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The use of ICT in teaching practice in ISUTIC

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ABSTRACT: The purpose of the study was to examine the educational-technological profile of teachers to boost the use of ICT in teaching practice, in order to outline a strategy for integrating the virtual learning at the ISUTIC (Higher Institute of Information and Communication Technologies). The research design that employed the exploratory descriptive, with a quantitative methods approach was adopted for the study. Specifically, the forty five participants that taught at the ISUTIC in 2017 were used for the analyses. The results indicate that 48.89% of lecturers strongly agree that ICT makes their work more productive, 46.67% agree that ICT makes classes more interactive, 51.11% agree that better ICT knowledge results in greater preparation, 42.22% fully agree that ICTs motivate students and 48.89% agree that they need to become more and more empowered in ICT. The study recommends that, the use of technological tools in teaching-learning activities should be the vision of all teachers who now have the task of preparing intellectually, professionally and culturally future generations. The data are analysed and discussed through assess the level of preparation of teachers and their attitudes towards ICT, to design the necessary training activities.

KEYWORDS: teacher, knowledge, attitude, ICT, ISUTIC.

1 INTRODUCTION

The advent of ICT information and communication technologies has transformed virtually all walks of life, including in the education sector. Today, higher education has faced enormous challenges resulting from the deep and dynamic changes in digital society and market needs [1]. The formulation of educational policy at the global, regional or local level has become complex in the face of cultural, economic and productive changes in the 21st century. The intellectual capital desired to develop lifelong learning is also considered an active force for the creation and promotion of economic growth as well as well-being in all societies [2].

Consequently, the skills and competencies required to produce, develop and manage knowledge and innovation are of utmost importance to any modern society.

Teaching in engineering requires mastery of innovative pedagogical methods by the teacher and continuous updating, but in Angola and particularly in ISUTIC this is not always the case when it comes to professionalism in university teaching. On the one hand, this requirement is considered to be unimportant or unnecessary; on the other hand, there are no opportunities for contact with this area [3], [4].

This paper aims to analyse the technological-educational profile of teachers to boost the use of ICT in teaching practice, as a crucial point to introduce the virtual learning at the ISUTIC.

2 CONTEXTUALIZATION

The ISUTIC is a higher education institution (HEI) in Angola. It was created in 2009 by Executive Decree No. 7/09, of May 12, as an autonomous public HEI, with headquarters in the province of Luanda, was inaugurated on August 29, 2012 and on March

18, 2013 was the effective beginning of classes of the 1st year in the Telecommunications Engineering and Computer Engineering courses [5].

In 2017 the ISUTIC had 45 teachers who taught the 64 subjects of the Telecommunications Engineering and 61 of Computer Engineering courses, divided in two semesters and for the five curricular years, respectively. Due to the nature of the subjects and the curricular plan of the courses, some lecturers take two disciplines per semester, while others teach only one discipline per semester. Being a relatively new institution, the teachers who work there are of heterogeneous origin, ranging in age from 25 to 75 years. Consequently, their knowledge, skills and attitudes in ICT vary from one teacher to the other [6], [7], [8].

One of the current challenges of ISUTIC is the introduction of the virtual learning in its range of courses, aimed at catapulting the young Angolan society to technological sovereignty in the area of ICT and the consequent sustainable development. Therefore, the analysis of the educational-technological profile of the teachers is important to assess their level of knowledge in ICT, with a view to programming the necessary training actions and preparation for the introduction of the virtual learning at the ISUTIC.

3 METHODOLOGY

This is an exploratory descriptive study, with a quantitative approach, carried out in the second half of 2017, with a population sample of lecturers who taught the range of subjects of the ISUTIC Telecommunications Engineering and Computer Engineering courses.

The instrument for data collection comprised a questionnaire that aims to assess the level of knowledge, access and attitudes of teachers to ICTs [9], [10]. As a sample of the study were the 45 teachers who taught at ISUTIC in 2017.

4 DISCUSSION AND RESULTS

The average age of the participants was 34 years and only 20% of the female gender.

