How to Asses Empathy During Online Classes

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Abstract. During this work, we will focus on strategies for understanding learning paths in online courses. Indeed, more and more researchers are interested in the attitude of learners in the learning conditions of online courses. We note that the cameras are often turned off, and different reasons are mentioned, such as the fact of feeling obliged to stare at the camera, the question of the privacy of the home although interfaces allow to create a fictitious decor, and finally that it is not necessarily usual

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1 Introduction

The idea of e-learning as it was initiated is based on the premise that this form of learning is more student-centered [1, 2]. In addition, the active participation of the student is important for the success of the system. It must involve a process on the part of the learner such as participation in the co-construction of teaching content and knowledge. This is one of the reasons that is often mentioned, the notion of Personal Learning Environment (PLE) [3]. Just like for trainers, there is a Personal Teaching Environment (PTE) [4]. Even if these spaces overlap, PLEs can be richer than PTEs. Indeed, learners can aggregate in their PLE, other applications or tools that the teacher does not have. From this health crisis emerged the use of the webcam as a tool allowing the teacher to do his lesson by imitating the face-to-face lesson. The e-learning course then moved into a distance course, and very little use of e-learning took place. However, for some researchers, the improvement of e-learning environment can be enriched by the co-construction of the course which the use of digital tools [5, 6]. We have previously analyzed the role of forums in setting up an online course [7].

This notion of online or distance learning to which learners naturally subscribed through their personal choice and to which certain teachers had also been formed was imposed on everyone, including the conditions during which the lessons must be provided by teachers and followed by students.

Moreover, with technological developments, online uses tend to want to replace face-to-face lessons with the use of sound and video. Faced with this technological choice, allowing to the system to penetrate everyone's privacy, many choose to turn off their cameras, even the teacher sometimes… We must not lose from our sight the fact that learning is above all a collective adventure, designed as social learning [8]. In terms

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of educational construction and by evoking the socio-constructivist school among others, it is undeniable that the central hypothesis of the social construction of knowledge is at the heart of the social psychology of development, which considers in particular social interaction between peers but also between learners and course leaders as one of the key elements of the cognitive development of the individual. Other schools of thought evoke this encounter, such as socioconstructivism and the proximal zone of development [9] and vicarious learning and socio-cognitivism theory [10].

It is therefore necessary to ask the question about the fact of the extinction of the camera in the propensity of its active role in learning seen from a purely communicational angle. We observe, like the vast majority of colleagues with whom we have spoken, that very often the cameras are turned off, which means that the students have only sound as their interface, so how then we can reproduce the face-to-face course and why this question poses a problem in achieving effective teaching?

In this work, we will be interested in this issue to the interaction linked to human-computer interface and how therefore to put in place practices that can promote empathy in particular, which is a fundamental element in learning. Indeed, pedagogy is intimately associated with communication and it is no coincidence that the two disciplines, namely education sciences and information and communication sciences, overlap on this theme of learning.

Long before the discovery of mirror neurons, which play an important role in empathy, H. Wallon underlined the importance of the postural function in communication [11]. This form of communication is essential to denote the role of emotion in the communication process [12].

2 Motivation and Learning Path

Motivation is a key factor in the learning path [13]. In this regard, teachers use several strategies to successfully capture the attention of students. In this regard, it would be useful to recontextualize learning as it is experienced in France. Indeed, with the massification of access to higher education, this tends to educate a larger proportion of young people of a generation, and which is largely open to the middle classes [14]. Unlike the Grandes Ecoles, the University is no longer exclusively the place of training for the social and academic elite, insofar as it also welcomes the largest share of graduates of a generation.

This ipso-facto generates new problems, with the emergence of new teaching methods due to the erosion of the level but also of the cognitive capacities of the students and also of their working methods. This is one of the reasons for the massive failure of the first cycle in France and for which alternative strategies have been put in place, in particular the work-study model [15], where students alternate a time at the university and a time in the enterprise and in which appropriations are of the order of competence rather than knowledge.

We can see that all these “obstacles” that learners encounter during their university course have a major impact on their motivations to continue their studies, and thus we fall into a vicious circle which inevitably leads to failure. For this reason within universities and in particular that of Gustave Eiffel University, tutoring jobs have been

multiplied and which allow the learner, due to his interaction with his tutor who is also a student, to be able to put in place the mechanisms mentioned above and which will promote the success of the learner, by playing on confidence, motivation and acceptance of the error, which as we have discussed are key factors of success before any form of knowledge.

