

Digital micro-credentials in the context of educational metasystemology: an approach to open education pedagogies with video lessons designed learning-centered strategies

Elena RAILEAN¹, Yuliana GERMAN²,

¹ Institute for Advanced Research on Anthropological Challenges at the University of Political and Economic European Studies (ICASA) – Chisinau, Chisinau, Republic of Moldova

² Ion Creanga State Pedagogical University of Chisinau, Chisinau, Republic of Moldova
elenarailean32@gmail.com, julianagerman777@gmail.com

Abstract: *Educational metasystemology (EM) is the frontier science of pedagogy and educational management. EM is focused on seeking sustainable ways in learning design to guarantee a synergistic effect in the lifelong capacity of learners to learn by planning, observing, and assessing effective learning strategies throughout life. Its notable feature is that teacher(s), student(s), and environment(s) work in tandem. Educational metasystemology is based on the Metasystems Learning Design Theory that assumes that learning outcomes are a result of self-regulation, personalization, feedback diversity, clarity, dynamism flexibility, and ergonomics. This article aims to understand the role and impact of video lessons in digital use and the development of micro-credentials in the context of educational metasystemology as an innovative approach to open education pedagogies. Results show that micro-lessons evolve from multimedia lessons to video clips and videoconferencing. However, their integration into digital microcredentials cannot be achieved without the adoption of metacognitive strategies, digital assessment, and the establishment of an ecosystem of learning and communication for sustainability. This approach evidences the role of critical thinking, real problem-solving, and creativity.*

Keywords: video lessons, micro-credentials, digital micro-credentials, open badges, transparency.

1. Introduction

Microcredentials, as an umbrella term for short courses with an impact on professional development, have been developed since 2011. Other terms for micro-credentials are digital badges, open badges, and open digital badges (Catalano & Doucet, 2013). These days, micro-credentials are supported by a variety of philosophical and pedagogical approaches to the design, development, and quality assurance of learning materials. Traditionally, they are based on careful monitoring of teaching, learning, and assessment strategies, methods, and processes. As a

result, there are multiple definitions. One of these is, as follows: *‘micro-credentials encompass various forms of credential, including ‘nano-degrees’, ‘micro-masters credentials’, ‘certificates’, ‘badges’, ‘licenses’, and ‘endorsements’. It is focused on modules of learning much smaller than those covered in conventional academic awards, which often allow learners to complete the requisite work over a shorter period. In their most developed form, micro-credentials represent more than mere recognition of smaller modules of learning. They form part of a digital credentialing ecosystem, made possible by digital communications technologies establishing networks of interest through which people can share information about what a learner knows and can do (UNESCO, 2018).*

The European approach to micro-credentials refers to ‘the record of the learning outcomes that a learner has acquired following a small volume of learning’ (European Union, 2021). According to this document, the basis of trust in microcredentials is transparency. This means that micro-credentials should provide the following mandatory elements: identification of the learner, title of the micro-credentials, country/region of the issuer, awarding body, date of issuing, learning outcomes, notional workload needed to achieve the learning outcomes, type of assessment, form of participation in the learning activity and type of quality assurance used to underpin the micro-credentials. In sum, ‘micro-credentials are transforming digital education by offering flexible, targeted, and accessible ways for learners to acquire and demonstrate skills’ (Stamatakis et al., 2025).

The learning design of microcredentials is based on quality assurance, transparency, relevance, valid assessment, learning pathways, recognition, portability, learner-centered, and authenticity, as well as information, and guidance. From this perspective, micro-credentials refer to ‘a certification of assessed learning that is additional, alternate, complementary to or a formal component of a formal qualification’ (Selvaratnam & Sankey (2021) and emphasizes the importance of open/digital badges as a way to validate the learning outcomes. In general, "open badges" are visual indicators of accomplishment and an original method of documenting and sharing what a person is capable of. They are granular, stackable, evidentiary, personalized, and machine-readable (UNESCO, 2018).

