The Physical and Human Dimension of Communication in Distance Education

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Abstract. Distance education is essential to improve access to education, particularly for certain categories of people who are unable to travel to a training center, such as long-term hospital patients, prison inmates, etc. In addition, distance education has been given a new impetus by the Covid-19 pandemic, allowing many universities and training centers to maintain pedagogical continuity. Today, distance education can rely on more and more sophisticated tools and technologies. However, one may wonder if this is enough to cover all the dimensions of learning. We will argue that non-verbal communication is necessary to promote learning and thus guarantee the quality of teaching and the commitment of the learners. To this end, we believe it is appropriate to start a reflection on this subject and to try to provide an answer to the following research question: how can distance education compensate for the lack of the physical and human dimension of communication? The aim of this paper is to present the first results of our reflections. Based on work in the fields of educational science, ergonomics and human-machine interaction, we propose a model-driven approach that is independent of any technological platform. This approach can be instantiated and adapted to different learning situations.

Keywords: Distance education, Non verbal communication, Collaborative learning, Learning community, Model driven approach, Federated architecture.

1 Introduction

Distance education has been developing for several years thanks to the evolution of multimedia and Internet technologies. It is essential because it makes it possible to improve the accessibility of education, in particular for certain categories of learners who cannot move to a place of training, such as people hospitalized for a long time, the population of prisons, etc. Moreover, with the Covid-19 pandemic and even today after the pandemic, distance education has received a new impetus, allowing many universities and training centers to maintain pedagogical continuity, for example during periods of transport strikes or, for some countries, during times of war.

Although distance education can rely today on increasingly sophisticated tools and technologies, one can wonder if this is enough to cover all the dimensions of learning. For example, do technological advances make it possible to consider certain types of subjects that require strong human interaction, such as programming, mechanics, and other courses requiring practical work, etc.?

According to several researchers in the field of educational sciences, one of the main challenges of distance education, beyond mastering the spatio-temporal aspect, is the creation of a remote presence [9,13]. However, the scope of those studies is often limited to situations where the interactions between the learners and the trainer are only conveyed by verbal communication (oral and written) online, without any body language that is perceptible to the distant audience. In addition, there is much research arguing that gestures convey content information (both concrete images and abstract concepts), thus revealing a speaker's mental representations [14, 17].

We therefore intend to include non-verbal communication (emotional states, body language, etc.) to complement verbal communication. We will state that non-verbal communication is necessary to promote learning and thus guarantee the quality of teaching and learners' commitment. To this end, we believe that it is appropriate to start a reflection on this subject and to try to provide an answer to the following research question: how can distance education compensate for the lack of the physical and human dimension of communication?

This research question could be approached from several perspectives. We are currently focusing on issues related to the socialisation of the virtual classroom and the creation of a remote pedagogical presence. This paper presents the first results of our reflections. Based on work in the fields of educational science, ergonomics and human-machine interaction, we propose a model-driven approach, independent of any technological platform, in the form of a general framework that can be instantiated and adapted according to different learning situations. We use a concrete example of a remote Java programming lab session to illustrate this framework.

The remainder of the paper is structured as follows. The next section introduces key definitions and outlines the theoretical framework upon which our study is built. Section 3 elaborates on the proposed approach and its principal components. In section 4, we investigate the feasibility of our approach. Finally, section 5 concludes the paper and provides insights into our future research directions.

2 Definitions and Theoretical Framework

This section presents the background on which our study is based. It begins with some definitions of the concept of distance education, together with theoretical terms used to describe the relationships between learners and trainers. It then presents some of the main theoretical trends related to collaborative learning.

2.1 Definitions

Distance Education (DE). DE is defined in [21] as a pedagogical process in which a significant part of the teaching is provided by a trainer distant from the learner in space and/or time. According to a communication from the European Commission on May 24, 2000, remote education consists of "using multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services, as well as remote communication and collaboration."

