International Journal of Computer Trends and Technology
ISSN: 2231 – 2803 / https://doi.org/10.14445/22312803/IJCTT-V69I6P105

Volume 69 Issue 6, 28-35, June 2021
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Original Article

Adaptive E-Learning and Scenarization Tools: The Case of Personalization

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Received Date: 02 May 2021
Revised Date: 04 June 2021
Accepted Date: 10 June 2021

Abstract *- In the face of technological innovations, the field of education has undergone an evolution through the use of technology that has had a significant impact on teaching and learning. Adaptive E-learning is a new reform used by the majority of private and public educational institutions. Several platforms on the market respond to this type of teaching, offering various features. Different researches have tried to offer and understand the relations and interaction with the educational content during a learning situation. However, few of them offer an adaptation to the learner's profile.*

At this stage, our work focuses on the personalization of pedagogical scenarios during different types of pedagogical activities, taking into consideration the learners styles, characteristics, and preferences,.... scenarization is understood as the process of developing a pedagogical scenario intended to be used and manipulated in a learning context in order to give coherence to a complex learning situation and to put the interactions between the different objects (resources, activities, instruments, tools).

Our work aims to determine the steps of scenario and scenarization tools in the context of an adaptive learning system in order to ensure the process of personalization and in particular in order to have an adapted and personalized scenario that will facilitate the learning of learners and the working environment as well as the exploration, the search for information, the objective of a scenario and to identify the errors of each learner profile and provide him with the appropriate feedback.

Keywords *- Adaptive e-learning, Personalization, Scenarization, Pedagogical scenario, Learner profile.*

I. INTRODUCTION

In recent years, the evolution of the Web has encouraged the development of personalized educational hypermedia systems to support and facilitate teaching and learning based on learners' needs. Within the framework of adaptive E-Learning, many solutions have been put into practice in the context of distance learning. The majority of these solutions focus on the provision of quality educational resources, often to the detriment of their use in diversified educational scenarios.

Faced with this observation, adaptive learning systems aim to meet the needs of learners through the use of new emerging approaches, the quality of educational services provided depends on the ability of these new approaches to provide learners, on the one hand, personalized educational content and adapted to the different profile of learners and on the other hand, the process that guides learners to acquire their learning process.

Adaptive learning consists of adapting and personalizing learning to the needs of each learner. It corresponds to a pedagogical concept whose purpose is to adapt pedagogical strategies to the particular skills and needs of each learner. These adaptive pedagogical systems promise to take into consideration the learner's profile (knowledge, preferences, aptitudes, objectives...).

Based on the research on personalization and scenarization in adaptive e-learning, this paper focuses on the steps of scenarization and the tools of scenarization an educational activity in an adaptive e-learning system, in this respect our approach tries to overcome the personalization of the content by creating the personalized educational scenario adapted to the learners' needs. Our paper is organized as follows: section 2 presents our scientific background of the research, of which we will present the main basic notions, section 3 presents in detail our proposed approach concerning the scenarization.

II. SCIENTIFIC AND PROBLEMATIC CONTEXT

Through our article, we focus our work on two essential points. The first one concerns personalization in adaptive e-Learning and the second one concerns the stages of scenarization in personalization and the tools of scenarization.

A. Overview of Adaptive e-Learning and Personalization

Adaptive learning, is a new approach to education that consists in adjusting learning to the individual needs of each learner, thanks to the crossroads between neuroscience, artificial intelligence, big data and pedagogy.

Adaptive learning is a technology that is set to revolutionize education.

To define this concept in a simple way, it is a learning method in which one or more characteristics of the learning environment adapt to the learner. This adaptability involves three main elements: appearance, order, and guidance toward the goal [1].

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- Appearance or the form of learning, is how the learning actions (content, text, graphics, videos...) are presented to the learner.

- Order is how the learning actions are ordered and connected according to the pace at which the learner progresses.

