



Using Pedagogical Activities in the Scenario for More Comprehensive and Interactive Pedagogical Videos

Chelliq Ikram¹, Anoir Lamy², Erradi Mohamed³ and Khaldi Mohamed⁴

¹²³⁴ Research team in Computer Science and University Pedagogical Engineering
Higher Normal School, Abdelmalek Essaadi University, Tetouan, Morocco
Ikramchelliq@gmail.com

Abstract. Pedagogical videos have become a highly effective medium for delivering learning content, with the advancement of video creation techniques and methods significantly contributing to their success. Modern technologies now enable the swift and economical production of educational videos, often through software, eliminating the need for expensive equipment like cameras. Before creating an educational video, it's essential to draft a detailed script outlining the intended learning activities. This article introduces a comprehensive framework for the effective creation of educational videos. Our proposed framework comprises a methodology, along with a series of steps and tools, designed to guide the scripting of educational videos. It is tailored to accommodate various learner types within an adaptive learning system. This framework aims to ensure that the educational video scenarios developed are not only effective but also enhance the learning experience through video-based instruction..

Keywords: Pedagogical video, Pedagogical activities, Scenarization, Pedagogical video scenario, Learning objects.

1 Introduction

Over the last decade, information and communication technologies (ICTs) have led to a huge increase in audiovisual information. In this context, it has become necessary to make available technologies that enable the desired information to be found quickly among all the multimedia documents. The use of ICTs makes it possible to arouse the interest and motivation of learners and makes them more active, which improves the quality of learning. In particular, video has been used for decades to transmit knowledge. Some research has shown that the use of video in schools improves students' ability to visualize complex phenomena and to memorize the different phases of learning situations [1]. They encourage learners to question and validate their understanding of concepts. Pedagogical videos free up time in class to guide and help learners in a more personalized way. Accompanied by the teacher, learners solve more complex problems. Today, there are hundreds or even thousands of pedagogical videos

on the Internet, especially on YouTube. They are increasingly being integrated into education, spanning various age groups from young children to adult , in a variety of formats. Pedagogical videos are also regularly used in face-to-face teaching to make it easier to understand the material being taught, but the video is also used to deliver e-learning, hybrid training, flipped classes, micro-learning, SPOOCS, or MOOCs. Although video has a place in pedagogical methods, there is little research into its effectiveness. Pedagogical videos are used in a variety of teaching and learning contexts. However, creating a pedagogical video is a daunting task. This upheaval in video creation calls for a rethink of a fundamental practice in instructional design, namely pedagogical scenarization, which is proving to be even more important in e-learning.

This involves planning the chronological sequence of pedagogical activities during a learning sequence in a video. Scenarization of the pedagogical activities in a video allows us to review the entire scenario and check its progress before going into production.

The pedagogical video's scenarization endeavors to create a comprehensive pedagogical sequence, incorporating the chosen methods of media presentation. It therefore anticipates the themes that will be covered in the video. As part of this work, we propose an architecture of activities through the pedagogical video, we present the steps and tools for the scenarization of a pedagogical video to help in the creation and facilitate the framing of the video in each pedagogical activity to make the latter as effective as possible in terms of learning through video.

2 Methodology

Creating an pedagogical video requires a detailed and intricate process where visuals, sound, and text are skillfully blended. The video should be designed in an engaging way to maintain attention and facilitate effective learning. The process of pedagogical scripting involves crafting models for learning environments and instructional narratives. This task encompasses planning, detailing, and outlining various aspects. Central to this role is the educator or trainer, who applies these techniques in developing various training formats, including in-person, remote, or online methods.

A scenario is characterized as a description, both before and after the fact, of how a learning situation unfolds. Its purpose is to facilitate the acquisition of specific knowledge. It outlines the roles, activities, and resources needed to engage with the knowledge, including the use of tools, services, and the outcomes resulting from these activities. [3,4] .

The pedagogical video script meticulously outlines the sequence of a learning activity featured in the video material offered to students. It details the learning goals, the scheduling of tasks, the description of student assignments, and the evaluation techniques. Additionally, it describes the measures to be taken for monitoring student progress throughout the activity. Lastly, it sets out the instructional support that will be automatically provided in response to the student's advancement. [5,6] .

