

# Moodle Research Software: Emotional Context in Ecuadorian Higher Education

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## Abstract

The objective of the study was to develop a theoretical approach between the logical and affective emotional bond that exists in university students in Ecuador when conducting educational research with the Moodle system. The nature of the research was developed under the qualitative approach, based on the humanist-interpretative paradigm. Due to its qualitative scheme, there are 22 universities in the city of Azogues with a population of 700,790 students, of which the selection of a homogeneous sample was applied, obtaining the participation of 618 students. The results were analyzed through the generalized comparison of data and theories through the qualitative data analysis software ATLAS.ti, which concludes with a theoretical approach consisting of three main constructs: cognitive influences of information and communication technologies, emotional logic and emotional bonding, establishing that digital connectivity facilitates the capacity of university research thinking.

**Keywords:** University Education; Online Education; Emotional Intelligence; Affective Domain; System Moodle

## I. INTRODUCTION

Nowadays, the usefulness of online guidance systems for university educators is widely reflected, generating a great influence from the affectivity of learning [1]. Traditionally, research on teaching and learning in students has been approached from a cognitive point of view, and the affection of students has been neglected. In this sense, the use of technology can explain some affective and emotional situations that repress the student's ability to successfully face research.

For [2] in Ecuadorian universities, insecurity and lack of interest in research studies, as well as evaluation models, limit

appropriate learning, which are frequently detected. The appreciation of emotions and the affective domain in higher education provides new models to process teaching and learning by introducing changes in the methodology to overcome the andragogic difficulties. The beliefs and attributes reflected by university students cultivate mastery over the triumphs and failures of their careers [3].

The Modular Object Oriented Developmental Learning Environment (Moodle) system is considered an indispensable element in the current educational society, as knowledge is constantly renewed at a surprisingly fast rate [4]. It is necessary to qualitatively analyze the impact of research technologies and their perspective on university education. The main objective of the research was to establish a theoretical approach between the emotional and affective logic that emerges from university educational research when applying the Moodle system in the universities of the city of Azogues.

## II. RELATED WORK

### II.I Moodle educational system

The new information and communication technologies provide additional resources that have been progressively incorporated into the learning process. The interaction of learning resources through the web or other electronic devices have led to better experiences and results for active learning, as well as to a greater interest and motivation of students [5]. Collaborative learning stimulates students' autonomy and intrinsic motivation [6]. According to [7] the systems at the service of learning, Learning Management System (LMS) in the form of virtual learning platforms, have been increasingly implemented in the learning system, becoming a connection device between teacher - student, but also between student - student. These systems of educational interaction not only provide a physical

place to deposit static content, but also allow the inclusion of interactive digital didactic activities [8].

Moodle is one of these free systems, which have a wide dissemination for its characteristics and stands out for developing a dynamic work environment for students [9]. The university level teacher can design the organization of the course material, while the student can manage their time, at the same time you can record all the activities developed, the number of accesses, as well as the time invested in the different activities, which offers an important added value. The Moodle system stores a large amount of valuable information to analyze student behavior [10] and [11]. The data obtained allow an objective feedback on the design of the activities, which contributes to the evaluation of the structure and type of activities proposed by the teacher and, on the other hand, the follow-up model in the work of the students.

The large amount of data makes it necessary to use techniques such as data mining to extract meaningful information. Data mining techniques have been applied to analyze the data obtained from virtual management platforms [12] since these platforms can store and safeguard interactions in files and databases. In this framework, the objectives of this work will be to analyze and study, through data mining techniques, the way in which students interact with the different university research activities configured. Also, to theorize the influence that different factors have on the logical emotional and affective interaction that they exhibit in the pattern of behavior and activity of the students in relation to a virtual teaching system, in this case the Moodle virtual platform version 3.4.

## II.II The humanistic paradigm

The main precursor of the humanistic theory was [13], who affirms that the human behavior of man is exquisitely rational, this is mobilized with an ordered and perceptive complexity towards the goals that his organism strives to achieve. The humanist theory stands out in relation to man, by characterizing the inherent qualities of his species, describing the positive, based on the constructive, realistic and reliable that tends to the vision of development, sensitivity, receptivity, creativity and adaptation [14].

