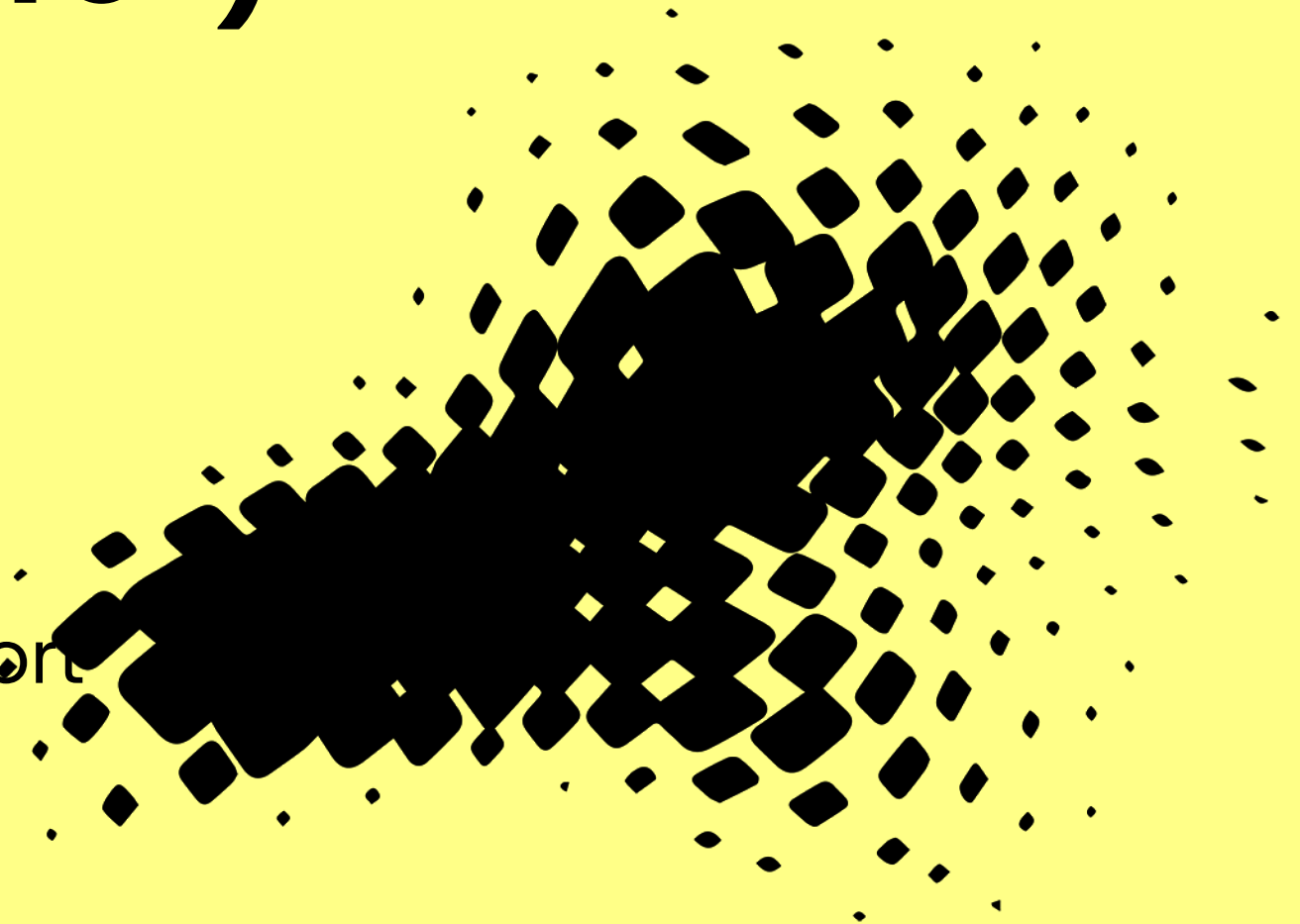


High-quality means of assessing (micro-) learning

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TP4 Digital pedagogy
Sub-contractor study, report
12/2022



Background

The purpose of this study was to map out studies and the results and good practices of the development work carried out on the evaluation of learning, and especially micro-learning. In addition to micro-learning, the study also mapped out the use and assessment of badges and micro-credentials, as these are often closely linked to micro-learning.

