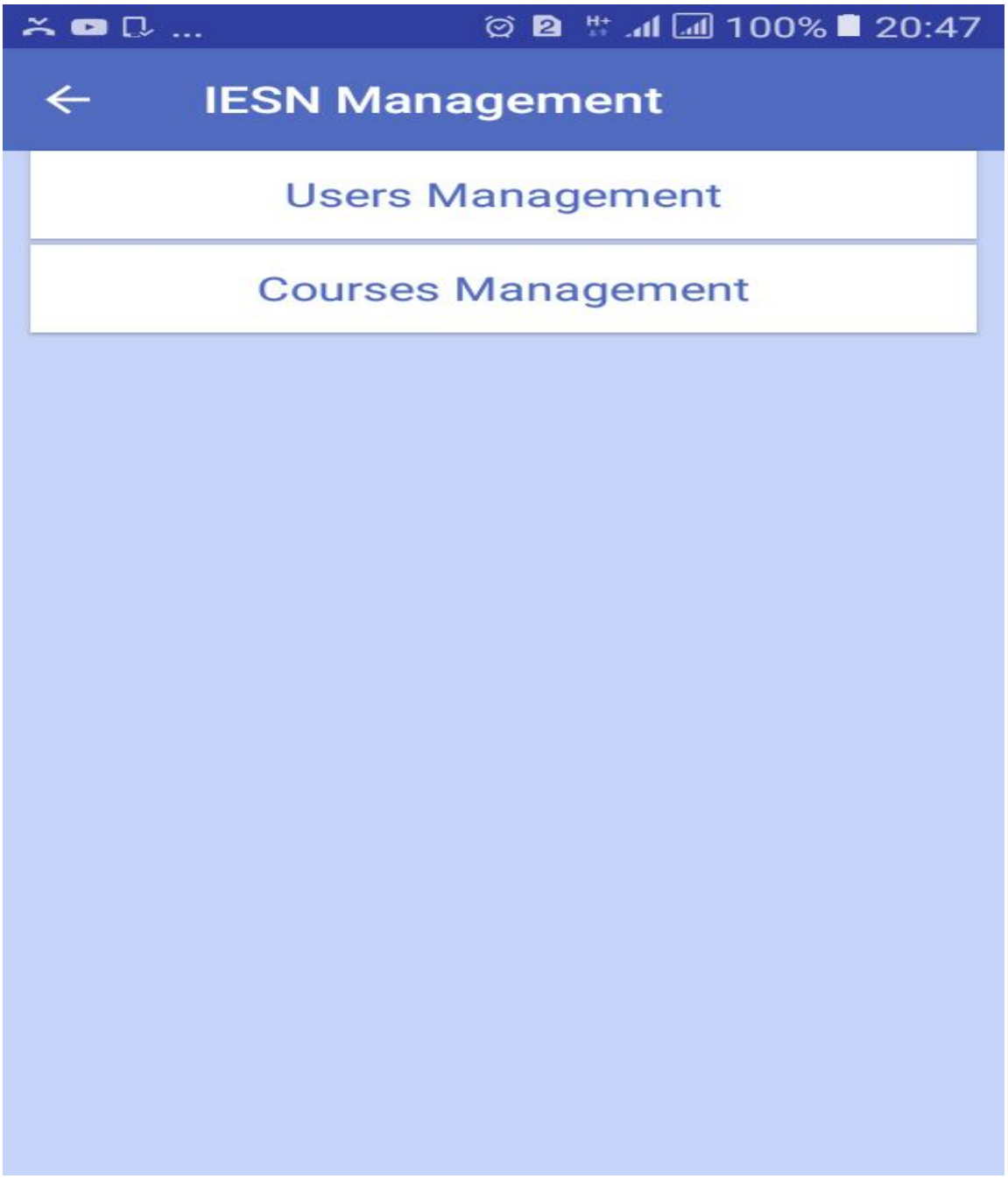
Shows the registration screen in the application, which enables students to register in the courses they will follow. Registration is done by entering the course code, to enable students to access the course professors and participating students.

Chat screen

Shows the chat screen

Shows the chat screen, which contains the messages that were exchanged between the current user and another user.