The research is based on the humanistic theory, challenging the behavioral theories of higher education to present a different vision of being in an open and innovative study of the educational episteme. It is necessary to develop the individuality of the students by relying on the recognition of themselves as unique human beings and to develop their potential [15] and [16]. The goal of humanistic thinking is between knowledge and belief. This thinking promotes the development of research knowledge in students, as unique

entities that not only participate cognitively in the classroom, but as individuals with affectivity.

## II.III Emotional intelligence

Emotional intelligence is the second theoretical foundation of the study, described by [17], as the ability to perceive accurately assess and express emotions. The ability to access or generate feelings that facilitate thinking. The ability to understand emotions and emotional awareness. The ability to regulate emotions that turn out to be emotional and intellectual growth.

[18], emphasizes that emotional intelligence facilitates the ability to take control, understand emotions, own feelings and those of others. This type of intelligence helps to motivate and resolve possible frustrations, which are born in the alteration of impulses, as well as moods, by decreasing the anguish, which interferes with the preponderance of rationality and trust with other individuals.

For [19] emotional intelligence is the ability to recognize one's own feelings and those of others. It allows the individual to be able to self-motivate themselves to positively improve their own internal emotions and external relationships. The cited author shows that emotional intelligence accesses the awareness of the feelings facilitated at the moment they are appreciated, facilitating a gradual and continuous attention to one's own internal changes.

In this self-reflective awareness it opens the mind of the human being to visualize and study the practices themselves, including the contours of the emotions. Emotional intelligence is best defined as the ability to apply awareness and sensitivity to discern the feelings and fundamentals of interpersonal communication. [20] advises resisting the temptation to react impulsively and unreflectively. Expresses that we must act with receptivity, authenticity and sincerity, gifts that should be considered in university education.

The correct management of emotional intelligence by the teacher and the student will allow them to act with empathy. The teacher must use comprehension to benefit the students in his charge and transform the educational space into a state of harmony and respect. With stable emotions, there are no difficulties in research activities, there is no lack of support or uncontrolled action in situations of strength in higher education.

## II.IV The interpretive paradigm

According to [21] the interpretative paradigm in the studies facilitates the location and knowledge of the researchers. In

relation to the present investigation allows a better understanding of the phenomena that are being developed, to generate proposals for permanent improvement in the context of the study. [22], states that the interpretive paradigm is considered interpretation-symbolic, qualitative, naturalistic, humanistic and phenomenological. According to the conceptual variables of the aforementioned author, the interpretative paradigm is presented as a broad alternative in the field of university education, presenting its historical antecedents in phenomenology, symbolic and humanistic interpretive interactionism.

The present investigation is related to the interpretative paradigm, through the search and deepening of the logical and attitudinal understanding of the students. It is fundamentally linked to the study scenario, especially in the context of research, providing intuition and knowledge to act against other similar situations. Emphasis is placed on natural situations with human beings where a methodological framework coherent with this particularity is required. The study is based on this paradigm, to visualize in depth the situation learned and to contribute new discoveries to the university educational community [23].

## **II.V Symbolic interactionism**

Symbolic interactionism as a behavioral component relates the universal, psychological and sociological aspects of the human being, for [24], his theoretical principle is established by indicating that the capacity to think is modeled by social interaction. Social structures and normative regulations are the framework of action that determines and configures human behavior without necessarily dictating their movements [25]. Symbolic interaction postulates cognitive and emotional work by stating that the construction of emotions is malleable and moldable by social influences. Within the limits imposed by social norms and internal states, individuals construct their emotions, the definitions and interpretations they make are central to this research process [26].

For the development of the investigation, the symbolic interactionism assumes that the internal and external expressions of the students are a socio-educational production. This indicates that speeches are improvised from one situation to another and that the environment that guides them establishes the rules of expression, the right feeling and the definition of situations. Throughout the study, research relationships are established among the students through the use of the Moodle platform [27]. In this way, the educational status organized by the research professor will establish the ideals, patterns, values and norms that guide and objectify the behavioral component of the expressions. The students and the

researcher discussed how and when the research activities were carried out, as well as the importance of their experience and not just their behaviour [28] and [29].