- Goal support refers to the actions of the system leading the learner to success. Adaptive learning is about meeting the individual needs of each learner during the learning process. Even for teachers, it is indeed difficult to perfectly identify the profile of each learner and to adapt the pedagogical content according to each profile. Adaptive Learning is a pedagogical concept whose purpose is to adapt pedagogical decisions to the particular skills and needs of each learner,...These adaptive pedagogical systems promise to take into consideration the learner's profile (knowledge, preferences, aptitudes, objectives...) in the construction of a unique and adapted pedagogical path.

Personalized learning offers flexibility and support what, how, when and where learners learn and demonstrate their mastery of knowledge. Specifically, these flexibilities and supports are designed in terms of instructional approaches, content, activities, objectives, and learning outcomes.

Personalized learning systems often leverage technology to improve access to adaptive and personalized learning for all learners [2].

Personalization is based on the collective and cooperative dimension of learning. It is not so much about the particularities of each individual as it is about taking advantage of the functioning of a group. Personalizing one's teaching is above all seeking to respond to the identified needs of groups of learners [3; 1].

The personalization of learning activities is a fundamental issue in research on personalized adaptive hypermedia systems, pedagogical practices are the source of the implementation of personalized learning activities or more precisely the personalization of pedagogical scenarios based on different types of pedagogies [4].

Indeed, the pedagogical activity refers to the operations that the teacher implements to make learners learn and concerns the organization of the content of learning situations, how to structure and present the learning situation, the learning tasks, the questions and instructions proposed, the procedures for assessing learning, etc [5].

A pedagogical scenario is the unfolding of a learning activity, the definition of objectives, the planning of tasks, the description of the learners' tasks and the evaluation procedures [6].

In the process of educational engineering, the interest in educational situations is expressed, where the situation is the central element of the educational treatment that intervenes at the stages of knowledge modeling, media processing and communication [7].

B. The steps of scenarization: The case of the personalization

The scenario has a triple role: it defines precisely the activities proposed to the learners on interactive pedagogical objects, it also specifies the control of the learner's progress during a pedagogical activity, finally, it determines the pedagogical assistance according to the learner's progress.

The pedagogical scenario is composed of two other scenarios: learning scenario and assistance scenario, and consists of describing the activity or activities specific to learning and assistance, the resources required to carry out the activities and the productions that should result.

A pedagogical scenario presents a learning activity initiated by a teacher in order to support the learning of his or her learners. A pedagogical scenario presents an approach aimed at achieving pedagogical objectives and acquiring general or specific skills related to one or more disciplines. It presents a learning activity, initiated by a teacher in order to supervise the learning of his learners

The process of pedagogical scenarization is expressed in the form of a theater metaphor that we reproduce based on the version of "The unfolding of a learning unit is described by an element named method that organizes its different deployments in the form of plays (mise en scène). A play is composed of acts performed in sequence. The acts are made up of scores that associate a role with an activity performed in an environment (setting)

Scenarization is understood as the process of developing a pedagogical scenario to be used and manipulated in a learning context. It is implemented by a teacher, a trainer or an educational engineer with the aim of giving coherence to a complex learning situation and of putting the interactions between the different objects (resources, activities, instruments, tools).

We will consider it as a structured and coherent whole made up of two parts: the learning scenario, whose role is to describe the learning activities, their articulation in the training sequence as well as the expected productions, and the training scenario, which we will call the supervision scenario, which specifies the methods of intervention of the teacher-tutors as designed to support the learning scenario.

The pedagogical scenario is the result of a process of designing a learning activity.

The design of a scenario makes it possible to position the instructional activity

According to Villiot-Leclercq, 2007 proposes 17 dimensions on which the teacher can design a scenario

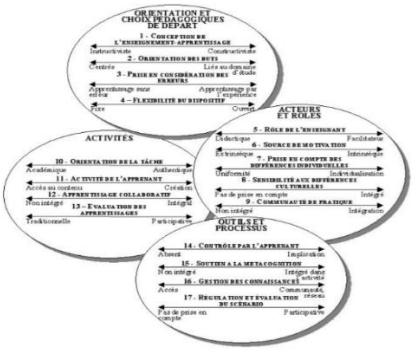


Fig. 1. The 17 dimensions for designing a scenario according to Villiot-Leclercq, 2017 [9].

