

# *Towards Innovative Teaching with Educational Persuasive Interfaces*

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**Abstract**— This Research to Practice Complete Work presents the category of Innovate Practice. Digital social grouping is now a common practice for exchanging any kind of data between group connections. However, this has posed some key issues for education professionals on the best path to the current educational system to fully embrace this practice and move on. [1] It suggests that "the school model as we know it is over. It makes no sense to students, does not produce expected results, nor prepares the new generations for the challenges of contemporary life." To fill this gap, an innovative teaching model emerged as an alternative approach centered on the student and reinforced by the pedagogical and technological infrastructures. This work presents a framework as a computational tool to build and provide custom educational interfaces based on the concept of persuasion to push users to the most relevant content (eg, direction). This structure is based on participatory elements from various disciplines that cross the fields of education, computational engineering and psychology. The proposed framework shows that user interactions explored from the persuasion, engagement, and content customization techniques take into account the skills, needs and interests make teaching more attractive and applicable.

**Keywords**—*Innovative teaching model; Persuasive Interfaces; Educational Computational Strategies*

## I. INTRODUCTION

Historically education is centered on a process where the educator holds the knowledge and the student follows the taught theory thus leading to a meaningful knowledge transfer process. [2] suggests that this approach is based on the epistemological conception of environmentalism or empiricism, where the teacher talks and the student listens; the teacher dictates and the student copies; the teacher decides what needs to be done and the student does the prescribed tasks; the teacher '*teaches*' so that student can learn. [3]

mention that the only source of human knowledge in empiricism is the actual experience acquired in terms of the physical environment, acquired through our senses, highlighting thus the importance of education in the formation of human kind.

However, in such a traditional model, educational environments have turned into a social obligation, making no real sense whatsoever in the conception of the individual as someone in formation, thus creating boredom and disinterest, often leading to drop-out cases. As a result, such individuals do not reach their maximum learning. In the end, whoever manages to persist and complete the serialization, leaves the educational system with insufficient skills in the areas needed the most by the job market.

[1] describes that students who lose interest in their studies believe that they are unable to learn, and often end up leaving too early the classroom. [4] points out that schools teach the contents they know how to measure; they measure what society values the most. To contribute to a change in today's Brazilian reality, this work aimed at developing a framework for building persuasive educational interfaces used a computational strategy for teaching within the context of innovation. Alternative pedagogical practices that shorter the gap between classroom and daily life were fully explored.

The methodology relies on on exploratory and descriptive research. For this study, digital repositories, documentaries, books and websites focusing on innovative teaching models and the use of educational technologies were exploited, as well as theories related to persuasive interfaces. This approach is multidisciplinary by nature crossing the disciplines of psychology and computer science.

The framework development is based on the contextualization of the presented themes and their validation undertaken with specialists in computing and education in

addition to the users of the Moodle virtual learning environment (VLE) deployed at a Brazilian public university. The data collection procedure surveyed a significant group of people regarding the problem studied and then through quantitative analysis conclusions were drawn. All elements reported by the evaluators have been treated with confidentiality. The results of the analysis are presented in a comprehensive way.

## II. METHODOLOGY

Part of the principle of exploratory and descriptive research, according to [5] aims to give greater knowledge about the problem, detailing and describing its peculiarities. It can involve systematic observation, interviews with experienced people on the problem researched and analysis of examples for better understanding.

Firstly, the literature review was done from the digital repositories related to the area, based on what was proposed by [37] that mentions the Systematic Review of Literature as a considerable investigation of a relevant phenomenon that produces characteristic results through the interpretation of content and quality of the researched material. The research followed the steps proposed by Peterson et al. (I) definition of research questions, (ii) conducting research on relevant primary studies, (iii) screening of documents, (iv) keywording of abstracts, and (v) data extraction and mapping.

After the organization of the theoretical reference, the analysis of the interfaces of the virtual Moodle learning environment of a Brazilian public university was carried out. The observation was based on elements of the scientific areas of computation and psychology, taking into account elements of usability and principles of persuasion. In the verification were found some problems, being these solved in a prototype that was developed like model of persuasive interface for virtual environments of learning.