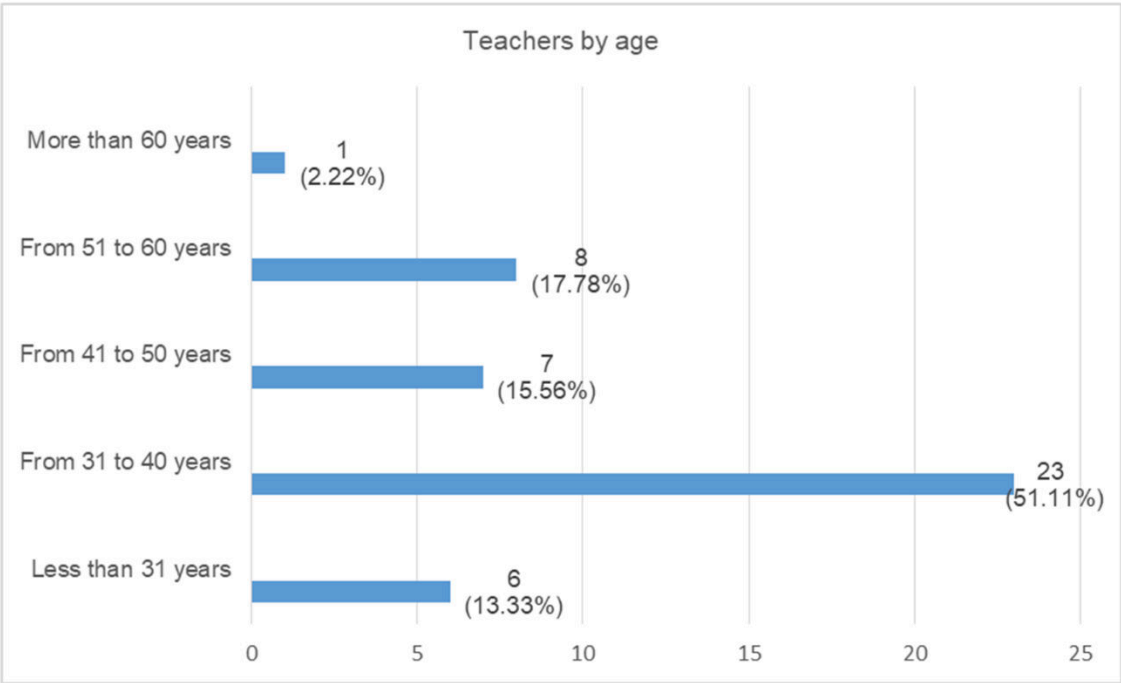

Fig. 1. Age range of teachers involved in this research

The distribution of teachers by gender is shown in Fig. 2, with 9 female teachers (20%) and 36 male teachers (80%), revealing the poor adherence of the female gender to engineering courses, specifically engineering of Telecommunications, in Angola.

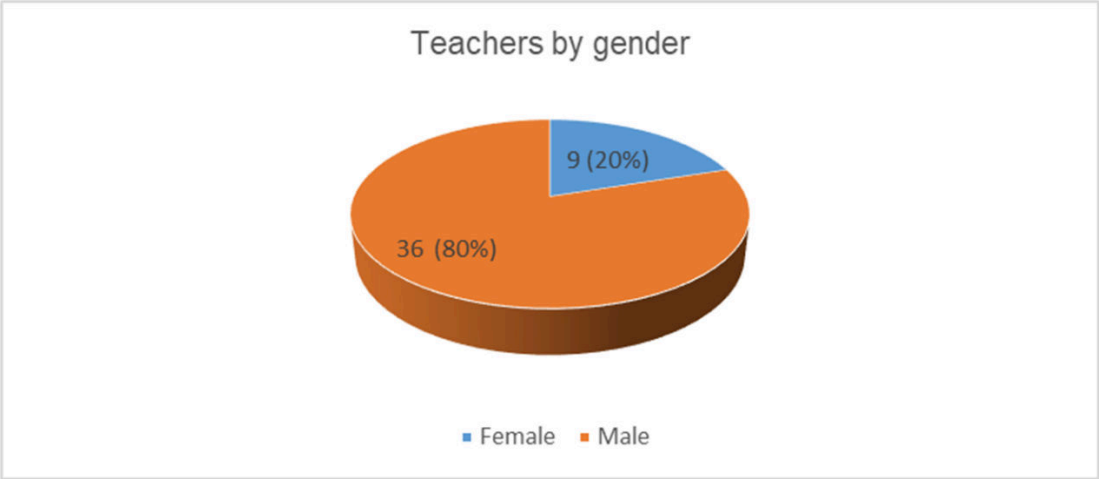

Fig. 2. Distribution of teachers by gender

The distribution of teachers by academic degree is illustrated in Fig. 3, with 8.89% of Doctors, 28.89% of Graduates and 62.22% Masters, which is according to the predominant age group among ISUTIC lecturers.