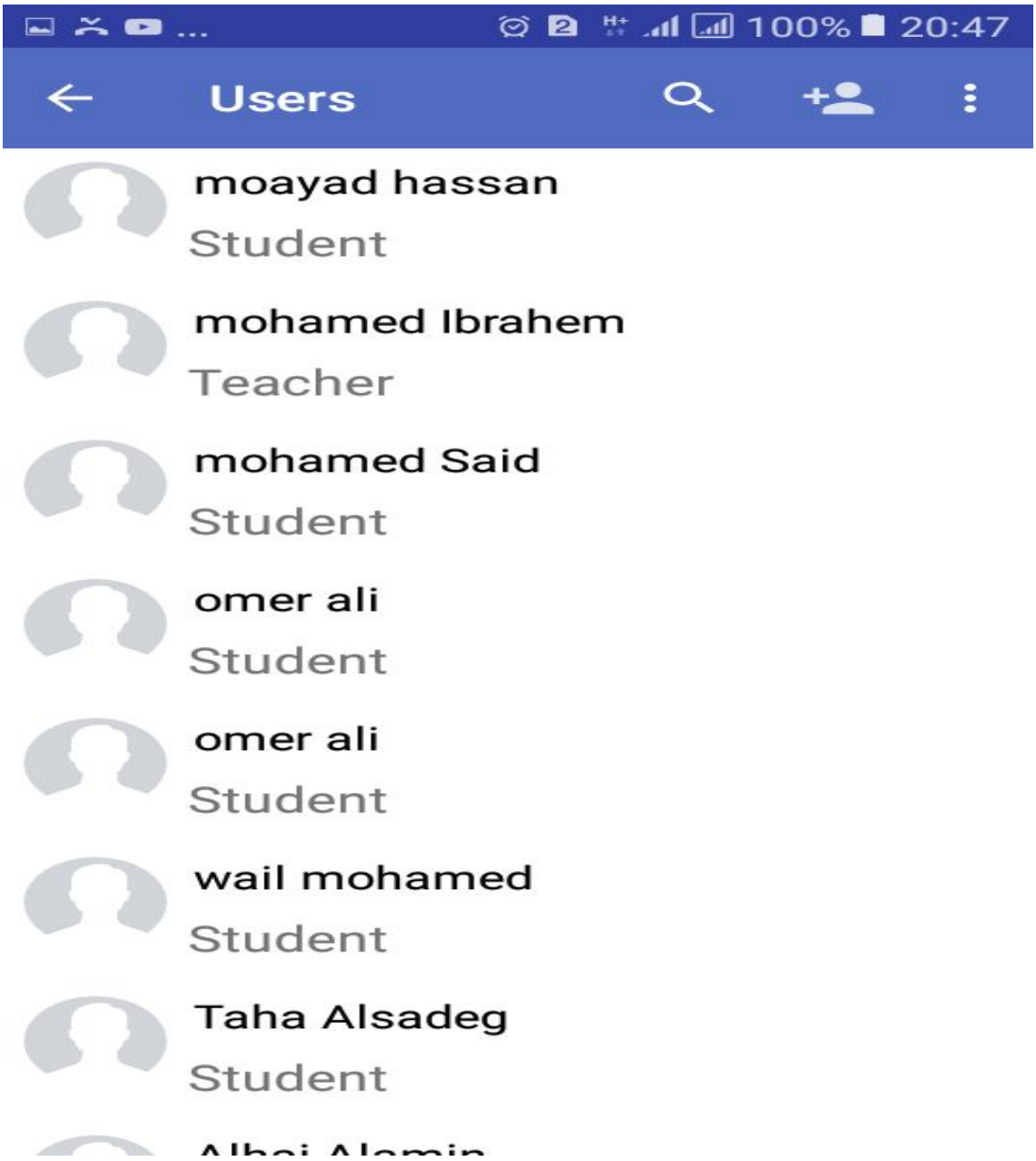
Application management screen



Shows the application management screen

Shows the application management screen, through which the screens can be opened (the user data management screen, and the courses data management screen).

Users Data Management Screen



Shows the users Management screen

Shows the users data management screen, through which users' data can be managed (go to the screen to add a user or modify an existing user’s data, display user data, delete user data, select courses for teachers, and suspend and archive user accounts).

