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FAVORABLE FACTORS TO THE ACCEPTANCE OF MOBILE APPLICATIONS: A STUDY WITH STUDENTS OF A PUBLIC EDUCATION INSTITUTION

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Abstract

This research presents as general objective to identify the factors favorable to acceptance of mobile applications by students of an institution of technical and higher education of the North Zone Natal, based on *Technology Acceptance Model* (TAM) proposed by Davis (1989). Regarding the methodological procedures, this study is characterized in its nature as the exploratory type purposes quantitative, conducted through a *survey*. The sample used was of type random stratified probability, composed of 251 students of campus of the North Zone Natal of the Federal Institute of Education, Science and Technology of the Rio Grande do Norte (Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Norte - IFRN). Through a factorial analysis, we identified four factors that explain the favor of acceptance of mobile applications by students, one of the factors generated – intended use and Perceived ease of use – presents itself different from the original TAM constructs. The factors can be interpreted as being Perceived Utility, intended use, intended use and Perceived ease of use and Perceived ease of use yet. Conclusively, the Perceived Utility is the factor that can explain the use of mobile applications.

Keywords: Mobile applications; TAM model; acceptance of mobile applications.

1. INTRODUCTION

The current market scenario has suffered considerable changes, especially on the structures and functioning of organizations. With the growth of competition and integration of markets, the need to streamline processes and reduce costs in its operations require organizations to assimilate these changes and promote a constant evolution in the form of lead and structure your business and information technology (IT) as one of the pillars of this change.

This new scenario has generated a technological evolution that can be observed through different perspectives. One of them refers to the growth of services related to the use of mobile devices such as *tablets, smartphones and laptops*. With the use of these devices, the process of dissemination and access to information becomes more flexible and open in organizations, in which they can develop new strategies for communication and interaction with your users. More and more new services are being offered to mobile users, due to the growth of base of these users and devices, thus eliminating the technological barriers (Elgazzar, Martin and Hassanein, 2014).

The popularity of mobile devices has made the information gain space outside of work and residences. With this, *Bring Your Own Device* (BYOD - bring your own device), where each user brings your device to have access to the information of the Organization, as well as *Bring Your Own Application* (BYOA) become more present in the corporate world.

When it comes to educational practices, some studies, such as the Feitor *et* Silva (2013), explain that many students began to use mobile devices to access to study materials. This new behavior can help in reducing infrastructure costs for education institutions and provide greater mobility and convenience to students and other members of the academic community. In addition, mobi-

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le technology offers both students as teacher's new ways to communicate with each other, as well as new ways to interact with learning resources, as well as make better use of your time to studies (Ciaramitaro, 2012). In institutions that face a process of expansion, the application of these new tools of interaction becomes a big challenge, especially when they imply changes in cultural and organizational terms.

The Federal Institute of Education, Science and Technology of the Rio Grande do Norte (Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Norte - IFRN) is one of the most traditional teaching institutions of Rio Grande do Norte and an example of this organizational profile. With 104 years of existence, the institution underwent several changes, such as the increase in the supply of technical courses and degrees in various areas of practice, exerting a social role more broadly and relevant. Today the institution has 21 units, including the unit of distance education (EAD). With this expansion, the IFRN is consolidated as one of the largest federal education institutions of the country, with decentralized actions and present in different regions of the State (IFRN, 2015).

Such an investment demand expansion and increase of its structure, considering the various administrative and organizational support, including the it area. The increased use of the network and the administrative and academic system suggests the need for structuring and increment of the various types of it services so that these services generate a better service and satisfaction of the academic community. The development of *online* applications for mobile devices would be a way to improve these services.

In this context, the objective of the present research is to identify general the factors favorable to acceptance of mobile applications by students of the *Campus* North Zone Natal of IFRN. The research focused on adoption and evaluation of their impacts are important in the field of information systems (is) in the case of organizations or society (Silva, Days and Sanchez Junior, 2008). Various theories are used to understand the factors that determine the acceptance and use of technology. However, several studies were developed in different contexts about this content from the early 1980, with the emergence of the *Technology Acceptance Model* (TAM), initially developed for studies of systems and technologies used in the work environment. Recent research has applied the TAM to study the acceptance of a particular technology in different environments.

Since its conception and validation, several national and international works have been produced involving TAM (Lima Junior, 2006; Costa Filho, Pires and Hernandez, 2007; Silva, 2008; Ramos *et* Oliveira, 2009; Park, 2009; Fernandes, 2010; Grohmann *et al*., 2013; Diniz *et al.*, 2012; Farias *et* Borges, 2012; Vilar, 2013; Morais *et al*., 2014). To associate the idea of these other studies about mobile applications aimed at education (Oliveira *et* Medina, 2007; Souza, Torres *et* Amaral, 2011; Galvão, 2012; Asevedo *et* Silva, 2013; Reis, 2014), have as a result a unique study, and that, as an object, a subject of growing importance within the contemporary education, acceptance of the technology in a teaching-learning environment.