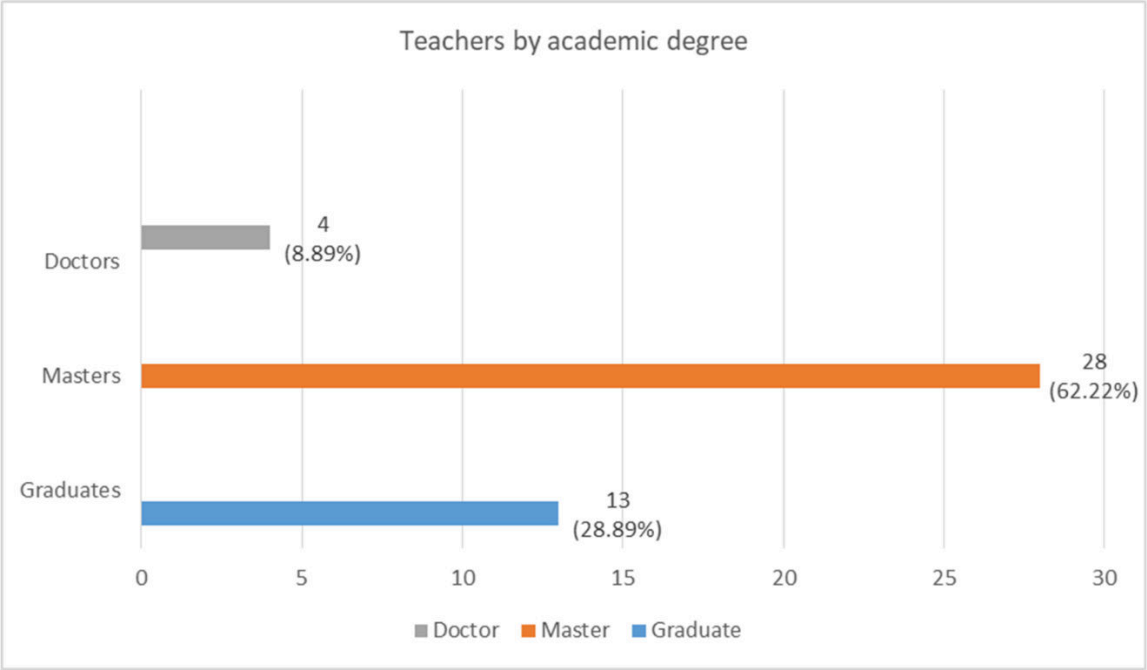

Fig. 3. Distribution of teachers by academic degree

As for seniority in teaching in the subsystem of higher education, 2.22% have more than 20 years of teaching, 11.11% have between 11 and 20 years, 46.67% have between 5 and 10 years and 42.22% have less than 5 years of teaching, as shown in Fig. 4.

