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Design and Modeling of Educational Scenarios for Collaborative Online Learning Activities

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Abstract

Collaborative learning has evolved from traditional classroom teaching to e-learning platforms, at this level of revolution, Educational scenarios for online collaborative learning activities must be carefully designed to make an interactive and engaging learning experience. This research aims to model collaborative educational scenarios within the framework of online learning activities to allow learners to participate in online activities. We discuss the appropriate educational scenario, which combines multimedia content, interaction between the collaborative group, and active learning elements, and then we model this scenario with the UML modeling language. As a result, we represent how the design of educational scenarios, provides a better enhancement of the collaborative learning experience through the use of new technologies so that learners are encouraged to reflect on their learning processes and their group's collaboration, thus promoting better understanding. In conclusion, designing and modeling a collaborative learning educational scenario emphasizes collaboration, interaction, and knowledge acquisition between learners within a collaborative learning activity.

Keywords: *Collaborative Learning, Online Collaboration, Educational Scenario, Online Collaborative Activities, UML Modeling.*

INTRODUCTION

Computer-assisted collaborative learning (Ikram et al., 2021) requires an environment and scenarios that are well studied and well developed by the educational manager of our system. For this we present how the online educational scenarios evaluate the development of the traditional teaching towards Collaborative distance education (Dor and Shmuel-Nir, 2023) in order to help students in difficulty and improve the quality of teaching, although collaboration can be considered as an educational strategy in terms of disciplinary learning, it is also defined as a philosophy, a way of life (Meirinhos and Osório 2009). This work is based on a conceptualization of collaborative online learning based on a modeling language and process with UML.

The environment (Saber, 2020) houses components of technologies in collaborative interaction and that, in a collaborative learning environment, these technologies are oriented towards the same goal: collaborative interactive learning. Let us now examine the collaborative interaction scenarios that can take place there, to subsequently identify the different resources and technologies that a learning scenario can accommodate to properly promote and support them.

The design is essentially the responsibility of the teacher; our objective is to support teachers and develop educational scenarios that allow this to achieve the objectives set during the implementation phase. We study these general objectives of online collaborative screenwriting. From there, identify specific objectives, then it is broken down into learning sub-elements and finally content, furthermore, this phase aims to formulate and develop educational strategies select the learning support and the different elements that support it. Compose educational material developed for training.

The development of collaborative learning systems requires very important processes. Practical modeling is important in the life cycle of the system during platform development; choose the UML modeling language we present in our

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work.

We will therefore show you UML in action based on a complete development of a collaboration scenario at the learning activity level. On the other hand, we specify a 2TUP development process suitable for developing e-learning systems in a collaborative manner. Our sole aim is to demonstrate our collaborative scenario design approach and UML modeling approach so that the design of e-learning activities can go through transformation cycles where the activity logic changes qualitatively. Such changes are always associated with the redefinition of active objects or products and the development of new tools and associated forms of collaboration.

The different definitions of realization are presented in the form of diagrams dealing with the different actions to realize the scenario, thus specifying how to move on to the design phase, which concerns the planning of tasks. Suggestion of various tasks suggestion of diagrams and models of various interfaces necessary to carry out the project. Finally, we discuss the results obtained regarding the different phases of participation in collaborative learning scenarios adapted to online activities.

As a final step we present prototyping, which allows us the creation of a complete scenario of collaborative activities, design allows this the learner builds a mental structure of knowledge and finally creates an online collaborative learning model. In this context, we present the following a series of four diagrams which serve as a graphical representation of our scenarios. Finally, we also present interfaces for collaborative online activities, a model that continues to offer attractive presentations to learners and teachers. Further clarify that wiki templates and online chat video conferences are carefully presented.

LITERATURE REVIEW

Online Collaborative Learning

Collaborative Learning

Collaborative learning (Papi et al., 2018).) Learning activity carried out by a group of learners with a common objective. Each learner becomes a source of information, motivation (Wong and Wong, 2017), interaction and mutual assistance, benefiting from the contributions of other learners and group synergy (Lemaire and Glikman, 2016). Support from trainers to facilitate collective learning.