The material covered by the study consists of scientific articles, results of development projects, examples that emerged at Digivisio 2030 events, and models and examples implemented by other organisations.

The work was carried out in autumn 2022 in co-operation with other Digivisio 2030 sub-contractor studies that were under way at the same time. Some of the results of the study were presented on 12 December 2022 in the digital pedagogy studio webinar Digipedagogiikan studio, on the basis of which the report was supplemented with examples and observations received from the participants.

Content

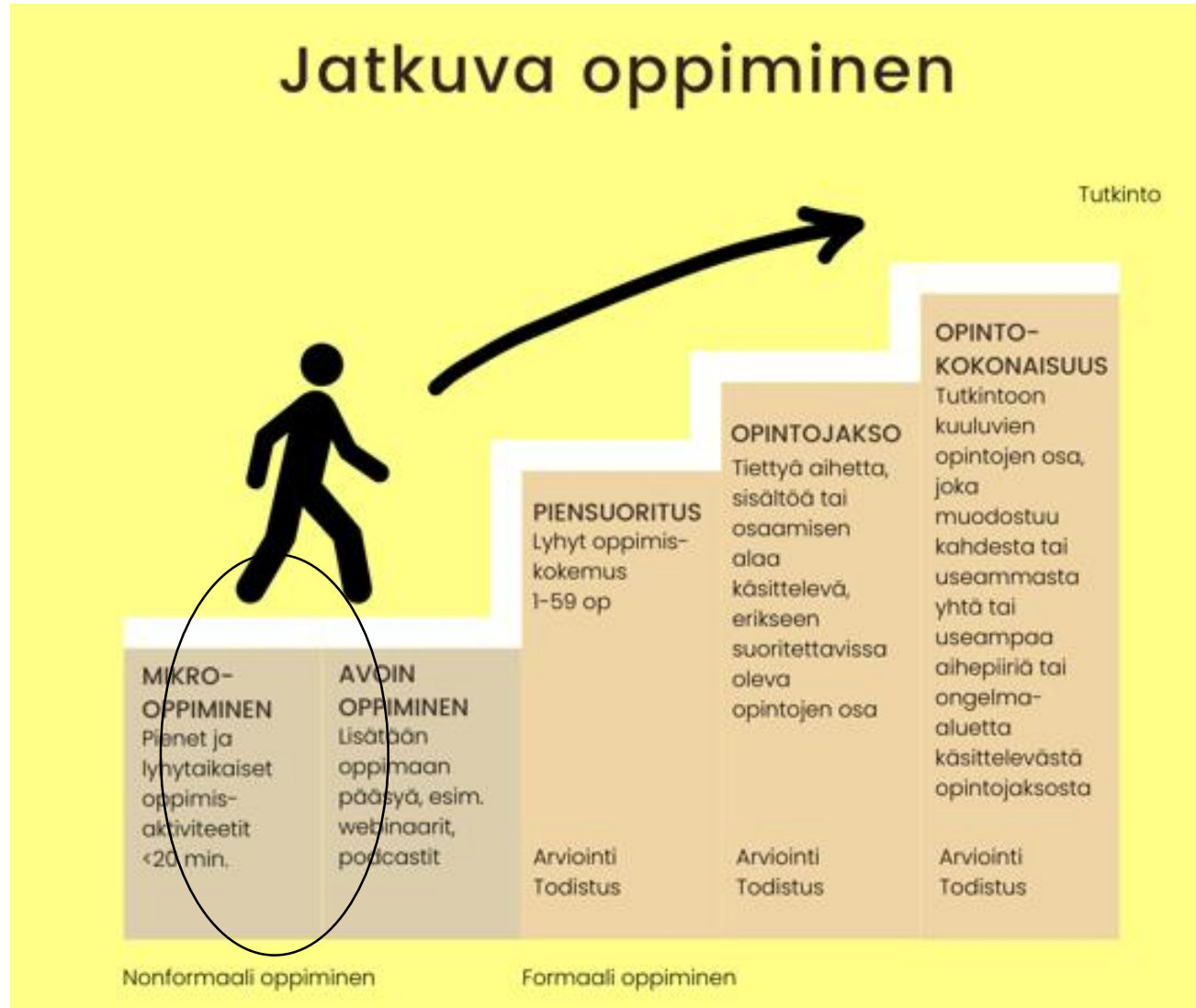
- Learning and assessment
- Micro-learning
- Gamification
- Badges
- Micro-credentials
- Recommendations