## **III. METHOD**

The methodology applied for the research was a qualitative approach, characterized by research and understanding of the phenomena, exploring them from the perspective of the students in a natural environment and in relation to their context [30]. The qualitative method is distinguished, when the researcher wants to explore, interpret, and know with breadth and depth the perceptions, emotions, feelings, experiences, approaches and points of view of the people, from the perspective of the students themselves or subjects investigated, in their common environment and in an open manner [31] and [32].

The researcher is part of the research platform of the University National of Education (UNAE). In this way, it is possible to facilitate the perception, structure and relationship between the students' research activities with the Moodle platform in order to respond to the proposed objective. Establish relations between theories and technological practices, to generate premises and criteria in the emotional and affective context of the students [33]. (see Table I).

### **III.I Participants in the research**

In the study, the selection of key informants was applied, recommended by [34], through a non-probabilistic sample of homogeneous participatory type, which seeks to describe in depth a specific group of individuals who were previously consulted and have their cooperation. The study involved 618 students from the 22 universities located in the city of Azogues, considered key informants. The informants belong to different levels and careers, estimated as similar groups in the universities that participated in the progress and development of the object of study, presenting their availability for the observation and analysis of their cognitive abilities, as well as the manipulation and knowledge of the Moodle system [35].

For the selection of informants, a digital survey was carried out with simple and understandable questions showing the request for participation [36]. The focus group technique, defined by [37], was applied as a methodology of workshops or meetings with a select group of individuals. The objective was to provide information about the points to be addressed in the development of the study, to recognize the experiences, expectations and knowledge of the Moodle system in the students. Table 1 shows the number of students who participated in the study. The subject scheduled in the course

called research methodology, the number of actions and interventions made by students, executed from February to July 2019. (see Table I).

**Table 1.** Attributes of Moodle stock records with the total number of interventions in the course of the investigation

Course	Number of students	Total number of interactions	Average actions per student	IP Direction
RES01	618	100720	12360	Unique numeric label assigned to the device used by the user

#### IV. RESULT

The data collection involved techniques and instruments, which were used to obtain data from the Moodle system and thus focus the verification of the problem posed. The research professor applied the digital observation guide by participating in the research orientation chat. The author added the Chat Moodle viewer to systematically capture any situation or phenomenon presented by students in the application of the system in their research practices recommended by [38] and [39].

Likewise, a semi-structured digital interview was conducted that allowed greater freedom and flexibility in obtaining information, providing a complex information base [40]. The audios of the interviews were transcribed by the Dragon Natural Speaking system version 13. The data obtained in the interviews and the observation guide were analyzed by comparative theoretical triangulation [41]. The triangulation method was developed through the ATLAS operating system.Ti version 8, providing the categorization of the results [42].

The information obtained in this interpretive investigation was extracted from the research methodology course offered during the semester February - July 2019. This course was offered to the 618 undergraduate students, representatives of 22 universities in the city of Azogues. This course was introduced with the extensive use of the Moodle environment to allow the researcher to deliver the content of the course - learning materials and complementary links; to promote student

participation through forums, online chats, assessment tasks, questionnaires and didactic activities.

The structure of the online research course consisted of readings, assignments, exercises, reading questionnaires and a final evaluation, which the students had to complete with a minimum grade of 6 and a maximum grade of 10 to pass the course. In this environment, the researcher applied 45 minutes of activity with the students per week. Afterwards, the task consisted mainly of monitoring the online activities of the students.

To support this configuration, a pre-designed PowerPoint template was attached to the Moodle course resources before starting each activity, as well as additional learning materials in Portable Document Format (PDF), presentations, video clips and web links. We also opted for student participation and feedback through a forum to add additional exercises such as assignments and questionnaires. Students were able to navigate the content independently through individual accounts. Some student accounts could only be used locally in university laboratories, but experimental accounts were also opened that are based on the cloud and can be used online to access comfortably from anywhere, many students even accessed the course online using mobile devices.

The predefined course template divided the course into several modules. For each module, students were asked to complete the readings related to the topics, perform the prescribed exercises on the scheduled dates and take the exams online. Students were also able to download content materials and exercises to work online. In connection with this configuration, Moodle has built-in features that can produce various types of reports that can be used to track student activity. One of these reports, called action records, allowed the researcher to track what resources and activities of a module have been accessed, when and by which student. For the purposes of this study, the records of the students' actions were collected throughout the semester for the course. At the end of July, the access to the platform by the users was eliminated.