Add new user screen

Shows the screen for adding a new user

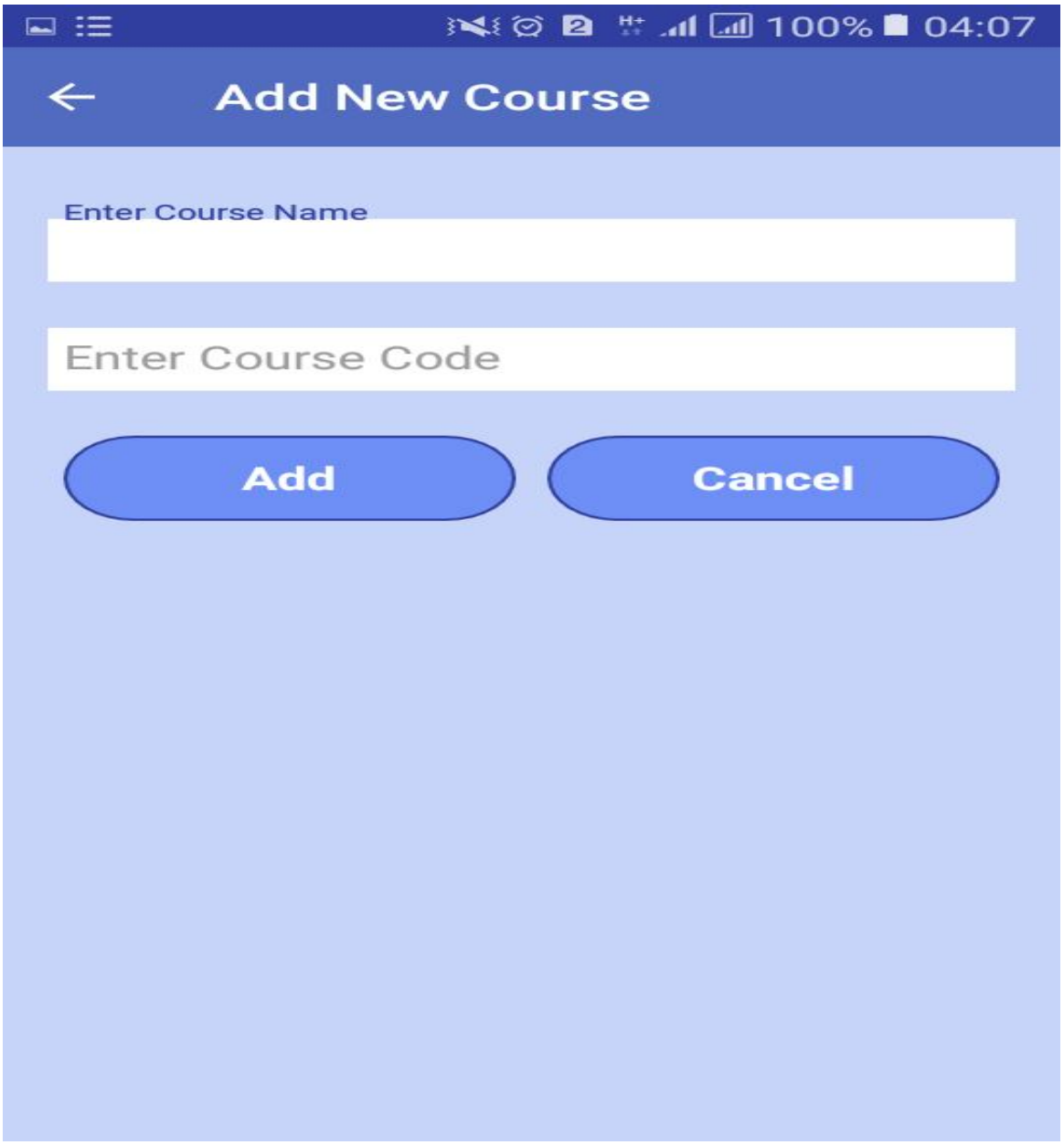
Shows the Add User screen, which enables the application manager to add new users ’data, and define their types (professor, student, supervisor), or modify existing user data.

Course Data Management Screen

Shows the course data management screen

Shows the course data management screen, through which it is possible to manage the course data (go to the screen to add a user or modify an existing course's data, display the course data, and delete the course data).