During the Covid-19 period, we had the opportunity to experiment with several modes of remote education, which we can summarize in two groups: fully remote and hybrid. Fully distance education is in turn broken down into synchronous and asynchronous education. Hybrid teaching is defined by part of the learners being face-to-face and another part remotely. Both modes can be used in a complementary way. As part of our study, we are particularly interested in the synchronous mode. While asynchronous education offers its own set of advantages, it may not provide the same level of interactivity and human contacts as synchronous education.

The literature presents different theoretical concepts to describe the relationship between learners and trainers in distance education. In the following, we present four of them, which seem to us complementary to formalise the distance learning activities in the context of our study.

The Concept of Transactional Distance. Moore [20] uses the term “transactional distance” to express the level of interaction and communication. This notion brings together the different modes of communication and interaction that we can put in place in a distance education session. These modes of interaction also depend on the mode of teaching chosen. For example, in the context of asynchronous teaching, we can establish tempotal landmarks for the completion of an assignment and send a message in the form of an email. In a type of synchronous teaching, we will use a videoconference tool to explain important concepts.

The Concept of Learning Community. Garrisson [10] introduces the notion of “learning community”. He sees the purpose of interactions as creating or fostering a learning community. In a learning community, presence manifests itself cognitively, socially and educationally.

The Concept of Remote Presence. Jézégou [13] relies on the two above notions to define the concept of “remote presence” as follows: “remote presence results from the social interactions that the trainer maintains remotely with the learners to support cognitive and socio-affective presence. These interactions involve fostering transactions among learners while contributing to a socio-affective climate based on the symmetry of the social relationship and on amiability, within a digital communication space”.

The Concept of Zone of Proximal Development (ZPD). Vygotsky [25] argued that social interactions are crucial to learning. He developed the concept of the “Zone of

Proximal Development" (ZPD), which explains how people can learn from each other by sharing a common core of knowledge. He believes that an individual's knowledge can be represented by a central core. This core can be used to perform tasks autonomously. This core is surrounded by a region (ZPD) where the individual has some knowledge but needs help to use it to perform tasks. Looking at a community of people, an individual's ZPD overlaps with the knowledge core of others, suggesting that people are able to learn and improve more in the presence of others.

2.2 Collaborative Learning

The consideration of the above concepts in our study requires the adoption of learning strategies that encourage strong interactions between learners and teachers. To this end, we believe that contributions in the field of collaborative learning offer an interesting solution. Collaborative learning is an interdisciplinary field. This includes knowledge from computer science, education, psychology and ergonomics. According to several researchers, this type of learning can be seen as a social phenomenon that requires the cooperation of several actors in training. Collaborative learning is based on several theories [15, 23]. After proposing a definition of this concept, we present the socio-constructivist theory that we consider most interesting in relation to our research.

Defining Collaborative Learning. There are various definitions of collaborative learning in the literature [7, 12]. We would like to quote here the one by Henri and Lundgren-Cayrol. According to them, collaborative learning is an active process centred on the learner, which takes place in an environment where he works on constructing his knowledge. He expresses his ideas, articulates his thinking, develops his own representations, elaborates his cognitive structures and carries out a social validation of his new knowledge. The trainer plays the role of learning facilitator, while the group participates as a source of information, a motivator, a means of mutual help and support and a privileged space for collective knowledge construction. Thus, according to this definition, collaborative learning is a combination of two processes, one for the individual and the other for the group [12].

The Socio-constructivist Approach. This theory, proposed by Vygotsky, incorporates the main ideas of the constructivist model of Piaget [22] and adds the social role of learning [6, 23, 25]. The social and cultural aspects of knowledge are taken into account. The construction of knowledge, although it is personal, takes place in a social framework and is created through a process of social interaction between the teacher and the learner or between the learners themselves. Teachers using such approaches seek to create a learning community by encouraging collaboration, cooperation and trust, and by considering multiple ways of learning.