##### IV.I. Categorization

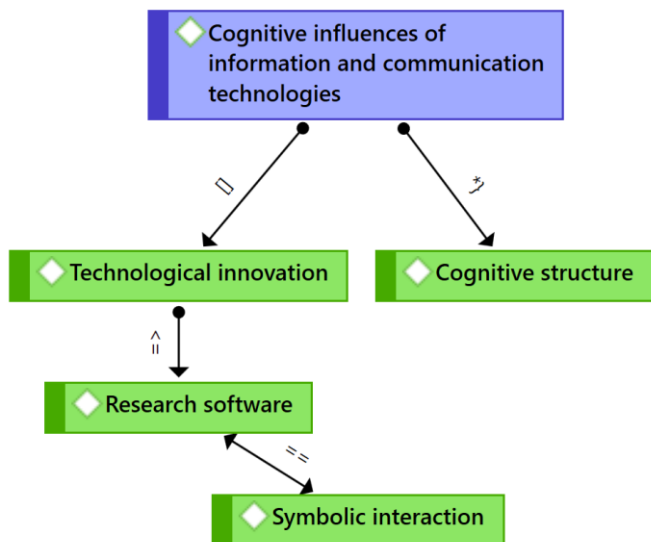
The information collected in the interviews and in the digital observation guide of the Moodle platform was reviewed and organized using criteria of logical-analytical discernment. The data were contrasted in the ATLAS.ti software, where the categories were formed. [43] describe the categories as data derived concepts, which represent structural networks of emerging phenomena. The concepts and themes that emerged from the research determined the units of analysis to obtain a more accurate description of the results. The large amount of information was minimized in parts, to provide a greater understanding of the material analyzed. The coding was done

only on elements representative of the instruments that were applied. The data were classified and grouped, facilitating the search of possible links or relationships to obtain the theoretical approximation of the object of study [44].

The information obtained in the interviews and digital observations perceived by the researcher with the students, responded to the objective of the study [45]. The qualitative analysis software issued the categorizations that were used as analytical bases for the theoretical approach, including the cognitive influences of the ICT, the emotional logic and the emotional bond. Next, structural networks by category are presented.

#### IV.II. Category 1: Cognitive influences of ICT

The results of the study showed that the psychological and cognitive currents fostered by the application of the Moodle system are predominant in the field of student learning research. Demonstrating that students need to work with symbols, models and digital representations for meaningful learning in research (see Figure 1).



**Fig. 1.** Structural network of the category, cognitive influence of information and communication technology

The majority of the students in the search of complex information for their research studies, demonstrated great talent in the use of the Moodle system by not presenting difficulties in their performance. The common and optional use of digital networks for today's students was emphasized [46]. During the course the students had the opportunity to criticize and design action plans that were addressed, discussing the convenience and feasibility of the proposed actions [47]. In addition, a continuous review was carried out, which included the formulation of questions and the questioning of the strategic

organization of the resources (cognitive, material, documentary, technological) available to carry out the activities. In this way, the students expressed a feeling of being part of the data search activities and not just information recipients.

The Moodle platform favored teamwork, since it not only allowed the development of cognitive skills, but also proves to be a very effective way of learning and thus be able to visualize the qualities that ICT allows to advance significantly in the logical reasoning of the research, through communication with other university students [48]. The data analyzed showed that the fundamentals of technology are related to the potential of symbolic interaction as an interface to construct thinking in the knowledge society [49]. During the course, the researcher detected the use of imagination during the constant intervention of students, as well as the distinction between attitudes resulting from symbolic interactionism. For the researcher, there is a cognitive relationship between the image and the adaptation imagination of the students when applying the Moodle platform [50].

#### IV.III. Category 2: Emotional logic

[51], indicate that emotional logic exists to understand that we are co-pilots of our world, through the reptilian brain that governs automatically and quickly with immediate relationship between beings and the environment. On the other hand, the cognitive brain is conscious, but slower, which makes sense and allows one step back. The agreement between the two co-drivers is not always cordial, much less agreed. Their discord creates stress, this is the internal dialogue, between a source of constant emotional pressure, and the internal component of the feelings that degrades the relationship of each being; This interconnection is defined as the emotional logic.