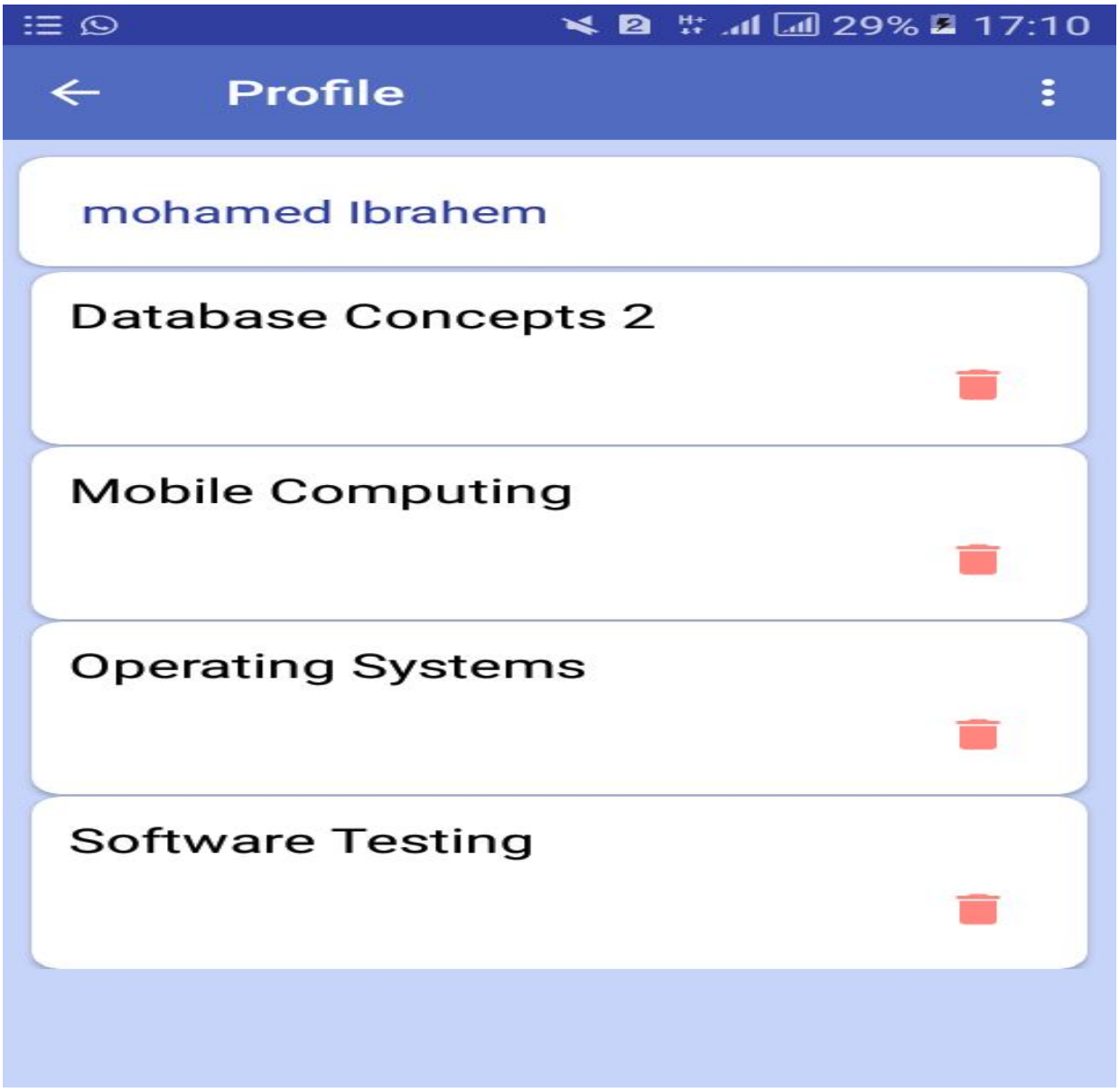
Add a new course screen



Shows the screen for adding a new course

Shows the screen for adding a course, which enables the application manager to add or modify the course data.

User Account Screen



Shows the user account

Shows the user account screen, which displays the courses that the user is following and can cancel the follow-up of the courses through it. You can also log out of the application