At the end of the construction of the prototype, it was submitted to the voluntary validation of some users who use the current Moodle of the university in their presence or distance activities. After voluntarily experiencing the prototype and receiving guidance on the purpose of the work, the validation of the new interface was done through a checklist, available in Google Drive, with ten questions that considered the scientific areas of psychology and computing, elementary for construction of the prototype. The questions in their entirety and the results are available in the Data Validation Process subsection.

The research volunteers were divided into distance education students, enrolled in a specialization course, and students of the on-site modality, linked to the undergraduate or graduate level. The answers of the checklist were obtained by a total of 26 students, 10 of the distance education and 16 of the face-to-face modality. The procedure chosen for validation was the data collection technique, in which the information was treated with total confidentiality and the results of the analysis presented in a global way.

## III. INNOVATIVE TEACHING MODEL

We live in the era of cyber culture, in which the form of consumption, production, occupation and relationship has been modified; the traditional educational model no longer meets the needs of contemporary society. In order to enable a global formation, education has the responsibility to adapt to a new social context [7] where innovating is a necessary condition for people to advance as citizens, as society, as a nation.

### A. Pedagogical and Technological Infrastructure

The renovating model of educational practice, through active methodologies, does not only focus on the development of intellectual abilities, but also on the improvement and gathering of skills and competences that the new generation requires including flexibility, relationship capacity, critical thinking, questioning of rights and duties of citizenship. Active methodologies in this scenario comprise teaching strategies that favor the interaction between different stakeholders and value the collective construction of knowledge [8].

The use of computer system brings versatility, differentiated information sources and effective real-time interaction within the academic community. [9] suggest that the computer has become a sociocultural object that is part of everyday life and its use in schools can undoubtedly bring significant gains to learning.

In the innovative model of teaching, scientific training is not considered the most important concept, but the differentiated way of involving it, of bringing the real world integrated into human relationships and projects based on individual interests, making the student aware of school responsibility under another viewpoint. [10] is emphatic in stating that [...] learning is not only part of development but it can go beyond it by projecting it forward and eliciting new formations.

[1] suggest that in order to fulfill the mission of innovating, educational institutions should understand broadly an integrated curricula, motivating the student to: (i) know and take better care of their body, mind and emotions; (ii) develop critical, logical and scientific thinking, broadening their understanding of the world and their ability to solve problems creatively and innovatively; (iii) respect and consider diversity; (iv) communicate in different languages and platforms, relating and cooperating with others; (v) recognize and exercise rights and duties, make decisions and act ethically, sustainably and responsibly; (vi) set goals, organize and persevere to achieve their goals and life project.

[11] addressed innovative education through ubiquitous technology using mobile and wireless computing. The paradigm shift capitalizes on aspects to reducing time and removing distance barriers so that students can learn anytime, anywhere whilst connected to the internet through their mobile devices. This provides a transparent adaptive support to the learning process and its personalization to the students. The trend emphasizes on-demand methods and tools through experiences, customizing scenarios, taking into account

differences in skill levels, perspectives, cultures and other educational contexts.

[1] points out that adaptive technology platforms help considerably since they use artificial intelligence to understand how individual students learn, offering therefore individualized studying plans. In this context, [12] suggest that there is a growing trend in the education sector through the insertion of persuasive tools that use attractive resources to embody teaching and maintain students motivated.

[1] detail computational and other analog resources in support of educational professionals: hand-in-hand learning can happen by building digital or analog products such as rockets assembled with pet bottles, Lego robots, objects made from 3D printers, games, or computer animations. Such a practice has begun to receive attention in schools through robotics and programming classes. This has been extended to the boundaries between the educational environment with the *maker* movement, which explores the idea that ordinary people can build, repair, modify and manufacture the most diverse types of objects and projects with their own hands and capabilities. To facilitate this process, several innovative schools are setting up manufacturing labs, i.e. spaces where students have access to a range of tools and materials to increase their DIY projects production.

In the traditional educational system, assessments usually happen through identical examinations without much consideration of individual interests, skills, and competencies. [13] claims that students are given equal homework assignments and then evaluated through standardized tests applied on the same day within a time window chosen by the educator. This work also did analysis suggesting that a model that tries to serve everyone without taking individuals into consideration creates a false meritocracy systems and it drives inequality at a high cost to people and society. The innovative model proposes the appreciation of learning in a differentiated way.