Emotional intelligence is conceptualized as the ability of the individual to perceive, know, value and express emotions with the same ability to access them. It facilitates integrated thinking to regulate emotions and promotes emotional and intellectual development. After analyzing the results, the students presented hidden feelings. These were presented when they were interconnected in Moodle, for the search of methodological information, expressing emotions in their messages, which are not expressed personally, but digitally. The students interviewed described that there are impulses that lead them to understand each other better in the technological world, described by the researcher as beliefs. Active emergent emotion was detected, where the students in their interviews stressed being afraid to be able to consult with the teacher any concern, but when viewing the consultation of other young people in the chat, they felt confident with themselves and then opened up in communication. For [52], there are different types of emotions, different emotions are defined as emotional

typology, it is characterized as being a unique quality that students have when they identify themselves as part of the study.

The results were derived from logic, where it was demonstrated that it was necessary to group or subdivide the students, due to their emotional typology. Very active groups and others less active were established. Communicative and other less participative students. The students indicated that they always agreed to work in groups during the research days. The researcher experimented and found that by joining a research group made up of students, one can resort to the transmission of level knowledge, where students can reach the same level as the practical training teacher.

The same happened with the sub-groups of the Moodle course, where a scientific research language was not necessarily used. Problems were addressed where students participated heterogeneously. The students interacted with proposals for the organization of study ideas, other teams generally rated the results obtained by the sub-groups as a community of student researchers. The dynamics of the group activity through the Moodle platform eliminated the connotation of repetitive, boring and monotonous classes. The students expressed that the research course was creative and dynamic. The interest of the students increased as they progressed collectively in the acquisition of knowledge through the strengthening of critical thinking [53].

When studying the qualitative results related to the emotional aspects, the emotional logic as a category in the present study can be defined as the sense that drives the emotions and the state of mind. It is the impulse that leads the student to act or react logically in certain circumstances of their university educational research (see figure 2).

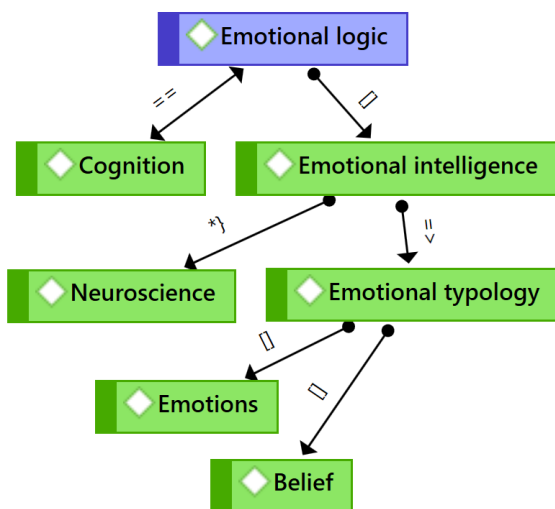


Fig. 2. Structural network of the emotional logic category

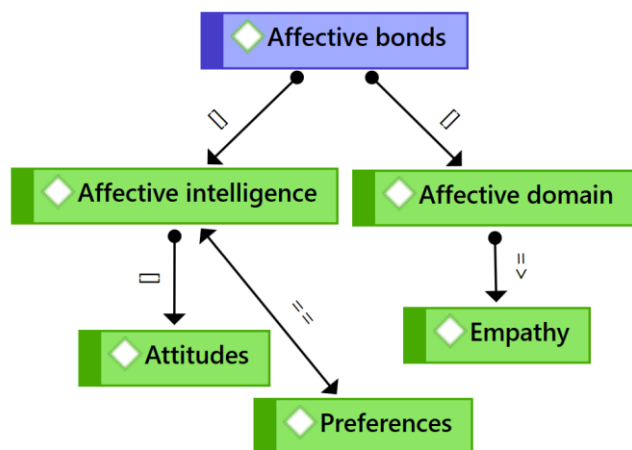
#### IV.IV. Category 3: Affective bonds

In the analyzed data of the study, emotional contagion was perceived by highlighting the empathy and attitudes of the students that positively impacted the activities. The researcher found that students demonstrated confidence and motivation with a sensitive perceptual learning style, when they reported that it is easier and simpler to access information when applying the Moodle system. The students demonstrated the affective domain, defined by [54] as a wide range of feelings and moods that are generally considered as something other than pure cognition, including as specific components of these attitudes, beliefs and emotions of mastery.

