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D2.2 Describe Tools and Affordances for Student-Centered Assessment

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1 RATIONALE/KEY CONSIDERATIONS/INTRODUCTION

There are many tools to assess student's learning. If we try to cluster them, we can see tools for competence levels (like PISA or the EQR), exercise-driven tools (to survey student's learning or to document the learning process and/or learning outcomes – for example ePortfolios) and evaluation tools (which mainly support the assessment process). Rubrics are usually an example for the latter, even though they frequently base on descriptors for competences.

When focusing on formative assessment, a combination of exercise-driven tools and evaluation tools seems most appropriate. In order to get a picture of the transversal skills of a student – and/or to allow her/him to get a picture of them her-/himself, a Portfolio solution seems to be an appropriate approach. Compare the ATS2020 documents D. 2.1 (Functional Specifications of eAssessment tools), D. 1.2 (Innovative Assessment for Learning Approaches), and D. 1.4 (ATS2020 Technology and Tools) to find the background for this reflection.

For the ATS2020 project, it will be ideal to find a tool or tool combination that doesn't only support the learning process, but also serves the pilot evaluation, i.e., the gain of competences of learners (and teachers) should be documented.

Key questions for this deliverable:

1. How do the different types of tools function and how/by whom are they applied/used?
2. Which tool(s)/tool combination can be used to assess transversal skills?
3. Which tool(s)/tool combination is recommended for the ATS2020 pilot?

This document is complementary to the Mahara page devoted to D. 2.2 (https://mahara.ats2020.eu/view/view.php?id=301). The mentioned page was kept simultaneously with WP2 developments since April 2016.

Important for this deliverable is to get clear about the focus of assessment: It makes a difference whether we evaluate on basis of Learning Goals, Outcome Taxonomies, Educational Standards or Competency Levels (see Fig. 1). More detailed answers to the question of assessment focus are given in the deliverables of WP1 and show an orientation towards outcome oriented learning on the basis of learning goals.

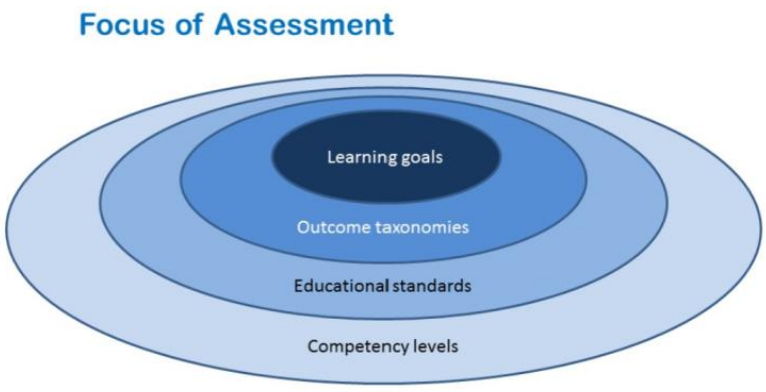


Fig. 1: Focus of Assessment (created by Bernhard Ertl, 2015)

Furthermore, we need to take the Focus on Assessment into consideration. Basis of assessment can be learning goals, outcome taxonomies, educational standards or frameworks defining competency levels. In ATS2020 we have a framework of competency levels (developed with D. 1.1), but it will just serve as a frame for the overall learning process and to make the discussions of learning goals – which are negotiated between learners and their teachers.

When focusing on assessment tools, we can see the following interrelation between the ATS2020 work packages 1 (assessment model) and 2 (technology and tools).

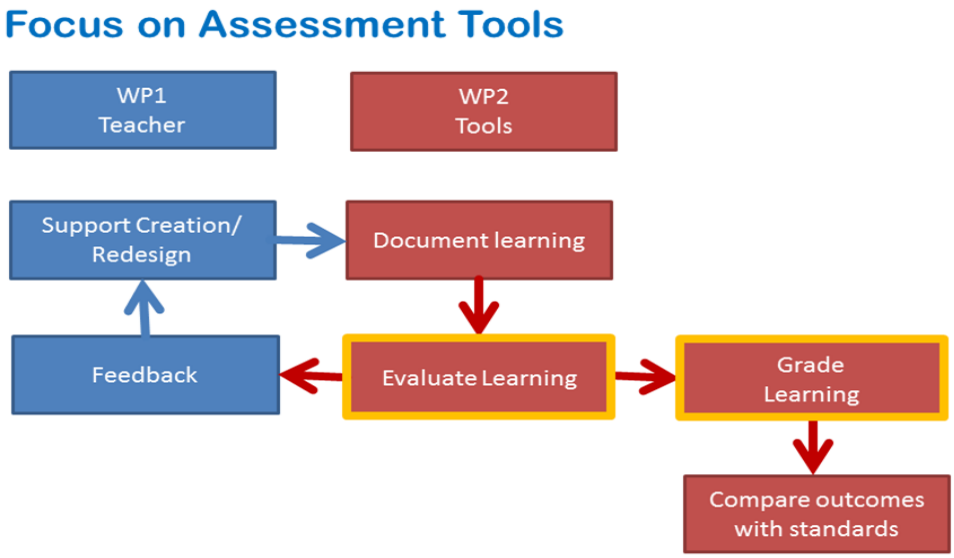


Fig. 2: Focus on Assessment Tools (Bernhard Ertl, 2015)

For the assessment process – assisted by tools – the following tensions should also be taken into consideration:

- Reaching Standards vs. Focus on the Individual (and her/his learning aims)
- Learning Outcomes vs. Learning Gains
- Supporting Excellence vs. Ensuring Inclusion

It is important to devote a chapter to platforms (VLEs: LMSs as well as ePortfolio platforms) as these have to be used in order to bundle the tools and to organise the work with them. See **chapter 3: Evaluation of Virtual Learning Environments (VLEs)**).

2 METHODOLOGY

The use of electronic portfolios is one of the methods to evaluate the actual condition by using computer and network technology. It enables the portfolio owner to accumulate and store their works in various forms, including audios, videos, images, and text.

2.1 DESKTOP RESEARCH AND REVIEW OF (E)ASSESSMENT TOOLS

A range of (e)Assessment tools are presented and reviewed in order to give an insight into what is state of the art and as a basis for reflection what can be used for the assessment of transversal skills. Most of the reviews were shared with ATS2020 partners and a broader audience right away, via the ATS2020 WP2 ePortfolio at https://mahara.ats2020.eu/view/view.php?id=178 (bibliography, blog, link to own page devoted to D. 2.2).

2.2 EVALUATION OF TOOLS

2.2.1 Dimensions of Evaluation (Ertl e.a.2010)

Following Ertl e.a. (2010), the following dimensions of evaluation of assessment tools can be derived: a cognitive, an epistemological, a social and a technical dimension.

Cognitive dimension: assessment prerequisites (including assessment strategies as wells as self-assessment of prior learning/skills). Strategies how to reach learning goals also belong to this dimension, and so is the setting of these goals. A further aspect is ownership of learning.

Questions for this dimension (also derived from Ertl e.a.):

- How and how much does a tool/learning environment (LE) enable learners to identify and evaluate their existing skills?
- Which learning strategies and processes are encouraged by the tool/within the LE?
- How are learners supported in developing a strategy and pursuing it?
- Can learners take control of their own learning? How are they supported in this? (Ertl e.a., 2010, 36/37)

Epistemological dimension: This dimension refers to structure and implementation of the content. Ertl e.a. (2010) reflect mainly content provided for the students. For ATS2020 we could use this dimension to discuss how far a tool reflects learning content or contains references to learning content.

Social dimension: the focus of evaluating tools for assessment should be on facilitation/mentoring and sociability. Questions – again basing on the reflections of Ertl e.a. (2010, 38) – are:

- Is there a space providing collaborative assessment methods?
- Is a transparent skills framework available as a basis for the assessment by learners and teachers?

- How are the roles and tasks of the users of the tool/learning environment defined?
- Can the following tasks be carried out: self-assessment, peer review, assessment by a teacher/mentor, assessment by an authority (cf. Del. 2.1.1, Functional Specification, for details)?
- Does the tool/environment provide spaces for the socialising of learners?
- Is an integration of the various learning aspects which are related to assessment possible (e.g.: group work, documentation of oral presentations, face-to-face-meetings with the teacher/mentor or with peers)?
- Technical Dimension: this dimension reflects usability and technical support affordances (cf. Ertl e.a. 2010, 38/39).
- Are the assessment environments and tools appropriate and adequate?
- Which competences do students and teachers need to use learning environments and assessment tools in order to perform the tasks foreseen in the ATS2020 assessment model?
- Do screen design and menus allow easy navigation and rather intuitive work without big training efforts?
- Can technical support (1st – 3rd level support) be given in an adequate and timely manner (the latter mainly referring to reaction times of support staff)?

These questions can serve as a basis for choosing ePortfolio-platforms, as well, and a table derived from the questions stated above was used for a workshop by Nicolas Kanaris & Andrea Ghoneim at the ATS2020 Final Conference in Brussels on 2 February 2018:

Dimension	Criterion	Remark
Cogntive Dimension	Does the learning environment/tool enable learners to activate their existing knowledge/skills?	
	How does the learning environment prevent cognitive overload?	
	How much prior knowledge/prior skills do the students have?	
	Which learning strategies and processes are encouraged within the environment?	
Epistemological dimension	Which didactical content will be realized?	
	Is the learning environment based upon a particular educational theory?	

	Does the learning environment increase the student's level of motivation?	
Social dimension	Do teachers, tutors, and students have set roles and tasks?	
	Are there chances for learner's socializing?	
	Are there features which allow giving and receiving of feedback/formative assessment?	
Technical dimension	Are the learning tools appropriate and adequate?	
	Do the students have a sufficient level of media competence to use the LE?	
	Does the usability and screen design of the environment allow easy navigation by the user?	
	What kind of media can be used within the LE?	
	How is the quality of technical support?	

Table 1 on the basis of Ertl, B., Ebner, K., & Kikis -Papadakis, K. (2010). Evaluation of e-learning. International Journal of Knowledge Society Research, 1(3), 31-43.

2.2.2 Evaluation of eAssessment Tools

When drafting the proposal, we thought of developing a criteria list for e-assessment tools as was done for ePortfolios by Himpsl & Baumgartner in 2009 and to use it to assess the tools with the method of Qualitative Weight and Sum (QWS).

We felt that the QWS methodology proposed in the project bid offers a good and flexible framework and is not too context sensitive. Also, it seemed that it makes it possible to divide work and work efficiently in parallel. However, research showed that the field of available technology support is too large and thus cannot provide enough depth for the survey and comparison. The other reason for abstaining from doing an evaluation basing on QWS was the fact that results had to be produced in a timely manner in order to ensure that enough time can be devoted to set up first teaching and learning spaces equipped with a (preliminary) choice of eAssessment tools in order to train the teacher trainers and to start with further development of tools in cooperation with them.

When trying to work with QWS with ATS2020 partners in Ljubljana (in July 2015), it showed that there was not enough time to do a workshop on it. Even the key partners of WP2 found the method too complex. The more complex the method, the smaller is the subset of tested tools (in order to achieve results in time). The other problem that emerged, was, that not all tools can be used in every platform, therefore the interdependence of tools and platforms also has to be taken into consideration, which also raises complexity.

As a result, the criteria checklist basing on Ertl e.a. (2010) was used for rough orientation, while – on this basis – mainly a strength- weaknesses-profile of tools was elaborated. To keep discussions on tools and new developments alive during the project, a blog was created additionally. "Tools, Platforms, and bases for learner-centered, assessment-based work in classroom. Andrea's ATS2020 blog" is displayed on the main page of the ATS2020 WP2 ePortfolio collection at https://mahara.ats2020.eu/view/view.php?id=178.