An important role in the design of micro-credentials is **video lessons**. Traditionally, a video lesson represents a lesson that contains educational video material on a specific topic to help both teachers and students achieve learning outcomes. In this way, teachers can present content in a more or less interactive way and students – learn more interestingly. In the Republic of Moldova, this method was used during the COVID-19 pandemic when video-lessons were developed as a part of educație-online.md coordinated by AICE. It was expected that teachers and students would learn by watching video-recorded lessons developed according to the curriculum, using a smartphone or a personal computer and that using video lessons for remote teaching would be very useful. AICE creates and distributes lesson plans, models of digital products and content of video-lessons. Nonetheless, videotaped lessons did not deviate significantly from a

traditional teacher's lecture. Students could post questions in the comments section after viewing the video lesson. Today these video lessons are free and available on Educatie online platform.

The impact of video lessons on learning outcomes lies in their appeal via the Internet, their capacity to facilitate more effective processing and memory recall, and their promotion of critical thinking, reasoning, problem-solving, and decision-making. The problem is that there are different types of videos, video lessons, and learning strategies with video lessons. According to (SendPulse, 2025), the most effective types of video lessons are:

- *lecture capture*, which is a record of classroom lectures, uploaded to the internet, and available in the search field on YouTube,
- *voice-over presentation*, which is a PowerPoint presentation with a teacher's voice playing over the presentation's slides,
- *talking head video*, which is a real-time or pre-recorded video where a teacher speaks on the subject with/without a script
- *interactive video lessons*, which include different activities and imply a teacher using video, adding audio, PowerPoint slides, etc.

This article aims to identify the diversity of the learning strategies with video lessons and their affordability for digital microcredentials from the perspectives of educational metasystemology, where meta- is more than a system and rely on synergic effect. Educational metasystemology, a frontier science of pedagogy and educational management, is focused on seeking sustainable ways in learning design to guarantee a synergistic effect. Its notable feature is that teacher(s), student(s), and environment(s) work in tandem, for these three conditions are important: a) (meta)cognitive strategies, b) interactive assessment, and c) ecosystem of learning and communication. Educational metasystemology is based on the Metasystems Learning Design Theory that assumes that learning outcomes are a result of self-regulation, personalization, feedback diversity, clarity, dynamism flexibility, and ergonomics. Thus, to plan effective learning outcomes is important to know the state-of-art in pedagogy and educational management.

In classical pedagogy, the lesson is a basic form of organizing instructional and educational activity in school, carried out with a class of students, at a determined time, under the leadership of a teacher or professor following the curriculum. However, lessons are diverse and their diversity was classified as follows: a) lessons for acquiring new knowledge, b) lessons for recapitulation and systematization of materials, c) lessons for training and consolidation of skills and abilities, d) lessons for verification and assessment of knowledge, e) lessons for consolidation and systematization, j) mixed or combined lessons.

In non-classical pedagogy, the lesson is the result of the correlation between successful learning strategy, tactics, and the power of the environment. Joan Rubin

(1975) was one of the first researchers to study learning strategies. By observing students' educational activities, the researcher concluded that the best students use specific strategies to acquire knowledge. However, at that moment was important to know and apply cognitive strategies even though some researchers indicated metacognitive strategies (Flavell, 1978; Myers & Paris, 1978; Loper, 1980).

2. Research methodology

To identify the diversity of the learning strategies with video lessons is important to understand the state-of-the-art, for instance, the global trends in 'microcredentials' and 'video lessons'. One of the techniques that allow us to view the global trends is Google Books N-gram Viewer – a tool that allows us to display a graph showing how the entered phases (up to seven) have occurred in a corpus of open accessible books.

2.1 Micro-credentials and video lessons

For visualization of the global trends on micro-credentials, digital badges, and video lessons, were used from 1960 – 2022. Results are presented in Figure 1.



Figure 1. State-of-the-art research of micro-credentials and video lessons

Figure 1 shows that micro-credentials, digital/open digital badges, and video lessons are important subjects in research. Globally, most research is devoted to digital badges. We could establish a hypothesis that digital badges have the potential for the achievement of learning outcomes through micro-credentials.

If global trends in publishing books regarding the use and development of digital micro-credentials are investigated following the educational Metasystemology approach, one could observe the emergence of various learning strategies with video lessons, which are more or less interactive. Such strategies evolved from 'enhanced lectures to team-based learning' (Railean, 2024).