Interactions that produce complex explanations are particularly useful for improving learners' learning. However, non-responsive feedback can harm students' learning collaboratively (Poortavakoli et al., 2020).

Collaborative learning requires joint intellectual efforts between learners or between learners and their teachers. This typically involves students working together to co-construct an artifact for assessment (Sulisworo, 2012)

When communicating, negotiating and making materials, knowledge is shared and acquired. Learners have the opportunity to develop stronger analytical skills to interpret information and gain additional knowledge through collaborative learning (Abderrahman et al., 2012).

Online Collaboration

Online collaboration is a situation in which two or more people learn or attempt to learn together in an online learning platform or system. Two or more learners can be interpreted as a pair, a small group or a class. Learning something online can be interpreted as taking a course, performing learning activities such as problem solving. The group ensemble can be interpreted in different forms of online interaction (Kawtar et al., 2021)

Online collaboration can be viewed as coordinated, synchronous activities that are the result of an ongoing attempt to develop and maintain a shared understanding of a problem (Abbad, 2011). Shared goals, structural symmetry, and a high level of negotiation, interactivity, and interdependence characterize collaborative interactions (Kew et al., 2018).

Online Collaborative Learning

Collaborative online learning (Auricoste et al., 2014) is more engaging and beneficial than face-to-face learning. On the contrary, the face-to-face mode does not guarantee a spirit of cooperation between students and often leads to conflicts between relatives pursuing the same professional objectives. Online collaborative learning (Kawtar et al.,

2021) shows that the more dispersed students are, the better they work together.

Therefore, although online collaborative learning is suitable for a wide range of disciplines and skills, it may not be suitable for learning specific concepts or skills (Dhaiouir et al., 2022).

The wide variety of meanings of the words "online" and "computer-supported collaborative learning" is a challenge for online collaborative learning. In some learners, online groups occasionally meet in person, while in other learners; groups are formed into geographically distributed subgroups (Persico and Pozzi 2011).

Although it is widely recognized that changes in sociotechnical contexts have a significant impact on group experiences, consideration of these effects has been neglected in many studies examining these different online group structures. This challenge should be considered when using group activities to improve the skills of new students (Demir 2021).

Educational Scenario

A teaching scenario (Musial et al., 2011) is a detailed teaching plan that describes how a particular learning activity will be carried out to achieve the teaching and learning objectives. Typically, a document guides teachers or trainers on how to present content, engage learners, and assess understanding. A variety of different scenarios are used to create a diverse and effective learning experience (Tran, 2020), for our case we will see the face-to-face educational scenario which is focused on the presentation of information, the teacher transmits structured way of knowledge to learners, it can include educational videos, presentations, lectures, etc. An online educational scenario, this scenario specifically intended for online learning environments, follows this.

Face-To-Face Educational Scenario

Instructional scenarios, also called learning scenarios, are often presented. According to the double dimension, as a means of explanation and communication, as a series of training sequences or manifestations of learning activities through the use of information and communication technologies (BOUDECHICHE and SériDI, 2019).

Face-to-face teaching scenarios help teachers plan lessons effectively, focus on learning objectives, and create engaging learning experiences for learners. It can be customized based on the specific needs of your learning group, topic and available resources (Eggeling and Adler-Nissen, 2021).

Online Educational Scenario

The online educational scenario becomes a course proposal with progressive phases distributed over time, suggesting methods for organizing instructions and explaining the courses' expected results online (Blanvillain et al., 2021).

Therefore, the online scenario includes all interaction options available to the learner and is clearly presented to the learner in the online training setting. Other authors believe that interactions with other training subjects are not parallel to the online educational scenario (Ciekanski et al., 2020).

PROJECT NEED

Educational Scenario and Online Collaborative Learning

The following figure (Zargane et al., 2023) illustrates an example scenario of a collaborative learning situation in our project, which simulates a learning situation composed of three systems. For the benefit of the design of a collaborative learning scenario, according to the learning activities proposed above, the scenario activity is the first step of the learning situation, for our research, we use implementation activities. Situation as an introduction to learning situations, while assessment tools that test learners' prerequisites.

Figure 1: Online educational scenario of a collaborative learning situation.