Therefore, the relevance of this research is given by the fact that there is a gap between the use of mobile applications and studies that evaluate their acceptance by students, based on the theoretical TAM, proposed by Davis (1989). Another important issue, the managerial point of view, is the positive contribution that this study brings educational institutions in general, by providing results on the favor of the acceptance of mobile applications by students. With these results, you can think about developing mobile applications for the didactic teaching and learning.

2. THEORETICAL FRAMEWORK

For the development of this research, the theoretical framework includes a bibliographical survey on mobility associated with mobile devices, the use of mobile applications within the context of contemporary education and the theoretical TAM.

2.1. Mobility and mobile devices

With the rapid development of technology, from the twentieth century began the era of information, also known as the digital age, which extends to the present day, where people seek increasingly stay informed. Mantovani (2006) in his study recalls that, within the science of information, the information has its predominant definition as knowledge statement. However, nowadays, it is not enough to have only the information available, it is necessary to share it on the network to develop communicational power (Pellanda, 2003).

With the adoption of new technological practices, how to interact has changed and, if before the information was only possible with the exchange of text, today, due to technological convergence, can add to this context media immersion stream the audios, photos, animated graphics and videos present in several holders able to provide different content circulation through the multimedia calls, which integrate different forms of communication (Mantovani, 2006; Pellanda, 2003).

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With this mode, there is a greater demand for interactive products for users, especially for the new generation, which has been growing at the same time with the Internet. Added to this, the combination of broadband with the release of wires that connect users with computers is enabling a new way of network communication, the so-called mobile communication (Pellanda, 2003). Today, wireless technologies are changing the relationship between people and urban spaces, thus creating new forms of mobility (Lemos, 2010). The interaction via mobile devices provides new experiences of time and space (Ubiquity), which interferes with the way people communicate.

At the beginning of the 21st century came another element-mobility-to compose the informational contemporary scenario (Mantovani *et* Moura, 2012). According to Brotas (2011), people gather in the age of mobility and the permanent connection, in which information is transmitted in several places and broadcast from these own spaces, in which the displacement of people and the production of meaning.

The great responsible for this information are the mobile devices, able to meet the needs of the era of mobility, this which, according to Costa, Furtado and Pinheiro (2012) were responsible for breaking the physical limits, geographic, economic and cultural. These wireless technologies allow the user to stay connected at all times, even while moves, and who has access to this information everywhere when needed.

Due to the large amount of access to technological devices, people have been given new behaviors and attitudes in the face of technology. Studies conducted by IDC Brasil (2014) reveal that were sold between the months of July and September 2014 about to 15.1 million *smartphones*, so-called "smart phones", with 49% growth compared to the third quarter of 2013. This same comparison period also makes the market for *tablets* celebrate with high 18.1% in the third quarter of 2014, corresponding to the sale of more than 2.3 million *tablets*, while the computer market suffers a decline among that same period, with sales of about 2.6 million *notebooks* (about 1.6 million) and *desktops* (about 974 1000), which means 25% drop in sales when compared with the same period in 2013.

More recent studies carried out in the year 2015 by IDC Brazil show that the Brazilian market ended the year of 2014, compared to 2013, with 26% drop in sales of PC (computers), up 13% and 55% by volume of sales of *tablets* and *smartphones*, respectively. Registers the continued decline of the computer market in the country with 20% drop in the first quarter of 2015, compared to the same period last year (IDC Brasil, 2015). According to Anderson *et* Rainie (2008), it is believed that in 2020 the mobile device will be the dominant connection tool.

2.2. Mobile applications

Mobile internet (MI), in conjunction with portable devices, makes it possible to reach of mobile connectivity levels never previously experienced, which ultimately spark the interest of academic and business media (Lunardi, Dolci and Wendland, 2013). Due to advances in processing and network capabilities of mobile devices and revolutionary achievements made in wireless communication, the global interest of mobile applications is on the rise (Elgazzar, Martin *et* Hassanein, 2014).

In this context, it was observed that the use of mobile applications – commonly known as *apps* – as a means of access to the internet arose to meet the need of the new consumers of mobile devices seeking increasingly to real-time communication (Colombo *et* Cortezia, 2014; Segundo *et* Oliveira, 2012) and also for fun and efficiency to your life. The applications are programs (tiny *software*) paid or free installed on operating systems such as *Android, iOS, Linus, Symbian OS, Blackberry, Windows Phone, Palm OS*, among others, that allow access to content *online* and *offline* and aim to facilitate and assist in the execution of tasks day to day practices (Nonnenmacher, 2012).