[14] describes several evaluation tools, not entirely limit to tests and notes, because such organizations understand that memorizing to reproduce contents that are now easily accessible is not very efficient from a learning perspective. He continues in his observations claiming that self-evaluation appears as a highly valued tool that replaces competition and individualism with a perspective that favors self-knowledge and collective cooperation. [7] mentions that innovation in education depends on the importance of architecture and pedagogical spaces and the role of personalization, tutoring and individual attendance to the rhythms and needs of each student.

In the new educational models the physical spaces stand out aesthetically: they are broad, open, leafy, colorful shared integrative decoration, with an architecture that escapes the austerity of the traditional model, allowing the student to feel

comfortably welcomed and free to implement ideas and inspire his creativity, without the feeling of being in a discouraging place by imposition.

### *B. Physical infrastructure*

The tables, chairs, sofas and other objects are specially designed and organized so that students with common interests meet in groups to interact and carry out the activities. There are several places for groups to define strategies for solving problems and tasks that are designated by mediators. In this new structural configuration, the educational practice adapts to the student universe, searching for possibilities and paths for an inventive learning, facilitating the innovative teaching, conferring aspects and qualities intrinsically inherent and attractive to the learner.

The pedagogical process follows the development of the various spaces of society integrating in an innovative way, encouraging an open, transdisciplinary education and providing a welcoming environment, where the student has the freedom to comfortably develop their creativity and experimentation, as well as to stimulate communication between students, teachers and parents in real time through technological mechanisms, thus allowing a strong, collaborative learning network to be formed.

The Human-Computer Interaction is an area that contributes in the relations and the communicational process between the user and the computational tools. In a multidisciplinary way it includes, besides computer science, other disciplines such as: engineering, psychology, sociology, anthropology, ergonomics, arts, design, linguistics and semiotics. According to [15] HCI benefits from knowledge and methods from other areas outside of computing to better understand the phenomena involved in the use of interactive computer systems. The authors continue their reflection highlighting the performance of psychology in HCI for access to the conceptions, emotions and subjectivity of individuals.

## IV. HUMAN-COMPUTER INTERACTION

Human behavior and its deliberations are closely related to the information received from the outside world. The Law of Hick (1952) and Hyman (1953), based on the considerations of psychology, relates time to a number of possible predilections in which an individual is capable of making a decision. [15] emphasize that this Law split the set of options into categories, remove approximately half of the options at each step, rather than considering all the choices one by one, which would require linear time. They continue the analysis of the Hick-Hyman Law stating that it can be used to estimate how much time a person will take to find one of several options available in an interface.

Fitts's Law also derived from the scientific area of experimental psychology makes the association of Time,  $T$ , in which an individual is in a state of waiting to reach the target object ( $S$ ) and distance ( $D$ ) between the clicks on the tactile elements and the target object. According [15], this law helps

designers to decide on the size and location of interface elements that the user needs to interact with.

At the same juncture, based on predictive and cognitive psychology, applied through information processing, Card et al. (1983) created the Model Human Processor (MHP), subdividing into three human systems: perceptual, motor and cognitive. The perceptual system, when receiving the information captured by the bodily sensors of touch, smell, taste, sight and / or hearing, provisionally stores its contents in sensory memory, and then sends what is most significant to working memory. In turn, the cognitive system interacts with working memory by encoding the information received for the deliberation of a decision, in which the motor system reacts by discreetly triggering the body's standard muscles.

[15] emphasize that in some individuals the human processor works using one system at a time, executing each task singularly. While in others, the three systems may operate together, processing information more quickly. [17] denote that the interaction with an interface through typing, reading and simultaneous translation fit as an example in this context.

The user interface consists of presentations, information, data, controls, and commands. It is also this interface that requests and receives the inputs of data, controls and commands. Finally, it controls the dialogue between presentations and inputs. An interface both defines the strategies for performing the task, how it conducts, guides, receives, alerts, helps and responds to the user during interactions. [18] Understanding the actions of behavior and information processing is important to the construction of an interface, because, in addition to technical procedures, human cognitive ability must be considered.