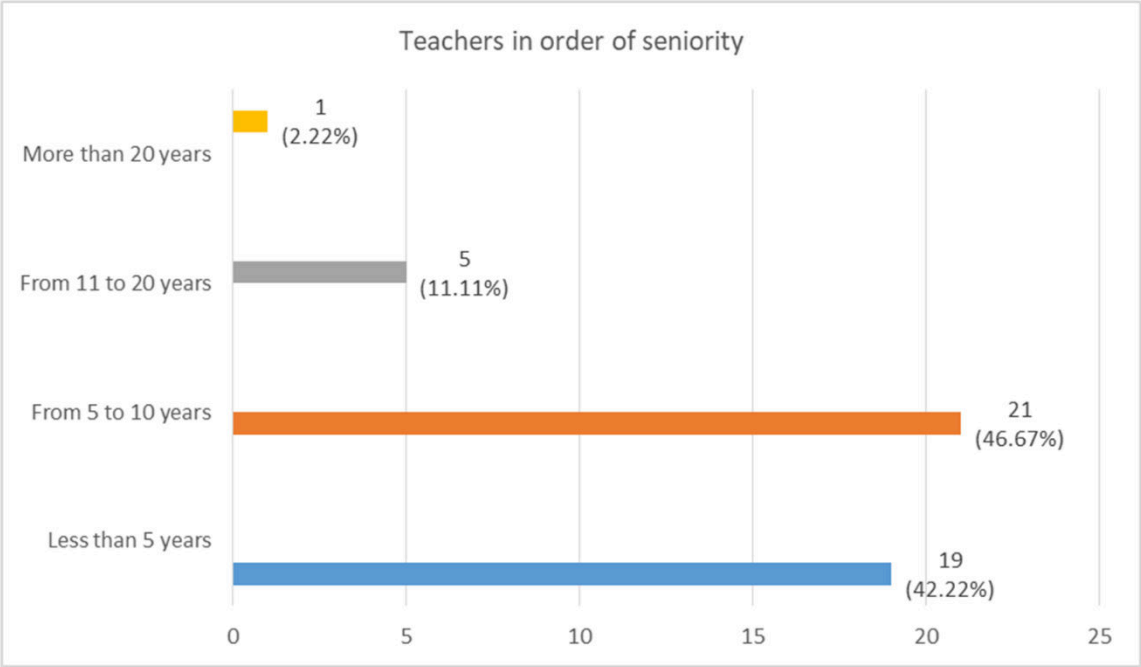

Fig. 4. Distribution of teachers by seniority in teaching in the subsystem of higher education

Currently, two courses are taught at ISUTIC: Telecommunications Engineering and Computer Engineering. The Figure 5 shows the distribution of teachers per course, with 40% teaching in Telecommunications, 37.78% in Computer Engineering and 22.22% teaching subjects common to both courses.

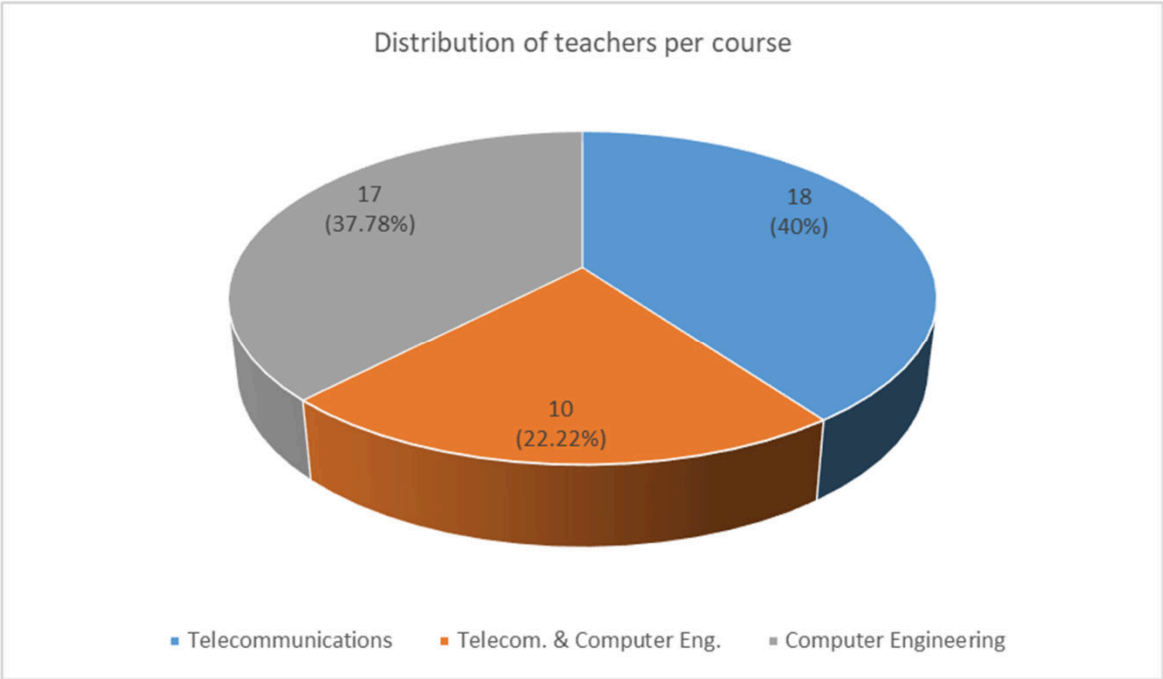

Fig. 5. Distribution of teachers per course

The questionnaire consists of four multiple-variable questions, about the level of knowledge of each lecturer in the field of ICT, access to ICT and teachers' attitudes towards ICT.