2.2 Scope of video-lessons

Ioan Cerghit (2002) noted that lessons can be academic or discursive/heuristic; rational / intuitive; innovative / routine; informative / formative; productive / reproductive; deep / superficial; independent / dependent; expository/Socratic; descriptive/dialectical; analytical / synthetic; authoritarian centered on autonomy; imperative / indulgent; affective or empathetic/distant; self-controlled or self-censored / spontaneous; solitary / team; teacher-centered / student-centered; elaborated / unelaborated; motivating / unmotivating; old / new; predictable / unpredictable. The affordability of video lessons depends on the learning strategy.

In designing effective content for digital microcredentials video lessons play an important role. But what video lessons are used most of all? To answer this question, let us observe that after 1960, information computer systems, feasible for visual communication, were gradually replaced by information and communication systems, also called visual conversation systems, in which it is used, including educational multimedia and the Internet. Thanks to these innovations, in which the content in the school textbook would be supplemented with audio, video, animation, and other New Media, the video lesson emerged. Soon, the first technologies for designing video lessons were integrated into automated training systems. Gradually, video lessons were turning into lessons with video/multimedia elements and complemented the content of the school textbook, especially for the study of foreign languages, chemistry, biology, and physics.

The first study of global trends in educational technologies for the development of video lessons allows us to state that this concept has evolved from a) *filming a training course* through video lecture (i.e. a form of transmitting knowledge using information and communication technologies) to *instructional video*. '*Instructional video is a type of multimedia instruction in which graphics are in the form of motion pictures recorded by a camera and words are in the form of speech and background sounds recorded by a microphone*' (Mayer, 2009). The instructional video may be integrated into traditional classes 'particularly in online courses as well as serving as a foundation for many blended classes' (Beheshti et al., 2018). This makes it possible for researchers to define video-based learning as a field of study and define it as the technology that electronically captures and disseminates educational image sequences that show moving scenes.

In general, video-based learning refers to the instructional process of obtaining information, knowledge, and skills along with the principled support of video resources. However, educational technologies are diversified into *video podcasts* (i.e. a series of audio or video episodes that focus on a specific subject or theme), *live lectures* (i.e. live educational video classes that are held online through a learning management system, which allow students to track their syllabus and progress through two way communication), *video clip* (which is a sequence of short film-type video sequences with an artistic or advertising character), *video blogging* (which refer to practice of capturing and sharing events experienced on platforms such as YouTube, Vimeo, Facebook).

There are many ways to increase the effectiveness of instructional videos. As was noted by Mayer, Fiorella & Stull (2020), ‘people learn better from an instructional video when the onscreen instructor draws graphics on the board while lecturing (dynamic drawing principle), the onscreen instructor shifts eye gaze between the audience and the board while lecturing (gaze guidance principle), the lesson contains prompts to engage in summarizing or explaining the material (generative activity principle), a demonstration is filmed from a first-person perspective (perspective principle), or subtitles are added to a narrated video that contains speech in the learner’s second language (subtitle principle). People do not learn better from a multimedia lesson when interesting but extraneous video is added (seductive details principle).’

3. Learner-centered learning strategies in designing video lessons for effective microcredentials

For digital micro-credentials to be considered several technologies are important to implement: digital repositories, blockchain in certification, digital signature, artificial intelligence, and users’ perception online survey. Acree (2016) noted that instructional design and educational platform are important for micro-credentials, but many additional problems need to be solved. One of these is that carefully crafted microcredentials encourage metacognition and evaluation, which makes learning a greater challenge. Regarding the strategy of designing an affordable content, is important not to have one content for all. More important is how users would engage with the microcredentials with video-lessons and “conceptual understanding of content” (Ernita, 2025). One of example is an educational platform which include a *Professional Learning and Collaboration Environment* (PLACE) website, where will be guided on what they must do to earn the micro-credential in terms of tasks, evaluation (artifacts), and feedback. The definition of high-quality microcredentials remains an open question. To answer this question let us consider the global trends in the use and development of video lessons in the didactical process.