## V. CONCEPTIONS OF USABILITY ENGINEERING

According to [19] usability engineering intends to develop the relationships between the user and the computer systems, aiming to provide mechanisms and systematic resources to ensure a high degree of quality and ease of use of the target interface. [20] characterized a group of tasks that will occur during the design cycle of a project, according to the following tasks:

- a) Knowing the user - Studying and understanding all those who are directly or indirectly part of the context of use;
- b) Competitive analysis – Carry out a survey of mechanisms with similar functionalities, evaluating and glimpsing possible characteristics that would be desirable or not in an interface;
- c) Define the goals of usability - Quality as a priority, based on the parameters of behavior and performance of the user;
- d) Parallel Designs - Produce initial designs, studying and observing the solutions for each level of user: beginner, intermediate or advanced, as well as the physical and operational environment of use;
- e) Participatory designs - Consult and interact with the user, participate in discussions, attending to requests and proposals;

f) Coordinated design of the interface - Include documentation, help and product tutorials;

g) Guidelines and heuristic analysis - Guidelines for user interface design. Divided into two groups: general, applied to all and any interface or specific, used in a given category;

h) Prototypes - Build prototypes with the intention of enabling a more appropriate solution;

i) Empirical tests - Observing the users in the use of the prototypes;

j) Iterative design - Decision-making for solving problems.

[21] defined a lifecycle for usability engineering, organizing various proposals for human-computer interaction to guide the process of developing a user-friendly interface that matches the interests and expectations of its users. Three iterative stages are defined: Requirements Analysis / Design, Evaluation and Development / Installation. Each process is based on the following context:

a) Requirements analysis - Establishes usability goals according to the tasks, limitations and levels of users;

b) Design, Evaluation and Development - According to [15] aims to design a solution that meets the goals established in the previous phase;

c) Installation - Gathers users' assessments after some time of use, pointing out solutions and / or improvement needs.

## VI. PERSUASIVE INTERFACE

Interface is the communication link between the user and the computer system, [22] briefly described that the user interface should be understood as being part of a computer system with which a person comes into contact - physically, perceptually or conceptually. According to the Portuguese-language dictionary Michaelis, persuasive is all that is convincing and has the abilities to guide someone towards a certain direction and goal. [23] denotes that persuasion is related to the thoughts, feelings, and behavior of an individual, so that it influences the users without having to exercise coercion.

Thus, the combination of these vocabulary elements, persuasive interface is a computational tool that allied to psychology, using communication strategies, lead the user to consume certain content involuntarily, giving a more emotional experience. The science that studies computational interactions mediated by persuasion is called Captology. The expression was formulated in [12]. Captology acts in the process of persuasion, combining resources of computation and psychology, through the resources of these two scientific areas.

[12] developed the model FBM - Fogg Behavior Model - where three elements must be present for persuasion to occur significantly: motivation, capacity and trigger. That is, the user needs to be sufficiently interested in the subject, have the ability to use the system and thus be involved in a timely manner.

There are some induction methods that are based on the social and cultural contexts of the target audience, according to

[25] there are three forms of persuasion: Interpersonal when more than one person verbally interacts; Computer-mediated, computer-mediated communication, but asynchronously, which is not effective through simultaneous connection; Human-computer, in which the system strives to induce user behavior in the computational interfaces.

According to [12], usability and persuasion are considered complementary, attention to both guidelines is essential for a computer interface product to meet user needs and encourage it to perform a task through induction, thus generating a positive result.

[26] points out that persuasive interfaces are not exhaustive and minimize tasks considered complex, allowing therefore the user to observe the connection between cause and effect, creating and extending interactions across networks and social communities. Therefore, the greater the usability of the system, the greater the chances of induction are.

[23] described some human psychological characteristics that must be observed to meet the needs of users, thus, to extend the persuasive potential: availability, usability, trust and desire.

Availability is related to responsiveness, security and free access to the page on any device. As for usability, it refers to the ease of navigation. Trust is tied to the preservation and integrity of your data. The desire is only reached from the positive condition of the three previous items, and from there, persuasion is considered, and can influence the user until he wants to act.

#### *A. Persuasive Principles*

[27] developed principles of weapons of influence to convince with seven precepts proposed: scarcity, authority, reciprocity, sympathy, social similarity, commitment and coherence, being able to act singularly or in principle linking with one another. Reciprocity and sympathy go hand in hand, the first is the capacity rewarding an attitude. [28] describes social relationships that carry reciprocity where everyone has the same opportunities and chances of interaction, whether in a group, in a game, at work, in political discussions or in life.