The pedagogical video scenario allows for the clear definition and presentation of an approach and strategy for authentic content structuring within educational videos. This supports a pedagogical activity, defined as a teacher-led situation designed to help learners achieve educational objectives and acquire skills, whether they are general or specific, related to diverse aspects of life in accordance with the study program's terms and specifications. [7,8,9].

In our work, we have proposed the following stages in the pedagogical video scenarization process :

- To create an educational scenario, it's crucial to establish clear learning goals. This involves asking a set of questions regarding the intended audience, the specific skills that the audience should acquire, the planned schedule for the learning process, and the resources that are available for use.

- During the sequencing phase, the emphasis lies in structuring the themes, activities, and/or workshops that will facilitate the achievement of the educational objectives. Each segment, often called a minimum teaching unit or a pedagogical unit, should align with a distinct learning goal that aids in fulfilling the overarching training objective.

- At the scenario development stage, the plan begins to materialize. It's crucial for all the sequences within a scenario to be well-organized and logical. Selecting appropriate content, educational techniques, and technological tools tailored to the intended audience is key. Crafting an effective scenario involves careful consideration of four elements: the characters involved, the setting, the challenges presented, and the resulting consequences.

- Implementation: After the tools have been chosen and customized, it becomes necessary to select a digital space or platform that aligns best with the project's requirements and, consequently, with the target audience. This chosen platform will be used for the implementation of the scripted and mediated content.

- Evaluation: the whole point of a scenario is to achieve its objectives. To verify the attainment of the objectives. Evaluation plays a crucial role for both the learner and the designer. For the learner, it helps in assessing their mastery or lack thereof of the required skills. For the designer, it's a means to verify what the learner has assimilated, ensuring that the educational goals are met. Additionally, it allows the designer to evaluate the efficacy of the training system, including the tools, media, and digital environment utilized.

2.1 Scenarization tools

In designing a script for an pedagogical, it's vital to grasp the interplay between the video's narrative and the embedded educational activities. Tailoring these elements to suit the learner's proficiency, preferences, and learning style is essential. This customization facilitates each learner's ability to absorb, comprehend, retain, and concentrate on the information presented. [2].

Three fundamental tools are available for the scenarization of a pedagogical video. These tools are highly effective in facilitating the scenarization process with a structured and systematic approach.

A. Activity diagram

The activity diagram provides a visual representation of our pedagogical's structure, aiding in the clarification of the learner's role within the pedagogical script. This diagram bears semantic resemblance to communication diagrams, alternatively referred to as Collaboration diagrams in the Unified Modeling Language (UML) or state-transition diagrams.

The specification table delineates each task presented to the learner within a video sequence-based activity. This is done using a list of dimensions, including:

- The characteristics, source, and objective of the video presented to the learners, along with the anticipated outcomes from them.
- The sequence of tasks envisaged and the criteria for this sequence.
- Procedures for monitoring and interaction.
- For the activity diagram, we suggest that you complete the following table

For the specification table for a pedagogical video, we suggest you complete the following table:

Table 1. Activity diagram table for a pedagogical video

Nature of expected results	Sequence of tasks	Monitoring procedures	Structuring and regulation tools	Methods of interaction

B. Storyboard

Originating from the realms of cinema, animation, and comics, the concept of a storyboard has been a wellspring of creativity. Notably, in the 1920s, the Walt Disney Studio pioneered the use of storyboards. They sketched each scene on individual sheets of paper, which were then assembled on a board to create the storyboard. This visual sequence was then reviewed and critiqued by the director [10]. What is interesting to note is that the storyboard was always produced as part of a team to incorporate all the designers' points of view. It lies at the boundary between images and writing [11,12]. This tool therefore has great potential for presenting issues of use. It can be used to illustrate user usage through drawings, presenting the advantages or disadvantages of concepts or products in terms of effectiveness, efficiency, and satisfaction [13]. But it seems to us that the most relevant approach is to use storyboards as a method for designing solutions, together with designers [14].