Mayer et al. (2020) assert that when asked to participate in generative learning activities during a video lecture or demonstration, people learn more effectively. Generative learning activities refer to behaviors that students engage in during a lesson to enhance learning, such as ‘taking summary notes (i.e., learning by summarizing) or writing an explanation (i.e., learning by self-explaining) or physically imitating the instructor’s demonstration (i.e., learning by enacting)’. Another example is learning design based on a) *perspective principle* (people learn better from narrated video of a manual demonstration when it is filmed from a first-person perspective rather than a third-person perspective), b) *subtitle principle* (people learn better from graphics with spoken words than graphics with printed words and people learn better from graphics and spoken text than from graphics, spoken text, and printed text), c) *seductive details principle* (people do not necessarily learn better when interesting but extraneous video is added to a

multimedia lesson.) and d) *gaze guidance principle* (people learn better from a video lecture when the onscreen instructor shifts gaze between the audience and the board while lecturing rather than looking only at the board or only at the audience).

However, in use and development of microcredentials mainly used *video clips*. The video clip is a short video in the form of 5-50-second-long portions of a long-form YouTube video, that aims to educate or communicate a substantive message and, therefore, refers to on-demand instruction. The other form is video-conferencing, which refers to the live, visual connection between two or more remote parties over the internet that simulates a face-to-face meeting for simultaneous two-way communication between people around the world.

Globally, research in using and development of video clips and video-conferencing has been increased. This is the evidence of increased interest in understanding the affordability of video clips and video conferencing in learning, as learning, and for learning (Figure 2).

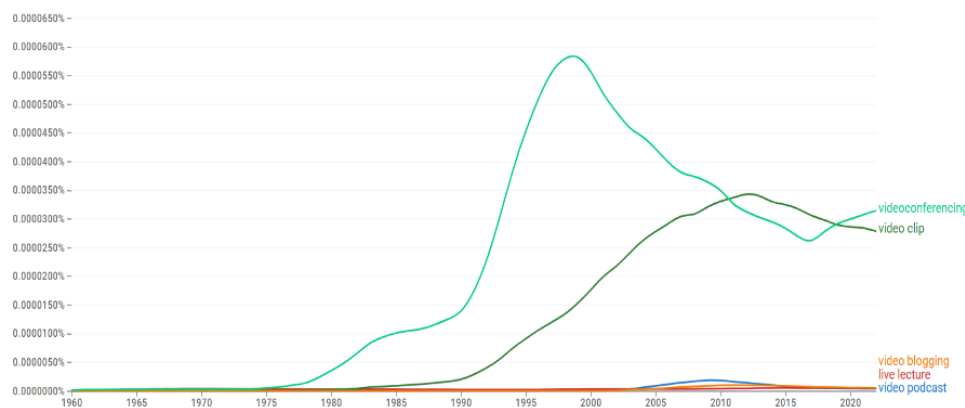


Figure 2. Evidence of video clips and video-conferencing

According to (Hilsmann & Dodson 2025), microlearning is bite-sized instruction, with modules ranging from approximately 90 seconds to 5 minutes. Mobile microlearning provides concise and engaging educational activities that correspond with various learning preferences and styles. However, from the perspectives of educational metasystemology in the design and development of digital micro-credentials the following principles are important: self-regulation, personalization, feedback diversity, clarity, dynamism flexibility, and ergonomics. Moreover, these principles could be integrated into all learning strategies, both teacher-centered and learner-centered. This dilemma could be solved by taking into account the role and risks of Artificial Intelligence in generating relevant content.

4. Conclusions

The instructional design of video lessons evolves from traditional lessons captured by multimedia technologies to the learning design of video clips and video conferencing. Each of these educational technologies opens the door for multiple learning strategies, which are cognitive, affective, social, and (meta)cognitive, and could be integrated into digital microcredentials. Nowadays, comprehension regarding the effectiveness of video lessons is further strengthened while teachers use interactive learning strategies like group discussions in the model of flipped learning. For best results, this implies that video-based learning enhances conventional teaching techniques rather than takes their place.

Prior studies have demonstrated that students' learning outcomes can be enhanced by the use of digital media, particularly instructional videos lessons. From the perspective of educational metasystemology, the focus of learning design should be the synergic effect, which can be achieved using the principles of self-regulation, personalization, feedback diversity, clarity, dynamism flexibility, and ergonomics. More research is needed to evidence the impact of the educational metasystemology for the on-demand learning design of digital microcredentials.