According to [29], commitment and coherence focus on commitment, responsibility, and engagement, encompassing three essentially human elements: thought, heart, and will, which work efficiently through expressiveness for mental, emotional, and / or physical growth of the individual. In social similarity individuals come together through similarities to share their common interests, act, feel, and think alike, with only the smallest characteristics that differ from one another. [23] points out that if it is good for him, it must be good for me; the various existing social networks are an example in this modality.

Authority is not only about power, but about managing positively for the growth and well-being of a whole. Obviously, authority does not always exercise lawful activity or for good, but in the computational persuasive context ethics must be a previously indispensable element. The principle of authority is commonly respected as it has the influencing

power to generate behaviors. [24] relate characteristics of authority to problem solving, when a company that sells sports products uses as advertising boy in its virtual store a respected and recognized athlete is using this principle.

The shortage refers to the lack of something, in the persuasive conjuncture [27] describes that the more difficult a favorable outcome in a target task, more valuable when conquered. [30] points out that subjects are interested in ideals that they may not always have, but this medium can be used as a strategy of persuasion and induction. [31] exemplifies using the Twitter social network, which limits the user to 140 characters, but is one of the most commonly used social networks.

The mentioned principles mentioned throughout the text involve the persuasive bases of the commotion, the convincing and the pleasant, the more pleasant and emotive the interface, the greater the chances of convincing an individual.

## VII. CONCEPTUAL FRAMEWORK

Framework is a framework developed to solve or support a given problem. According to the Oxford dictionary is a set of information that supports decision making. [32] denotes that in the literature, it is observed that its definitions and applications vary according to the fields of knowledge, that is, each scientific area applies according to its needs and adaptations.

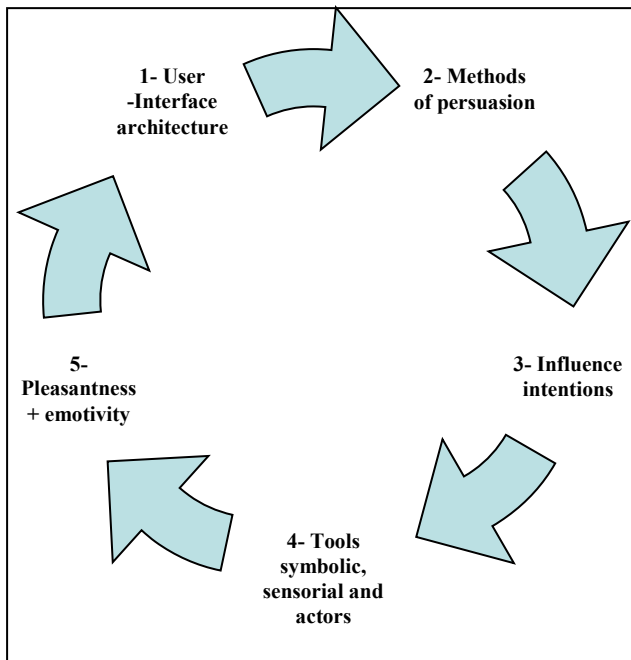
In the area of computing, one of the types of framework built for the resolution of diverse questions is the conceptual one, a theoretical proposal, object of exploration of this work. According to [33] a conceptual framework is a set of concepts that are interrelated, guide an investigation, determining the scope and logic of using certain concepts for problem solving.

The Conceptual Framework presented in this paper, as a computational strategy for the development of persuasive educational interfaces, is based on the theory of Connectivism. Structured by [34] where the construction of knowledge can reside in other individuals as well as in non-human devices.

The contextualization of the themes presented covers the scientific areas of psychology and computation. The application of the developed method occurred in the virtual Moodle learning environment of a Brazilian Federal University, [37] because in the last years the researchers turned their attention to environments of learning, content presentation and educational media. The Moodle (Modular Object Oriented Distance Learning) is a learning platform worldwide used by educational institutions. It is free, open and with no limit of users. The choice of the educational environment is justified because it is used by a large number of professors and students of institution. Moodle users are commonly the developers, teachers and students, both in face-to-face mode, as support and repository of extraclass and supplementary materials. As for distance education, as a learning environment.

From the union of the psychological and computational elements, a diagram was created that lists five consecutive steps for the construction of Persuasive Educational Interfaces, connecting the application of the Conceptual Framework, the central theme of this work. The Figure 1 briefly exemplifies the conceptual framework.