In the testimonies given by the students, the educational research process stood out as a cognitive process thanks to the application of the Moodle system. For the researcher, an active participation of the students was established, promoting the affective components, such as their perception, intelligence, memory and thought. These situations of technological incursion and diversity can determine the impact of university education on students [55] and [56]. For the author of the study, the emotional bond is the emotional link that arose between the applicability of Moodle and university research. This link was formed from different relevant aspects of students' attitudes, which are based on socio-educational and family principles, where research stopped being precise, rigorous and cold until it became an area of affective knowledge.

In order to introduce the students to the affective bond it was necessary to undertake the endowment and the knowledge of the affectivity. It was found that not only can learning be established through cognitive achievement, but also the affective dimension of the student should be considered [57]. In the testimonies it was perceived that the affective questioning maintains an important role in the university education, strongly rooted in the students without often realizing that they have feelings, without being able to know or control them [58].

[59] and [60], conceptualize the affective domain as the elements that make up the affect, since they must also be considered and know how to manipulate them by every teacher, among which are the tastes, confidence, behavior, emotions, beliefs, preferences and affective relationships. In Figure 3, the affective bond, as a third category, is divided by the affective domain and by the affective intelligence defined by [61] as the ability to know, express and control thought and affectivity, especially feelings, emotions, passions and motivations.



**Fig. 3.** Structural network of the emotional bonds category

The analyzed results demonstrated the cultural identity of the university student, characterized by the preferential attitudes with the modern thing in the actuality; this identity is framed in a global compatibility that in more specific terms is a constellation of particular identifications and different cultural instances, but the taste for technology is unique. Cultural identity depends on the context and the situations that were temporarily attributed to the activities of the course. One of the outstanding contexts of the third category is the affective intelligence, which was reported by applying the Moodle system as a technological tool in research. The subjective and objective plans allowed to relate the research activities that the students executed with their technological reality [58].

## V. CONCLUSION

This research analyzes the main functionalities and research support provided by the standard Moodle platform for university students in Ecuador. It was determined that the main tools found on the platform such as Assignments, Chats, Forums, News and Questionnaires / Surveys, as well as external tools such as Blogs, Wikis, Questionnaires and Web-conference, were the main cause that motivated students to use Moodle in the research course since these features in Moodle facilitated the necessary andragogic requirements, such as collaborative and mixed learning.

The answers given by the students revealed that the most mentioned purpose of the use was the ease of downloading content and attaching to the activities. The most used information were the presentations and images. In addition, the students gave more importance to the assignments. The results show that at the university level worldwide these tools allow

interaction, participation and communication in real time, being used mainly as a repository of materials and information.

By allowing the opinion and participation of students in the search for solutions through brainstorming, participants showed interest in the identification and personification of the user interface. It is expected that students have more interaction using learning in order to carry out research methodology activities. It can be added that the design and redesign of the interface by the students provides an informative feedback through the content exposed in the platform, being this manipulated by the users substantially improves the content retention and accessibility. Therefore, for every university, the Moodle platform as e-learning tools is considered important since it manages to successfully promote the teaching and learning process.

When comparing the categories, it can be concluded that for any university emotional intelligence provides many successful attributes in professional and research life, both in the teacher and in the students. UNAE has taken emotional intelligence as a training element in its research projects. It is also considered ideal to implement cognitive intelligence, favoring the integral development of the student body.

It is emphasized that emotional intelligence is more important than cognitive intelligence for the success of an individual in daily life, work and academic research. However, the empirical evidence has been clear in this regard, due to the results of the research. On the one hand, teachers in Ecuador deserve an emotional education as a good predictor of success and that is related to the good performance of students. Universities at the macro level require professors who opt for the qualities of technological knowledge, which demonstrate significant relationships with success in research.

By contrasting the cognitive influence category of information and communication technologies, the emotional logical category, the affective link category with the theoretical foundations and the qualitative data provided by the students who participated in the research activities, a theoretical approach finally emerges. It is theorized that the interaction that the student exercises with the Moodle technological environment facilitates his capacity for investigative thinking, allowing him to study in a simple and accessible way; where the emotional logic fulfills a function that admits to be linked to its modern and updatable environment.

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