With regard to education, the applications are of important pedagogical means of support, both for the construction and application of knowledge, and to provide an environment in which the students comply with cycles of reflection and action, which reflects the interaction between the students and the appliance itself (Galvão *et* Püschel, 2012). Computational subsidies are being increasingly used in schools and universities as tools to aid the teaching and learning of different areas of knowledge.

In the current education, the use of technologies is featured, such as educational *software*, electronic equipment, computers and other, what motivates the students to learn academic content in an easy, fast and fun, resulting from the possibility of access to the *web* and mobile devices (Medeiros *et al.*, 2012). The introduction of this new technology in education appears to complement the teaching in the classroom, where the teacher's role is to guide the student, mediating the relationship with this new form of teaching and learning.

It is within this context that the creation of mobile applications for education makes relevant, considering that their use may be directed to the intended study of individualized way and/or collaboratively, which, in turn, provides users with new educational opportunities to experience teaching-learning experiences that go beyond the traditional education in a face-to-face as both distance mode (EAD) (Asevedo *et* Silva, 2013), motivating the user to this new reality that aims to better achieve the educational objectives.

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These issues aroused some studies about the adoption of strategies aimed at education, BYOD in which the scholar would be responsible for bring your own mobile device (*smartphone*, *laptop* or *tablet*) the educational institution to be integrated with educational activities (Feitor *et* Silva, 2013; Kobus, Rietveld and Ommeren, 2013; Lee *et* Son, 2013; Song, 2014), or, as suggested by Feitor *et* Silva (2013), could be adopted in the classroom using mobile applications *online*.

Jones *et al.* (2010) explain that students began to use mobile technologies and IT equipment for communication and for access to study materials. Kobus, Rietveld and Ommeren (2013) claim that although the students use the devices in different ways, few times they are incorporated into the classroom to help them in their academic pursuits. In turn, the use of personal mobile devices should be considered as an alternative in learning and teaching as a means to raise the degree of student involvement in the learning process (Peterlicean, 2014).

According to the research of Nonnenmacher (2012), students use mobile applications to various finalized, including how to support learning. Corroborating with it, the work carried out by Oliveira *et* Medina (2007), Souza, Torres and Amaral (2011), Galvão (2012), Segundo *et* Oliveira (2012), Asevedo *et* Silva (2013), Reis (2014) and others, mobile applications that came just to add positively in education. The strategy employed is the use of accessible technologies to support teaching and learning and to provide benefits at the time of acquiring knowledge. This scenario demonstrates that the use of mobile applications in education can assist in new pedagogical practices geared to students' learning.

2.3. TAM Model (Technology Acceptance Model)

The TAM or Technology Acceptance Model is a theoretical model focused on individual behavior in relation to the acceptance of technology that was developed and validated in the years 1980, in North America, by Fred d. Davis, researcher itself. This model, one of the most used in the field of information system (IS), originated from a contract with *International Business Machines* (IBM) of Canada with the *Massachusetts Institute of Technology* (MIT) to evaluate the market potential for new products and offer an explanation for the determining factors of the use of computers (Davis; Bagozzi and Warshaw, 1989; Vilar, 2013).

Based on usage problems on systems, he proposed the above referenced model that not only explained the causes that determined the acceptance of computers, but also provided for their use, thus seeking to understand the interaction between user and technology and the factors that define the behavior of users in relation to the particular technology (Silva; Dias, 2007; Pires *et* Costa Filho, 2008).

The above-mentioned model was designed to understand the causal relationship between external factors of users' acceptance and the actual use of the system, which through various tests and methods assess the behavior of IT users and IS regarding your acceptance to a particular technology and its actual use (Davis, 1989; Davis, Bagozzi and Warshaw, 1989).

Thus, the model in question received the influence relation attitude-behavioral intention –*Theory of Reasoned Action* (TRA) from psychology-which provides the behavioral intention beliefs through background factors, attitudinal and normative and social being, the Fishbein model original (1967), and subsequently reviewed and revised by Fishbein *et* Ajzen in 1975 (Pires *et* Costa Filho, 2008; Ramos *et* Oliveira, 2009; Farias *et* Borges, 2012; Vilar, 2013).

In this way, the TAM measures the impact among these factors by studying the behavior of the user on the specific technology and understand it through the evaluation of two construc tors related cognitive belief: the perceived usefulness (PU) and the perceived ease of use (PEOU) for him, which are influenced by external factors, in addition to being considered as fundamental determinants of use of system (Davis, Bagozzi and Warshaw, 1989; Diniz *et al*., 2012). Both constructs measured completely the effects of external factors, those that refer to the functional features of the system or technology, system structure*, design,* system development, qualification and training of users, manuals and user support, among other who are responsible for providing a better understanding of what influences the two main constructs (Davis, 1989; Silva, 2008).

For Davis (1989), people use a technology in order to improve their performance at work (perceived utility). However, the individual may have knowledge of its utility, but its use is undermined as soon as its use becomes complicated, so that the dedicated effort does not compensate its use. Therefore, individuals must believe that the use of a given technology can be freed from physical and mental efforts (perceived facility of use).