According to this theory, learning should take place in the learner's zone of proximal development, which includes tasks that can be accomplished with the help of others. This zone significantly increases a learner's potential to learn more effectively [25]. The teacher's role is to define this zone accurately in order to provide appropriate practice. He/she will also encourage debate between students (socio-cognitive conflict) by having them work in groups.

3 The Proposed Approach

3.1 Overview

As indicated above, our main objective is to try to answer the question: how can distance education compensate for the lack of the physical and human dimension of communication? In fact, based on our own experience (involving several hundred students, a dozen subjects and three different types of profiles) of distance learning since the Covid-19 pandemic, as well as the testimonies we have collected, we have observed that interactions during distance learning sessions can be reduced due to the discouragement of learners. Distance learners are isolated and unaware of the actions of their peers, making group coordination difficult and potentially leading to situations of inconsistency in a shared experience.

Therefore, we argue that it is necessary to develop an approach that allows, above all, to remobilise the interaction of the learners and to reinforce the "remote presence" that Jézégou [13] mentions (see section 2). In other words, we need to find a way of defining learning situations that make it possible to break down the isolation of the learners, encourage their involvement and improve their motivation. The defined learning situations need to be supported by learning environments that foster social relationships and positive attitudes among learners.

To achieve this goal, we need to rethink traditional pedagogical processes and teaching strategies. In particular, we need to move from a transmissive pedagogical approach to a collaborative and interactive approach. In the collaborative and interactive approach (see section 2) the role of both learners and teachers changes. The role of the learners is to share, criticise, cooperate and collaborate. The role of the teacher is not limited to the transmission of knowledge but can also be: orchestrating, guiding, animating and monitoring.

We think that these issues could be addressed from several perspectives; we decided to focus first on the socialisation of the virtual classroom and the creation of a remote pedagogical presence. We believe that pedagogical processes and strategies inspired by the paradigm of socio-constructivism (see section 2) might be more appropriate. As we have already mentioned, in this type of approach the teacher, using different teaching-learning strategies, draws on the skills and personal experiences of the learners, promotes the establishment of meaningful links between them and their environment and stimulates their questioning and creativity [23].

In addition, studies in ergonomics have shown that non-verbal communication has a stronger influence on tasks that require: interpersonal information exchange, interactivity between participants and a strong common reference. It is therefore necessary to take non-verbal communication into account when developing mediated interactions. As the body (body language) is the impaired parameter in distance education, we will also study to what extent we can rely on existing technologies to build up to compensate for the lack of physical presence in online education.

So, in order to address the above issues, we adopt a model-driven approach that is independent of any technological platform. It takes the form of a general framework consisting of two main elements:

- A meta-model, which we call "The Collaborative Distance Learning Meta-model".
- A generic functional architecture of the technical environment that supports the meta-model.

3.2 The Collaborative Distance Learning Meta-model

Fig. 1 shows a simplified UML representation of our Collaborative Distance Learning Meta-model. Its definition takes into account the issues described above and is based mainly on the theoretical elements presented in section 2. This meta-model, supported by the technical environment presented in the next section, can be instantiated for different collaborative learning situations.

As can be seen in Fig. 1, a distance learning session corresponds to a pedagogical situation, which can be of several types: lecture, practical work, tutorial, etc. It is made up of a series of activities of varying complexity. We distinguish two complementary types of activities: learning activities and activities that help build social connections (Socialisation Activity). A learning activity can be individual or collaborative. Socialization Activities are necessary to increase the sense of social presence and allow learners to interact and coordinate their actions. Each activity can use or produce a number of artifacts (pedagogical and/or interactive) supported by specific tools (see next section).

We are going to focus on the grey boxes, which represent the concepts and elements that are necessary to socialise the virtual classroom and to create a remote presence.