Learning and assessment

- *Learning*, definition:
 - A process in which an individual adopts new information or changes existing knowledge, skills, behaviour or preferences
- *Assessment*, definition:
 - The aim is to assess the pupil's or student's learning competence or learning outcomes

Vocabulary of Education OKSA (Ministry of Education and Culture publications 2021:10) (in Finnish)

Micro-learning



Source: Digivisio 2030 –The digital pedagogy studio webinar Digipedagogiikan studio 23 November 2022
Modularity and micro-credentials on the tray of continuous learning

Micro-learning and continuous learning 1/2

- (Online) learning in small sections, a meaningful way to learn
- Frequently working life oriented and based on continuous learning needs
- Micro-learning content or micro-learning can be used in small competence modules
- **Micro content:** Small amount of digital information
 - Individually targeted and therefore fascinating; content that can be presented independently
 - Material in small pieces: blogs, wikis, formulas, mini podcasts (1-20 minutes), micro videos (1-10 minutes), questionnaires, games
 - Content that contains one concept or idea; content that has a URL or link.
- Source: Jomah et al 2016; Nikou & Economides 2018

Micro-learning and continuous learning 2/2

- *Micro-learning is a way of studying small pieces that are easy to absorb. (Perämäki 2020)*
- A flexible way to develop competence in a timely manner, drawing on small content packages that inspire the subject and applying what has been learned in practice quickly
- Possibility to select and study contents at one's own pace

<https://www.ttl.fi/koulutus/verkkovalmennus/mikro-oppiminen> (in Finnish)

<https://www.mediamasteri.com/blog/mita-tarkoittaa-mikro-oppiminen> (in Finnish)

Note! Although micro-learning in itself means small (online) learning pieces that typically last less than 10 minutes, they can also be part of a larger entity, such as a MOOC.

Examples of micro-learning

- **Nearly 450 micro-learning material items implemented in the SotePeda 24/7 project on the aoe.fi website** ([Open learning materials - Sotepeda 24/7 \(sotepeda247.fi\)](https://www.aoe.fi/ajankohtaiset/sotepeda-24-7), in Finnish)
- **Finnish Institute of Occupational Health's micro-learning library (in Finnish)** (<https://www.ttl.fi/koulutus/verkkovalmennus/mikro-oppiminen>)
- **Mikro-oppimisen avulla osaamista nopeasti ja tehokkaasti**, article in Finnish (Panu Huczkowski) (<https://www.lapinamk.fi/blogs/Mikro-oppiminen-avulla-osaamista-nopeasti-ja-tehoasti/40628/d1268673-5b41-4cd8-94b4-a13a7d5bf05b>)

Gamification in online teaching

What is gamification?

- Bringing elements familiar from games such as interaction and psychological rewards to a goal-oriented environment – for example, an online course or online teaching
- A way to improve the implementation of a goal such as learning

What gamification is NOT?

- Adding funny things and tricks only to increase entertainment value
- Creating or developing a game – gamification is a tool for making certain goals, such as adopting new things, more effective.

Source: <https://www.mediamasteri.com/blog/pelillistaminen-opetuksessa-ja-oppimisessa> (in Finnish)

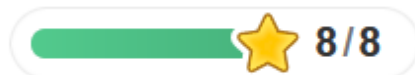
Moodle, an example of gamification

Kertauskysymykset

Raahaa sanat oikeisiin laatikoihin.

- Magneettitutkimuk... ✓ ei käytetä ionisoivaa säteilyä
- Luun murtumadiagnostiikka perustuu natiiviröntgenkuviin ✓
- Natiivi tarkoittaa röntgentutkimusta, joka on tehty ilman varjoainetta ✓
- Mammografia tarkoittaa rintojen röntgent... ✓
- Tietokonetomograf... ✓ potilaan saama säteilyannos on suhteellisen suuri.
- C-kaarilaite ✓ voi olla käytössä esimerkiksi leikkaussalissa.
- Tietokonetomografiatutkimuksessa säteily tuotetaan röntgenputkella ✓
- Ultraäänitutkimuk... ✓ voidaan tutkia non-invasiivisesti ja ilman ionisoivaa säteilyä vatsan aluetta

Hyvin meni!