The collaborative educational scenario (Atawneh et al., 2020) describes the rules that apply to the box. It is not a question of describing the exact order of overall activities within a group, but of defining the rules of cooperation. These actually correspond to a declarative framework within which the actions of the actors within the groups are articulated.

Online collaborative scenarios are associated with actions executed in the form of scripts. This amounts to describing how actions should take place within the order of actions performed in a chain to perform the first action. This scenario actually consists of a series of basic actions (Bruillard, 2011).

Designing Activities for Collaborative Online Learning

The main purpose of this following diagram is to facilitate the presentation of activity design in collaborative learning and communication between online class members in online learning, which can improve collaborative learning by enabling students to discuss topics with their peers and with their teacher. This design provide support to students in real time and to track their progress.

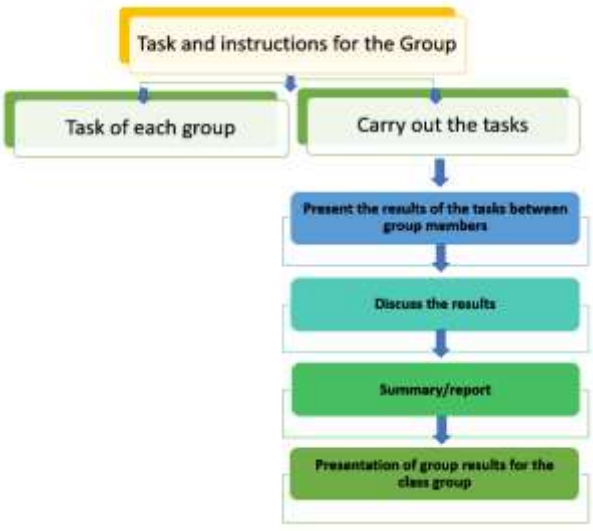

Figure 2: Designing activities for collaborative online learning.

NEEDS STUDY

Development Process

The development process (Charroux et al., 2010). Is an essential element of the success of the project? It constitutes its different stages and characterizes the main characteristics of its operation. Choosing a development method that meets the details and requirements of your project requires prior development to obtain a project that meets the needs and expectations of your users.

2TUP stands for "2-Way Unified Process". This is a UP process. The 2TUP process is a response to the constraints of continuous change imposed on information systems. In this sense, control over the capacity to develop and modify such systems is strengthened. "2 Track" literally means that the process follows two paths. There are these methods "Functional architecture" and "technical architecture" correspond to the two axes of change imposed on computer systems (Roques, 2008).

The UML Modeling Language

Modeling involves designing a model. Depending on the goal and the means used. In computer science, data modeling is used to describe the stages of building information systems UML (Unified Modeling Language) throughout the development cycle. Indeed, the different UML (Unified Modeling Language) diagrams allow appropriate modeling of the system at each stage thanks to their simplicity and clarity.

In fact, UML is defined as a graphical and textual modeling language used to understand and describe requirements, specify and design solutions, and communicate perspectives (Roques, 2018).

UML also unifies the notations necessary for the different activities of the development process, and therefore offers the possibility of establishing monitoring of the decisions taken, based on the definition of the required code (Khaldi and Erradi, 2020).

It is the result of integrating proven techniques for analyzing and designing large software and complex systems.

From this, we can conclude that the UML language offers many advantages for systems analysis and design, making it useful at all stages of a project. Therefore, the UML pair and the integration process realize object-oriented systems (Khaldi and Erradi, 2020).

MODELING (UML)

Modeling (UML) of Activities

Static Modeling

Class Diagram

A class diagram is a graphical way of representing the structure of a software system by highlighting the different classes, their attributes, and the connections between them.