A storyboard is a precise scenarization of the video in the form of a prototype or a document (digital/paper) used during the pre-production of a pedagogical video. It is used to determine the main elements and actions that make up each video sequence. It is used to visually explain and stage the unfolding of a course to plan the needs of all

the elements that make up the video, both at a technical level (framing, camera movements, special effects, intention) and at a decorative level (constructed sets, virtual sets), as well as emotions, visual cues or comments.

The storyboard tool enables course content to be organized and presented in a way that interests the learner, for example through the use of dialogue and interactivity.

The storyboard takes the form of a series of blocks. Each block represents a video entity. During the location scouting, once the group has agreed on the shot it wants to film, it must be drawn in the corresponding block. And so on until a kind of pedagogical video is obtained [2] .

Table 2. Pedagogical video storyboard

Title			
Entity			
Scene title	Scene number	1	2
	image		
	Voice over		

3 Results

Creating a script for pedagogicals is essential. This script offers a method and strategy for authentic scripting and design of video content within a teaching activity. Such an activity, conducted by an educator and offered to the learner, aims to achieve educational goals and the development of general or specific competencies related to one or more life domains, in accordance with the curriculum's requirements and specifications.

Drawing on Burgos's work on adaptation in the design of a learning scenario [15] , on the work of Khaldi and his colleagues in their article entitled "The educational scenario architecture of to Learning situation"[16] .We also draw on the work of Depover et al. on learning versus pedagogical scenarios [17].

Therefore, building upon the research and developments in the realm of scripting and crafting pedagogicals, especially the contributions of Jack Koumi and Schonenberg along with his team, it is deemed beneficial to gain a deeper insight into the timing, methods, and strategies for adapting pedagogical scripts to the evolving dynamics of teaching and learning environments [18,19]. The following figure illustrates the

structuring of pedagogical videos based on this work. Each pedagogical video is divided into three main entities (Input, Learning, Output).

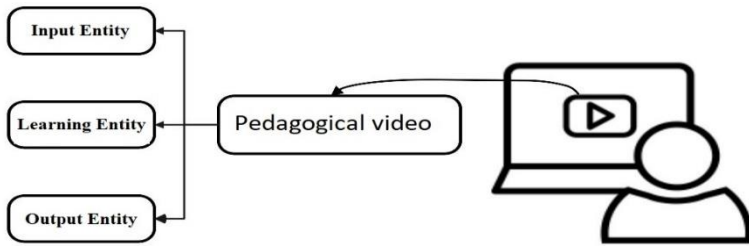
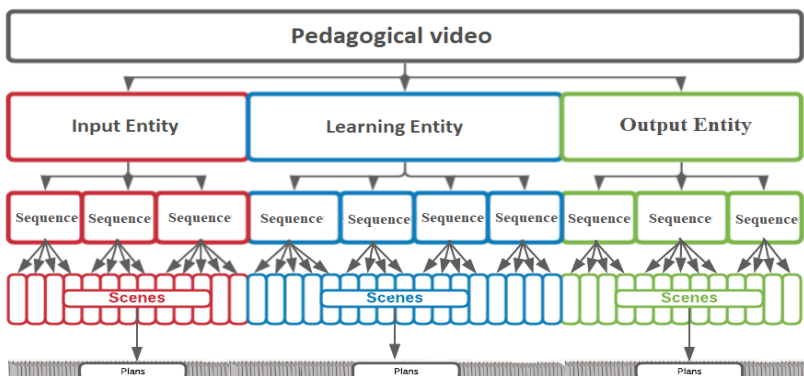


Fig. 1. Three main entities (Input, Learning, Output).

- The entry entity of a pedagogical video serves to verify the prerequisites needed for understanding the content or to succinctly, creatively, and precisely introduce the module, course, or section of the course. This helps the audience grasp the overall context and objectives, while also providing a positive initial impression.
- The learning entity of a pedagogical is designed to enhance the learning experience by simplifying the content, learning scenarios, and activities in line with the set objectives, while also considering the proficiency and demographics of the target audience. The video content should be conveyed in a straightforward, clear, and concise communication style.
- The output entity of a pedagogical video aims to highlight the key takeaways for the learner, providing a summary of the most important ideas presented. It also offers a chance for learners to evaluate their comprehension and retention by assessing the knowledge they have gained.