The perceived facility of use exerts direct influence on the perceived usefulness, that is to say, is perceived and utility both prior influences the attitude of individuals to be favorable or not to use a specific system. The external factors are the behavioral intent of use. This, in turn, is intended to use or continue using the system in the fu-

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ture and it is she who will determine the actual use of the system – with respect to the amount of use over a unit of time, i.e. its use directly by an individual-which is determined jointly by perceived usefulness and use individual attitude with respect to the actual use of the system, each exerting a peso relative (Davis, 1989; Ramos *et* Oliveira, 2009; Silva *et* Dias, 2007).

The relationship between attitude and intention indicates that individuals develop intentions to carry out actions in that they have a positive feeling, while the relationship between perceived utility and intention to use is based on the idea that, within an organizational context, individuals form behavior intentions who believe increase their performance at work (Dias *et al*., 2011; Silva *et* Dias, 2007).

In Figure 1 it is observed that the technology acceptance model proposed by Davis (1989) suggest that the actual use of information systems by an individual occurs if this believe that their use will provide positive results (attitude), being determined by its voluntary behavioral intention in using it and that this is set jointly by perceived ease of use and perceived usefulness, mediate the effects of external factors on behavioral intention (Silva *et* Dias; Sena Junior, 2008; Morais *et al*., 2014; Davis, Bagozzi *et* Warshaw, 1989). One can also note that arrows indicate the relationships existing between the cause factors and behavioral intention to use a system or an application precedes the actual use (Lima Junior, 2006; Vilar, 2013).

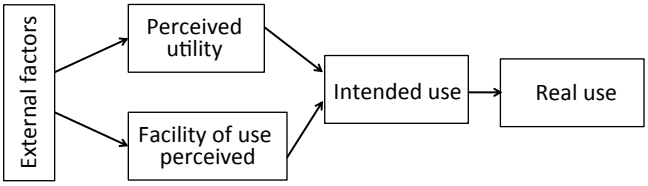

Figure 1 - Technology Acceptance Model (TAM)
Source: Drawn from Davis (1989)

In this way, the TAM is used to understand why the user accepts you, offering support to predict and explain your acceptance, with the intention to improve it. At the same time, identifies why the factors of non-acceptance, that is, what causes resistance in adopting a particular technology. This way provides guidance for your fix be implemented properly (Davis, 1989; Bagozzi, Davis and Warshaw, 1989).

Other studies have been conducted in different contexts on the TAM, who suffered adaptations to be deleted and/or included factors that contribute to the knowledge of the level of individuals ' propensity to adoption of new technologies. In the case of work performed by Diniz *et al* (2012) that excludes the factor intended use and enter the model of self-efficacy in the use of the computer; Costa Filho, Pires and Hernandez (2007) which analyzed the implications of the construct "habit" in your search; Shin (2012) that includes four quality factors-call, service, mobility and coverage; Fernandes *et* Ramos (2012) that added the constructs confidence, perceived risk and social influence; Matthews *et al*. (2014) added the constructs anxiety, ease of access, skill with the phone, entertainment and compatibility; and other surveys that have been carried out in various areas, such as in restaurants, businesses, newspapers, hospitals, *e-commerce* and other.

There are also developments of TAM, known as TAM 2 (Venkatesh *et* Davis, 2000) and *Unified Theory of Acceptance and Use of Technology* -UTAUT (Venkatesh *et al*., 2003), according to Lima Junior (2006), Pires *et* Costa Filho (2008) and Diniz *et al* (2012).

3. METHODOLOGY

In this section, will be described the methodological procedures used in conducting the research, with the exposure of the type of study, universe and sample procedures used for gathering and processing of data.

As to the nature, the research is classified as quantitative, since there was a measurement and quantification of the data obtained from the statistical data collection instrument – questionnaire (Leite, 2008). As for your purposes, she is characterized as exploratory, because, according to Vergara (2004, p. 47), "is held in an area where there is little knowledge accumulated and systematized. This study, then, seeks to discover new issues, which provide a further clarification of the subject still little explored, and at the same time, the importance on the use of mobile applications. And as the media consists of a *Survey*-type research, quantitative method, with data collection through a questionnaire. According to the research of Freitas *et al.* (2000), the aim of the *Survey* research is the production of quantitative descriptions of a population, in addition to using a predefined instrument. According to the study authors, using the *Survey* method is appropriate when the researcher intends to investigate what, why, how or how the occurrence of a specific situation.