This diagram generally represents the static structure of a system in terms of classes and the relationships between these classes. This is the most common diagram in object-oriented modeling. Typically used to model system vocabularies, dependencies, and database schemas. Class diagrams are important for visualizing, specifying, and documenting structural models. In our case, Figure 3 represents the class diagram of an online collaborative activity:

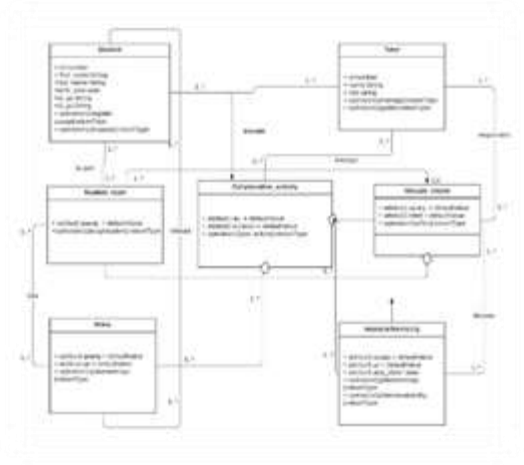

Figure 3: Class diagram of an online collaborative activity.

This simple class diagram shows seven classes: learner, tutor, student group, class group, system, wiki and video conferencing entity with their attributes and methods for associations and cardinalities:

The "Tutor" class: The tutor class attributes are identifier, first name, and role. This presents five main operations, managing the collaborative activity, managing the student group, managing the class group and guiding the student. This allows the tutor or teacher to create, modify and validate activities, student groups, and class groups.

The "Student" class contains the following attributes: identifier, First name, Date of birth, Address, id_ge (the student group identifier to which he belongs), id_gc (class group identifier). Student class operations are: Enroll in the activity, carry out the task in wiki or by videoconference.

"Student group" class: has attributes: identifier and operation: assign student.

Class "class group": has attributes: identifier, title, and as an operation assign the class online.

"Collaborative activity" class: as attributes: Title, Duration, and as Operations: plan the collaborative activity.

Class "wiki": has like attributes: identifier, url and as operation schedule meetings for student groups.

"Videoconference" class: as attributes: identifier, url, video_date, and as operations: Check availability, schedule meetings for the class group.

Use Case Diagram

For the second static diagram, it is the case diagram a diagram diagram (workflow) describes the functionality of a system and its behavior from the user's point of view in the form of actions and reactions. These help define the boundaries of the system and the relationships between the system and the environment. A use case is a specific way of using a system. This is an image of a system function triggered in response to a stimulus issued by an external actor. In our case, Figure 4 represents the use case diagram of an online collaborative activity:

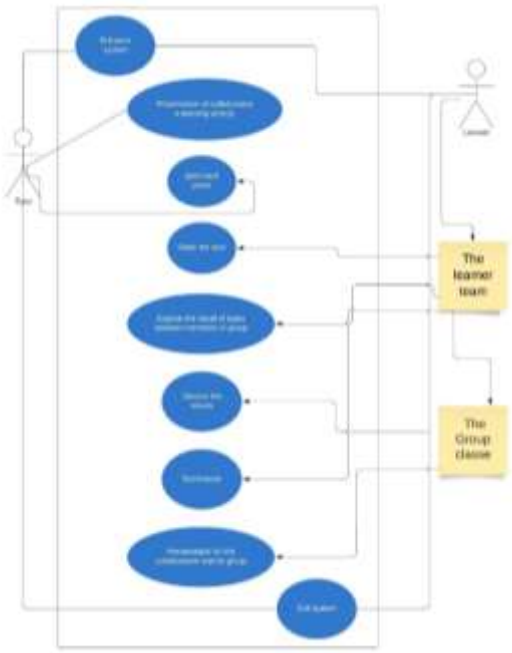

Figure 4: Use case diagram for an online collaborative activity.

To create the case diagram, we specified all the steps that an online collaborative activity can involve. Indeed, there are four managers in this flow, which is made up of a tutor, a student, a group of students, and a class group where:

The student: connects and interacts in the system and subsequently interacts with other students.

The tutor: after authentication to the system, he presents the collaborative e-learning activity in the system, and shares the tasks between the groups of students.

The student group: carrying out the activity tasks in a collaborative context, discussion of the results, recapitulation and final presentation of work through wikis.

The class group: groups of students present their results to each other through videoconferencing.

We cite a generalization relationship between three actors which explains the inheritance between the Student and the student group, the latter itself inherits from the class group

Dynamic Modeling

Activity Diagram

At the level of dynamic modeling we present the activity diagram which used to deepen the internal functioning a method or a method to chain a process of activities or incidents, allows us to specify the use, the basic actions and the structure, in object-oriented programming, control and instruction interact.