Each entity within the video is composed of multiple sequences and serves to deliver the content while directing learners to sections they may not have fully grasped in a previous sequence. This is facilitated through clickable and interactive elements that can be incorporated into the video for enhanced engagement and understanding. Included within these are features like a quiz to be taken live, multiple-choice queries, and images for sorting, among others. Every video sequence consists of a collection of scenes, each made up of one or more "shots". A "shot" comprises a series of images captured continuously, with or without camera movement. The shots are separated by shot boundaries. The figure below gives an idea of how we determine the general architecture of a pedagogical video .



At this point, drawing from the structure and ideas presented in our theoretical framework, we suggest a comprehensive architecture for a scenario in an pedagogical. This design underscores the significance of pedagogical activities across diverse teaching and learning settings, regardless of the particular subject matter or concept. When crafting educational scenarios, it is recognized that their development is an integral component of an ongoing life cycle.

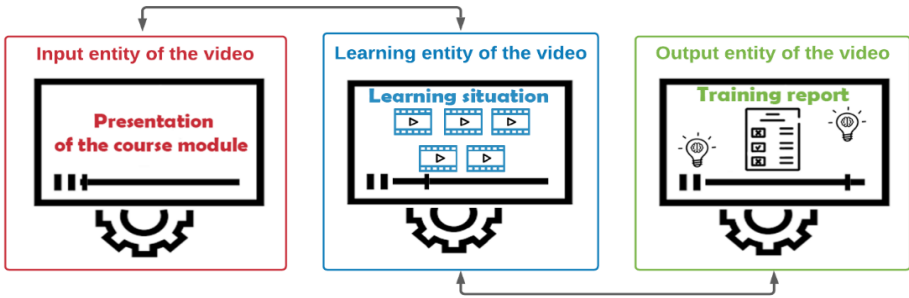


Fig. 3. Global architecture of a scenario for a pedagogical video.

This is a succession of stages linked to the evolution of a product or service. Above all, it involves formalizing a methodical structuring of the various processes implemented. According to Khaldi [16], The lifecycle of an educational scenario is made up of four stages, illustrated in the figure below:

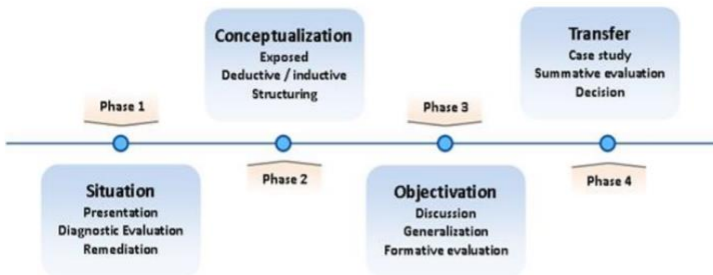


Fig. 4. Cycle of the pedagogical scenario

Reflecting on the pedagogical scenario's lifecycle within a learning context., we propose various types of pedagogical scripts. These scripts are tailored to the learning situations and related activities that might be encountered within a pedagogical video setting.

3.1 Situational scenario:

The situational activity marks the initial stage in the lifecycle of an educational scenario. We suggest a context-based scenario for an pedagogical that emphasizes the establishment of goals (general, specific, intermediate) along with skills (disciplinary, cross-disciplinary) and foundational knowledge. Additionally, the situational activity in an pedagogical serves as an introductory segment to a learning scenario. It sets the stage for upcoming content and engages learners by prompting questions (soliciting feedback), while also functioning as an evaluative tool. This tool evaluates the learner's current knowledge and measures their initial comprehension within the pedagogical learning environment. By doing so, we can pinpoint the learner's strengths and weaknesses and then suggest a tailored remedial activity with resources matched to the learner's proficiency level.

Figure 5 illustrates an example of a situational activity scenario for a learning situation in a pedagogical video made up of three entities.