2.2.3 Evaluation of Tools and Platforms used by ATS2020 partners

On basis of the first stage of desktop research, and expertise of the WP2 key partners, a first setup of technology and tools support for ATS2020 was proposed on 03 September 2015 in an Online partner meeting (see chapter 5 of this deliverable for details).

For the evaluation of the tools and platforms the ATS2020 team decided to conduct a mini survey resulting from the teachers' experiences expressed in a WP2 ad hoc meeting on September, 17/18, 2015.

In the mentioned meeting (Documentation is published as D. 2.1.4 at https://mahara.ats2020.eu/view/view.php?id=182), teacher's experiences and the exchange on key user's needs and practice had a great influence on the (re-)design of the WP2 deliverables. Teachers were very happy with the platforms in use which were corresponding to the ones favoured by the ATS2020 team. After doing a first training with these platforms (Mahara and Office 365), a user experience analysis among ATS2020 partners was carried out in order to see whether all partners are using similar learning environments.

The questionnaire was developed as an online survey instrument containing 4 open and 7 closed questions.

After the survey instrument was developed, the ATS2020 partners were invited by Email on January 14, 2016 as follows:

> *Mini-Questionnaire*
> *While writing D. 2.1 (ATS2020 functional specification for Tools and Technology for Assessment), it showed that there should be more information on different topics from the partners/partner countries. Bernhard and I were thinking about a sequenced questionnaire - small chunks of questions on different tech&tool topics. Participation is not time consuming and can also serve as P2V activitiy (P2V = Peer to Peer Networking for valorisation - see for example http://peerlearning.eun.org/ww/en/pub/peerlearning/homepage/about_p2v.htm).*
>
> *The first questionnaire is here:*
> *http://goo.gl/forms/DGkAscOsw9*
>
> *Depending on outcomes and information needs, we will come up with*

further questionnares in order to deepen insights and discussions.

[…]

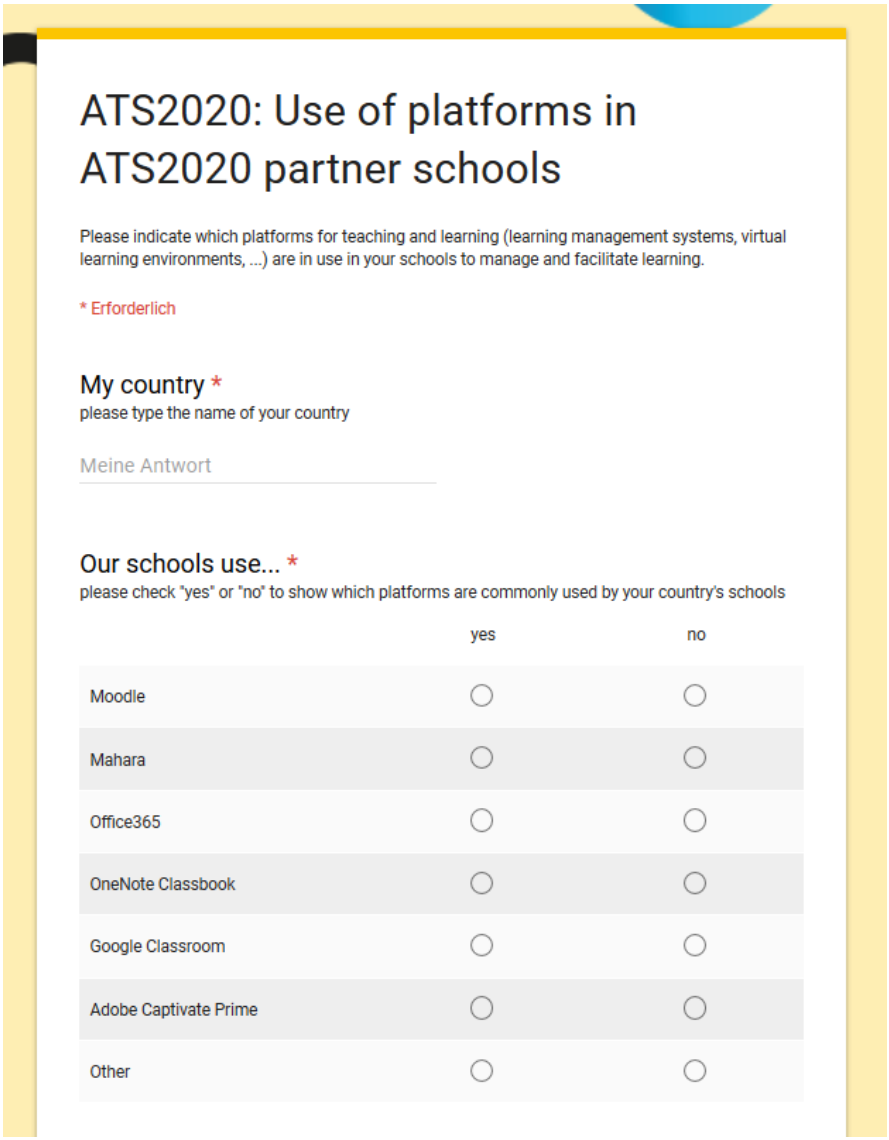
Filling in is anonymous, should be rather brainstormingly (don't do much research about things that are maybe simply not well enough communicated to have impact - even if they exist) and there can be more than one reply per country.

The online questionnaire itself was opened by the following instruction:

Please indicate which platforms for teaching and learning (learning management systems, virtual learning environments, ...) are in use in your schools to manage and facilitate learning.

Partners were presented with a list of popular eLearning platforms (LMS, ePortfolio platforms and other VLEs) and given the additional choice "Other".

The abovementioned questionnaire looks as follows:



ATS2020: Use of platforms in ATS2020 partner schools

Please indicate which platforms for teaching and learning (learning management systems, virtual learning environments, ...) are in use in your schools to manage and facilitate learning.

* Erforderlich

My country *
please type the name of your country

Meine Antwort

Our schools use... *
please check "yes" or "no" to show which platforms are commonly used by your country's schools

	yes	no
Moodle	○	○
Mahara	○	○
Office365	○	○
OneNote Classbook	○	○
Google Classroom	○	○
Adobe Captivate Prime	○	○
Other	○	○

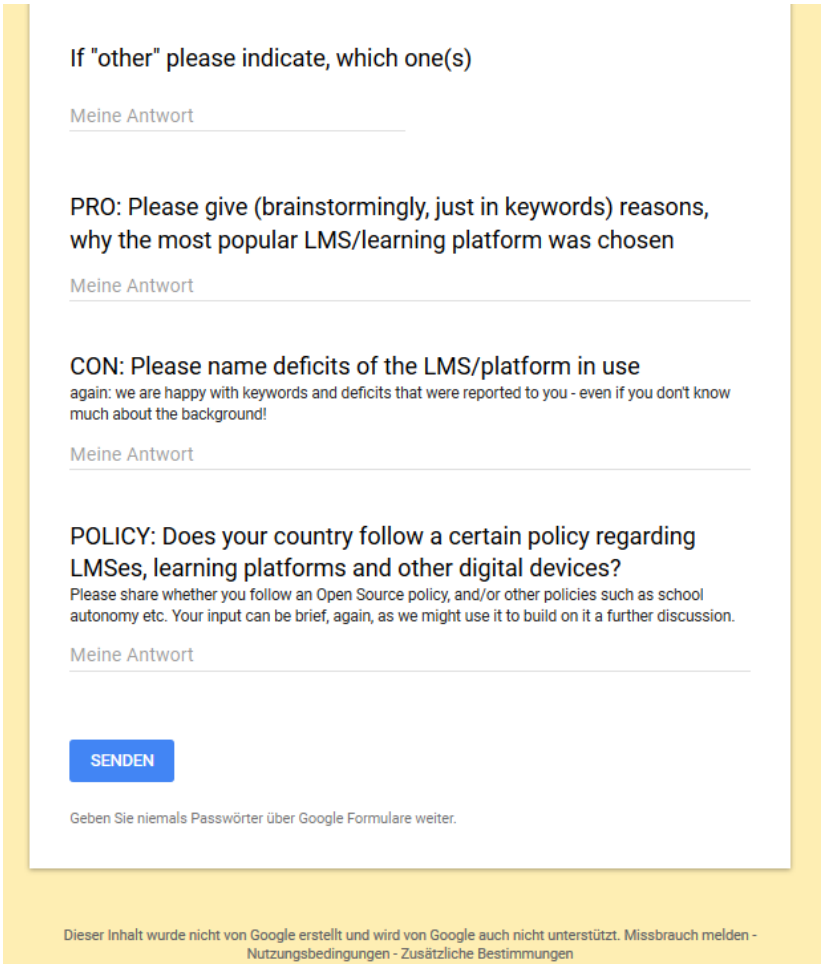


Fig. 3: Online questionnaire for ATS2020 partners at https://docs.google.com/forms/d/e/1FAIpQLSdZ50qaR55HqlAqbij2XZK3pkLti9Pnvjw5JP56-Xh8YMXBnQ/viewform?c=0&w=1

The results were presented in the ATS2020 partner meeting on February 4, 2016.

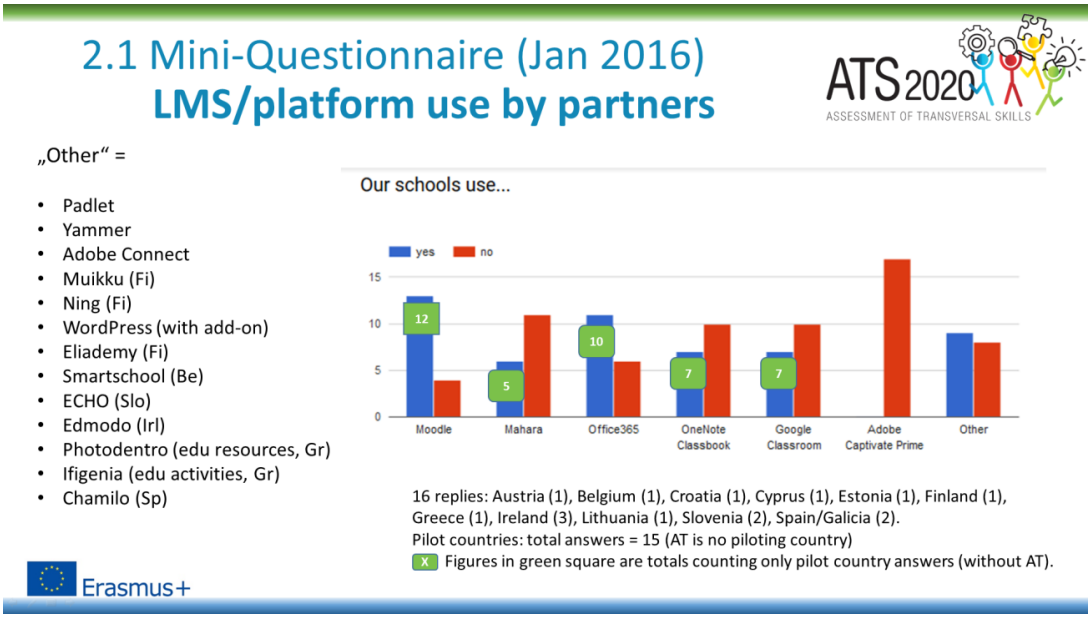


Fig. 4: Use of eLearning platforms in ATS2020 partner countries (Source: WP2 presentation at Online Meeting on Feb 4, 2016 on basis of the abovementioned questionnaire)

Fig.4 shows that a majority of partners and their schools use or have experiences with Moodle or adaptations of Moodle (12 positive replies, see fig. 4). Office 365 is also widely used (10 out of 16 replies positive), as well as OneNote Class Notebook (7 positive answers) and Google Classroom (also 7 yes-answers). Mahara – the only dedicated ePortfolio system among the LMS-platforms in question – was selected 5 times as platform in use.