Edistymisen seuranta

NYT



Kertauskysymykset

Suoritettu (hyväksytty arvosana) ✓

Tips for gamifying online teaching

- PLD = Personalized Learning Designer, i.e. it is possible to create different rules that, for example, enable students to progress to new materials, assignments, etc. based on their results
- Add-ons for gamification are available for Moodle, for example, Game and Level Up!
- The Stash plug-in is also a gamification plug-in for Moodle.
- A presentation of Moodle game plugins from 2018:
<https://www.slideshare.net/EADTU/oofhec2018-teija-lehto-tanja-korhonen-developing-a-gamified-online-course-on-serious-games>

Examples of gamification

(12 December 2022 Digital pedagogy studio webinar Digipedagogiikan studio – participant comments)

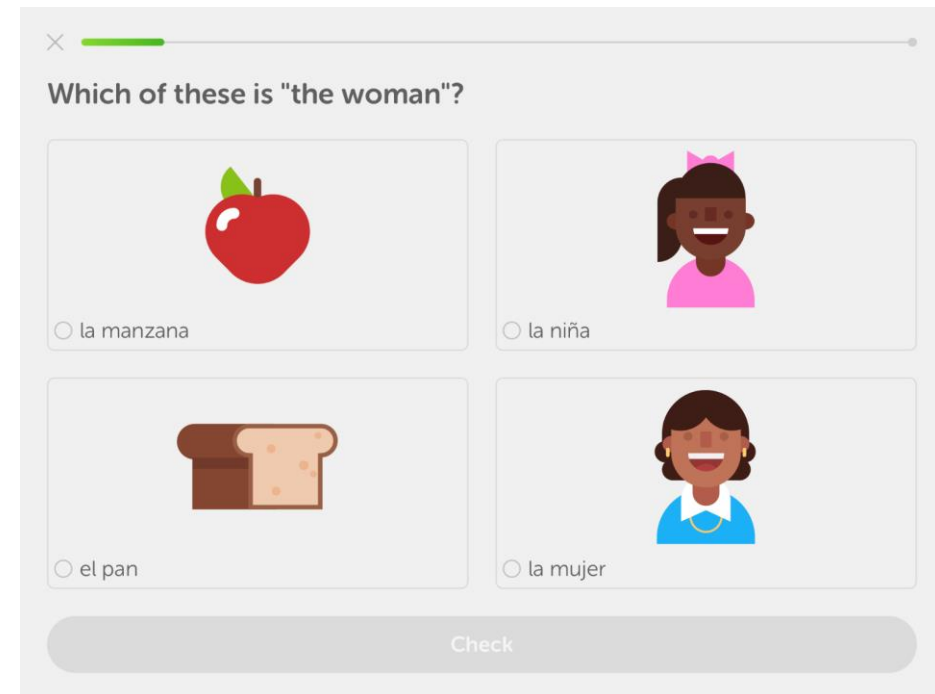
- In the gamified Oppiminen Online module developed by OAMK, HAMK and partners, professional teachers have already developed their digital pedagogy competence over 33,000 times. In several articles, see Digital open badge-driven learning project
 - <https://www.researchgate.net/project/Digital-Open-Badge-Driven-Learning>
- Adventure Pedagogy:
 - <https://hundred.org/en/innovations/adventure-pedagogy>
- In Duolingo, gamification is well implemented from the perspective of language learning. As a learner, it is essential that the individual performance is max. 5 minutes long, so there is time to complete it. However, the gaming logic makes one complete several in a row. An essential incentive are also points and comparison with other learners. Not all learners are motivated by these elements, but they are very inspiring. Learning by doing is also essential. A mobile device enables learning when possible – e.g. when outside of home.
- Gamification can also make good use of escape game pedagogy
 - <https://sites.uef.fi/sm4rtloc/pakopelipedagogiikka/> (in Finnish)
 - <https://www.uef.fi/fi/artikkeli/pakoteekki-tukee-farmasian-opiskelijoiden-valmistautumista-apteekkiharjoitteluun> (in Finnish)
- The teachers of Savonia have created a mobile game called Lääkemaisteri for practising pharmaceutical invoices <https://blogi.savonia.fi/sotevi/laakemaisteri/>

Mobile micro-learning

- Learning is combined with everyday activities (bus trips, waiting...)
- Personalisation of studies, not tied to time and place
- Commitment to studying with a device (mobile device + app), which is always with you -> ease of use
 - Notifications: increase engagement and learning attainments
 - Micro-learning can be a stimulation to do something when a person is bored
 - The individuality of mobile micro-learning is motivating

Source: Dingler, Weber, Pielot, Cooper, Chang & Henze 2017. Language learning on-the-go: Opportune moments and design of mobile microlearning sessions.