4.1 WHAT LEVEL OF KNOWLEDGE ABOUT ICT DOES THE TEACHER HAVE?

- This question is composed of a group of variables that seek to prove the knowledge of the teachers about different technological aspects and was conformed on a scale of: none, low, average, high and advanced knowledge, in each variable (technological tool that was called the area of knowledge).
- The answers to this question resulted in:
  - Variable use of Projector with Computer: 80% of teachers have an average knowledge, 15.56% have high mastery, 2.22% have advanced and low knowledge, respectively.
  - Variable Word, Excel and PowerPoint (PPt): 62.22% have an average knowledge, 15.56% have high knowledge, 11.11% have advanced and low knowledge respectively.
  - Variable Research on the Internet: 51.11% have an average knowledge, 22.22% have high knowledge, 17.78% have advanced knowledge and 8.89% have low knowledge.
  - Virtual Library variable: 28.89% have an average knowledge, 22.22% have high knowledge, 17.78% have advanced knowledge, 28.89% have low knowledge and 2.22% have no knowledge.
  - Variable Website design: 17.78% have no domain, 35.56% have low knowledge, 15.56% have average knowledge, 17.78% have high knowledge and 13.33% have advanced knowledge.
  - Variable E-Learning: 11.11% have no domain, 35.56% have low knowledge, 28.89% have a medium knowledge, 15.56% have high knowledge and 8.89% have advanced knowledge.
  - Variable Videoconference: 17.78% have no domain, 37.78% have low knowledge, 26.67% have average knowledge, 13.33% have high knowledge and 4.44% have advanced knowledge.
  - Variable Moodle platform of ISUTIC (under construction): 28.89% have no knowledge, 62.22% have low knowledge, 4.44% have average knowledge, 2.22% have high knowledge and advanced respectively.
  - Variable Use of Simulators: 4.44% have no domain, 48.89% have low knowledge, 31.11% have average knowledge, 13.33% have high knowledge and 2.22% have advanced knowledge.
  - The synthesized summary of these data is shown in table 1.

Table 1. The level of knowledge about ICT, of ISUTIC lecturers

Level of knowledge	Knowledge Area																	
	Projector-Computer		**Word Excel PPt**		**Search on the internet**		**Virtual Library**		**Design of Websites**		**E-Learning**		**Vídeo conference**		**Moodle Platform of ISUTIC**		**Use of simulators**	
	Nº	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**
None	0	0	0	0	0	0	1	2.2	8	17.8	5	11.1	8	17.8	13	28.9	2	4.44
Low	1	2.22	5	11.1	4	8.89	13	28.9	16	35.6	16	35.6	17	37.8	28	62.2	22	48.9
Average	36	80	28	62.2	23	51.1	13	28.9	7	15.6	13	28.9	12	26.7	2	4.44	14	31.1
High	7	15.56	7	15.6	10	22.2	10	22.2	8	17.8	7	15.6	6	13.3	1	2.22	6	13.3
Advanced	1	2.22	5	11.1	8	17.8	8	17.8	6	13.3	4	8.89	2	4.44	1	2.22	1	2.22
Total	45	100	45	100	45	100	45	100	45	100	45	100	45	100	45	100	45	100

4.2 WITH WHAT KIND OF DEVICE DO YOU HAVE ACCESS TO THE TECHNOLOGIES, IN THE PERFORMANCE OF YOURS DUTIES?

- In this question were selected three devices: Computer, Tablet and Smartphone.
- The answers to this question resulted in: 100% have a computer, 28.89% have a tablet and 84.44% have a smartphone that besides the computer can also be used in teaching. The summary of these data is shown in table 2.