FIGURE 1. CONCEPTUAL FRAMEWORK



#### A. Applying the Conceptual Framework

The designed model was applied in the virtual learning environment (AVA) Moodle, of a Brazilian public university. To solve the problems detected, a prototype of the Moodle educational platform was produced based on the conceptual framework guidelines. The Figure 2 shows visually how the platform was and Figure 3 demonstrates how it was after the application of the developed conceptual tool.

FIGURE 2. INTERFACE MOODLE

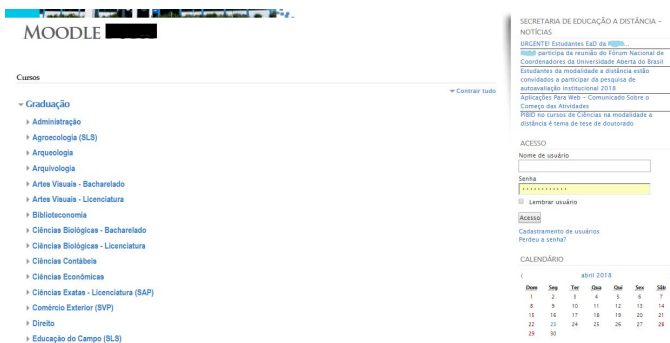


FIGURE 3. INTERFACE MOODLE PROTOTYPE



The proposed solution shows a cleaner design with a menu for access divided by the tabs: About, Member Network, Classroom, Forum, Progress, News, Support and Learn more, providing greater effectiveness in interactions. The login can be done by social networks or by e-mail in Login / Register. The news is no longer exposed, avoiding the overload of information. A greeting and motivational phrase are relevant for the user to feel welcomed in the use of the virtual environment. The image of the user can be a photo or an avatar, because according to [26], immersion in the user universe is a preponderant influence factor for persuasion, in which cybernetic figures can be used.

The Classroom tab, from the login, only releases the courses in which the user is registered, avoiding the unnecessary search in a long list, according to the orientation only the discipline (s)/course (s) that the user has. Expressions like you have tasks that need attention are replaced by phrases of encouragement, moving from compulsory to focusing on the design of the psychological variables of persuasion. Tasks delivered correctly and within the stipulated deadline can be punctuated, prompting a competition enters the class and / or colleagues, the first in the ranking obtains as gain some kind of reward at the discretion of the teacher.

In the Forum tab there is information on how many views the post has received, any comments and the number of tanned in heart shape, following the format of the social network Instagram. The Member Network tab brings a social network in which participants can follow each other, uniting ideas and resources around shared values and interests. In the Support tab, users can contact the developers in case of problems, doubts and / or suggestions.

The News tab, in a cleaner format, the user decides if they want to consult, since this information polluted the visual when they were exposed along with other contents of the page. The Learn more tab provides a chatbot of the name Cida with information related to the Projects of the Academic Directory of Computer Engineering. The intention is to demonstrate that a simple tool with synchronous purpose can collaborate by persuading the student to have greater participation in the interactions in Moodle.

The purpose of the prototype for Moodle is that it is more attractive to its users through usability and persuasive interactions, becoming more commonly favored in the context of innovation in the end activities, increasing pedagogical possibilities.

#### B. Data Validation Process

After the users voluntarily experimented with the prototype and received guidance on the purpose of the work, the validation of the new Moodle interface occurred through a checklist, available in Google Drive, with ten questions that considered the scientific areas of psychology and computational, elementary for the construction of the conceptual framework produced, composed of "Moodle prototype x Moodle".

The procedure chosen for validation was the data collection technique, in which the information obtained was treated with

total confidentiality and the results of the analysis presented in a global manner. All research volunteers use the current Moodle in their face-to-face or distance learning activities. The selected students in the distance mode were the students of the Specialization in Information and Communication Technologies in Education (TICEDU) from a Brazilian university, offered in RS, at the poles of São José do Norte, Esteio and Santo Antônio da Patrulha. The participants of the research in the presential modality are linked to undergraduate or graduate students of the university. Adding the two user categories, 26 volunteers responded to the checklist. The results are presented in a global way, preserving the identity of the volunteers. The intention of the validation was to obtain answers regarding the users' impression in the interaction with the prototype Moodle, and especially with respect to the usability and persuasion of the tool in the educational context. Table 1 presents the questions and their results.