The design of a teaching scenario is based on different poles:

- Orientation and initial pedagogical choice: teaching-learning design, goal orientation, consideration of errors, flexibility of the device
- Actors and roles: Role of the teacher, source of motivation for the learner, consideration of individual differences in learning style, work situation,...
- Tools and processes: Orientation of the task that will allow the mastery of skills in a learning activity for the learners, the nature of the work (individual, collaborative)
- Activities: Evaluation of learners' learning
- Tools and processes: Learner follow-up, support or tutoring, knowledge management, regulation and evaluation of the scenario

Indeed, the scenario will facilitate the learners' learning and working environment as well as the exploration, the search for information, the objective of a scenario and to identify the errors of a learner and provide him/her with the appropriate feedback.

The design of a scenario must follow a number of essential steps, of which there are five [12].

Table 1. Scenarization steps

Define the objective (s)	In order to design an educational scenario, it is necessary to define the educational objectives to be achieved in order to describe the process implemented during an individual's activity. At the same time, it is necessary to determine the target audience, the desired skills to be mastered by the target audience, the chosen temporal organization and the available materials.
Sequencing	The sequence of themes, activities and/or workshops will provide learners with a wide range of learning opportunities likely to achieve the educational objectives set and the acquisition of skills targeted by the training device
The development of the scenario	It is the stage of the concretization of the scenario, we speak about the structuring and the coherence which are put for the whole of the sequences used in a scenario, of which it is necessary to offer a great freedom of action and to choose well the contents, the techno pedagogical tools adapted and personalized to the needs of the learners, also to offer a
Define the objective (s)	In order to design an educational scenario, it is necessary to define the educational objectives to be achieved in order to describe the process implemented during an individual's activity. At the same time, it is necessary to determine the target audience, the desired skills to be mastered by the target audience, the chosen temporal organization and the available materials.
	broad range of scenarios or it is paramount to guarantee a certain pedagogical control in order to insure the ecological validity of the proposed contents and to insure the exploitability of the scenario in the aim of arousing the interest of the learner
The implementation	After the determination of the objectives, the skills, the activities, ... it is necessary to choose a digital space, the most adapted to the project and to the needs of the learners to implement the scenarization, mediatized and personalized content.
Evaluation	Evaluation is important both at the learner level, to ensure that the objectives have been achieved, as well as to position oneself in relation to the skills or not acquired. Also this step allows the designer to control the effectiveness of the training device, namely the tools, media and digital space chosen.

To produce and maintain a personalized and adaptive scenarization in the framework of an adaptive e-Learning system, it is necessary to propose adapted activities and a gradation of complexity according to the level of the learner, his learning style, his preferences,... To do this, it is necessary to know the learner's knowledge level in relation to the task in order to alter it according to the learner's profile (e.g. increase the difficulty or propose assistance). This is called personalization