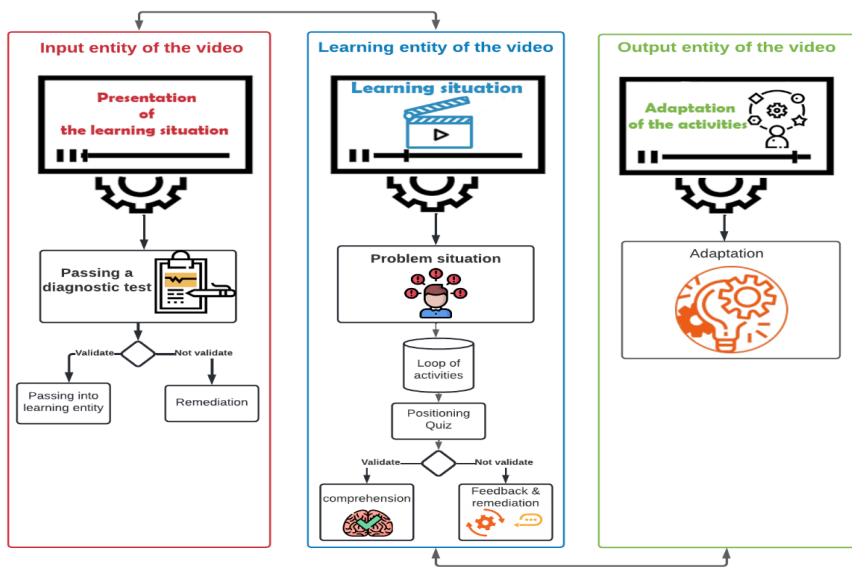


Fig. 5. situational activity scenario

- Input entity scenario for a learning situation in a pedagogical video:

The input entity focuses on detailing the learning situation, clarifying the goals to be achieved by the end of the scenario, the knowledge to be acquired, and the skills to be cultivated by either an individual learner or a group. Furthermore, it's advisable to include an initial video sequence that functions as a pre-test. This pre-test aims to evaluate the fundamental prerequisites necessary for involvement in the scenario, pinpoint any gaps in learning, and map out the trajectory of the learner's progress.

- Scenario of the learning entity of a learning situation of a pedagogical video:

The learning entity of a situational scenario in a pedagogical video relates to The delineation of the problem scenario. of a pedagogical activity in which the learner is presented with a task that he cannot complete without being confronted with a real difficulty. The learner will also be given exercises or examples of positioning, for example, a video sequence presenting a positioning quiz, to situate their level of knowledge at the start of the learning situation and also to suggest elements that will help them to learn as well as elements that will help them to structure their knowledge.

- Output entity scenario for a learning situation in a pedagogical video:

The output entity of a situational scenario consists of adjusting and adapting the situational scenario of the pedagogical video to the learning situation by proposing a video sequence adapted to the learning entity of a pedagogical video.

3.2 Conceptualization scenario

The conceptualization phase is the second stage in the cycle of an educational scenario. This phase focuses on organizing targeted knowledge through activities that encourage conceptual understanding and practical experimentation. The aim here is to facilitate the development of specific knowledge and its application in enhancing the learner's abilities. Within an pedagogical, the conceptualization activity prompts the learner to analyze the content of the video (including problems, phenomena, situations, etc.), which could be based on a single video or a series of videos, employing either inductive or deductive methodologies.

A. Deductive approach

The deductive approach, also known as logical deduction, entails moving from the general to the specific, from abstract concepts or principles to tangible applications. It starts by introducing a concept and/or rule, then advances to validate these through the use of examples. Even within a pedagogical context, integrating a theme can still embrace this methodology, encompassing concepts, rules, examples, analysis, and the

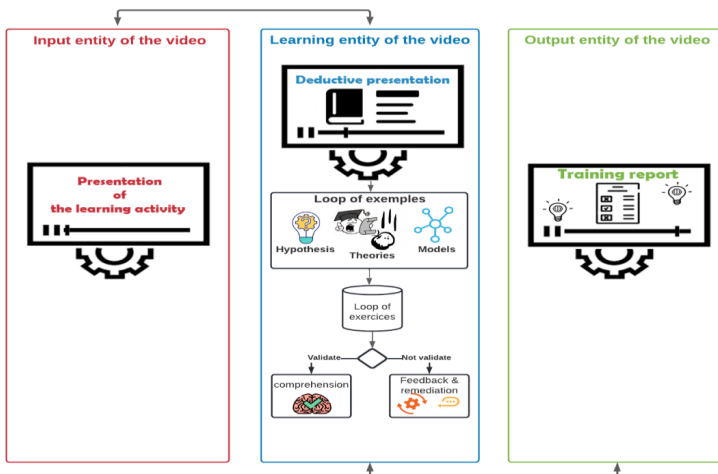


Fig. 6. Deductive approach scenario

verification of these concepts and rules. This represents a model of explicit instruction, focusing on the transmission of knowledge and the learner's acquisition of skills.