Replies on the open question which other platforms are in use showed that partners who replied don't make a difference between platforms and tools – and that most of the tools mentioned are not only platform-based, they partly can also be used as platforms:

Padlet (https://padlet.com/), for example, is an online space for collaborative brainstorming, but offers a range of further functionalities. It can be both embedded into Personal Learning Environments (PLEs) like ePortfolio platforms and used for creating ePortfolios, as well. (Cf the blog entry at https://mahara.ats2020.eu/artefact/artefact.php?artefact=42158&view=178)

The following pro arguments for the "most popular" tools/platforms in use were given:

Belgium	Google (classroom), Smartschool	GO!, organized by the flemish community and one of the 3 main educational networks of Flanders had an agreement with Smartschool. Besides there are a lot of other publishers who work Smartschool.
Croatia	Moodle, O365, Adobe Connect	We (CARNet) provide support for Moodle and Office 365. We have information that other platforms are in use but there is no support at the national level.
Cyprus	Moodle, O365, Google (cl.)	None of the above platforms is more popular than the other. They are used by a small number of schools mostly with the support of the ministry. Even though they are quite user friendly and easy to use, the decision on using one of these depends on how familiar teachers are with one or the other and the support and training they will get.
Estonia	HITSA Moodle	supports community-based learning over the Internet and is suitable both for the creation of online courses and for supporting classroom teaching
Finland	Muikku (own production), Ning, WordPress (with add-on), Eliademy, Google (cl.)	Institutions own coding / own product has been in early times competitive advantage, now particularly the possibility to use bid data / data analysis. In other cases: operational reliability, easy to let outsiders (visitors) participate, opportunity to work with large groups, smooth interface, possibility to edit interface,
Finland	Moodle, O365, OneNote	Open source, cost, support
Greece	Moodle, Google (cl.), Photodentro + Ifigeneia	Edu resources + activities; Open e-class + teleconference etc.; support by the Pan-Hellenic School Network, promotion during educational seminars.
Ireland	Moodle, O365, OneNote, Google (cl.)	Education boards are recommending O365. Trend is moving from Google towards MS in schools
Ireland	Moodle, O365, OneNote, Google (cl.)	Moodle - less used now - Open Source - feed-down from Third level Office 365 - familiarity with MS packages - MS support for schools through initiatives Google Classroom - I'd say more the Google suite of Apps
Ireland	Moodle, Mahara, O365, OneNote, Google (cl.), Edmodo	skills of teachers ; In service available; (No) Cost !!!!! Management and administration time
Lithuania	Mahara, O365, OneNote, Padlet,	Teachers experience, popularity, innovation

	Yammer	
Slovenia	MOODLE, o365	MOODLE: open, easy to use for teacher and students, technical support, educational support workshops and seminars, community of teacher
Slovenia	Moodle, Mahara, o365, OneNote, ECHO (Slo. product)	Mostly Moodle because of the costs and tecnical support for schools.
Spain	Moodle, Mahara, O365	You can share contents between pupils, between teachers. You can communicate, collaborate with students or teachers everywhere and always.
Spain	Moodle, Mahara, OneNote, Google (cl.), Chamilo	We use Moodle and ABALAR platform because they are provided by the Galician Government in their portal. We use Chamilo to work in European and School Projects and Mahara for e-portfolio, the government has a platform for it.

Table 2: Replies to : "Please give (brainstormingly, just in keywords) reasons, why the most popular LMS/learning platform was chosen"

According to the answers given above, Moodle is for many partners popular because it can be used free of costs (except for the setup and adaptation) and because schools get technical support for it. O365 takes its popularity from the fact that the MS Office suite is well known among teachers and students. Even though OneNote Class Notebook is used by a range of partners (see figure 4), there were no reasons given why it is used. No pro-arguments are given for Google classroom, either – one answer mentions that Google apps become more popular than Google classroom. There are no explicit pro arguments for Mahara, either.

Counter-Arguments: Partners also mentioned negative sides of platforms in use

Belgium	Google (classroom), Smartschool	There a lot of possibilities and there a lot of steps to take before you can handle a simple task. Working online together on a task.
Croatia	Moodle, O365, Adobe Connect	Moodle - too complex for some users, requires a lot of administration (for teachers) and requires logging-in (for participants), it suits those who plan to use it long term and build courses/materials, but not those who just want to use something quickly or once
Cyprus	Moodle, O365, Google (cl.)	The biggest drawback with these solutions and especially with Moodle and Google Apps For Education (Google Classroom is offered only through GAFE) is the administration of the platforms. Teachers would prefer not to have to deal with user accounts and permissions, and only deal with their digital classrooms and students as users.
Estonia	HITSA Moodle	
Finland	Muikku (own production), Ning, WordPress (with add-on), Eliademy, Google (cl.)	Own coding team costs a lot. Global products are having huge resources. Costs are always a problem. I work in a team where we try and do a research about new things. One disadvantage is how to move contents from one platform to another.
Finland	Moodle, O365, OneNote	Usability
Greece	Moodle, Google (cl.), Photodentro + Ifigeneia	lack of sufficient bandwidth in some schools.
Ireland	Moodle, O365, OneNote, Google (cl.)	O365 great for email etc but not developed as an LMS. Schools are starting to use OneNote to better effect

Ireland	Moodle, O365, OneNote, Google (cl.)	Con - generally the lack of ICT support for any platform General password administration Lack of sustainability beyond "the project" Presumption that young students are digital natives Moodle - perceived as "clunky" by students - Office 365 / One Note - too many features Google - not sure other than general comments above
Ireland	Moodle, Mahara, O365, OneNote, Google (cl.), Edmodo	Set up and ongoing management and administration. Difficulties in navigation Need for more support Life long learning requirements
Lithuania	Mahara, O365, OneNote, Padlet, Yammer	"Mahara" "My learning" localization
Slovenia	MOODLE, o365	MOODLE: students dont have possibilities to create their own learning space
Slovenia	Moodle, Mahara, o365, OneNote, ECHO (Slo. product)	Moodle is not the best userinterface for todays learners, because it is not intuitive.
Spain	Moodle, Mahara, O365	All the students must be able to work with the platforms. Each student need a laptop, tablet or computer at the school and at home.
Spain	Moodle, Mahara, OneNote, Google (cl.), Chamilo	We are happy with platms we have we have plenty of them, one is for digital books. Teachers can create their own lessons or the ones provided by the government

Table 3: Replies to: "Please name deficits of the LMS/platform in use"

Even though it is difficult to summarize the answers, we would see a trend towards platforms that are easily and intuitively to use and/or for which there is support. A quote to keep in mind is taken from the answer from Cyprus: "Teachers would prefer not to have to deal with user accounts and permissions, and only deal with their digital classrooms and students as users." Another factor that should not be neglected and is mentioned by Greece is "lack of sufficient bandwidth in some schools". Indeed, even in the US-based Education Week it is stated (in 2016!) that

> *The promise of technology in the classroom is almost entirely dependent on reliable infrastructure. But in many parts of the country, schools still struggle to get affordable access to high-speed Internet and/or robust wireless connectivity. (Herold, 2016)*

Do the ATS2020 partners' countries follow a certain policy regarding LMSes, learning platforms and other digital devices? This question was answered as follows:

Austria	we have a steering Group to give recommendations (for example for lms.at) and to discuss new developments. Generally Schools can decide autonomously what to use, policy is to encourage IT use in classrooms - by students + teachers.
Belgium	no.
Croatia	Open Source policy is popular but not implemented consistently. Office 365 licences are purchased for schools accross the country, but schools have autonomy with other tools

Cyprus	There isn't any policy on what platform or software schools should use. Schools are allowed to choose whatever platform they want.
Estonia	To meet the needs of Estonian educational institutions, HITSA moodle environment has been developed by HITSA (Information Technology Foundation for Education). HITSA Moodle is free for the schools of general education in Estonia. In general, schools are autonomous to decide if and which learning platforms or digital devices they use.
Finland	In the field of copyrights and safe use of the Internet there are national wide recommendations. We are having a digital licence system for digital content outside Creative Commons. Teachers Union has also given own advices, lately for streaming (Periscope and so on) and the rights to deny the use of own mobile devices.
Finland	No official policy however open source should be favour if equal than closed software
Greece	• investment on open source platforms, • development of dedicated platforms, such as Photodentro, • development and customization of educational software.
Ireland	Schools have total autonomy on what they use.
Ireland	There is great school autonomy regarding policies - all schools must have an AUP (acceptable use policy) and there have been ICT grants in recent years... I prefer Open Source but Google and MS are making things "easier"...
Ireland	No policy - school autonomy
Lithuania	
Slovenia	No policy, School can choose LMS/platform
Slovenia	In Slovenia is open educational resources policy very important and impemented. Not only platforms, but also e-materials (Creative Commons license).
Spain	Xunta de Galicia (Spain) develops ABALAR program (One notebook per student) There is also an online platform to share all types of materials to teach, learn and evaluate all the students, all areas. It's also free for the pupils. (Parents pay nothing)
Spain	Yes, we have the ABALAR program and the ABALAR platform (Moodle) In the last years schools use digital books provided by Galician Goverment. School that like to join the projects have to apply for it, by presenting a program of use. Teachers have to do the training.

Table 4: Replies to: "Please name deficits of the LMS/platform in use"

The answers of the ATS2020 partners show a tendency towards:

- School autonomy in choice of platforms, but recommendations are given
- Favourizing open source, at least, if a competitive open source platform/program is available.
- Even though many ATS2020 partner countries use Moodle or a LMS built on the basis of Moodle, the usablilty of Moodle is not satisfying (at least not for learners): It should be more learner centered and more intuitive.

- Office 365 is also widely used but does not provide all the functions of a LMS. The trend for those who use O365 therefore points to using it in combination with OneNote Class Notebook.

The results of the mini-questionnaire are in-line with the observations made at the ATS2020 ad hoc meeting in September 2015 in Ljubljana (see D. 2.1.4 at https://mahara.ats2020.eu/view/view.php?id=182).

3 Evaluation of Virtual Learning Environments (VLEs)

e-Platforms (Electronic Learning platforms) - or Technology Enhanced Learning Environments like VLEs (Virtual Learning Environments) are the basis of web based learning, including interactions between students and teachers.

> *The term 'virtual learning environment' (VLE) refers to the components in which learners and tutors participate in online interactions of several kinds, comprising online learning. (Sneha & Nagaraja 2014)*

As D. 1.4 (Technology and Tools) provides more information and reflection on Technology Enhanced Learning Environments, we want to focus in this deliverable only on two types of VLEs: on LMS (Learning Management Systems) and ePortfolios.

3.1 LMS – Learning Management Systems

Learning Management Systems like Moodle (https://moodle.com/moodle-lms/) are the best known VLEs. They serve as a content management system in which – usually – the teacher provides the learners with learning content while the learners hand in their assignment and are assessed by the teacher. LMSes come with a practical overview of handed in assignments and assessment tasks as well as grades given for the teacher.

The learner also gets some insight into the process, but doesn't have many options with respect to structuring her/his own content.

SWOT analysis of Moodle as a tool for formative assessment

Strengths	Open Source, adaptable and customizable, once set up sustainable (unlimited use by the institution which set it up), good management functions for teachers
Weaknesses	Adaptation and customization needs expert staff and thus can be costly, not enough learner-centered opportunities
Opportunities	Customization allows to add more features (plugins) that give more opportunities to the learner. Moodle is widespread and therefore new developments are shared with the community of Moodle users
Threats	As the platform is not learner-centered, some assessment procedures (especially peer assessment) can only be done via a "workaround" which makes the handling complicated and may result in a lack of motivation for the actual procedure.