The question then is how to succeed in this transmission in digital space and ensure the success of an online course, while accepting the decline in interactions. Indeed, with the health crisis, the establishment of distance or online courses shows all the problems to ensure effective courses in the educational sense of the term. We often find that measuring course success is based simply on metrics, such as did the course work well, were there any malfunctions, does the bimodal system work well, etc. without however worrying about the complex reality of the course and the environment necessary for its success, and which were detailed above, namely the PTEs and PLEs. In addition, the vast majority of trainers confuse online courses and distance learning courses and are satisfied to teach courses on very easy-to-use videoconferencing tools such as Zoom, which has been so successful thanks to its simple functionalities.

2.1 Motivation

On the question of the motivation that arises from the emotions or feelings that one has, there are a plethora of theories [16]. Besides, that's why we carried out this work. Indeed the essential question is to know how to motivate the students to learn, how to generate the emotions or the feelings necessary to carry out this task knowing that we have several handicaps to overcome as it is indicated in the object of this article to know without communication non-verbal. If we consider that “motivation designates the forces which act on a person or within him to push him to behave in a specific way, oriented towards a goal” [17], we can easily deduce that without stimuli motivation cannot be triggered in an individual. Classical theories also present motivation to us as a result of a need [18], of an expectation [18]. McCelland in 1961 developed the theory of belonging, fulfillment, and power needs, thus providing a different reading of Maslow's theory [19].

Classical theories therefore consider the evolution of social relations in an interpersonal register and more specifically in professional and work relations which put the individual in a position of uniqueness, i.e. the “me” is superior to the “us”. In summary, the dynamic of motivation at this level is triggered in a logic of individual reflection. This focus on motivation is essential to allow students to be in ideal learning conditions. It is certain today that inequalities also exist in distance mode and that they are more important than in face-to-face mode where inequalities linked to several factors, including socio-psychological ones, were already noted [20], such as anxiety [21], socialization processes [22] and their emotional impacts and on our learning processes and to recall what has already been noted, namely that we never learn alone and finally the usual emotional states which are managed alone and therefore the difficulty of the learner when he is in a state of negative emotion [23].

2.2 Emotion

The notion of emotion has been studied by several authors and in several disciplines. The term “emotion” is a set of affective reactions, regardless of their duration or intensity. In this sense, emotions are distinguished from feelings, which last a long time unlike emotions which sometimes have a short lifespan such as anger or surprise. It is helpful to note that we are always aware of our feelings, which is not always the case with emotion. For Robert Plutchik [24], there are eight basic emotions which are in opposite situation namely Joy and Sadness, Confidence and Disgust, Fear and Anger and Surprise and Anticipation. Each of these emotions has a role, such as the fact that fear allows protection or trust which allows incorporation and finally anticipation which allows exploration. We can clearly see the role of these emotions in the educational function and the role of the communicational space in the transmission or encouragement of these emotions. We all know that emotions are transmitted to others via artefacts, as we will see below about mirror neurons. Other authors have developed an approach based on valence namely positive or negative then on fundamental positive or negative emotions also such as joy and love or anger and sadness and which then break down into sub-emotions.

For Paul Ekman [25], there are so-called primary emotions which are identical to many cultures, including certain animals. They correspond to more specific mental states, characterized in particular by a rapid onset, a limited duration, and an involuntary appearance. We have defined here so-called basic emotions and as it was indicated by Ekman, these emotions are found in all individuals, including in certain animals, in particular chimpanzees. However, our most complex emotions are very dependent on our cultures and sociological factors. For Paul Griffiths, there are two classes of emotions, namely emotions called “affect programs” and emotions known as “higher cognitive emotions”. It is for this reason that certain emotions are accompanied by facial reactions and of which Paul Ekman has produced an extremely elaborate catalog. They indeed produce specific facial, vocal or muscle reactions.

The role of these emotions is essential in our decision making and this is what is shown by Plutchik among others. Since the work of Damasio [26] which made it possible to understand how emotions can exert a decisive influence on the decision-making process. Other authors have consolidated this path such as Dan Ariely [27], Alain Berthoz [28] confirm the hypothesis according to which emotions, by influencing our choices and by motivating them, are a determining element in leading to decision-making.. Our analysis of this notion of emotion is very important to the success of a course and even more so of an online course especially when the cameras are off and which is undeniably the case in most courses. To be able to take action, you have to be motivated and this is not only a rational process, but it is accepted that motivation is linked to emotion [29].

3 Social Cognitive Theory

Albert Bandura, who developed the Social Learning Theory, demonstrates that there is an interaction between the mind of the learning person and his environment. Indeed, cognitive social theory shows us that human functioning is complex due to its existence and its environment and the product by its actions. He argues that "human functioning is the product of a dynamic and permanent interaction between cognitions, behaviors and environmental circumstances. This shows us how important our emotions and our interactions are in our reactions with our self but also with others. This is summarized according to this triple approach between interaction of our behavior, our internal personal factors in our environment [30].