- Scenario of the input entity of a learning situation of a pedagogical video (Deductive approach) :

The input entity for the conceptualization activity's scenario, using a deductive approach in an educational video, involves presenting the learning activity. This presentation includes defining the objectives to be accomplished by the end of the activity, outlining the knowledge to be attained, and specifying the skills that the learner is expected to master.

- Learning entity scenario for a learning situation in a pedagogical video (Deductive approach):

In the deductive process of the conceptualization activity's scenario, the learning system initiates by activating the learners' pre-existing knowledge. This step is crucial for introducing the targeted concepts. It involves presenting examples and counter-examples, engaging learners in practical application, and evaluating their understanding and acquisition of the material.

- Output entity scenario for a learning situation in a pedagogical video (Deductive approach):

The outcome of the conceptualization activity within the deductive approach scenario is subject to evaluation as part of the proposed deductive approach's conceptualization activity review.

B. Inductive approach

The inductive approach involves moving from the specific to the general, placing the learner in a situation where he or she takes ownership of what he or she needs to learn, either on his or her own or in cooperation with others, through exploration or observation. The pedagogical video acts as a guide in this approach, placing the learner in situations where the video can provide feedback to help them develop their skills .

- Scenario for the input entity of a learning situation in a pedagogical video (Inductive approach) :

The role of the scenario input element in the conceptualization phase of the inductive approach is to introduce the learning activity by outlining the goals to be accomplished at the conclusion of the video. This involves detailing the knowledge the learner should acquire and the skills they need to master.

- Learning entity scenario for a learning situation in a pedagogical video (Inductive approach) :

In an inductive process, the learning entity for the conceptualization activity functions as a theoretical framework. It is designed to explore connections between multiple events, evaluate learning progress, and solidify understanding. This enables learners to formulate definitions, offer examples and non-examples of the concepts or notions being taught, and activate their pre-existing knowledge. The initial phase within this entity involves engaging with the activities presented in the video, followed by analyzing the outcomes to validate the empirical findings against theoretical laws and principles.

- Output entity scenario for a learning situation in a pedagogical video (Inductive approach):

The output entity scenario for this type of activity comes under a review of the conceptualization activity of the proposed inductive approach.

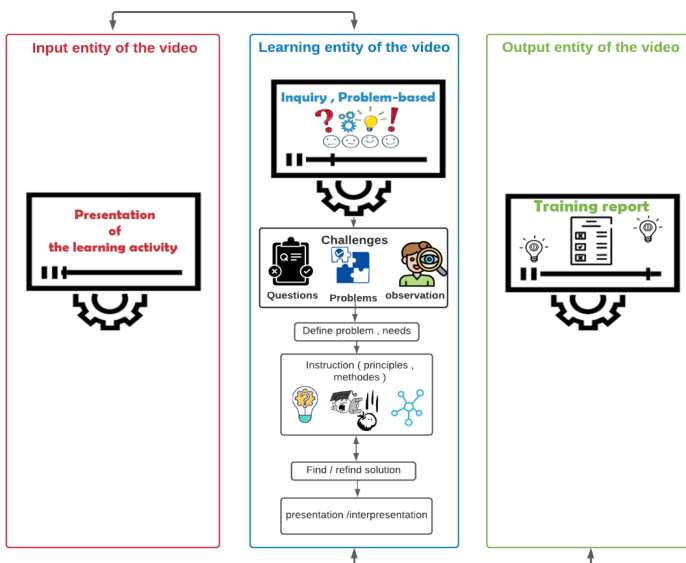


Fig. 7. Inductive approach scenario

3.3 Evaluation scenario

In an educational context, the evaluation scenario places a strong emphasis on applying and reapplying the knowledge and skills acquired to enhance the learner's education. The primary objective of such a scenario in a pedagogical video is to reinforce, consolidate, and ensure the retention of the knowledge each learner has gained. Simultaneously, the included elements are designed to address any learning gaps that learners may have, thus aiding them in overcoming educational hurdles. This is accomplished by fostering connections and encouraging the application of learning to real-world situations, while also presenting more complex challenges to learners who advance at a quicker pace..