TABLE 1. DATA VALIDATION PROCESS

Validation of Data	
Questions	Results
1-As for your interaction with the visual interface, if you could choose one of the versions to work on, which one would you choose?	81.3% of the presential users and 80% at a distance chose the prototype. This allows us to conclude that a considerable portion of those belonging to these groups of users would like to use the prototype tool in their tasks.
2-In which of the virtual environments do you feel some kind of induction to accomplish the tasks?	In the presential group, the prototype obtained 81.3% of positive considerations, whereas in the distance group it was considered 80% favorable.
3-In which of the versions did the strategic organization of the information occur according to your interest?	In the classroom presential the prototype obtained 87.5% of approval and in the public at a distance reached 90% of positivity. The majority of the volunteers felt captivated by the organizational strategies adopted.
4-Which version had the most influence of content?	The prototype obtained 75% acceptance in the set of presential users and 70% in the distance. Even achieving a reduction in approval over traditional Moodle, the acceptance ratio still brings competitive advantage.
5-As for the use of icons, images, texts and other tools, with which you were most satisfied?	100% of users linked to distance education were satisfied and preferred the prototype. In the category of face-to-face users, 87.5% also chose it.
6-Pleasure is essential for the user to return more often to the virtual environment. Which version represents this feature more intensely?	100% of distance users considered the prototype superior to the current Moodle. The presential education group judged the prototype to be 87.5% pleasant compared to the traditional environment.
7-Two strong principles of influence for persuasion are reciprocity and sympathy. Which of the systems did you feel the most action of these concepts?	Presential users considered the reciprocal and sympathetic prototype to be 81.3%, while distance users surpassed this percentage, considering a favorable 90% compared to the traditional environment.
8-In the prototype, item	In the group presential users, 75%

Validation of Data	
Questions	Results
Members, the user can create a profile, publish photos, videos, follow and be followed. Do you think this feature gives you more interest in using it?	agreed, analyzing that the changes in social network format are important, while 12.5% disagreed and the same percentage considered this item indifferent. In the group of distance education students, 70% considered that the resource provides greater disposition in the use of the environment, at the same time that 10% disagreed, and 20% considered it indifferent.
9-In the Learn More tab, there is a Chatbot, that is, an information robot that interacts with the user in the prototype. In a school of 1 to 5, considering that the larger the scale, the better the assessment. How much do you think this tool is interesting?	The face group judged 50% on the scale 5, considering a good evaluation. While 31.3 considered the scale 4. The equivalence in scale 3 was analyzed by 6.3% and proportionality in scale 2 was considered by 12.5% of users. In the group of distance students, 50% considered the scale 5 and 50% defined the scale 3 in response.
10-The Progress tab of the prototype was developed for the student to follow their performance in the virtual environment. Do you find this feature useful when accompanied by incentive messages?	87% of presential students agreed that this item was useful, while only 12.5% thought it was indifferent. Of the distance students, 80% agreed with the graph demonstrating the user's development, as 20% defined as indifferent.

In general, it can be seen that the educational purpose of the tool has reached its goal. The proficiency in the relation of the students with the prototype was significant, since they recognized and attested through their answers, that can be benefited with more flexible tools and contents. Analyzing in general, it is possible to verify that the educational purpose of the tool has reached its objective. The proficiency in the relation of the students with the prototype was significant, since they recognized and attested through their answers, that can be benefited with more flexible tools and contents.

A more versatile and harmonized virtual environment with contemporary and innovative education can provide the building of autonomy and analytical thinking, stimulating the work of teachers and designing a satisfied and enthusiastic student to acquire or perfect a skill. [36] emphasizes that technologies are more than mere media, interfere with thinking, feeling, acting, social relationships, and developing skills and abilities.

## VIII. FINAL CONSIDERATIONS

Thinking is a knowledge production institution, for this the curriculum can be systematized and organized from the existence of needs, with both analog and technological interventions, that provide advantages, benefits and incentives for the community. Presenting a teaching methodology with a contemporary vision, the innovative teaching model acts as an agent that transforms social reality, making student life more interesting and applicable.

Academic spaces are representations of social modifications. The actions and interactions of teachers and



students through popular and accessible technological instruments promote innovation and pedagogical improvement.

The Internet leads the citizen to live in a different way space, time, social relations, the representation of identities, knowledge, power, borders, legitimacy, citizenship and research, allowing a new way of insertion in the social, political, economic and cultural reality. [38]

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