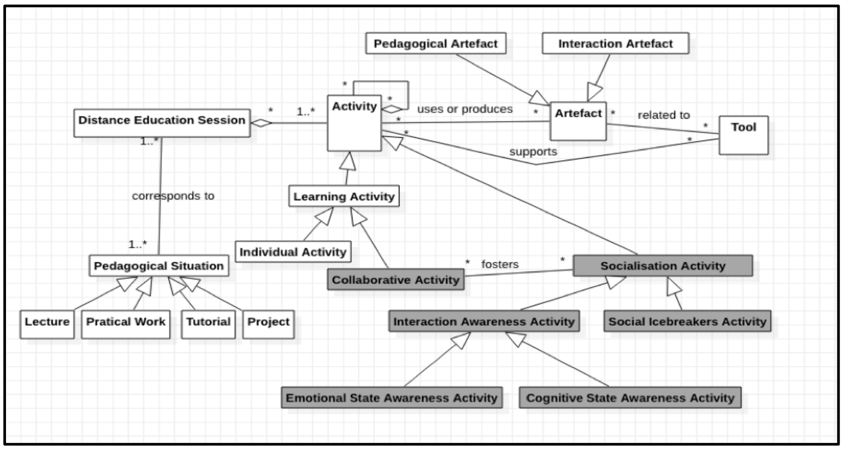

Fig.1 Collaborative Distance Learning Meta-model

Collaborative Activity. Collaborative learning activities are seen here as a way of actively involving students in sharing their knowledge and learning processes with each other, thereby reducing feelings of disconnection and isolation. Effective implementation of this type of activity requires, in addition to the steps common to any type of educational activity, additional actions that we call "Socialisation activities". The main aim of these actions is to create the conditions for an effective collaborative learning situation. Depending on the time available and the degree of interaction desired, they could be combined with collaborative activities in different ways. The activities related to Socialisation are presented in the following sub-section.

Socialisation Activity. We consider socialisation activities as a secondary objective in a distance learning situation in the sense that their main objective is to reinforce collaborative learning activities. In fact, socialisation activities add a social dimension to enhance the mediated collaboration in a distance learning environment. Learners get to know each other and perceive each other positively through a socialisation activity. According to [1, 3], a socialisation activity is about creating a space where learners and trainers commit to a common learning goal and achieve learning through collaboration and strong social interaction. By encouraging positive interactions between learners, this type of activity can therefore increase the sense of social presence and engagement. As shown in Fig.1, we consider two broad categories of socialisation activities: interaction awareness activities and social icebreakers activities. Interaction awareness activities are then divided into two subcategories: emotional state and cognitive state activities. These are presented below.

*Interaction Awareness Activity***.** In a face-to-face collaborative learning situation, the learners have a direct sense of the presence of the others and of their actions. However, this direct perception, which is necessary for the quality of collaborative learning, is complicated by the limited access to the non-verbal channel in distance learning situations. Thus, the main purpose of the interaction awareness activity is to provide means and tools to enable each learner to be aware of the presence of other learners and their actions. To do this, we propose to base this type of activity on the notion of awareness, which comes from the fields of educational science and computer supported collaborative work (CSCW) [4]. According to several researchers, awareness refers to perceiving other people, their activities and their products [4]. Awareness in a collaborative learning environment is essential for coordination, communication and collaboration. We propose to distinguish between emotional state awareness and cognitive state awareness. Emotional state awareness refers to the perception of other participants' emotions, while cognitive state awareness refers to the perception of their activities, products and intentions.

(1) Emotional state Awareness Activity

Emotions are fundamental because they instinctively influence our behaviour and decisions. Studies in the field of affective computing and the psychology of emotions have shown that the understanding of the partner's emotions in the context of collaborative education is necessary for the regulation of learning and the achievement of common goals [19]. Other studies have shown the importance of helping learners not only to share their emotions during collaborative learning, but also to understand the impact of their emotions on the way they work and learn [18]. A positive relationship between the ability to regulate emotions and the perceived quality of interactions was shown by Molinari et al [18].