A. Formative evaluation

Formative evaluation aims to foster learning advancement and provide insight to both the learner and teacher regarding what has been mastered and what areas require further improvement. Focused on specific learning outcomes, it includes one or more interventions. Implemented during the learning activity, its purpose is to track learners' progress, helping them recognize the nature of their errors and the challenges they face. While often guided by the teacher, formative assessment can also involve self-evaluation or feedback from peers.

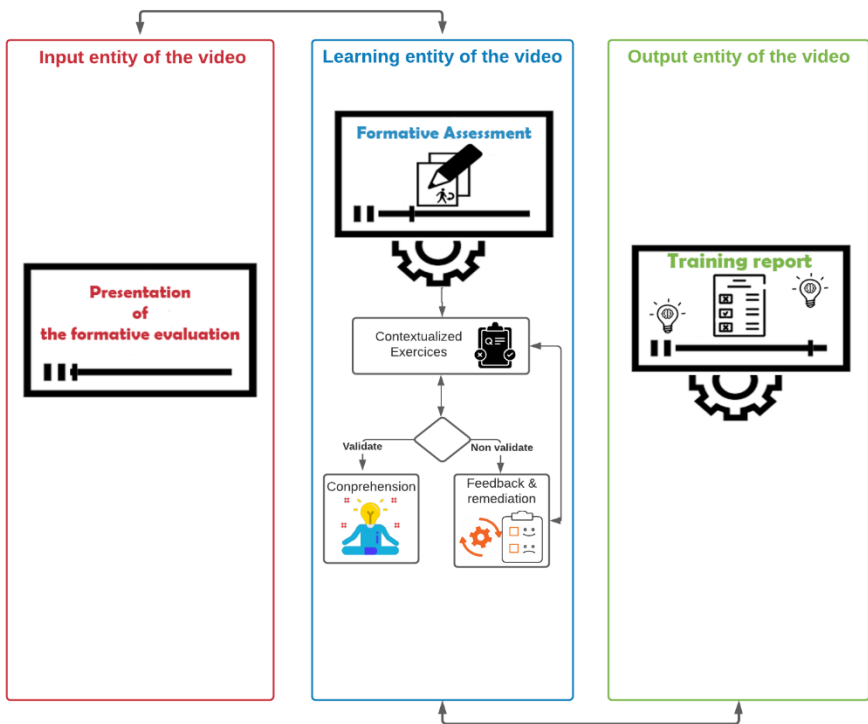


Fig. 8. Formative evaluation scenario

- Pedagogical video learning situation input entity scenario for formative assessment:

In a pedagogical context, the input element of the formative assessment activity relates to initiating the assessment process. This entails specifying the learning situations or activities to be assessed by identifying the knowledge and skills that will be evaluated in the learner.

- Learning entity scenario of a learning situation of a pedagogical video for formative assessment:

The learning entity scenario for a formative assessment within an pedagogical video's learning situation begins with an outline of the tasks to be performed, along with instructions tailored to the specific formative assessment methods being used (such as exercises, questions, etc.). The subsequent phase involves the learner engaging with these exercises, assessing their own level of knowledge and skill acquisition, as well as their ability to apply these in the given scenarios. This stage also includes an analysis of the learner's engagement and commitment to their knowledge-building process. The final phase of this learning entity addresses remediation for any challenges the learner faces, and adjusts their learning approach based on the context and specific situation.

- Scenario for the output entity of a learning situation of a pedagogical video for formative assessment:

The output entity of a scenario for formative assessment in a learning situation focuses on reviewing the assessment activities. This review takes into consideration the outcomes of the remediation and adaptation processes that have already been addressed within the learning system.

B. Summative evaluation

The aim of summative or certificative assessment is to validate and acknowledge learning. This assessment occurs at the conclusion of an instructional process and is intended to officially confirm the extent to which students have achieved their learning goals. The responsibility for conducting this assessment lies with the teacher and should be executed impartially and fairly, accurately reflecting the students' accomplishments.