REFERENCES

- Acree, L. (2016) Seven lessons learned from implementing micro-credentials. *Friday Institute for Educational Innovation at the NC State University College of Education*. <https://www-data.fi.ncsu.edu/wp-content/uploads/2016/02/28152144/microcredentials.pdf> [Accessed 2nd January 2025].
- Beheshti, M., Taspolat, A., Kaya, O. & Sapanca, H. (2018) Characteristics of instructional videos. *World Journal on Educational Technology: Current Issues*, 10(2), pp. 79-87.
- Catalano, F. & Doucet, K. (2013) Digital 'badges' emerge as part of credentialing's future. *Institute for Credentialing Excellence*, 203. <https://finepointwriting.com/wp-content/uploads/2013/07/White-Paper-Freelance-Writer-Sample.pdf> [Accessed 2nd January 2025].
- Cergnit, I. (2002) *Sisteme de instruire alternative și complementare. Structuri, stiluri și strategii*. Bucuresti, Ed. Aramis.
- Ernita, N. (2025) YouTube Video Application in Mathematical Physics 1 Lecture: Effectiveness on Students' Conceptual Understanding. In *Proceeding of International Conference on Physics and Physics Education*. 1(1). pp. 53-63.
- European Union (2021) *A European approach to micro-credentials*. A European approach to micro-credentials brochure [Accessed 2nd January 2025].

Flavell, J. (1978) Metacognitive development. *Structural/process theories of complex human behavior*. 213-245.

Google Books Ngram Viewer.
https://books.google.com/ngrams/graph?content=micro-credentials%2Cvideo+lessons&year_start=1960&year_end=2022&corpus=en&smoothing=3&case_insensitive=false,
<https://books.google.com/ngrams/info>
 [Accessed 4th January 2025].

Hilsmann, N. & Dodson, C. (2025) Mobile Microlearning in Continuing Professional Development for Nursing: A Scoping Review. *The Journal of Continuing Education in Nursing*. 56(2), 53-62.

Live Lectures. (2025) <https://www.teachmint.com/glossary/1/live-lectures/#:~:text=Live%20lectures%20are%20live%20educational,track%20their%20syllabus%20and%20progress> [Accessed 2nd January 2025].

Loper, A. (1980) Metacognitive development: Implications for cognitive training. *Exceptional Education Quarterly*. 1(1), 1-8.

Mayer, R. (2009) *Multimedia learning*. New York: Cambridge University Press.

Mayer, R., Fiorella, L. & Stull, A. (2020) Five ways to increase the effectiveness of instructional video. *Educational Technology Research and Development*. 68(3), 837-852.

Myers, M. & Paris, S. (1978) Children's metacognitive knowledge about reading. *Journal of Educational psychology*. 70(5), 680-687.

Railean, E. (2024) Interactive Learning Strategies in Higher Education: From Enhanced Lecture to Team-Based Learning. In *Implementing Interactive Learning Strategies in Higher Education* (pp. 1-32). IGI Global Scientific Publishing. doi: 10.4018/979-8-3693-3559-8.ch001.

Railean, E. (2017) Metasystems learning design theory and information visualization. In: *Proceedings of the International Conference on Virtual Learning*, Ed. 12, 28 octombrie 2017, București. National Institute for R & D in Informatics, 2017, Vol. 12, pp. 170-175. ISSN 1844-8933.

Rubin, J. (1975) What the "Good Language Learner" Can Teach Us. *TESOL Quarterly*. 9(1), 41-51.

Selvaratnam, R. & Sankey, M. (2021) An integrative literature review of the implementation of micro-credentials in higher education: Implications for practice in Australia. *Journal of Teaching and Learning for Graduate Employability*. 12(1), 1-17.

SendPulse (2025) Video lesson. https://sendpulse.com/support/glossary/video-lesson#video_lectures_types [Accessed 2nd January 2025].

Stamatakis, A., Logothetis, I., Petridis, K., Kalogiannakis, M. & Vidakis, N. (2025) Micro-Credentials Establish New Realities in Digital Education. In *Integrating Micro-Credentials with AI in Open Education*. 19-38. IGI Global Scientific Publishing. doi: 10.4018/979-8-3693-5488-9.ch002.

UNESCO (2018) *Digital credentialing-implications for the recognition of learning across borders*. <https://unesdoc.unesco.org/ark:/48223/pf0000264428> [Accessed 2nd January 2025].