Facial expressions, body language and gestures are the most common and effective ways to convey emotions without speaking. They can be observed by others. However, as mentioned above, the perception of these non-verbal signals is very limited or impossible in a distance-learning situation. This can lead to an increased gap between the emotions expressed by a learner and what is actually perceived in the group.

The emotional awareness activity therefore aims to overcome these distance-related limitations by providing the means and the tools to enable the learners and the teacher to be aware of their emotions and to share them during a collaborative learning session. This activity should therefore integrate the following two actions:

1. Linking specific tools to the current learning environment to allow better access to non-verbal signals.
2. Implementing emotional feedback tools that allow learners to share their emotions during the collaborative learning session.

A number of interesting tools that can be used for this purpose are presented in the following section.

(2) Cognitive state Awareness Activity

As we mentioned above, a second type of interaction awareness is not related to knowledge and perception of participants' emotions, but to their activities, products they are involved with, and their intentions. We call this type of awareness cognitive state awareness. In a learning situation, learners need to be aware of and consider what others are doing and have done in the past. We therefore need processes and tools that enable learners to be informed in real time about the activities and status of their partners. Consequently, this activity consists mainly in selecting and integrating the most appropriate technological tools for the learning situation. These tools and the method of integration are presented in the next section.

Social Icebreakers Activity. As mentioned, we consider two broad categories of socialisation activities, social icebreakers being the second.

Social icebreakers are teaching strategies designed to help build relationships with learners, foster a safe learning environment, and reduce inhibitions or tension in the classroom [16]. Therefore, the use of icebreakers at different times during the learning session would allow students to continue the socialisation process and have more substantive interaction with each other. The paper by Barkley et al [2] gives some examples of social icebreakers activities. One of them is the following:

1. Divide students into different groups of 4-6. In their groups, students list as many things as possible that they all have in common.

2. Each group reports back to the rest of the class after the small group discussion.

This paper gives other examples.

3.3 The Functional Architecture of the Learning Environment

Fig. 2 gives an overview of the software functional architecture of the learning environment. This environment is designed to support the learning meta-model presented in the previous section. It is a generic architecture that can be adapted according to the learning situation set up by the teacher. Given the number and variability of tools required, we believe it is necessary to create an architecture that evolves and adapts to each situation, integrating or removing new tools. We have therefore opted for an architecture that allows the federation of existing or future tools.

A federation is defined as an open and dynamic software architecture that is easily adaptable to different types of problems and modes. To this end, it relies on the cooperation of a set of participating components [11, 24].

In the context of our approach, this architecture will have to federate four main categories of tools, together with a module for the human-machine interaction. These components are presented below.

Collaboration Tools. This category includes tools necessary for the support of the actual collaborative activity. Its aim is to help learners interact and support each other in order to learn better in groups. Tools in this category may include: Collaborative mind mapping tools; Screen sharing and group work tools; and Visual presentation tools such as Sociograms.

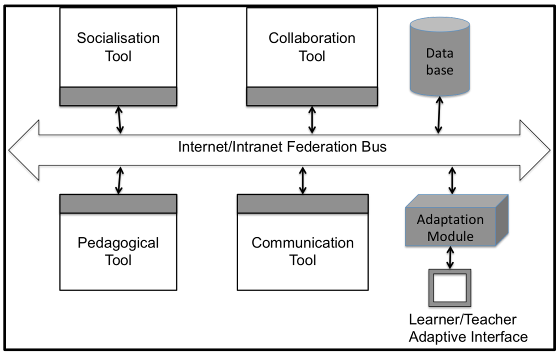

Fig. 2 The learning environment's software architecture

Collaborative mind mapping tools are used for brainstorming, exploring ideas and problem solving. A mind map is a visual representation of an idea. Start by placing the main concept in the center and brainstorm ideas that relate to it.

Among the tools available for screen sharing and working in groups are the collaborative coding tools. Collaborative coding tools allow multiple students to work on the same code at the same time, share ideas and solve problems as they occur. These tools offer a variety of features, including real-time multiplayer editing, audio and video chat, and group debugging. Here are a few examples of such tools: CodeTogether (www.codetogether.com), CodePen (https://codepen.io), Visual Studio Live Share (https://visualstudio.microsoft.com), etc.