The study population consists of the student body of the composed of 251 students of campus of the North Zone Natal of the IFRN -the fact of using mobile devices and, consequently, of mobile applications well selected can be beneficial to the academic environment, hence the focus of this research in teaching-focused mobile applications. This *campus* of the institution has a total of 721 stu-

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dents regularly enrolled in the 2014.2 period, according to the data obtained through the Academic System of the Academic Secretary. For sample calculation was used the following formula, prepared in equation (1):

$$n = \frac{N\,\alpha^2\sigma^2}{\varepsilon^2\ (N\text{-}1 + Z\ \alpha^2\sigma^2} \quad (1)$$

Where:

n = sample

N = population

Zα = normalized score for reliable statistical estimates

= sampling error

= standard deviation

After the calculation, was obtained a sample of 251 questionnaires, with 95% confidence level and a margin of error of 5% more or less. The field study was conducted with 289 student's mobile application users of campus of the North Zone Natal of the IFRN by applying questionnaires by the researchers, only 251 of these questionnaires were returned under conditions of tab.

Second Leite (2008) there are three types of probability samples, the most common simple random or casual, the stratified random samples for conglomerate. The random stratified sample consists of "selection of a sample of each subgroup of the population considered" (Leite, 2008, p. 127). In this perspective, the present study presents the method of probability sampling stratified random, considering that for the construction of the sample were carried out sweepstakes with the classes of trade electronics, informatics, informatics and licensure maintenance and computer support, respectively. Following this order, was taken a sample of students in each course from the draw for the groups present in the courses, enabling the same chances of choice and representativeness of the participants of the survey, which allowed the sample of each subgroup of the population concerned.

Initially, the data were collected through the bibliographic survey, through books, scientific articles, theses, dissertations, magazines and websites. In a second moment, data collection was carried out through a questionnaire. The research instrument, mounted to collect the data, was developed by researchers, which were based on the literature review and the direction of the objectives of the study. Its approval was given through a pilot test applied with 31 student's mobile application users of different classes of the campus of the North Zone Natal of the IFRN, where small changes were made in the issues to get a better understanding. The final questionnaire consists of three parts and has a total of 30 issues, having conditioned the participation of students in research, the following criteria: be a student of the campus of the North Zone Natal of the IFRN; and have used mobile apps at least once.

Part I of the questionnaire was used to collect information regarding the use of mobile applications and contains items such as type of platform used on the mobile device, number of applications routinely accessed and main types of categories of mobile applications used.

Part II contains questions related to mobile application acceptance factors, showing 10 measuring points in the scale *Likert*type, where "0" means totally disagree and '10' totally agree, related to claims presented about the constructs perceived ease of use, perceived usefulness and intended use. The construction of the issues related to three constructs presented was based on studies of Oliveira (2003), Lima Junior (2006), Costa Filho, Pirez and Hernandez (2007), Silva (2008) and Vazquez (2013), so that were appropriate to the context of the use of mobile applications designed for education. In general, the table 1 shows the distribution of the questionnaire variables by construct.

Table 1 - Distribution of variables for construct

Constructs	Questionnaire variables
Acceptance factors (perceived ease of use)	4, 5, 6, 7, 8, 9, 10, 11
Acceptance factors (perceived utility)	12, 13, 14, 15, 16, 17, 18, 19
Acceptance factors (intended use)	20, 21, 22, 23, 24, 25, 26

Source: the authors themselves.

The questions in part III concern the respondent student profile, such as gender, age, course and its mode.

The application of the questionnaire took place between days 5 and 25 March 2015, in 6 classes of the technical course in Commerce, 4 classes of the college degree in computer science, 3 course electronics technician classes, 3 classes of the course computer technician, 2 classes of the technical course in computer maintenance and support, and 1 class of the course computer technician for Internet a total of 19 classes.

The data collected through the application of questionnaires were coded by researchers and recorded in the statistical program *Statistical Package for the Social Sciences* (SPSS) version 20 to be rotated in the *software*. The analysis of the data was performed in two stages: the first is the descriptive analysis and the second in factor analysis.

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The descriptive analysis of the treated data about the use of mobile applications and the student profile, which were summarized by means of tables, which show the frequency and percentage, to help in the understanding of the information they provide. In short, "the descriptive statistics summarizes information in a data collection" (Agresti *et* Finlay, 2012, p. 20).

In the second step, the multivariate analysis technique adopted in the survey was the factor analysis, which consists of a statistical technique of multivariate analysis, related to each other, all the variables are analyzed simultaneously, in order to examine and explain the interrelationships that exist between them. Your goal is to condense the information present in the original variables to group them into related variables and transform them into factors (Corrar, 2007).

The study used the *rotation* method to perform the rotation of the factors obtained and increase its explanatory power. To Corrar (2007), this technique orthogonal rotation, which keeps the factors perpendicular to each other, seeks to minimize the number of variables with high loads factorials (correlation between the variables and factors) to different factors, so that each variable is identified with ease on a single factor.

Along the factor analysis were performed several tests, such as the *Kaiser-Meyer-Olkin* (KMO), *Bartlett*, *Measure of Sampling Adequacy* (MAS) and Commonalities. The factorial analysis process yielded five factors, through groupings of variables present in constructs, here used the TAM.