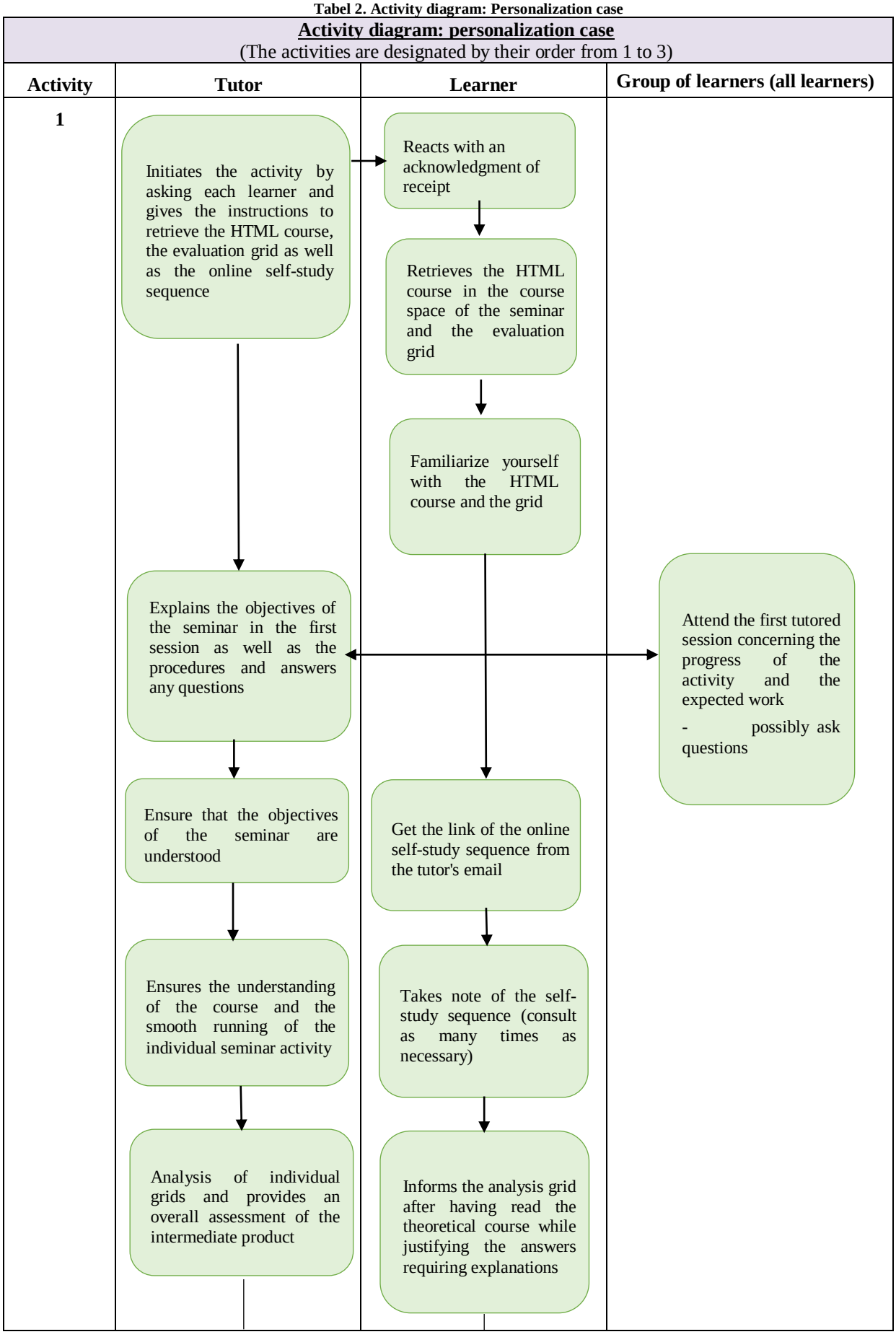
A. The tools for the scenarization of a personalized activity