Table 5: SWOT Analysis of Moodle Platform

In the ATS2020 Deliverable 1.4 ("Technology and Tools for a formative Assessment process"), the theoretical background of LMSes is given in a substantial way in chapter 3.2.3 ("Technology-Enhanced Learning Environments").

We just want to add here the comparison of Bauer & Baumgartner (2012) between LMSs and ePortfolios:

LMS	E-Portfolio
Orientation towards course	Orientation towards students
Teachers set the rules	Students create their own rules
Course sets a certain structure	Unstructured, students develop their own structure
Grading	No grading
Content is accessible to all students within a course	Content is only visible when the owner releases an e-portfolio view
Formal learning	Informal learning
Social networking is limited to course participation	Students determine their social networking

Table 6: Bauer & Baumgartner (2012, E:4, LMS compared to e-portfolios)

From this table it gets quite clear that the student-centered approach of ATS2020 does not match well with the course-centered approach which one can follow using a LMS.

3.2 CMSes and/as ePortfolio platforms

CMSes are Content Management Systems. They are software for the elaboration of and organization of content. This content can be created and managed collaboratively. CMSes are the basis of most websites available online today, and they are the basis of most social media platforms, as well.

ePortfolio software also bases on CMSes, and sometimes it is not easy to distinguish (technically) between a CMS and an ePortfolio platform. As the following figure shows, the systems are overlapping.

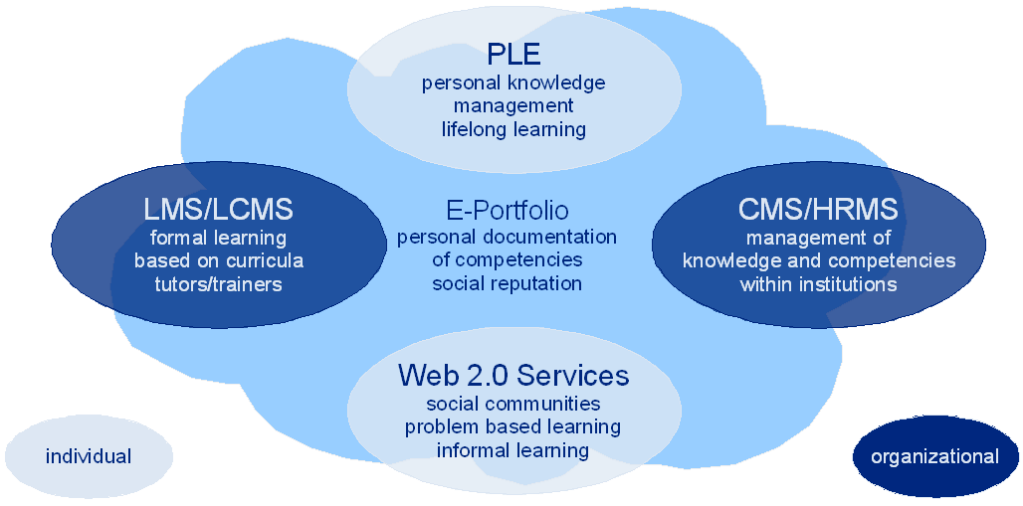


Fig. 6: taken from Himpsl & Baumgartner 2009, p. [3]. The model bases on Erpenbeck & Sauter 2007

Bauer & Baumgartner (2012, p.10) state that an ePortfolio "is a specific form of a content management system (CMS), which acts as electronic collection of digital artefacts" and serves as a means for reflection(s) on these artefacts in the same time.

Himpsl & Baumgartner (2009) define the following minimum requirements for ePortfolio platforms which base on "pedagogically motivated assumptions":

- Electronic portfolios "belong" to the learners – that means that learners must have the right to use their data; they must be able to individually administer the access to their data themselves. After the portfolio work at a certain institution is finished, their data must still be available to them.
- The e-portfolio system does not serve classroom management, that means that in particular tools for communication and collaboration in the group of learners are not part of the evaluation.
- The individual benefit for the learners represents the most important thing; the software is therefore not really regarded as a competence management system of the institution.

According to JISC, ePortfolios are recommended as a tools for assessment, „as a means of capturing valuable material developed from a process of learning. Assessment also ensures the engagement of all students and staff" (JISC 2008/2015), even though the paper refers to Helen Barrett (2004) to make sure that ePortfolios are used for Assessment for Learning rather than for Assessment of Learning:

Portfolios used for Assessment of Learning	**Portfolios that support Assessment for Learning**
Purpose of portfolio prescribed by institution	Purpose of portfolio agreed upon with learner
Artifacts mandated by institution to determine outcomes of instruction	Artifacts selected by learner to tell the story of their learning
Portfolio usually developed at the end of a class, term or program - time limited	Portfolio maintained on an ongoing basis throughout the class, term or program - time flexible
Portfolio and/or artifacts usually "scored" based on a rubric and quantitative data is collected for external audiences	Portfolio and artifacts reviewed with learner and used to provide feedback to improve learning
Portfolio is usually structured around a set of outcomes, goals or standards	Portfolio organization is determined by learner or negotiated with mentor/advisor/teacher
Sometimes used to make high stakes decisions	Rarely used for high stakes decisions
Summative - what has been learned to date? (Past to present)	Formative - what are the learning needs in the future? (Present to future)
Requires Extrinsic motivation	Fosters Intrinsic motivation - engages the learner
Audience: external - little choice	Audience: learner, family, friends - learner can choose

Table 7: Portfolios for Assessment of Learning vs. Portfolios for Assessment for Leaning (Barrett 2004)

The aim of this Deliverable is to recommend a learning environment for Assessment for Learning, and ePortfolios are obviously such an environment. ePortfolios can be created within almost every digital space, however, there are a range of software solutions which are created to support the elaboration of ePortfolios and to allow for formative assessment (Assessment for Learning).

Within this chapter we have a look into some ePortfolio platforms. As the choice – of commercial and open source solutions alike – is huge, a blog was created (at https://mahara.ats2020.eu/view/view.php?id=178) in which additional remarkable ePortfolio platforms (and further assessment tools) are reviewed continously.

3.2.1 Commercial Solutions

itsLearning

itsLearning is a learning platform with ambitious aims and impressive theoretical background. itsLearning supports Assessment for Learning (AfL) and offers an ePortfolio solution for its users. The management of the ePortfolio space is truly learner-centered – the students can decide what to share with whom at which time (https://files.itslearning.com/data/2174/82612/creating%20eportfolio%20in%20itslearning.pdf)

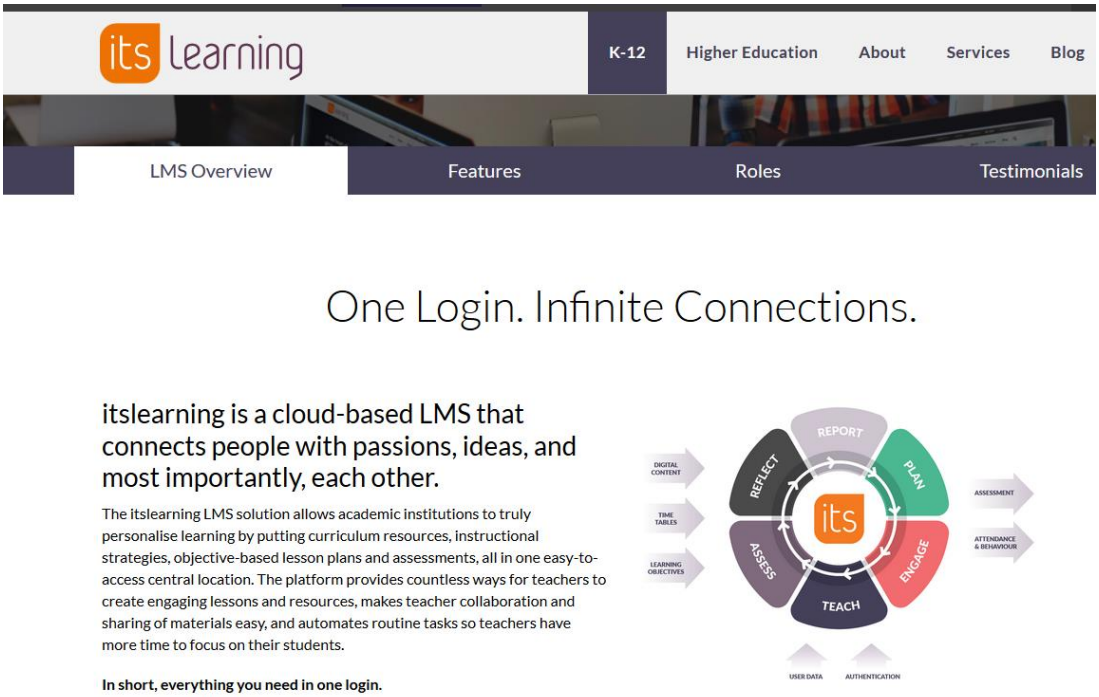


Fig 6: Screenshot: https://itslearning.com/global/k-12/lms-overview/

Strengths	Teacher centered management of assignments; good management functions for teachers Adaption to Flipped Classroom Settings is available. Currently serve over 4 million active users, growing market potential.
Weaknesses	Self- and peer-assessment still have to be clarified itslearning UK ltd. is a wholly owned subsidiary of itslearning AS, based in Bergen, Norway. - See more at: http://www.itslearning.co.uk/our-story#sthash.FXMMRvpy.dpuf Thus, license agreements have to be considered which can be limited and/or costly.

Table 8: Strenghts and Weaknesses of the ePortfolio platform of itsLearning

Brightspace ePortfolios

Brightspace, is an "integrated learning platform" created by D2L, a global corporation that also has a branch in Europe. It offers an ePortfolio space for students, which "enables learners to take control of their own learning journey, actively shaping their goals and objectives, and aligning their activities with program outcomes. With the ability to collect evidence of their learning by uploading files, importing results from a course, filling out a form, or using the Chrome browser plug-in to add links and images from the Web, learners are able to personalize their learning experience." Even though the statement shows a limitation to one Browser type (Chrome), the management feature of Brightspace ePortfolio reads in-line with ownership issues of ePortfolios and features necessary for teachers: "ePortfolio combines the best of both

worlds: powerful management capabilities for administrators, while providing users with full control over their content.