Table 2. Access to ICT in teaching at the ISUTIC

What kind of ICT device do you use in teaching activities?						
Answers	**Computer**		**Tablet**		**Smartphone**	
	Nº	%	Nº	%	Nº	%
Yes	45	100	13	28.89	38	84.44
No	0	0	32	71.11	7	15.56
Total	45	100	45	100	45	100

4.3 FOR WHAT PURPOSES AND HOW OFTEN DO YOU USE THE TECHNOLOGICAL DEVICE?

- This question is composed of a group of variables that seek to prove the use of the device in the different activities and was conformed on a scale of: never, rarely and frequently, in each variable (which was called purpose of use).
- The answers to this question resulted in: (relative to the Computer)
  - Variable Search information on the Internet: 53.33% use rare and 46.67% frequently.
  - Variable Elaborate activities in Word / Excel: 37.78% use rarely and 62.22% use frequently.
  - Variable PowerPoint Presentations: 26.67% use rarely and 73.33% use frequently.
  - Variable Communicate with students and teachers: 8.89% never, 53.33% use rarely and 37.78% frequently.
  - Variable Use Simulators: 4.44% never, 80% rarely and 15.56% use frequently.
  - Variable use of Social Networks: 4.44% never, 15.56% rarely and 80% use frequently. The summary of these data is shown in table 3.a).
- The answers related to the Smartphone (and Tablet) are shown in table 3.b), where the percentages were calculated with reference to 38 which is the total number of teachers holding this device and use it as an alternative to the computer in the exercise of its functions.

Table 3. The purposes and frequency of use of ICT devices, by ISUTIC teachers

a) Computer

Frequency	The purposes of use of ICT devices											
	Search information on the internet		**Elaborate activities in word/excel**		**PowerPoint presentations**		**Communicate with students and teachers**		**Use of simulators**		**Use of social networks**	
	Nº	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**
Never used	0	0	0	0	0	0	4	8.89	2	4.44	2	4.44
Rarely	24	53.33	17	37.78	12	26.67	24	53.33	36	80	7	15.56
Frequently	21	46.67	28	62.22	33	73.33	17	37.78	7	15.56	36	80
Total	45	100	45	100	45	100	45	100	45	100	45	100

b) Smartphone or Tablet

Frequency	The purposes of use of ICT devices											
	Search information on the internet		**Elaborate activities in word/excel**		**PowerPoint presentations**		**Communicate with students and teachers**		**Use of simulators**		**Use of social networks**	
	Nº	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**
Never used	0	0	19	50	20	52.63	20	52.63	14	36.84	0	0
Rarely	20	52.63	13	34.21	15	39.47	15	39.47	18	47.37	5	13.16
Frequently	18	47.37	6	15.79	3	7.89	3	7.89	6	15.79	33	86.84
Total	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**	**38**	**100**

4.4 WHAT ATTITUDES TOWARDS ICT DOES THE TEACHER HAVE?

- This question is composed of a group of variables that seek to verify the teachers' attitudes about different statements and was conformed in a scale of opinions: totally disagree, disagree, indifferent, agree and totally agree, in each variable (affirmation).
- The answers to this question resulted in:
  - Variable ICT incompatible with the discipline: 48.89% totally disagree, 42.22% disagree, 6.67% indifferent and 2.22% agree.
  - Variable No domain: 40% totally disagree, 42.22% disagree, 4.44% indifferent, 11.11% agree and 2.22% totally agree.
  - Variable I do not have time to prepare: 37.78% totally disagree, 48.89% disagree, 4.44% indifferent, 6.67% agree and 2.22% totally agree.

- Variable ICT distracts students: 37.78% totally disagree, 40% disagree, 6.67% indifferent, 11.11% agree and 4.44% totally agree.
- Variable Use only when necessary: 20% totally disagree, 42.22% disagree, 4.44% indifferent, 22.22% agree and 11.11% totally agree.
- Variable I need to train myself: 6.67% disagree, 11.11% indifferent, 48.89% agree and 33.33% totally agree.
- Variable ICT are innovation in teaching: 2.22% indifferent, 62.22% agree and 35.56% totally agree.
- Variable Scarce resources in the ISUTIC: 11.11% totally disagree, 28.89% disagree, 26.67% indifferent, 22.22% agree and 11.11% totally agree.
- Variable ICT motivates students: 8.89% disagree, 11.11% indifferent, 37.78% agree and 42.22% fully agree.
- Variable They make the classes more interactive: 4.44% disagree, 6.67% indifferent, 46.67% agree and 42.22% totally agree.
- Variable Improve learning: 2.22% disagree, 6.67% indifferent, 51.11% agree and 40% totally agree.
- Variable ICT increases productivity: 2.22% disagree, 6.67% indifferent, 42.22% agree and 48.89% fully agree.
- Variable Better ICT knowledge, higher preparation: 2.22% totally disagree, 2.22% disagree, 4.44% indifferent, 51.11% agree and 40% totally agree.
- Variable I enjoy time using ICT: 2.22% totally disagree, 6.67% indifferent, 48.89% agree and 42.22% totally agree.
- Variable They require a great inversion: 6.67% totally disagree, 6.67% disagree, 4.44% indifferent, 48.89% agree and 33.33% totally agree.
- Variable Willing to change the way of teaching: 2.22% disagree, 4.44% indifferent, 51.11% agree and 42.22% totally agree.