Activity charts can help you focus on your treatment. They are therefore particularly suited to modeling control and data flows. It therefore becomes possible to graphically represent the behavior of a method and the progress of a use case. In our case, Figure 5 represents the activity diagram of an online collaborative activity:

Figure 5: Activity diagram of an online collaborative activity.

The two parts represent the different phases that an activity goes through in an online system, starting with activity creation and ending with the presentation of results. Integration of sharing tasks between each group of students during class group. After completing the tasks, the students communicate with each other via wikis and present a general summary.

If the results are confirmed, continue to present their work in a video conference to the class group and summarize the final activity solution collaboratively.

Sequence Diagram

The second dynamic modeling is the sequence diagram, representing the organization of the objects involved in a particular interaction and the messages exchanged by these objects in chronological order. Concerning the sequence diagram of organizational and management problems, this work addresses each phase (framework, educational design, prototype, creation module, production/integration, and deployment/test). In our case, Figure 6 represents the activity diagram of an online collaborative activity:

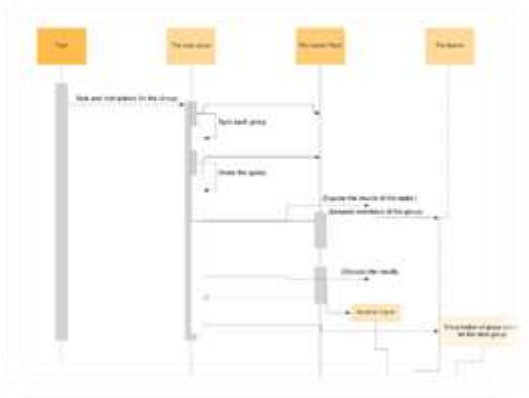

Figure 6: Sequence diagram

The interactions between the actors of our system, this makes it possible to represent the objects, which make up the online activity of our system, in this case the interaction is presented as follows:

Tutor (The teacher): he distributes the tasks of the collaborative activity between the learners and the tutor represents the groups of learners, these tasks so that the learners in the group communicate with each other during the online collaborative activity.

The group of learners: carried out the task in a group can modify and present the task process, and finally present the results between the group members. Groups of learners can react with the tutor and discuss these results.

Learners: interact with each other through wikis to resolve the collaborative activities, the learner can request, modify and discuss their task in a group. Learners can chat with the tutor during the learner group course or during the class group course.

A class group: allows communication between student groups using videoconferencing to present the results of each collaborative activity task. Each group of learners can request, modify and discuss these results. The class groups can react with the tutor and discuss these results.

In other words, from UML modeling of online collaborative learning activity. We created 4 UML modeling diagrams, two of which are static and two dynamic. At the level of static diagrams, the first is a class diagram; it is made up of seven classes, including an associative class. "Stain". The second diagram is a use case diagram linking four actors to nine main tasks. At the level of dynamic diagrams, the first diagram is the activity diagram and shows the specific process of task progression in a collaborative group, and how our educational scenario enhances these online learning activities. The second diagram is the sequence diagram presenting the interactions between the different actors in our scenario, also the communication process between the learners at the levels of our design in this online collaborative activity.

DISCUSSION

The designers (teachers/Tutors) particularly emphasize the desired learning process, the different types of tasks aligned with the learning objectives.

The research in this article shows that face-to-face (face-to-face) teaching scenarios help teachers plan lessons effectively, focus on learning objectives, and create engaging learning experiences for learners. Therefore, the online scenario includes all interaction options available to the learner and is clearly presented to the learner in the online training setting.

In summary that the design of a distance education system involves a series of questions: learning contexts, knowledge acquired educational scenarios, scenarios (interfaces), communication scenarios and evaluation of devices.

The development of collaboration skills must be well planned in educational scenarios rather than left to chance by designers, on the mastery of technical tools and collaboration spaces that make up the environment. Finally, focus on learning that arises from one's own needs. Objectives of the Collaborative Learning Program Guidelines.

This work shows that online collaboration offers a typology of educational activities, which has the advantage of being able to introduce advances in collaborative demands. However, solving the problem of online exchanges and above all, those certain types of tasks can accommodate different exchange modalities.