A sociogram is a tool for mapping relationships within a group. It provides diagrams that visually show the learner what is happening in the group. In this way, each learner is informed about his or her own contribution to the collective work and to the activity of the group.

Socialisation Tools. The purpose of the socialisation tools is to provide support for the socialisation activities described in the previous section. They are divided into two main subcategories: emotional state feedback tools and cognitive state feedback tools.

Emotional State Feedback Tools. The purpose of emotional state feedback tools is to facilitate the sharing of emotions between participants. Their main functions are to measure and analyse participants' emotions and to suggest visualisations that can improve awareness of the emotions felt. These tools can be divided into two broad categories based on the way they measure or assess emotions: objective assessment and subjective assessment. Below we briefly introduce these two categories with some examples of commercial and research tools.

(1) Objective assessment tools
Tools known as Facial Expression Recognition can often provide objective assessments. These tools are based on the Facial Action Coding System (FACS) developed by Ekman and Friesen [8]. The FACS is one of the most widely used and comprehensive coding systems for facial expression analysis. It is based on Action Units (AUs), roughly defined as the muscle groups in the face responsible for facial expressions [8]. Research shows that certain combinations of Action Units are associated with the six universal facial expressions of emotion: anger, disgust, fear, sadness, surprise and happiness. For example, the emotional state Confusion is related to the action units 4 (Brow lower) and 7 (Eyelid tighten) [8].

We have identified the following two tools that could be used in our research to test the approach that we are going to take. FaceReader (www.noldus.com) is commercial software designed to analyse facial expressions. It uses a webcam to classify facial expressions into one of the following categories: happy, sad, angry, surprised, scared, disgusted and neutral. It is also possible to add custom expressions by combining the above seven expressions. The results are displayed in a variety of graphs and can also be exported to a log file. The second tool is called MorphCast Emotion AI (www.morphcast.com), which is also a commercial facial emotion analysis tool. There is a version called Morphcast for Zoom. This is a plugin that allows you to integrate the emotion analysis feature directly into the video conferencing tool Zoom (https://zoom.us).

(2) Subjective assessment tools
Subjective measurement tools do not automatically measure emotions. Instead, they allow for self-assessment by giving participants the opportunity to indicate the emotions they feel during the collaborative task and to share them with their partners.

As far as we know, there are very few tools in this category. Most of them are prototypes for research purposes. One example is EMORE-L [19], a tool that provides participants with a list of 8 emotions: joy, fear, curiosity, boredom, engagement, confusion, surprise and frustration. Participants select the emotions they feel related to the situation and then indicate the intensity of their feelings using 7-point Likert scales (ranging from 1 very low to 7 very high). An emotional sharing module allows emotions to be shared between participants and how each participant represents the emotions of the others.

Cognitive state feedback tools. This category of tools aims to support the cognitive state awareness activity described above. These are tools that are able to provide real-time feedback on the activity of the participants during the interaction. The feedback takes the form of visualisations and can provide participants with different types of information about their partners, such as the level of participation. This type of tool is usually integrated into collaboration tools to varying degrees. For example, in the CodeTogether tool, each participant's contribution is identified by a symbol representing his or her name. Other more sophisticated tools are available as research prototypes [2].

Communication Tools. Interaction between participants is based on a communication space comprising a set of synchronous and asynchronous tools. These include social networks, email, but also tools that integrate collaborative features such as forums, commenting spaces, collaborative communication platforms. The SLACK software (https://slack.com), launched in February 2014 and owned by the Californian company *Salesforce* since 2020, is an interesting example of a collaborative communication platform.

Pedagogical Tools. Traditional tools for developing and delivering learning content to learners are included in this category. For example, there are tools for the creation and management of training material (courses, assessments, exams, etc.), but also tools for the monitoring of the progress of learners by means of performance indicators.