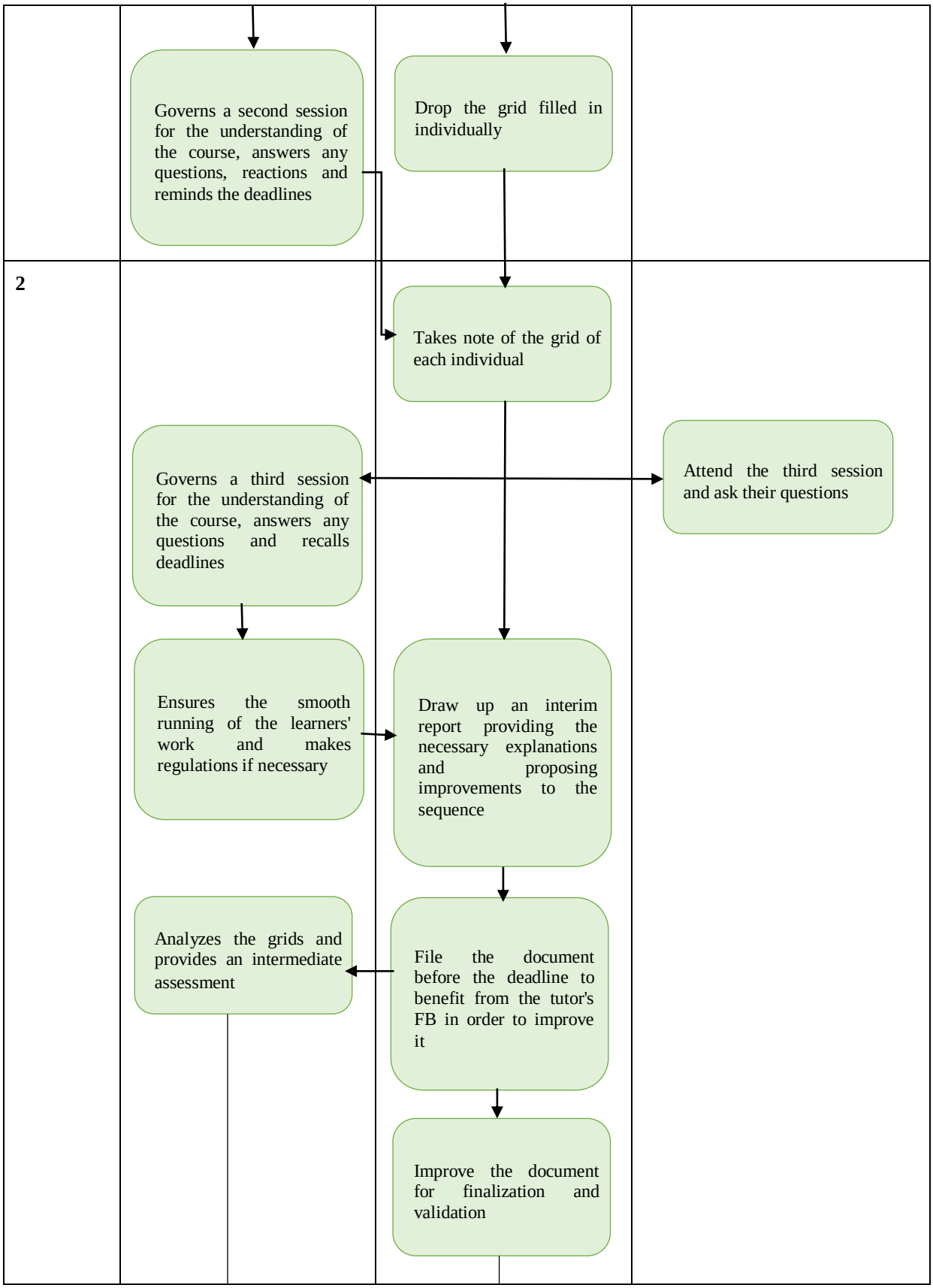
The design and implementation of online training is based on the principle of incremental design, which defines a working method in which the products that are developed will be progressively refined. There are two main tools for the scenarization of online teaching. These tools are effective in that they help to approach the scenarization process according to an organized and rational methodology.