Mobile micro-learning



Photos: <https://www.bookwidgets.com/blog/2017/02/12-microlearning-apps-that-are-the-perfect-fit-for-your-classroom>

Assessment of micro-learning

- It is advisable to include assessment in learning: gamification and various problem-solving tasks and automation are utilised
 - Reduces test anxiety, "performance pressure"
- Making use of gamification: for example, preparing assignments so that the student receives feedback on both correct and incorrect answers
 - Points, levels, stars, milestones
 - Questionnaires, Moodle H5P
- Real-world problem-solving and decision-making situations (scenario)
 - Pharmacotherapy - > pharmaceutical invoice and medication dosage
- Simulations
 - Students do something concrete, for example with software that gives feedback
- Final test/compilation test?
 - May be in place to combine the management of various materials

Challenges in micro-learning and its evaluation

- How is micro-learning recognised and acknowledged and at what stage?
- Writing out of objectives and contents -> recognising studies
 - Micro content quality assurance
 - When has competence accumulated so much that you can be awarded a badge?
- What is the role of micro-learning in degree education, what about continuous learning after completing the degree?
- When do separate micro-learning components form a logical (stacking) entity, when are they only separate pieces?
- How can learning analytics and artificial intelligence support the stacking of micro-learning and thus the construction of larger entities?

Badges

– background and purpose



- Electronic symbols
- In the background, the physical badges used by scouts
- The purpose of the badge is to demonstrate, for example, the competence remaining in the blind spot of formal education that is not otherwise visible in the degree certificate as a skill
- The badge system can also be utilised in a versatile manner in the development of competence, for example in building a personal learning path and motivating learning.

See e.g.

<https://unlimited.hamk.fi/ammattillinen-osaaminen-ja-opetus/osaamismerkit-osaamisen-tunnustamisessa/#.Y2Knx9-xUuU> (in Finnish)

Badges in identifying competence

Different interpretations and uses in definitions and operating methods

- a tool for making non-formal competence visible
- demonstrating formal competence alongside credits (e.g. FiTech)
- primary assessment tool for study unit evaluation (e.g. Abramovich 2016)
- synonym for micro-credentials
 - 'In international research, digital open badges are described as micro-credentials that serve a clear function in the knowledge structure of the learning process and outcomes, with the learner in the centre.' (Brauer 2021, <https://tieke.fi/en/micros-macros-and-badges-skills-for-working-life/>)

Brauer (2021) states that,

- 'What is exactly meant by these terms varies not only from country to country but also within countries. *The key thing is for us to create common ways to interpret competence descriptions in a uniform way in various situations.*'

Special features of badges

- Metadata related to badges most essential special feature
- The badge consists of an identification image and the information content (metadata) attached to it, which explains
 - badge name
 - issuer information
 - learning outcomes
 - evaluation criteria and
 - evidence required for the competence description (e.g. screenshot, web link).
- The assessment criteria may be described in each badge separately or as part of the overall structure of the badges.
- Formulation of learning outcomes and assessment criteria for badges is relatively simple if the learning outcomes are clearly described in the curriculum.

<https://eperusteet.opintopolku.fi/#/fi/opas/7396550/tekstikappale/7395308> (in Finnish)

Key tasks of badges in higher education (Mah 2016)

1. *Motivation*

- The badge is perceived as a prize (Moon et al. 2011)
- The motivating effect depends on the type of badge and the learner's previous know-how (Abramovich et al. 2013)
- The collection of badges can also become an intrinsic value instead of learning (Resnick 2012)

2. *Recognition of learning*

- Demonstrating non-formal and generic skills that would otherwise not be visible in a higher education degree (Gibson et al. 2013).
- Making generic skills visible with badges

3. *Making achievements visible*

- Significance in the eyes of employers

4. *Illustration of the learning path*

- Promotes self-regulation skills

5. *Engaging (first year) students*

- Badges make studying more attractive

Taking assessment into account in the planning of badges

- A uniform and systematic way of structuring the learning outcomes, assessment criteria and demonstration of competence, facilitates not only the applicant for the badge but also the teaching and guidance staff to build a common understanding of competence that may otherwise be difficult to verbalise (Brauer, Siklander et al. 2020).
- A technical template describing the design of the badge is often the first step when an organisation starts using badges. During the design phase, the template compiles the badge information from the assessment of competence to the graphic look, not forgetting the instructions intended for teachers.