The reporting capabilities are built with the end user and institution in mind, with administrators having the ability to view logs of anyone who accessed ePortfolio [meaning the space, not an individual's ePortfolio] and what changes they made to items. At the same time, learners have flexibility in how they build and manage their ePortfolio." (quotes from http://content.brightspace.com/wp-content/uploads/Brightspace_Learning_Environment_Brochure.pdf?_ga=1.81032721.749117578.1452174983 (2015-01-07))

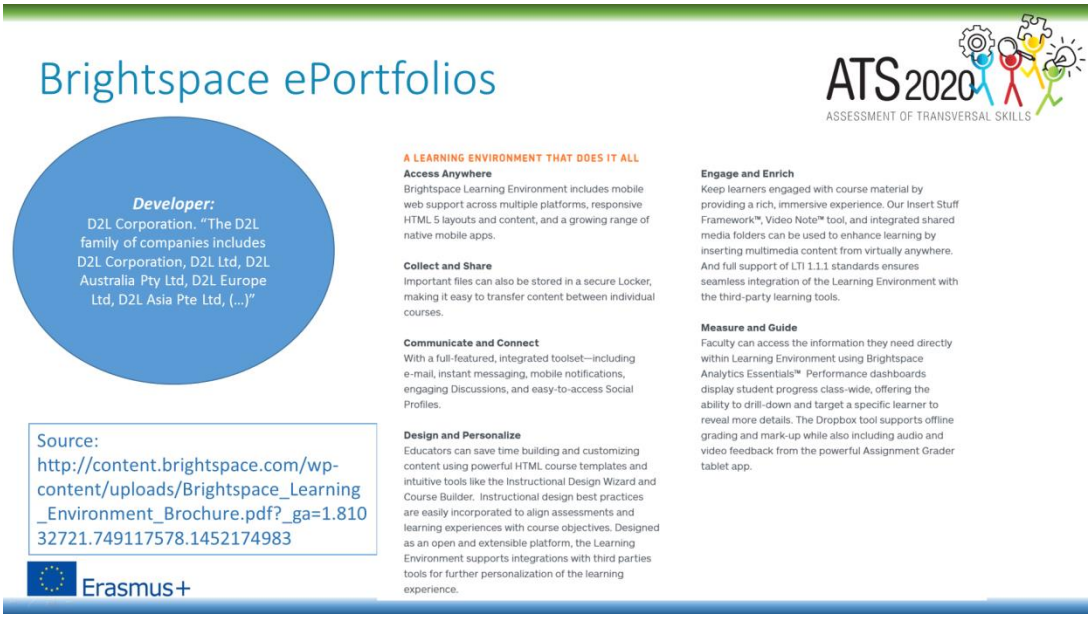


Fig. 7: Commented screenshot from http://content.brightspace.com/wp-content/uploads/Brightspace_Learning_Environment_Brochure.pdf?_ga=1.81032721.749117578.1452174983 (2015-01-07)

Strengths	Offers an ePortfolio space for students, which "enables learners to take control of their own learning journey, actively shaping their goals and objectives, and aligning their activities with program outcomes. The reporting capabilities are built with the end user and institution in mind, with administrators having the ability to view logs of anyone who accessed ePortfolio [meaning the space, not an individual's ePortfolio] Brightspace Learning Environment includes mobile web support across multiple platforms, responsive HTML 5 layouts and content, and a growing range of native mobile apps. Growing market: D2L's open and extensible platform is used by more than 1,100 clients and almost 15 million individual learners in higher education.
Weaknesses	Dependance on Brightspace Analytics Essentials™ Performance

	dashboards. Dependance on licence agreements/schemes and on time limits of use. Risk of difficulties with interfaces/embedding of 3rd party tools.

Table 9: Strenghts and Weaknesses of the ePortfolio platform Brightspace

Adobe Classroom

Adobe Classroom claims to:

Enable mobile learning across devices

- *Train and participate directly from mobile devices*
- *Deploy interactive mobile experiences including breakout sessions*
- *Enjoy hosting, file sharing, whiteboarding, and emoticons via mobile*
- *Allow participants on desktop to enter hassle-free with no downloads*

Deliver immersive live virtual classroom experiences

- *Measure live learner participation with engagement monitoring*
- *Brand-able, customizable and persistent virtual classrooms*
- *Streamline live session management with intuitive backstage tools*
- *Maximize engagement with extensive interactive options*

Manage live event registration and curricula

- *Generate custom landing pages quickly using templates*
- *Customize registration form*
- *Easily deploy reminder, confirmation, and ad-hoc emails*
- *Create curricula for live virtual classroom courses*

*Create and deploy engaging on-demand content**

- *Generate structured curricula with enhanced learner enrollment management*
- *Rapidly generate and deploy content using our Microsoft PowerPoint plug-in Adobe Captivate and Adobe Presenter*
- *Create content once and publish across devices, including SCORM and AICC content*
- *Use the features of a Learning Management System (LMS) at a fraction of the cost with Adobe Connect, or integrate it with your existing LMS*

(http://www.adobe.com/be_en/products/adobeconnect/learning.html)

In spite of its stunning functionalities, the price scheme (given for Belgium at http://www.adobe.com/be_en/products/adobeconnect/learning.html) looks discouraging:

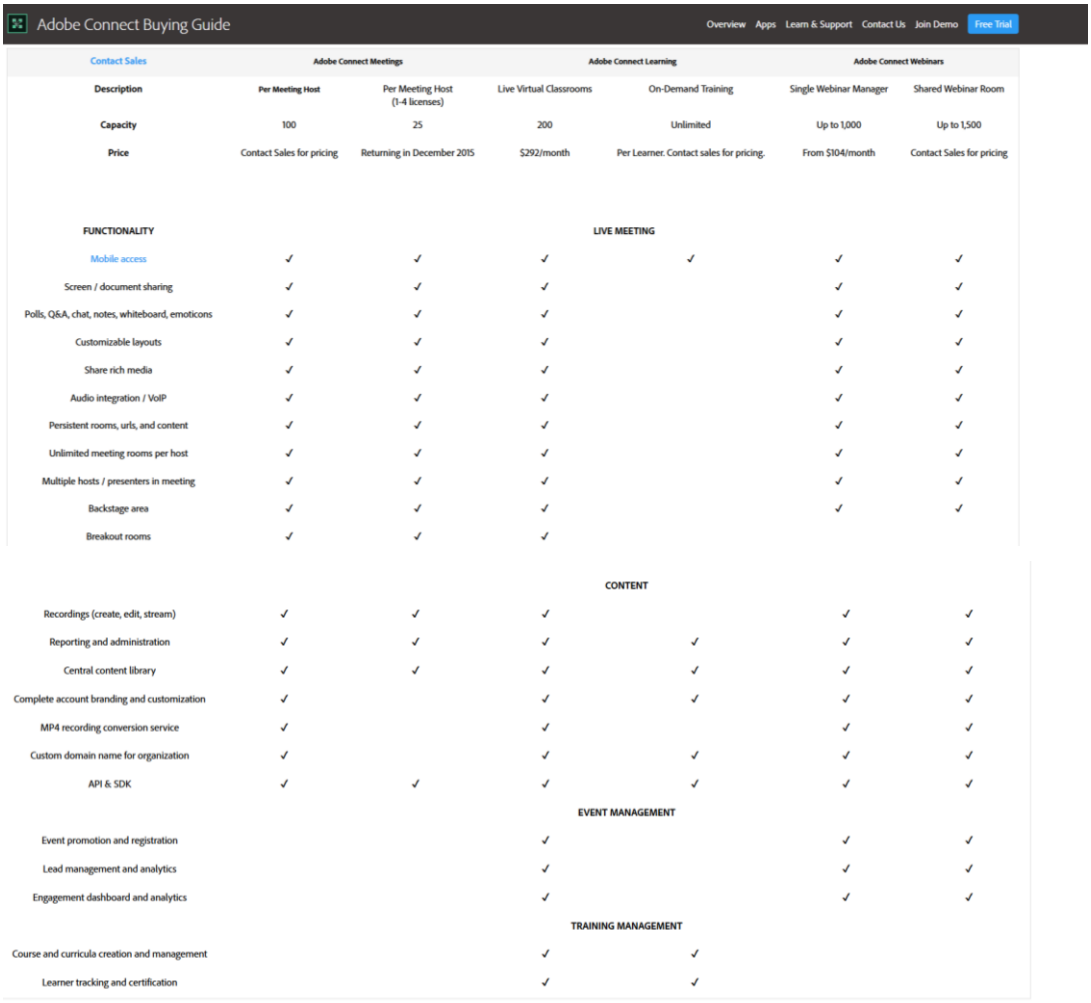


Fig. 8: Screenshot from http://www.adobe.com/be_en/products/adobeconnect/buying-guide.html (2016-01-20)

Strengths	Train and participate directly from mobile devices. Measure live learner participation with engagement monitoring Manage enrollment notifications & reminders. Follow the trend of curricula for live virtual classroom courses.
Weaknesses	Time limitations of use (what happens, if the licence is not extended?) Pricing

Table 10: Strenghts and Weaknesses of Adobe Classroom

Microsoft Office 365

Office 365 offers a free “education plan”

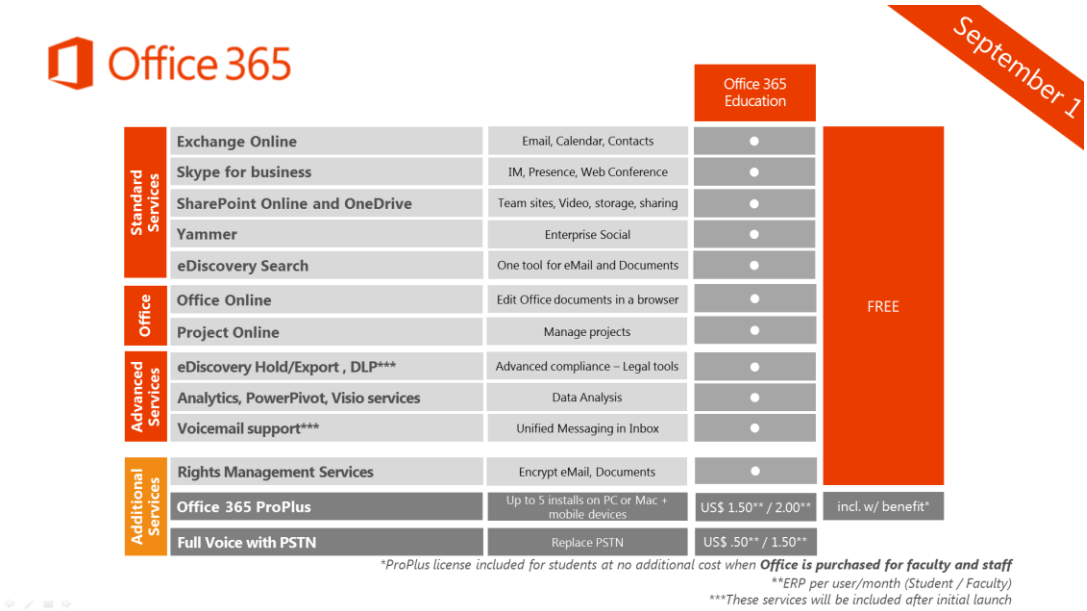


Fig. 9: Office 365 Education plan (https://products.office.com/en/academic/compare-office-365-education-plans, 2015-09-17)

ATS2020 teachers in Slovenia like to work in a combination of Office 365 and Mahara in order to build ePortfolios with their students.

Mahara	O365
Creativity development. Critical thinking. Talent recognition and balancing. Independence development. Risk evaluation. Problem solving. Decision-making. Responsibility for your own knowledge. Deep thinking about yourself with strengthening of inner learning motivation. Managing professional development. Too valuable, to be changed with learning environment.	Higher motivation for work. Faster work, more information. Higher learning effectiveness (because of interactivity). Individual and differentiated work. Autonomy at work. Discovering talents. Important and fast teacher’s on – line feed – back to a student. Fast view for a teacher about the current student’s progress in all areas (with just few clicks). Classical lesson becomes modern on – line lesson, which offers open learning environment. Learning environment, which replaces classical notebook and book.

Fig. 10: Suzana Plamenitas in a presentation for the ATS2020 WP2 ad hoc meeting in Ljubljana (2015-09-17) See D. 2.1.4 at https://mahara.ats2020.eu/view/view.php?id=182 for more information).

An additional argument for the combined use is the announcement of “the first release of its OpenID Connect authentication plugin for Mahara” in the Mahara newsletter of April 2016 (James McQuillan (2016)). This means, that Mahara and O365 can be used on the basis of a so-called single sign on. Once you log in to O365 you can proceed to the

connected Mahara installation. [However, the ATS2020 team tried several times to establish the announced Open ID connection and failed – statement added in 2017-12-20]

Strengths	Usability and Access, Learning Environment provided Wide range of training opportunities available O365 enables teachers and students alike to create pages (ePortfolios) Single-Sign-On possibility with Mahara (and potentially other ePortfolio tools).
Weaknesses	Dependance on whole Microsoft architecture In the free plan, only online-use of MS products is possible. This can cause problems in schools with weak Internet connection (WLAN).