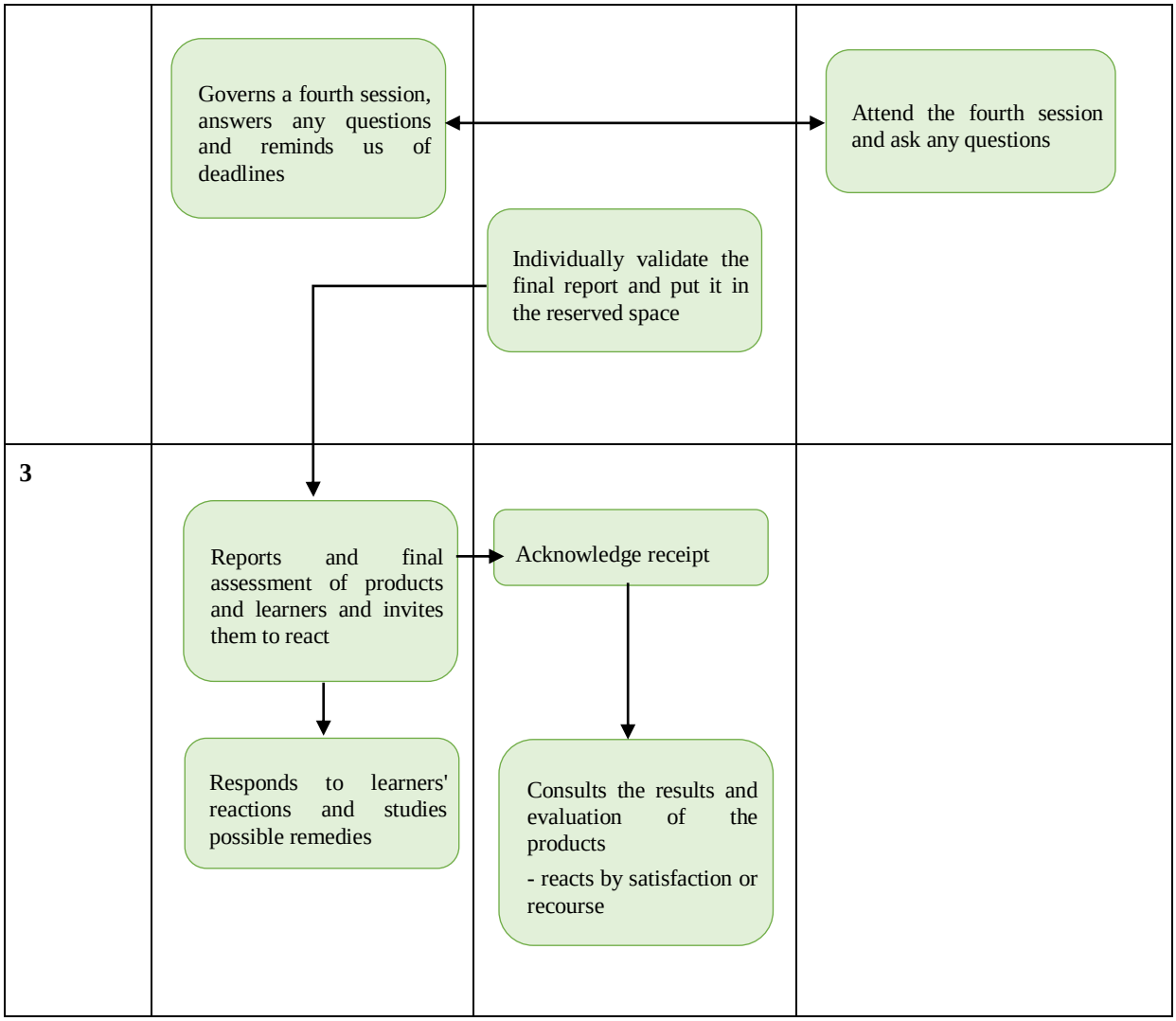
a) The Activity Diagram (AD)

The role of each of the actors (teacher, learner and class group) in the scenario is clarified in an activity diagram (AD) inspired by the UML (Unified Modeling Language) diagrams used for IT project management. The AD must highlight the scenario's progress in the context of personalization by situating the intervention of the two categories of actors in the sequence of activities.