- University of Oulu as an example (Brauer et al. 2020):



An example of the metadata of a badge template (Trepule et al. 2021)

Quality criteria that need to be visible in DB description metadata template in virtual learning environment	Assessment	Recognition
Information about the learner (name and ID number)	X	X
Type of badge (open digital badge; digital badge)		X
Name and type of the issuing institution (HE institution; continuing education institution; online/MOOC provider together with a HE institution; online/MOOC provider; employer organization; professional organisation / chamber, etc.)		X
Type of learning (short learning program (qualification, modular, etc.); ECTS based non-formal course; non-formal course (not ECTS based) certificate; informal learning activity evidence; ECTS based informal learning activity evidence)		X
Badge category (formal qualification / degree; non-formal certificate; record of experience / portfolio / badges)		X
Type of learning outcome (knowledge; skills; autonomy / responsibility)	X	X
Level of learning (EQF or NQF)		X
Mode of learning (online; face-to-face; blended; placement; workplace)		X
Activity type (workshop, seminar or conference; discussion; group work; teamwork; individual work; internship / placement; apprenticeship / shadowing; job experience; project work)		X
Volume of learning (in ECTS and contact hours)		X
Type of assessment (formative (accumulative); summative (at a conclusion of a defined instructional period); or both)	X	
Procedural requirements for learner authentication and ID verification (online assessment without ID verification; online assessment with ID verification (proctoring); ID verification with secure login + password in learning management system; ID verification with third party tool; ID verification against national ID databases; biometric ID verification; other)	X	
Assessed by whom (peer assessment; self-assessment; teacher assessment; independent assessor (third party))		X
Format of assessment (automatic grading; manual grading; both, automatic and manual grading)		X
Grading scheme (pass or fail; 100% to 0%; A+ (excellent) to F- (fail); 10 (excellent) to 0 (fail) grade scale)	X	

Micro-credentials and continuous learning

- 'A clear path to development and qualifications as an expert requires that the provision of learning is renewed into clearer entities that are identified and valued both among learners and in the labour market.
- The supply must be able to accumulate into an expert development path.
- Key methods include developing micro-credentials in accordance with the EU recommendation, strengthening the position of specialisation training and clarifying competence modules aimed at international talents and persons with a foreign background already in Finland.

Source: Ministry of Education and Culture. 2022. Maailman osaavimman ja sivistyneimmän kansan kotimaaksi. Kansallinen korkeakoulujen jatkuvan oppimisen strategia. (in Finnish)

Micro-credentials

- Micro-credentials are
 - 1-59 ETCS
 - A small amount of studies or acquired competence
 - whose *learning outcomes* are described
 - whose *scope* is defined
 - that has been reliably *assessed* and
 - that produces a *certificate* that is available for electronic use and owned by the learner.
- In Finland, micro-credentials offered by higher education institutions may include study modules included in degree education.(2) and study units as well as specialisation studies, open higher education studies, study modules completed as continuing education.(2) and fee-based continuing education.

Source: Ministry of Education and Culture. Vocabulary of Education OKSA, draft for comments 18 November 2022.

Certificate for micro-credentials

- In accordance with the commission's proposal, the evidence must include the following information:
 - (1) learner identification,
 - (2) the name of the small competence module,
 - (3) country/region of issuer,
 - (4) issuing body,
 - (5) date of issue,
 - (6) learning outcomes,
 - (7) indicative workload needed to achieve learning outcomes (where possible within the European Credit Transfer and Accumulation System)
 - (8) level of learning experience leading to a small competence module (and cycle where relevant) (European Qualifications Framework, European Higher Education Area Qualifications Framework), as appropriate;
 - (9) type of assessment
 - (10) form of participation in learning
 - (11) type of quality assurance used as the basis for a small competence module.

Source: Ministry of Education and Culture. Vocabulary of Education OKSA, draft for comments 18 November 2022.