The purpose of this article was to give you an idea of the UML modeling language provides ideas for diagrams needed for modeling in the process. Modeling of our project.

UML diagrams model and design the interactions in our system, that is to say how, why and in what order these interactions occur, in which we present the objects that constitute our system and the associations and interactions between them and the services that They provide, in this case the teacher guides and manages the class group, which contains learners working collaboratively.

An aggregation relationship between two entities explains that the student group and a subgroup of the class group, the group learners communicate with each other through wikis each of these groups is part of a private wiki in an e-learning system which allows the groups to exchange with each other, namely the management, the completion of the required tasks and to discuss and summarize the results together. Finally, the class group presents the group's results through videoconferencing and exchanges their final work on solving the problem collaborative activity.

MODEL

A human-machine interface composed of a series of training designs. Use presentation or design software to allow learners to test the screens. All applications have menus. Model It must be developed according to the demands of the learners.

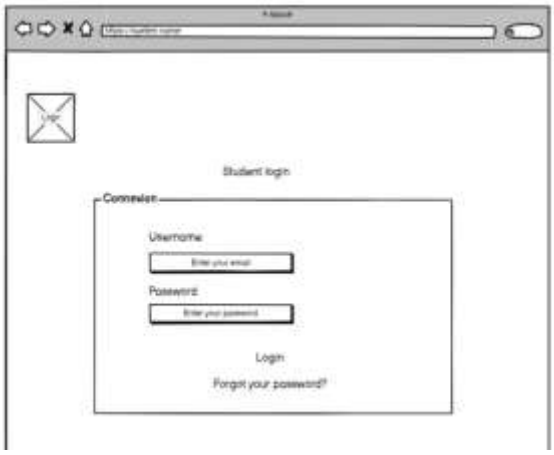

Figure 7: Connection model.

Figure 7 shows the login interface in an online system, with the name and password of the user i.e. learn it.

Figure 8: Online collaborative activity model.

Figure 8 shows the interface in an online system, the collaborative activity, which contains the student profile, activity name, plan, description and online activity instructions.

Figure 9: Communication model on the wiki.

Figure 9 represents the interface in an online system, how the discussion between the learners group with the wiki.

Figure 10: Communication model with videoconferencing.

Figure 10 shows the interface in an online system, how the discussion between the classes group with video conferencing.

CONCLUSION

Collaborative learning refers to tasks that require joint intellectual effort between students or between students and teachers (Gómez Aguilar et al., 2013). In most cases of collaborative online learning, this involves learners working together in groups to construct an artifact for assessment purposes (Florence, 2020).

In this article we began with the literature review which presents collaboration, depending on the use of online technologies such as discussion forums, wikis or videoconferencing. And for the adaptation of educational scenarios of collaborative systems for the benefit of groups of students who are working with collaborative activities, and promoting the objective of collaborative learning and the technology that you have at your disposal.

In collaborative online content mode with which learners will share their knowledge with each other so that at the end of the learning process, learners obtain complete information about the courses or activity. Learners actively participate in the learning process. The online content package encourages collaboration and active participation in learning and promotes learners' learning pace.

The preparation, planning, management and evaluation of collaborative learning activities are based on certain key decisions and represent a significant workload for the design of online collaborative educational scenarios, while the participation of learners in these activities requires significant investments.

As a conclusion to this work, after discussing UML modeling in the context of a collaborative online learning system, we presented different diagrams necessary for carrying out the activity scenario. At the static modeling level, we have introduced class diagrams, presenting all the classes of our system and the interactions between them different classes. We presented a use case diagram of the system flow, a detailed description of all phases involved in an online activity.

From a dynamic modeling perspective, we introduced activity diagrams to represent: the different phases that a collaborative activity scenario goes through. It ends with the creation of activities in the learning system. Announced sequence diagram of an activity scenario which allows you to visualize the dialogue between different actors. This allows you to represent the objects that make up your system online. This covers the different online learning processes and possible actions for each sequence

Finally, the presentation of models of the activity interfaces in a collaborative online learning system. Regarding home machine interfaces, we have introduced several interfaces representing different interfaces and their main functionalities role.

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