Adaptive User Interface. The user interface allows both the learner and the teacher to interact with the learning environment. They can access the various types of tools in a coherent manner, according to the learning scenario and the learning context selected by the teacher.

We propose an adaptive user interface that dynamically adapts to different profiles. These profiles are modelled and managed by an adaptation module. One possibility could be a virtual room adapted to the type of course (lab, lecture, etc.) and/or to the profile of the students (age, cognitive ability, etc.). The use of different emotional learning metaphors could also be an option. At the present stage of our work, the adaptation module does not yet exist; it will be the subject of work in the future.

4 Exploring Feasibility: Java Programming Lab Project

In order to illustrate our approach and to study the feasibility of it, we carried out an experiment with a group of students from our university. This is a practical work group in Java programming, consisting of 30 students in the second year of a computer science degree. The aim of the work was to write a small program in Java to manage data stacks. Below we present the different steps and the first results obtained.

4.1 Instantiation of the Meta-model and the Functional Architecture

The first step is to instantiate the meta-model in Fig. 1. The result is shown on the left side of Fig. 3, as a UML object diagram. As shown in this figure, we have chosen a teaching session consisting of a collaborative activity reinforced by two socialisation activities: cognitive state awareness and emotional state awareness. For the virtual classroom we used Zoom. Collaborative activity is supported by the CodeTogether tool, integrated here as an Eclipse plug-in. Cognitive state awareness is supported by features built into CodeTogether to visualise the interactions and contributions of each participant. Emotional state awareness is supported by a module of the MorphCast tool called MorphCast for Zoom.

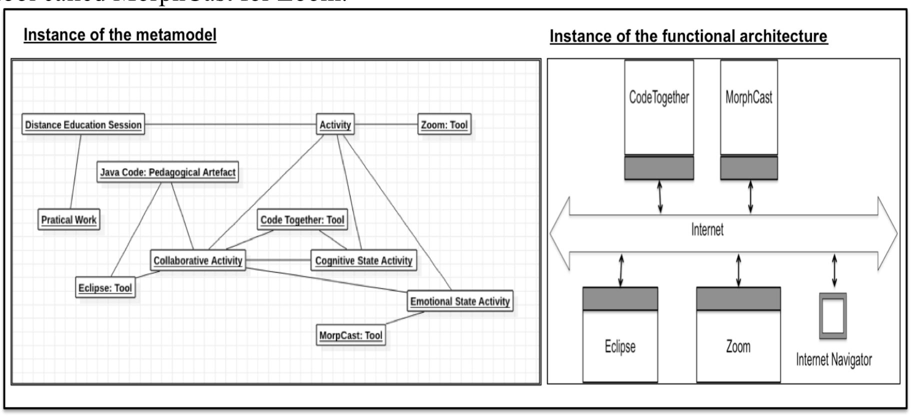

Fig. 3 Instance of the proposed approach

Next, we instantiated the functional architecture (see Fig. 2) of the learning environment. This integrates the various tools in a federated manner, as shown on the right-hand side of Fig. 3.

4.2 Results

A screenshot of the interfaces for interacting with the learning environment is shown in Fig. 4. The top part represents the learner interface, while the bottom part represents the teacher interface. As shown in the figure, the workspace allows all the learners to participate in the writing of code in a collaborative way. In order to facilitate the various interactions, an annotation system allows each participant to visualise the state of progress and the contribution of each individual participant. This visualisation is reinforced by what we call “cognitive state awareness”, which is provided by two features built into CodeTogether (See Fig. 4):

– The right panel "See what others are doing", which allows: to see what files others are working on; to view shared resources such as terminals and to split into different coding groups.
– The "Driving with others" button, which allows: to follow what someone is doing or even Self-programming of the code.