We understand well then how the interaction of learners with trainers is important but also between learners which allows to strongly consolidate the theory of socio-constructivism and which results in the success of the learner. Included in these forms of interactions we also find the forms of social persuasion that allow us to act on the beliefs of others by giving them the feeling that they have the capacities required to succeed. This exchange between trainers and learners is essential for success, especially at the time of doubts or questions by authorizing errors, an important step to be taken in order to succeed in learning [31].

By making the link between the need for interaction and learning and interaction and motivation, we see that contact is important for effective learning. This link is then reinforced by the communication function such as it was initiated by Wallon in terms of postural function and emotion [32] and subsequently widely studied by Martin-Juchat on the question of the role of emotion in communication [33]. Through this initiation carried out by Wallon, the link is clearly identified between the postural function of communication and the brain function. We then allow ourselves to create the continuum between the communicational approach and motivation and brain function. The latter through mirror neurons will make it possible to act at the level of this interaction to trigger this continuum. These mirror neurons are the trigger for the transmission of emotion. This transmission of emotion is essential in the learning journey, it allows errors in the student because of the attitude of the teacher but also of other students, and it must be remembered that there is no error-free learning. This transmission of emotions takes place primarily through mirror neurons during interactions that take place in a classroom. What about non-verbal interaction during online lessons and more when the cameras are off? This loss of interaction raises an obvious question, namely how to allow the student to interact and verify his knowledge if it is not through a learning path, certainly structured but without any prior interaction. And it remains a question which is how to check during the learning path that the student is following the course and other aspects necessary for memorizing knowledge.

This emotional function is very important in the learning mechanisms. J. Papez in 1937 notably hypothesized that the thalamus represents the central nucleus of this neural network and that it allows the attribution of emotional meanings to sensory perceptions [34]. This circuit known as the Papez circuit is involved in memory and learning functions [35]. We will see later the role of memory neurons in the transmission of emotions. Adding to this the Flow effect developed by Csíkszentmihályi

[36], we clearly see the role of these interactions in the success of the learning journey. In fact, this author shows that this effect is achieved when the learner is absorbed in his action and is completely satisfied with his results. This author then speaks of an optimal experience and this state can only be achieved if the learner is motivated by the task he is accomplishing, by attaching the emotions necessary to reach this level of motivation and therefore success. Obviously these emotions must be channeled in order to generate the actions required to succeed and its interactions between the different elements or actors and will then be decisive if we integrate the work of Bandura. For example, this Flow effect is achieved by an athlete while performing his exercise [37].

We must not lose sight of the fact that the learner is at a distance and as we have indicated with the camera off. He is then subjected to motivational conflicts, because of the possibility of carrying out other tasks more pleasant than following the course which is often difficult for some students, also because of what we mentioned above like the massification of the university system and the isolation of the student. Indeed our brain has two areas, one called emotional brain represented by the limbic brain and which often seeks immediate gain, and the other so-called rational zone which is more calculating and which defines more or less long-term rewards.. This area of the prefrontal cortex allows the regulation of executive functions, that is, the management of action according to the goals of the individual in relation to his environment [38]. This gap implies a conflict on the individual and which can effectively generate a motivation gap between immediate action and future action.

We clearly understand how this emotion, which we transmit to learners, can be contagious on the limbic zone and therefore will ensure motivational coherence unlike the motivational conflict that can arise from a decline in our verbal and non-verbal interactions. or even an unstructured course, whether online or face-to-face, even if in the latter case, trainers may resort to coercive measures. So this state of flow can be achieved without conflict or stress. Emotional contagion leads the observer to feel the same emotion as that expressed by his interlocutor [39].

4 Non-verbal Communication and Mirror Neurons

The “mirror neurons” activate when an individual perceives, for example, a smile, and this then creates in the receiver a virtual smile in his brain. In fact, mirror neurons are activated when an individual performs or observes this same action in others. This capacity for imitative reproduction of the experiencer's expressions is automatic and unintentional. This is an illustration of the primary visual functioning of mirror neurons. A very detailed documentation on the theory of mirror neurons can be found in an article by Gallese [40]. The discovery was made by chance by Rizolatti’s team [41], based on the comparison between primate and human brain function. This discovery led to a better understanding of the mechanisms involved in the perception of the actions of others [40]. These mechanisms of reproduction of the actions of others are based on a set of neurons called mirror neurons. It is thanks to mirror neurons that witnessing an emotional facial expression implicitly activates the same neural circuit that is activated when the observer is subjected to this same emotional reaction [42]. This form of exchange is essential for us as a teacher, as it will influence the course of

events in his classroom. Remember that a course is based on means of communication and that communication is any verbal or non-verbal means used by an individual to exchange ideas, knowledge or feelings with others. The total utterance of a message would result from the combination of a verbal part and a non-verbal part.