Finally, the reliability test, through the coefficient of *Cronbach's alpha*, whose fundamental idea to check if the items or indications of a certain range are truly measuring the construct in which support (Hair Jr. *et al.*, 2005). This test is responsible for measuring the level of reliability of each factor generated by the statistical program and, consequently, measures the consistency of the information provided by the data collection instrument. The value adopted by the *Cronbach's alpha* coefficient ranges between 0 and 1, the closer the result is 1, greater reliability of the dimensions of the construct. The literature establishes a minimum value to *Cronbach's alpha*, being 0.7, to determine whether the variations in a calculated dataset have real consistency (Corrar, 2007).

After the completion of reliability test- *Cronbach's alpha*, were eliminated from the model the variables FUP6 (I don't think studying through mobile applications) and FUP7 (Study through mobile applications requires a lot of mental effort), generate a factor (0.451) which does not answer to the minimum value required (0.7). Subsequently, the reliability test was held again to measure the degree of consistency of the data collected, this second time were generated 4 factors related to acceptance of mobile applications targeted to the education that meet the assumptions of factor analysis.

4. RESULTS

In this section, will be presented the results of the survey, with the explanation of data analysis in two steps. The first step will be the descriptive analysis of the data and the second stage will be presented the results of factor analysis.

4.1. Descriptive analysis of the data

After collecting and analyzing the data corresponding to the students ' profile questions respondents, it was found that the female gender presents a majority among respondents, with 138 (55%), compared to 113 respondents (45%) of the male gender.

The ages of the respondents are included between 14 and 58 years. Through the results, it was observed that 165 students (65.7%) have between 14 and 18 years, the age group with the highest frequency. Students who have between 33 and 58 years correspond to the minority, being 11 respondents (4.4%). The remaining respondents are classified in 19 and 25 years, being 57 respondents (22.8%) and 26 to 32 years, with 18 respondents (7.2%).

The high rate of students aged between 14 and 18 years is justified with the highlight of the regular, integrated mode appearing 184 times, which corresponds to a percentage of 73.3%. However, the mode of adult education (EJA) has the lowest percentage (3.2%), which accounts for the minority of students aged between 33 and 58 years. Subsequent mode, had 31 respondents (12.4%), and in Degree, were 28 (11.2%). The *campus* features five courses in total, which are described in table 2, in the course of trade is what presents highest percentage (89) within the sample collected, with percentage of 35.5%. On the other hand, the Computer course for Internet has the lowest frequency (28) and consequently the lowest percentage (11.2%).

Table 2 - Courses

Courses	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Trade	89	35,5	35,5	35,5
Electronics	45	17,9	17,9	53,4
Informatics	58	23,1	23,1	76,5
Informatics for Internet	28	11,2	11,2	87,6
Degree in computer science	31	12,4	12,4	100
Total	251	100	100	

Source: the authors themselves.

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In table 3, which refers to the platform of the willing respondents' mobile, the results indicate an emphasis on the use of the *Android* platform from *Google* enterprise with participation of 80.5% of the students. The platform that showed lower percentage (4%) was the company's *Apple* iOS.

Table 3 - Device platform

Platform	Frequency	Percentage	Cumulative Percentage
Android – Google	202	80,5	80,5
iOS – Apple	10	4	84,5
Windows phone – Microsoft	25	10	94,4
Other	14	5,6	100
Total	251	100	

Source: the authors themselves.

In relation to the amount of applications used daily, it was verified in the research that most respondents use between 4 and 6 applications per day on your mobile device, which corresponds to 130 (51.8%). Only 2.4% of students use more than 15 applications daily, corresponding to 6 participants.

4.2. Factor Analysis

The tests used to check if the original data enable the use of factor analysis in an appropriate and satisfactory occurred via the KMO and Bartlett's sphericity test, specified in Table 4.

Table 4 - Test KMO and *Bartlett*

Kaiser-Meyer-Olkin - Adequacy		,918
Bartlett's test-Sphericity	Approx. Chi-square	3631,259
	Df	210
	Sig.	,000

Source: the authors themselves.

The test of *KMO* points the degree of explanation of data from factors generated in factor analysis, whereas values greater than 0.5 indicates that the factors raised in factor analysis describe satisfactorily the variables from the original data (Corrar, 2007). In this case, the test yielded a coefficient equal to 0.918, which indicates a high degree of correlation between the variables and consistency in research instrument (see table 1). Another test that can be viewed in the same figure is the Bartlett's sphericity test, that shows if there is sufficient correlation between the indicators for application of the factor analysis, the significance level $p < 0.05$ (Corrar, 2007). The sphericity test indicated the possibility of application of factor analysis in the variables analyzed, which is significant.