Table 11: Strenghts and Weaknesses of MS Office 365

Microsoft OneNote Class Notebook

Oliver Zofic states in a presentation for the ATS2020 WP2 ad hoc meeting in Ljubljana (on 17 September 2016) as follows:

- The OneNote ClassBook can be used as a content library, for student notebooks and as a collaboration space.
- The OneNote environment also serves for the creation of personalized tests (for example for weaker and stronger students)

(see D. 2.1.4 at https://mahara.ats2020.eu/view/view.php?id=182 for details)

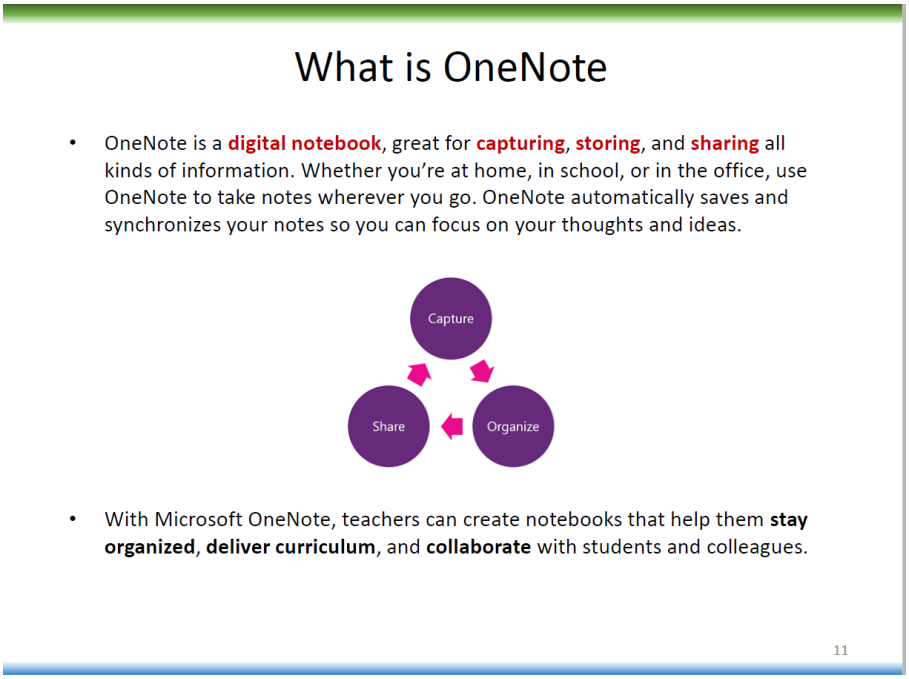


Fig. 11: From a webinar, held by Nicolas Kanaris (CPI) for ATS2020 partners in February 2016

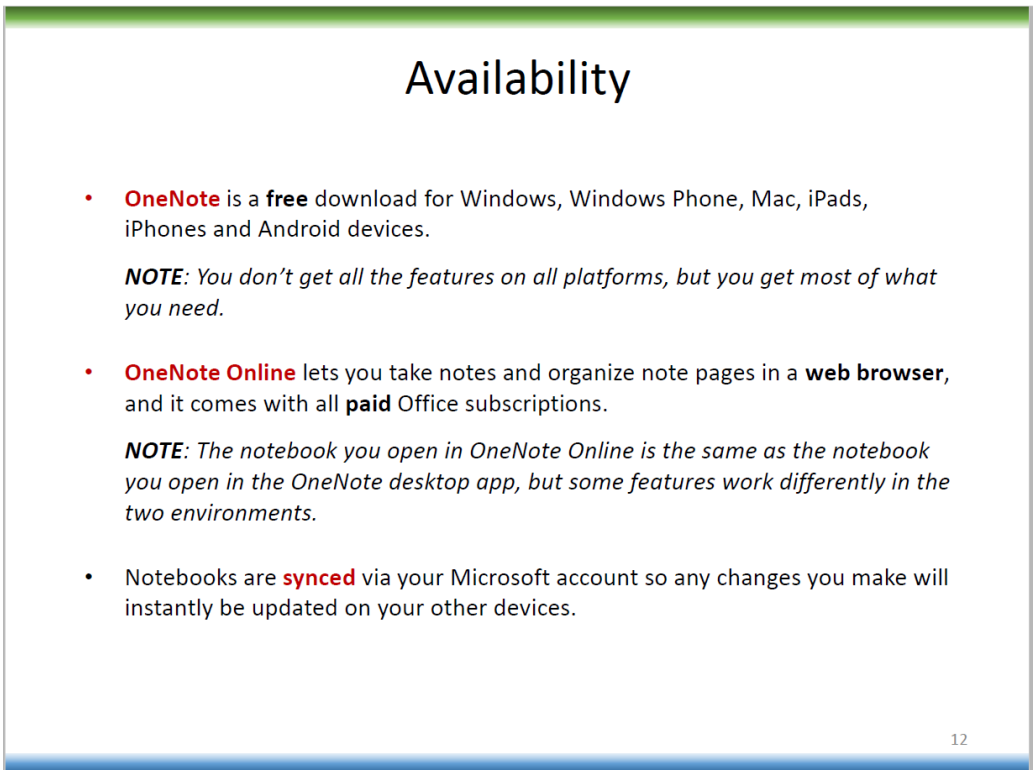


Fig. 12: From a webinar, held by Nicolas Kanaris (CPI) for ATS2020 partners in February 2016

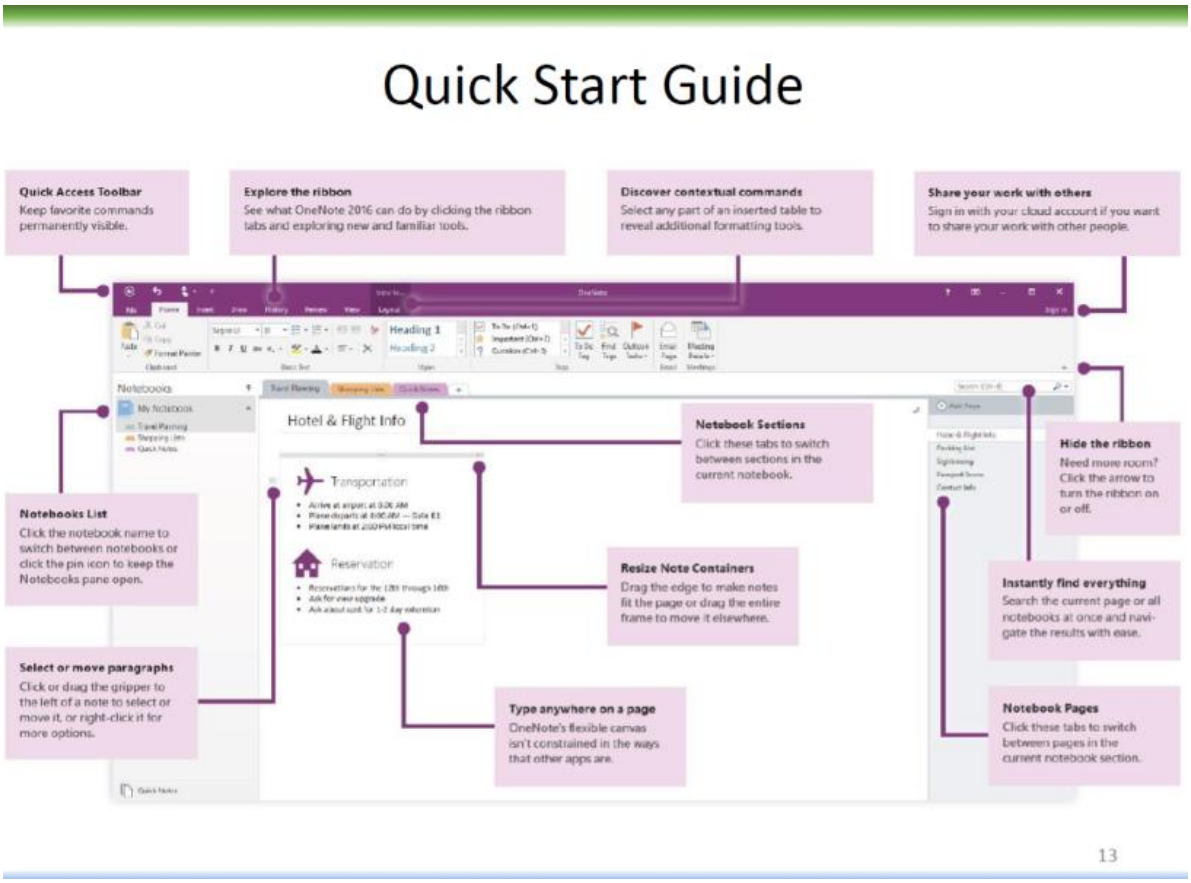


Fig. 13: From a webinar, held by Nicolas Kanaris (CPI) for ATS2020 partners in February 2016

A range of articles are available to describe OneNote for educational purposes. Examples:

- OneNote Team/Steffi Svendsen. 2015. Our secret weapon—OneNote for sharing, collaborating and assessing. https://blogs.office.com/2015/05/01/our-secret-weapon-onenote-for-sharing-collaborating-and-assessing/
- Burke, Dervla. 2015 (?). OneNote - Assessment - Coláiste Bhaile Chláir. https://www.microsoft.com/en-ie/pil-networkireland/onenote-assessment.aspx

Edita Rabizaite, ATS2020, contributed to the MS Office blogs with a post on "OneNote Class Notebook as an ePortfolio" (Rabizaite (2016)). As her didactic settings for creating ePortfolios within OneNote Class Notebook are quite similar to the ones used in EUfolio and ATS2020, her blogpost is almost a perfect guideline how work with Office 365/OneNote Class notebook could look like for ATS2020 pilot classes. She illustrates her work with graphics - and thus makes it easy to follow her teaching experience with OneNote Class Notebook.

Strengths	Synchronization of OneNote's notebooks is key if you have multiple devices. Being able to access and modify your notebooks from any of your devices can help save you time and possible frustration Dominant position in the market. Guidance and good practice examples (for teachers) via the MS Office blogs.
Weaknesses	Dependance on whole Microsoft architecture Requires cloud based architecture. Functionality for Mac/Linux-users is limited.

Table 12: Strenghts and Weaknesses of OneNote

Google Classroom

IES Rosalia de Castro (http://www.iesrosalia.net/) is a school participating in the ATS2020 pilot in Santiago the Compostela. As we had our partner meeting in Santiago, we had the chance to be welcomed in the school on Thursday, October 6, 2017 and the students had prepared presentations for us.

Some of the presentations focused on a comparison between Mahara and Google Classroom. The positive points of Mahara were – among others – that is is responding fast and convinces by a high level of interactivity. Having said that, students would like to have better possibilities to find/compare information and to have the chance to work without connection and then to synchronize their data.

Students find Google Classrooms more intuitive to use and find it more „efficient" because all the work is done in one place.