This form of verbal and non-verbal communication creates the phenomenon of empathy with the observer, and in connection with cognitive social theory, this emotion will generate behavior based on the emotion felt between the two interlocutors. It should be noted that there are three forms of empathy, namely understanding the emotions of others, their intentions and thoughts and finally the ability to put yourself in someone's shoes.

Several possibilities are available to us today to try to remedy this question. The first is the use of emoticons in online exchanges as well as in the chat room or forum. Emoticons were created by S. E. Fahlman [43], they are used in the field of computer mediated communication or CMC. This form of communication by computer (CMC) [44] today constrained by the health crisis in the field of education replaces certain face-to-face interactions; the nature of communication between trainers and learners but also between learners has changed.

With this new form of teaching and despite the fact that the millennial generation is more accustomed to this mediated communication, the communication of emotions is often lost and as we have specified above, it allows in particular the error for the student but also interaction between peers. Therefore, finding ways to enrich the medium is important. The issue with Computer-Mediated Communication is that in the absence of a camera, it cannot realize the role and traditional non-verbal dimensions of human communication such as facial expressions, gestures, body positions, personal distance, vocal variety or prosody and eye contact.

However, given the position of some trainers, the use of emoticons does not seem to be easily implemented. There is opposition to these uses by some teachers, and young people are more accustomed to delivering a form of emotion no longer through the quality of writing but the use of emoticons. This notion has already been approached from the angle of the theory of Generational Determinism of Recipients [44]. This theory makes clear in a fairly formal way that each generation has different values, points of view, and this leads to therefore different means of communication. Finally, we have seen, like many, that the different tools do not offer the same opportunities for discussion. Most have been defined from corporate communication perspective and the presence of emoticons is limited or nonexistent.

Another way to answer this question that we will be interested in in this work is the implementation of an emotional chatbot that can appear regularly in the user interface to maintain the attention of the student, and therefore, at least hopefully his motivation to continue taking the course. This will create a form of empathy through the development of machine learning and especially Deep learning in the implementation of emotional chat-bot. It is also useful to have recourse to formal and informal exchanges on the forum or the Chat space to measure the emotional state of the students and the class and to be able to generate emoticons by the Chatbot and which are more and more adopted by students during lessons.

5 Chatbot and Empathy

Indeed, these empathetic chatbots [45] will modify our relationship with others, They will allow new communicational models to emerge, thus generating new forms of emotions within the framework of human interaction and creating a new paradigm in the context of human-machine interaction with the emergence of a new form of interaction namely, human-robot interaction. Several disciplines are at the congruence of this new application, such as cognitive sciences, neurosciences, sociology, sciences of education, sciences of information and communication and computer science. We have previously worked on the notion of emotional Chatbot [46], and here we find an obvious field of application with the online courses which will become of certain use even after the passage of the health crisis, because of its practical aspect and by what it answers to sociological questions in particular, to answer the question of mobility, handicap,.. Solving this complexity will make it possible to establish the use of the online courses in an efficient way and not only to answer to crises.

In our use, we believe that this chatbot will allow, for example, launching quizzes or surveys, which will maintain the learner's attention during the online course. We adopted these assumptions and found that the students were more caring and more motivated to pass the exercises. By collecting the discussions in the discussion spaces, we were able to analyze the emotional state of the class and could see that the feeling was quite positive. It will also allow us during a chat conversation to define the emotional state of the class thanks to a sentiment analysis and thus provide a chatbot that will take this emotional state into account.

6 Conclusion

In this paper, we want to explain how it can be considered as very difficult both for students and teachers to do an online course without there being the dimension of verbal and non-verbal communication. The latter shows the consistency of the message and for the teacher the absence of a camera can lead to difficulty in the efficiency of online lessons. While most teachers turn on their cameras, it's not generally the case for students for a variety of reasons and therefore the lack of interaction between teacher and student but between students can lead to the "failure" of the elearning process. One of the ways to increase efficiency is to put in place tools that allow the transmission of the emotion felt by the learners and also by the class in order to better carry out the course. We are still making progress on the implementation of the emotional chatbot and further integration of emoticons into online exchanges.

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