After applying the reliability test, began the process of analysis of the Adequacy of the sample-MSA (*Measure of Sampling Adequacy*) of each variable in the anti-imagem Array, this is just responsible for pointing out the power of explanation of the factors in each of the variables analyzed. The diagonal from the bottom of the table, known as anti-imagem array indicates the MSA for each of the analyzed variables. The values of less than 0.50 are considered too small for analysis and, in these cases, variables that can be removed from the analysis (Corrar, 2007). In this research, the present variables in the array anti-image had its power of explanation between 0.761 and 0.960, and therefore following the pre-established criterion above, all of them were kept.

Then, the process of analysis of the commonalities of each variable. According to Hair Jr. *et al*. (2005), this procedure represents the percentage of explanation that each variable obtained along the factor analysis. It took the cut-off of 0.5, where the closer to 1 are the results of the commonalities, the greater the power of explanation of the factors. Of the 21 variables analyzed, most of them obtained a reasonable explanation (below 0.70), according to Corrar (2007), with variation between the 0.571 0.852. The variables that most explain the TAM are IU25 (I intend to use the institution's educational mobile apps, if she makes) and UP15 (think better study through mobile applications than using other forms of study), by presenting a coefficient of 0.852 and 0.815, respectively.

To perform the extraction of factors, we opted for the principal components analysis, considering the criterion of eigenvalue (*eingnvalues*) to determine the amount of factors to be considered in this analysis. Despite the weak correlation between the factors and some of the variables, the model can explain almost 69% of acceptance of mobile applications (total variance explained), provided in Table 5.

Right now, were then identified by the Rotation Matrix of indicators that are part of each of the four factors extracted from the factor analysis, which allows you to sort more precisely the indicators present in each one of the factors, as shown in the table.

Thus, it is concluded that the factor 1 is composed of 9 variables (UP15, UP17, UP14, UP16, UP13, UP19 UP18, UP12, and FUP9), interpreted as "perceived usefulness", in which individuals have placed their individual beliefs in the use of a particular technology in order to improve their performance at work. The factor 2 is composed of 5 variables (IU25, IU26, IU21, IU20 and IU22), which is named "intent to use", which is the intention of an individual to use a particular technology in the future.

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Table 5 - Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Variance %	Accumulated %	Total	Variance %	Accumulated %	Total	Variance %	Accumulated %
1	9,427	44,889	44,889	9,427	44,889	44,889	6,517	31,033	31,033
2	2,425	11,546	56,435	2,425	11,546	56,435	2,979	14,184	45,216
3	1,489	7,09	63,525	1,489	7,09	63,525	2,659	12,661	57,877
4	1,084	5,161	68,686	1,084	5,161	68,686	2,27	10,808	68,686
5	0,852	4,057	72,743						
6	0,766	3,647	76,389						
7	0,604	2,878	79,267						
8	0,576	2,742	82,009						
9	0,531	2,528	84,537						
10	0,484	2,305	86,842						
11	0,391	1,864	88,706						
12	0,352	1,675	90,381						
13	0,315	1,498	91,879						
14	0,302	1,437	93,316						
15	0,27	1,285	94,601						
16	0,239	1,138	95,738						
17	0,222	1,058	96,796						
18	0,196	0,932	97,728						
19	0,181	0,861	98,589						
20	0,167	0,797	99,386						
21	0,129	0,614	100						

Source: the authors themselves.

The 3 Factor is composed of 4 variables (IU24, FUP11, and FUP8 IU23) responsible for generating a new factor that is not included in the original TAM here, identified as "intent to Use and Perceived ease of use", which unites the concepts of 1 and 4. Finally, the factor 4 is composed of 3 variables (FUP5, FUP10 and FUP4), interpreted as "Perceived ease of use", in which individuals possess individual beliefs that a given technology should be free from physical and mental efforts at the time of your use.

The four factors generated during the process of factor analysis show, by testing *Cronbach's alpha*, which the indicators present in the search tool are measuring the constructs in that support. The coefficients of the factors can be seen in table 7, which indicate the level of reliability of each of the factors obtained.

According to the table above, it is possible to affirm that all factors found in the factor analysis showed higher internal consistency coefficients to the standard established in the literature, which is 0.7 (Hair Jr. *et al.,* 2005; Corrar, 2007).

When they compared the results obtained with those from other studies – which were used as the basis for the construction of the data collection instrument of this survey – it is possible to notice that Silva (2008) obtained in his research 6 factors, in which the Factor 1 was "perceived" utility, as well as the result generated in this research and the other factors are "visual" features "training in use", "intent to use", "outside influence" and "perceived facility", respectively, which explain almost 71% of the total variability of the data, while different from what has been achieved, Vilar (2013) found in its study the "behavioral intention" as the construct that most influences the use of *online* shopping system. Oliveira (2003), in his research, concluded that the "ease of use" has the largest coefficient of explanation of attitude and intent to purchase. Other important factors that influence consumer buying pattern are the "pleasure and perceived attractiveness" along with the "reliability and risk".