Tabel 2. Activity diagram: Personalization case




Governs a second session for the understanding of the course, answers any questions, reactions and reminds the deadlines
Drop the grid filled in individually
2
Takes note of the grid of each individual
Governs a third session for the understanding of the course, answers any questions and recalls deadlines
Attend the third session and ask their questions
Ensures the smooth running of the learners' work and makes regulations if necessary
Draw up an interim report providing the necessary explanations and proposing improvements to the sequence
Analyzes the grids and provides an intermediate assessment
File the document before the deadline to benefit from the tutor's FB in order to improve it
Improve the document for finalization and validation



An activity diagram is often insufficient to describe the scenario, we also have as a second scenarization tool:

- The Specification Table :this table corresponds to a description of each of the tasks proposed to the learner by reference to a series of dimensions of which we cite:

- Nature, origin and purpose of the material submitted to the learners and the results expected from them.
- Sequencing of the proposed tasks and the criteria for this sequencing.
- Structuring and regulation tools.
- Monitoring and interaction methods.

Concerning the activity diagram, we suggest that you carry out the work by filling in the following table

Table 3. Example of a specification table: Personalization case

Stages of the activity	Teacher (tutor)	Learner	Group-class of learner
1	State the objective (s) of the activity and suggest the task to be carried out with the various instructions;	The learner reacts by acknowledgment of receipt.	
2	Offers the resources and tools necessary to complete the task.	Recovery of resources and work tools by acknowledgment of receipt	
3	Gives explanations concerning the accomplishment of the task and gives clarifications concerning the knowledge to be acquired and the skills to be mastered at the end of this activity. Answer the questions asked		Attend the tutored presentation concerning the progress of the activity and the expected work. Questions may possibly be asked.
4		Clarification of his role and his participation in the realization of the proposed work. Creation of a working environment	
5	Offers learners to communicate their work.	The work report is communicated by the learner	Assistance of the class group of the work of the different teams.
6	Organize a discussion to take stock	Join the discussion	Assistance and interaction of the class group in the discussion
7	Proposes a summary report.	The learner reacts by acknowledgment of receipt.	
8	Offers formative training for the activity	The learner reacts by acknowledgment of receipt and sends his work	
9	Receives, corrects the work and reacts the learners.	Interact of the results obtained	
10	Fix the difficulties.	Overcome the difficulties encountered	Assistance with remedial briefing and feedback.

Regarding the specification table, we suggest that you carry out the work by completing the following table:

Table 4. The specification table: Personalization cases

Nature of resources and tools submitted	*Nature of expected results*	*Sequence of tasks*	*Monitoring methods*	*Structuring and regulation tools*	*Modalities of interaction*

Our problem concerns the specification of the scenario flow and in particular the personalization of the scenarization within the framework of an adaptive e-Learning system. We seek to enable both the implementation of a personalized scenarization that meets the needs of each learner profile.

III. CONCLUSION

In conclusion of our work, the scenarization is a very important phase that will help us to personalize and adapt the learning system to the individual needs, both in terms of learning pace and content. In these systems, it is essential to offer the means to sequence the different learning activities where the system can provide effective solutions, giving great freedom of action. The pedagogical control of these systems can then allow personalization and adaptation of the contents to each learner. However, it is difficult for designers to imagine, design and describe all the sequences of actions and leading to situations of interest while allowing a great freedom of action for the learners.

This article presents an approach based on a pedagogical framework. We propose the steps of the unavoidable scenarization of a personalized training presented in five essential points (the definition of the objectives, the sequencing, the development of the scenario, the implementation, the evaluation), as well as the scenarization tools to be used, which are presented in the form of an activity diagram and a specification table that aim to highlight the scenario's progress within the framework of personalization by situating the intervention of the two categories of actors in the sequence of activities.

ACKNOWLEDGMENT

I wish to express my sincere appreciation to my supervisors, Professor Khaldi Mohamed and Erradi Mohamed, and all members of our team Computer Science and University Pedagogical Engineering who have the substance of a genius, they convincingly guided and encouraged me, we thank also we thank Higher Normal School, Abdelmalek Essaadi University, for their support in our works and scientific researches.

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