- The synthesized summary of these data is shown in table 4.

Table 4. The attitudes of teachers towards the use of ICT

Teacher opinion	The Attitudes of teachers															
	ICT incompatible with the discipline		**No domain**		**I do not have time to prepare**		**The ICT distract students**		**Use only when necessary**		**I need to train myself**		**The ICT are innovation in teaching**		**Scarce resources in the ISUTIC**	
	Nº	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**	**Nº**	**%**
Totally disagree	22	48.9	18	40	17	37.8	17	37.8	9	20	0	0	0	0	5	11.1
Disagree	19	42.2	19	42.2	22	48.9	18	40	19	42.2	3	6.67	0	0	13	28.9
Indifferent	3	6.67	2	4.44	2	4.44	3	6.67	2	4.44	5	11.1	1	2.22	12	26.7
Agree	1	2.22	5	11.1	3	6.67	5	11.1	10	22.2	22	48.9	28	62.2	10	22,2
Totally agree	0	0	1	2.22	1	2.22	2	4.44	5	11.1	15	33.3	16	35.6	5	11.1
Total	**45**	**100**	**45**	**100**	**45**	**100**	**45**	**100**	**45**	**100**	**45**	**100**	**45**	**100**	**45**	**100**

- The predominant age group among the ISUTIC lecturers is the age of 30 (specifically between 31 and 40 years). These lecturers have some positive experience with the use of ICT and realize that it is an important and necessary element to improve their activities. Their perception of technology as a propitiator of new forms of teaching allows them to be willing to make changes in the pedagogical practice of learning and adapting to new styles that include ICT [9].

- There has also been an insignificant minority with attitudes that show some reluctance in the change of action before the ICT, and that considers the ICT like a element that distracts the students in the classes. These are the lecturers accustomed to the conventional teaching model in which the only active element is the teacher. It is important to emphasize that teacher training policies have been relegated to a second or third priority, which reveals some discrepancy in the domain and competences of ICT by the ISUTIC lecturers.

5 CONCLUSION AND RECOMMENDATIONS

It was observed that despite the heterogeneous nature, the questioned lecturers present a higher level of knowledge in the use of Word, Excel and PowerPoint with 62,22%, search of information on the internet with 51.11%, use of simulators with 31.11% and the most popular is the use of Projector-Computer with 80%.

The focus of lecturer knowledge focuses on the use of basic tools.

All lecturers questioned have a Computer that more frequently for some and smaller for others, make use of their teaching activities. In addition to the Computer, 84.44% have a Smartphone and 28.89% have a Tablet that they use, when necessary as an alternative to the Computer, in their activities.

Regarding lecturers' attitude towards some statements, the results indicate that 48.89% of lecturers strongly agree that ICT makes their work more productive, 46.67% agree that ICT makes classes more interactive, 51.11% agree that better ICT knowledge results in greater preparation, 42.22% fully agree that ICTs motivate students and 48.89% agree that they need to become more and more empowered in ICT. These aspects are positive and include the taking of actions conducive to the ongoing training and qualification of lecturers and the bet on the introduction of a virtual learning model.

There were also some results of attitudes that show some resistance to change, with 11.11% agreeing that ICT distracts students, 11.11% does not have basic ICT skills, 6.67% do not have time to prepare with help of ICT tools and 2.22% believe that ICTs are not compatible with their discipline. Obviously with dynamic training these last attitudes can change.

Faced with these evidences, it is advisable to create and implement dynamic ICT training and capacity-building actions to enable and improve the skills and attitudes of lecturers. That such training actions contemplate the preparation for the introduction of the virtual modality in ISUTIC.

Finally, the use of technological tools in teaching-learning activities should be the vision of all teachers who now have the task of preparing intellectually, professionally and culturally future generations.

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