The results obtained by the research de Lima Junior (2006) point three motivational elements-"security, economy and freedom"-for the use of Linux. Those elements do not appear to have any relationship with "ease of use" and "perceived usefulness" which, in turn, are motivators for the intended behavior. The results of the study indicate satisfactory reliability for three constructs above, studied by Davis (1989), whereas Costa Filho, Pirez and Hernandez (2007) concluded that "habit", "perceived usefulness" and "ease of use" have reasonable explanation of the total variation in the construct "intended use".

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Table 6 - Final model of factor analysis

Variables	Component			
	Factor 1	Factor 2	Factor 3	Factor 4
UP15 – I think I better study through mobile applications than using other forms of study	0,88			
UP17 – I think I become a more efficient student through mobile applications	0,827			
UP14 – I think I organize better my studies through mobile applications than using other forms of study	0,815			
UP16 – Mobile applications make school more interesting	0,81			
UP13 – Mobile applications make school easier than using other means	0,795			
UP18 – Use mobile applications is important and adds value to my learning	0,745			
UP12 – I think the mobile applications are useful for the performance of my studies	0,732			
UP19 – Mobile applications are useful in my academic pursuits	0,706			
FUP9 – I like to study with mobile applications	0,703			
IU25 – I intend to use the educational mobile applications of the institution, if it makes available		0,852		
IU26 – If there are other options available for mobile applications, mobile applications of the institution will be my first choice		0,764		
IU21 – I will install my favorite mobile applications to use them whenever i need it		0,678		
IU20 – Since I have access to educational mobile apps, I predict that i would use it		0,656		
IU22 – I'm going to use more regularly in the future mobile applications to study		0,512		
IU24 – I'll advise people of my closest relationship to use mobile applications			0,74	
IU23 – I intend to continue to use the mobile application for a long time period			0,739	
FUP11 – Use mobile applications is a good idea			0,564	
FUP8 – Use mobile applications facilitates the realization of my academic activities			0,564	
FUP5 – Interact with mobile applications requires a lot of effort				0,824
FUP10 – Overall, I think the mobile applications are easy to use				0,777
FUP4 – Mobile applications allow a comprehensible and clear interaction				0,665
Auto value	6,517	2,979	2,659	2,27
Variance %	31,033	14,184	12,661	10,808
Accumulated %	31,033	45,216	57,877	68,686
Load factor: Rotation Varimax with Kaizer Normalization Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) = 0,918				

Source: the authors themselves.

Table 7 - Consistency indicators of the factors obtained

Factors	Nº of items	Cronbach's alpha
Perceived Usefulness	9	0,942
Intended use	5	0,861
Intended use and Perceived ease of use	4	0,797
Perceived ease of use	3	0,705

Source: the authors themselves.

5. CONCLUSION

The present research sought to identify the factors that explain the use of mobile applications by students of the campus of the North Zone Natal of the IFRN through the TAM proposed by Davis (1989).

Through the results obtained, it was found that the majority of respondents are female (55%). The respondent population that presents more frequently have between 14 and 18 years of age, are part of the course of trade and are included in integrated mode among the courses. The mobile platform that most students use is the *Android – Google*, with an average of 4 to 6 applications being used per day.

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With respect to the factor analysis, it was possible to identify 4 factors generated by this statistical technique. As one might perceive the results obtained, it is possible to interpret the factors as being "Perceived Usefulness", "intent to Use", "intention to Use and Perceived ease of use" and "Perceived ease of use", which, together, can explain about of 69% acceptance of mobile applications designed for teaching the population under study. The "Perceived Usefulness" was the factor that showed the highest degree of explanation for the acceptance of mobile applications by students, grouping nine issues, taking into account the total percentage of variance explained.

Practically, this research has contributed positively to the educational institution in question, to provide information about the that promotes acceptance of mobile applications by students. With these results, the institution may use them as a basis for the development of mobile applications that improve the teaching-learning process, generating new forms of interaction to classroom teaching and building links of interaction between the teacher and the students, considering, in particular, the usefulness of these applications by students.

The study was limited to investigating the mobile applications within the tool to support the educational activities of educational and academic students in the classroom and beyond. It is also possible to observe another limitation with regard to the model used by restricting the search to only use constructs present in the original model, the fact that this is an exploratory research on adoption of mobile applications for the study.

As the direction of future research, it is recommended to study the mobile applications in other fields and research contexts, but also employ, in other studies, technology acceptance models beyond the original TAM used here. It is expected that with the adoption of other models to be discovered other variables or factors that contribute to the acceptance of mobile applications. It is also recommended to conduct other studies covering a qualitative analysis of these factors found, understanding how these factors contribute to the acceptance of mobile applications in the educational context.

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