One of their teachers, Alberto Sacido Romero, who also coordinates ATS2020 work at IES Rosalia de Castro, is using Google Classroom since September 2014 – being one of the first users. He showed us in a special session how a class is set up and how Google Classroom looks from the teacher's view. It is indeed easy to handle and rich in features in the same time. Especially the functions for searching and the way information is structured, is

convincing. However: How could students make their own ePortfolio with it? They can simply showcase and contextualize their best artefacts with the Google tools Blogger and/or Google sites. The students' blog SCQinfo (http://blogs.prensaescuela.es/scqinfo/) can be an example for an eProtfolio of a class. A last question form the visitors: With Blogger, you have to have your ePortfolio published right away: Don't teachers and students miss different privacy options? Alberto doesn't feel that his students have something to hide when it comes to blogging - „on the other hand, they have a lot to show". (c. blog entry of 6 October 2017 at https://mahara.ats2020.eu/view/view.php?id=178)

Strengths	flexible easy to handle unique collaboration features advanced search functions good structuring of information/workflow
Weaknesses	Privacy: the teacher can see everything, students do – and the way of data storage (where are user's data hosted) is unknown

Table 13: Strenghts and weaknesses of Google Classroom

SeeSaw

As some Belgian schools of the ATS2020 project were using it as an ePortfolio space to develop and assess transversal Skills, SeeSaw was included into this deliverable (and into the ATS2020 blog on "Tools, Platforms, and bases for Learner-centered Work in Classroom" at https://mahara.ats2020.eu/view/blocks.php?id=178) in October 2016. SeeSaw is a digital portfolio management system that is easy to use and allows to capture student learning in its full multimedial bandwith. Tama Trotti, K-12 teacher describes it in a blogpost on Emerging EdTech (2015) as a tool for "curation of student work that could be easily handled by students, accessible for parents, and alleviate storage issues with bulky notebooks". She points out how excited her students are to document and reflect their own work, and explains the benefits of peer-to-peer interaction and of parents who stay updated about their kid's learning journey via the SeeSaw ePortfolio.

The licence issue should be kept in mind, however:

> "Seesaw is free for teachers and parents. However, if a school would like to have a student's portfolio move with them from year to year, there is a fee for this and you will need to contact Seesaw directly for more information. If parents would like to continue to keep their student's portfolio there is a storage fee for that as well and parents can sign up directly with Seesaw." (Trotti 2015)

SeeSaw features look very convincing: Besides the multimedia capture of student learning and a good management interface for teachers, there are multiple ways of communicating - even with other classrooms (which can be at any school worldwide, eg. a partner school). SeeSaw Plus offers an assessment tool which looks very convenient for teachers. It has to be tested whether this tool is inline with the learner-centered approach of formative feedback, though.

A strengths-weaknesses-profile was not elaborated. However, it was ensured that the platform corresponds to the Functional Specification (D. 2.1.1, see https://mahara.ats2020.eu/view/view.php?id=182).

3.2.2 Open Source Solutions

Mahara

Mahara (http://mahara.org) is an open source ePortfolio software, emerging from a project supported by New Zealand's Tertiary Education Commission's E-Learning Collaborative Fund (eCDF). According to Kristina Hoeppner (Hoeppner 2014, p.410), the development of Mahara was guided by the following principles:

> *1. Student ownership of their E-Portfolio*
> *2. The ability to set permissions of access or authentication to various nominated groups.*
> *3. The ability to add metadata to all entries and artefacts, which could be customized by lecturers or programme teams.*
> *4. An aggregating function that would permit users with various permissions to access only what students permit them to access.*
> *5. The flexibility for formal or informal / social and personal or course-related areas. (Hoeppner 2014, p.410, with reference to Mahara project 2006, an unpublished document)*

Mahara can be used as a PLE (Personal Learning Environment) and collaborative work including the creation of group portfolios.

With its different options for sharing content, Mahara enables users to create showcase portfolios (usually publicly accessible as a demonstration of learning, working experiences and skills; cf. Stefani, Mason & Pegler 2007. P. 71).

As a range of ATS2020 partners already had experience with Mahara (partly through the project EUfolio), Mahara was the platform chosen for the train-the-trainer workshop in November 2015 in Krems, anyway. The evaluation of the workshop and the post-phase should inform the final decision to choose Mahara or another platform.

A reason to think about choosing Mahara should also be the evaluation of ePortfolio software by Baumgartner & Himpsl (2009):

Evaluation of E-Portfolio Systems Overview (May 2008)		Effort for first time installation	Collecting Organizing Selecting	Reflecting, Testing, Verifying Planning	Representing Publishing	Administration	Usability
Product	Licence						
Drupal ED	open source	high	✓✓✓	✓	✓✓	✓✓✓	✓✓✓
Elgg	open source	medium	✓✓✓	✓	✓✓	✓✓✓	✓✓✓
Epsilen	commercial	low	✓	✓✓	✓	✓	✓
Exabis	open source	low	✓	✓	✓	✓✓✓	✓✓
Factline	commercial	medium	✓✓✓	✓	✓✓✓	✓	✓
Fronter	commercial	medium	✓✓✓	✓✓	✓	✓✓	✓
Mahara	open source	low	✓✓✓	✓✓	✓✓✓	✓✓	✓✓
Movable Type	open source	high	✓✓✓	✓	✓✓	✓✓✓	✓✓
PebblePad	commercial	low	✓✓✓	✓✓	✓✓✓	✓✓	✓✓
Sakai	open source	medium	✓✓	✓	✓✓✓	✓✓✓	✓✓
Taskstream	commercial	medium	✓✓	✓✓✓	✓✓✓	✓	✓✓
Wordpress	open source	medium	✓✓✓	✓	✓✓	✓✓	✓✓✓

Fig. 14: Himpsl & Baumgartner 2009

The conclusion of the authors: „Mahara and PebblePad represent the most balanced products, which can be used for portfolio work without huge time expenditure for installation.“ (Himpsl & Baumgartner 2009). It has to be added that in the year since the Evaluation was done, Mahara was further developed. In a similar evaluation, undertaken in 2014 in Austria, Mahara was ranked first (Wallner, Gollner & Mödritscher 2014). The main reason was its way of data collection possibilities (saving, management, and display of digital artefacts). Of high importance for the ranking was furthermore the possibilities for reflection within Mahara (Wallner, Gollner & Mödritscher 2014).

Furthermore a plugin, “My Learning” which was designed for Mahara for the workflow in the project EUfolio is supporting the ATS2020 learning cycle (assess prior knowledge – set learning goals – develop learning strategies – collect evidence of learning, reflection and feedback – self evaluation – set new goals).

Strengths	Truly learner-centered Good storage structure collaboration features (groups/group discussions/group portfolios) sophisticated privacy settings (owner of ePortfolio can decide what to share with whom at what time) good reflection features companion for the ATS2020 learning cycle through a plugin
Weaknesses	Managerial overview for teachers is poor Mighty platform - which requires time to learn the important features Design looks old-fashioned compared to systems like OneNote Class Notebook

Table 14: Strenghts and weaknesses of Mahara

WordPress

WordPress is a powerful software which can be also the basis for creating ePortfolios. Created as a blogging software, WordPress is today a powerful tool that can be used as a VLE and as an ePortfolio space. When it comes to blogging, WordPress has considerable advantages in comparison to Mahara, as is shown in details by Don Preasant in the table below.

Feature	Wordpress.com	Mahara Journal	Comment
Reverse chrono posts	YES	YES	
Title for blog	YES	YES	
Tagline for blog	YES	NO	
Title for blog entry	YES	YES	
Entry summaries (first x characters)	YES	NO Full entries	KEY SHORTCOMING Entry summaries are a great way to scan
Upload or embed pictures and multimedia	YES	YES	
Date and time stamp	YES	YES	
Name with entry	YES	YES	
Archived by month	YES	NO	KEY SHORTCOMING Manual workarounds don't cut it (e.g. tagging by year or month)
Archived by tag	YES	YES	
Moderated comments	YES	YES	
Theming	YES Free/paid themes	YES Limited themes, skins	
Blogroll	YES	YES (manual: text block w links or RSS blocks)	
SOCIAL MEDIA INTEGRATION Share posts automatically	YES	NO	KEY SHORTCOMING
SOCIAL MEDIA INTEGRATION Sharing buttons	YES	(plugin only)	
Email subscription	YES	NO	
Preview/publish posts	YES	YES	
Private/public blog	YES	YES	
Multiple blogs	YES	YES	
Search	YES	YES	
RSS/Atom out	YES	YES	
RSS/Atom in	YES	YES	
Configurable home page	YES	YES	
Optional additional pages	YES	YES	
Permalink to post	YES	YES	
Track reader statistics	YES	NO	
Group blog	YES	NO (soon?)	
Ecommerce	(PAID)	NO	

Table 15: Don Preasant (2016) Mahara Journal vs. Blog. Post in Mahara Community > Forums > Support. WWW: https://mahara.org/interaction/forum/topic.php?id=7486#post30152

Even though WordPress is also a great workspace, and can be used as a storage space, as well collaborative work (except for group blogging) with WordPress needs a lot of programming effort to set up a suitable scenario. Additionally, this powerful platform offers a huge amount of options in its “backend” which does not guarantee an easy and intuitive way of handling it.

Strengths	WordPress is today a powerful tool that can be used as a VLE and as an ePortfolio space.

Weaknesses	WordPress needs a lot of programming effort to set up a suitable scenario. Additionally, this powerful platform offers a huge amount of options in its "backend" which does not guarantee an easy and intuitive way of handling it. Group-work features are limited

Table 16: Strenghts and weaknesses of WordPress

Elgg (example of an adaptation for ICT-go-girls)

Organisations (businesses/education) with a need for a private, organisation-only membership for social networking or with groups for social learning and/or collaborative working can use Elgg.

Elgg (http://elgg.org/) is an open source social networking software. It offers blogging, microblogging, file sharing, networking, groups and a number of other features – on this basis individuals and organizations can create an online social environment. For the project ICT-go-girls! (LLP – Comenius multilateral projects - Project N°: 526590-LLP-1-2012-1-ES-COMENIUS-CMP – see http://ictgogirls.eu/) Elgg was used to create a social platform with an ePortfolio feature for learning and teaching in lower secondary schools (students aged 10-15). The platform created has a surface that reminds of facebook (see illustration below) and can be used easily after a short introduction.

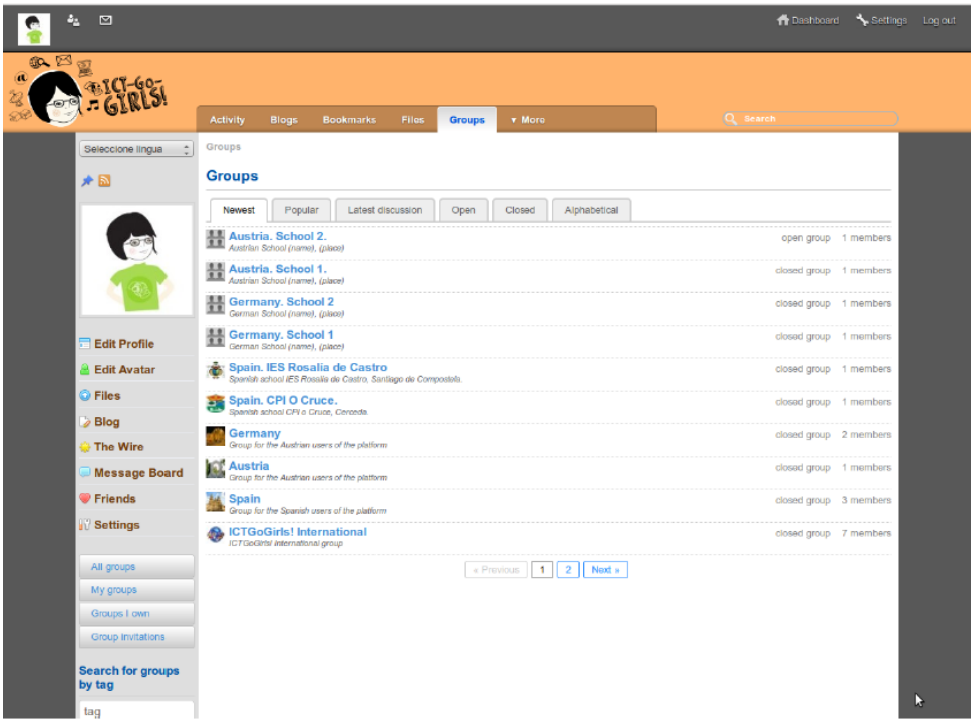


Fig. 15: Groups-page of the platform for "ICT-go-girls" as depicted in Manual (CESGA 2013)

A manual, from which the screenshot above was taken, was developed in November 2013 for the project. It is an internal resource but can be explored further.