- Pedagogical video learning situation input entity scenario for summative assessment:

The input entity of a summative assessment scenario involves presenting the assessment activity. This includes outlining the specific learning situations or activities that the summative assessment will cover, as well as identifying the objectives of the assessment.

- Learning entity scenario of a learning situation of a pedagogical video for formative assessment:

The learning entity entails assessing and gauging the learner's overall knowledge and skills acquired by the end of the course. The learner is afforded a singular opportunity to complete this evaluation. It commences with the introduction of the project or case study to be undertaken, outlining the tasks to be carried out along with their instructions, which can be accomplished through collaboration or individually. This process concludes with the synthesis of the work, resulting in the compilation of a comprehensive report.

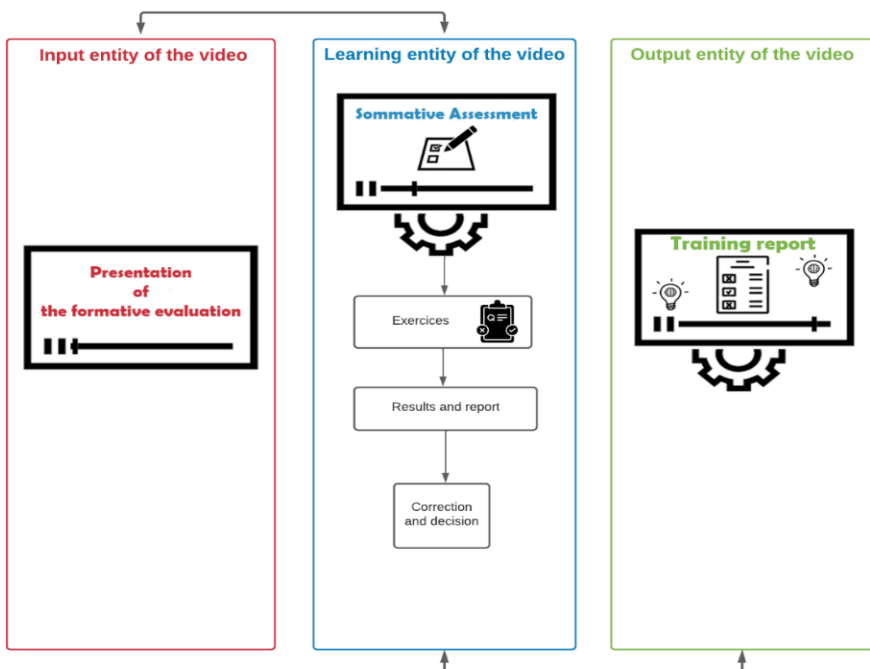


Fig. 9. Summative Formative evaluation scenario

- Pedagogical video learning situation output entity scenario for formative assessment:

The output entity of a summative assessment scenario focuses on evaluating the assessment activity itself, considering the results achieved. This evaluation is aimed at adapting and enhancing the learning process for future educational endeavors.

4 Conclusion and discussion

In conclusion, the stages and tools we have outlined for scripting an pedagogical video serve as a foundation for its media production phase. This involves the detailed process of description, narration, segmentation, and organization of the video prior to production. For the pedagogical team, the video's pedagogical script is a crucial document, formalizing the various components and steps of the planned action, serving as a key reference.

Throughout our article, we have explored the challenge of determining when and how to adapt an pedagogical video script, highlighting the need for flexibility in response to the evolving nature of learning situations.

We presented various scenarios for an pedagogical video, each crafted through pedagogical activities. Following the presentation of an overall scenario, we detailed six specific scenario examples for activities within a learning module. Each scenario is structured into three parts: the introductory entity, the learning entity, and the concluding entity. For each section, we outlined a series of actions tailored to the activity's nature, consistently specifying the learner's role while acknowledging the dynamic interactions between the learners and the pedagogical video.

With this foundation, our future projects aim to bring these theoretical concepts to life by actualizing the diverse pedagogical scenarios discussed in this work. This endeavor will transform our research into tangible, media-based pedagogical tools, enhancing the landscape of digital learning.

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