Micro-credential assessment

- As described in the curriculum
- Recommended assessment methods for micro-credentials:
 - Project-based assessment
 - Problem-based assessment
 - Scenario-based, reality simulation, assessment
 - Video recorded performance
 - Written assessment
 - Portfolio
 - Observation at the workplace
 - Discussions, dialogues, argumentation, etc.

Source: eCampusOntario's Micro-credential toolkit. <https://ecampusontario.pressbooks.pub/microcredentialtoolkit/chapter/assessments/>

Principles of micro-credential assessment

- Competence-based approach
 - The assessment must be based on evidence (task, etc., not just the time spent doing it) that is mirrored in the assessment framework
- Tailored assessment
 - The assessment criteria and the assessment framework must be drawn up for specific competence, not for the general framework (cf. knowledge, skills, being)
- Targeted feedback
 - the evaluator must give feedback that is in line with the competence framework. The feedback must be useful to the student! "Didn't go so well" is not enough for an assessment!
- Qualified assessment authors:
 - Evaluators must understand the components of competence and how the competence is linked to the competence framework
 - The assessment must be objective and impartial
- Reliability of assessment at organisational level: consistency of assessment at organisational level must be reviewed, quality assurance

Source: CCSSO. 2020. Design, Assessment, and Implementation Principles for Education Micro-credentials.

General recommendations

- Although the terminology of micro-learning and e-learning and their assessment has become clearer recently, it is still blurred and sometimes even inconsistent. It is recommended that the Digivisio 2030 project unambiguously define what the concepts (e.g. modularity, micro-credential) mean in the project and what their interconnections are; for example, what is the relationship between a micro-credential and a badge.
- If the non-formal teaching offered to the continuous learning tray (e.g. micro-learning "pieces") is to be stacked in such a way that it can be made part of formal learning, the learning outcomes, assessment criteria, NQF level and scope of the non-formal offer on the tray must be defined so that it is possible and equal to recognise previous learning irrespective of which higher-education institution receives the learning.
- Because the "pieces" of micro-learning are not entire study units, they also do not grant credits. From the learner's point of view, it is essential to know what kind of credit they will receive and where they will be stored if it is possible to compile stacking "total performances".

Recommendations, assessment of micro-learning:

- The NQF level for the contents should be defined.
- The contents should be designed stackable (i.e. how small are the contents that form an ECTS-sized performance?).
- Where possible, artificial intelligence should be utilised in recommending stacking studies.
- The learning outcomes, contents, duration and assessment should be described
- You should think about the ways in which micro-learning gives credits, or whether it does. The description must indicate whether it is only about participation or performance, and the evaluation criteria must be presented for the latter.
- The study description must be written so clearly (see previous sections) that the student knows what they commit to and what kind of credit they receive from this.

Recommendations, badges

- If a badge can be awarded for the offer to the continuous learning tray, the Digivisio 2030 project should define uniform minimum requirements for the metadata of the badge (e.g. a template describing both the scope, learning outcomes and competence demonstration and the NQF level)
- Clarifying the role of the badge. As awarding both a badge and credits for the same study attainment is administratively burdensome, the project should clarify when it makes sense to receive credits and/or a badge for the same study attainment. In the case of courses, it may also be meaningful to divide the course into sections awarded with smaller badges. The same performance may include both degree students and students who do not receive credits, but who could benefit from the badge from the perspective of working life and their professional development.
- The badge must show whether it is a participation mark or a performance mark. A badge should be created through a process comparable to the curriculum process, a badge does not have that dimension in a very controlled manner.
- If a single character is part of a larger entity, it should be clearly defined.
- It should be possible to update the participation marks to a badge if the learner complements their competence.

Recommendations, micro-credentials

- It would be desirable to have visible evaluation criteria for micro-credentials coming to the continuous learning tray. In the future, higher education institutions should discuss the evaluation criteria together and consider the possibility of creating a joint evaluation framework.
- All micro-credentials must be issued an electronic certificate in accordance with the recommendation of the Vocabulary of Education OKSA
- Since micro-credentials may include micro-learning "pieces" (for example, the course may have been implemented as a MOOC course with less than 10 minutes of learning content), in which case the formal and non-formal contents will be combined, these cannot be viewed separately, but the design and implementation of non-formal offerings must also take into account the criteria and rules of formal offering.
- The assessment of micro-credentials must be based on concrete evidence, which can be verified in different ways on a case-by-case basis.
- It must be possible to reliably identify the learner.

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**Thank
you!**

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