As mentioned above, we used MorphCast Emotion AI, facial emotion recognition software, to experiment with the emotional awareness activity. This software is integrated into Zoom as a service (MorphCast for Zoom). It provides real-time analysis of participants' emotional state, attention, and engagement during video conferencing on Zoom in the browser. Participants can choose whether or not to accept their emotional analysis.

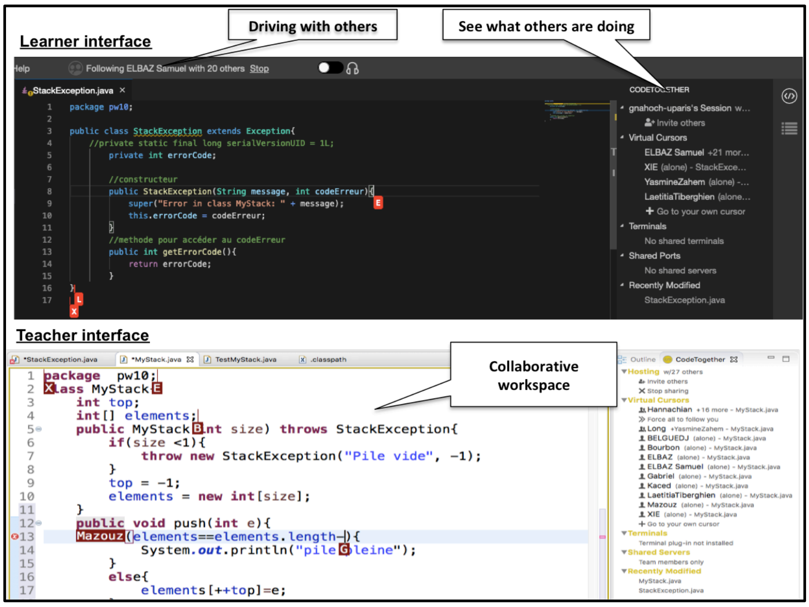

Fig. 4 Overview of the interface of the learner and the teacher

The screenshot in Fig. 5 shows examples of emotion visualisation. During the learning session, the teacher can start and stop the analysis. The tool evaluates the learners' non-verbal responses to determine and provide a real-time dashboard showing their emotions such as angry, happy, disgusted, sad, etc. (see Fig. 5). The dashboard can also show some information about the learners' average attention and arousal levels, dominant emotions, etc.

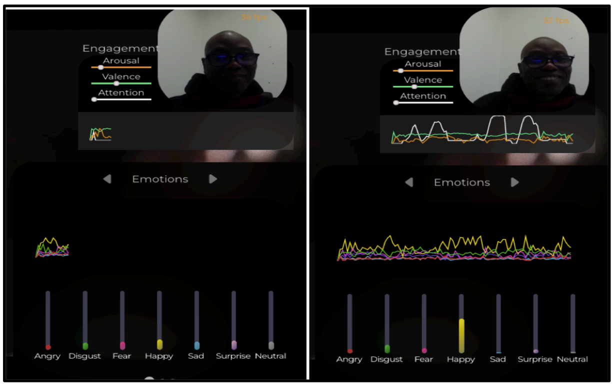

Fig. 5 Examples of emotion visualisation

5 Conclusion and Future Works

Distance education has spread during the Covid-19 pandemic and can now be understood in a different way. The wide range of audiences involved, from primary schools to higher education, has raised new issues about distance learning and its advantages and disadvantages. In this paper, we have focused on the physical and human presence that needs to be offset in the online experience in innovative ways. We have presented a model-driven approach that is independent of any technological platform. It can be instantiated and adapted to different learning situations. This approach was experimented with in a specific remote practical session in Java programming. We can confidently say that the results of this experiment are encouraging. In fact, the pedagogical objective was successfully achieved. We have observed a better engagement of the students. They familiarised themselves with the learning environment without any difficulties. This work is therefore a first step towards our goal. While it introduces and experiments the approach, a number of works are in progress. We are improving and completing the current outcome. The first promising results need to be confirmed by further experiments.

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