The platform is still online at http://social.ictgogirls.eu/, requests for further usage/adaptations have to be addressed to CESGA (Galicia Supercomputing Centre).

Strengths	Free, Open source (licensed under GPL) Network creator can enable self-registration or access controls in to approve membership Completely customisable in terms of functionality and look and feel All members can create their own wikis for personal or group use Anyone in the network can create a group (group approval can be implemented if required) Creators of a network determine terms of use and privacy policies; data is not controlled, owned or managed by Elgg
Weaknesses	High development effort to build up a platform based on ELGG Reflection support through the platform is possible but needs high work effort by the teacher/administrator

Table 17: Strenghts and weaknesses of the Elgg-based platform for ICT-go-girls

3.3 Conclusion: Recommendation Regarding Use of Platforms for ATS2020

Open source ePortfolio management systems allow use which is not limited by a licence agreement. They, however, need a lot of programming (and didactical) effort to meet the requirements of ePortfolio work (which are for ATS2020 stated in D. 2.1.1 at https://mahara.ats2020.eu/view/view.php?id=182). Commercial ePortfolio solutions offer a smarter design and fewer adaptation is needed. However, it cannot be made sure always, where data from commercial solutions are stored and how they can be saved for later use in other platforms.

Drawing from the mini-survey for ATS2020 (see chapter 2.2.3) and with a look at the Functional Specification for the ATS2020 learning platforms (D. 2.1.1 at https://mahara.ats2020.eu/view/view.php?id=182), the platforms Mahara and Office 365/OneNote Class Notebook were chosen. As most of the piloting partners use one of the two platforms already, high acceptance and low training efforts were expected.

Adaptations on basis of user experience and to make the functions of both platforms even more suitable for the users (students and teachers) are foreseen within the project lifetime of ATS2020.

4 (E)ASSESSMENT TOOLS AND THEIR POSSIBLE USE/ADAPTATION FOR THE ASSESSMENT OF TRANSVERSAL SKILLS

4.1 TOOLS FOR FORMATIVE ASSESSMENT

Assessment tools can be roughly clustered into 3 groups:

1. Competency level oriented tools. In these, learning targets are connected with levels of competencies. Reference frameworks are taxonomies, like the ones of Bloom or Anderson/Krathwohl or educational standards. Some diagnostic tools are also relying on competency frameworks.
2. Exercise-oriented tools: Within these tools, learning targets are documented and, ideally, it is possible to document the learning process and progress and to evaluate whether and how learning targets were achieved (assess learning progress on basis of learning documentation). To provide all these functions, a personal learning environment (PLE) is needed; the most suitable environment for the necessary combination of learner-centered storage space, workplace and assessment/reflection space is the ePortfolio.
3. Tools for the assessment process can stand alone or be incorporated into an ePortfolio platform. These tools can be rubrics, questionnaires or refined lists of learning targets. They can be used for self-assessment, peer assessment and assessment for the teacher. When using rubrics for formative assessment, they should contain a field for comments in order to stimulate feedback that exceeds ticking boxes or just do grading based on the fields provided.

Competency level oriented tools	**Exercise-oriented tools**	**Tools for the assessment process**
Learning targets connected with levels of competencies	Learning targets are documented	Learning targets/learning outcomes are evaluated (on the basis of a presentation and/or documentation)
Taxonomies, e.g. Bloom, Anderson/Krathwohl	Documentation of learning process and learning products/outcomes	Rubrics
Educational Standards, e.g. Pisa e.a. (closed exercises)	ePortfolio as a tool for documentation and evaluation	Reflection stems/Reflective sentence starters

Table 18: Type of tools for assessment of/for learning

The ATS2020 project will use ePortfolios, enriched with tools for the assessment process (as plugins or as templates that can be incorporated into the ePortfolio) for the piloting of formative assessment.

A competency level oriented tool will be used for the evaluation of the pilot.

We have elaborated on ePlatforms above, now we want to show the potential of ePortfolio platforms to host assessment tools or to incorporate the use of external tools.

4.1.1 My Learning – a cycle for self-regulated learning

Mylearning was developed as a plugin for Mahara, basing on the theories of "Assessment for Learning" (Black & William 1998). It is a Mahara plugin providing templates which can be filled with contents in order to plan and evaluate learning. The "MyLearning" plugin was developed within the Project EUfolio. EU classroom ePortfolios by Gregor Anželj (Slovenia).

Short reports, a video guide, a workshop activity and an ePortfolio page explain the use of "MyLearning":

- Gregor Anzelj (2014): My Learning never stops. In: Mahara Newsletter Oct. 2014 (Vol.4/No.3). https://mahara.org/view/artefact.php?artefact=394338&view=36871
- Andrea Ghoneim (2014): Mahara and O365 as ePortfolio Solutions for Lower Secondary Schools: http://mahara.eufolio.eu/view/view.php?id=6161
- Gregor Anzeli (2015): My Learning [Screencast-Tutorial] https://www.youtube.com/watch?v=hodBsNbnSu8
- ATS2020 two-day Workshop activities: WA: MyLearning Activity (by Anastasia Economou & Antri Avraamidou, created for the ATS2020 trainer workshop in Krems in Nov. 2015): https://mahara.ats2020.eu/view/view.php?id=145 (Only for logged-in users)
- ATS2020 – work with "MyLearning" (by Andrea Ghoneim in April 2016): https://mahara.ats2020.eu/view/view.php?id=179

However, the use of "MyLearning" needs supporting documents that have to be partly created by the teacher (such as questionnaires). An example of a good practice with "MyLearning", taken from the project EUfolio is presented in Ghoneim & Ertl 2016. The teacher, Petra Mikeln (from Slovenia), develops her own ePortfolio page to guide students through the learning process:

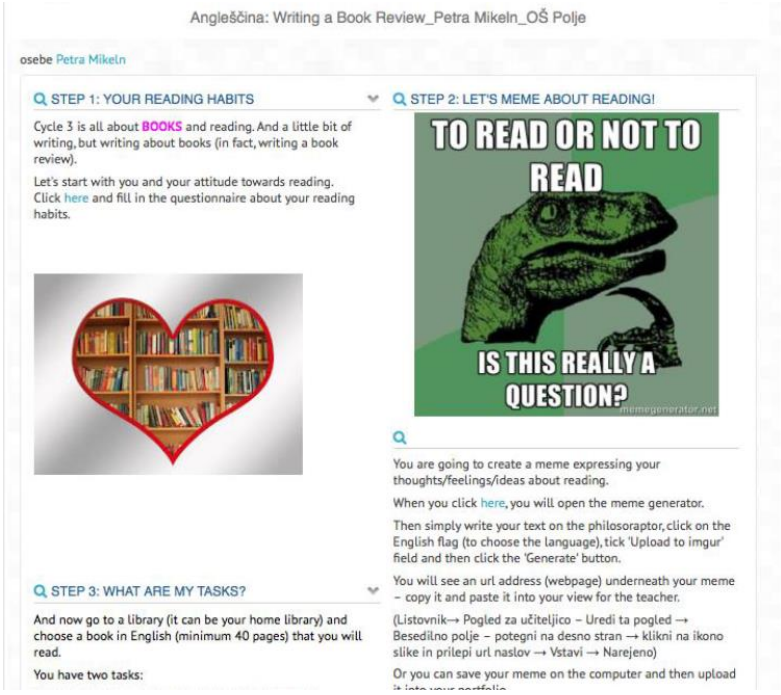


Fig. 16: Teaching Portfolio view(clipping) for "Writing a book review", addressing the students (Mikeln 2014)

The following figures (taken from a presentation for the ATS2020 partners in November 2015, adapted in May 2016) show the use of "MyLearning" in Mahara and a possible adaptation for the Microsoft solution.

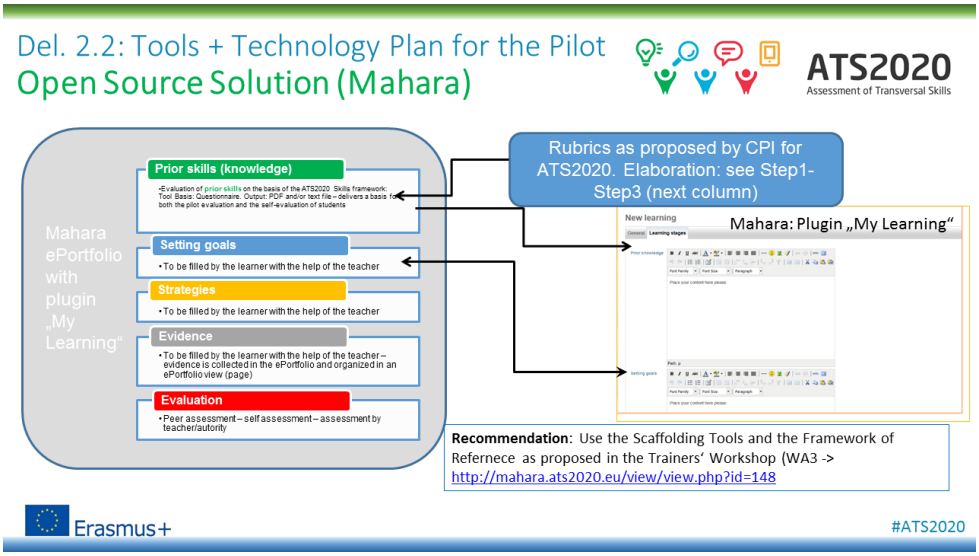


Fig. 17

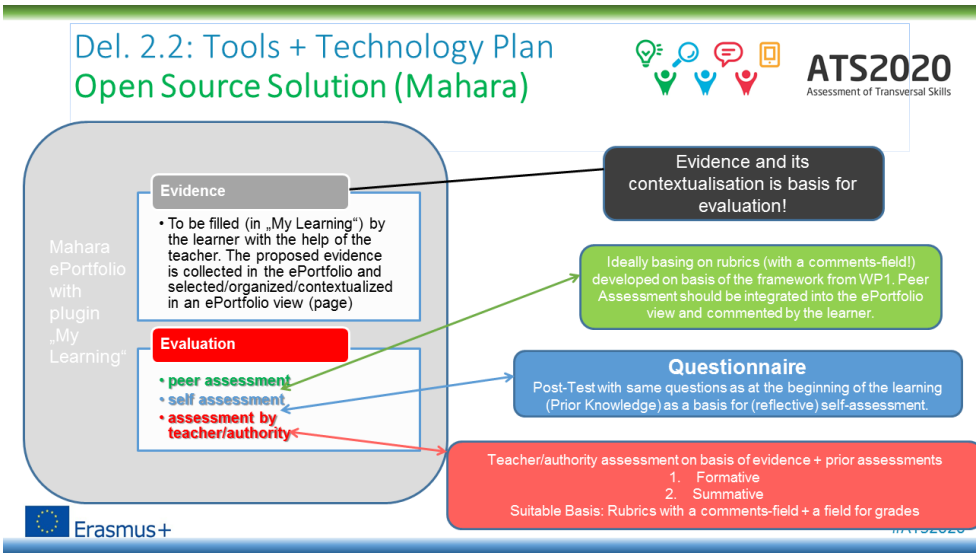


Fig. 18

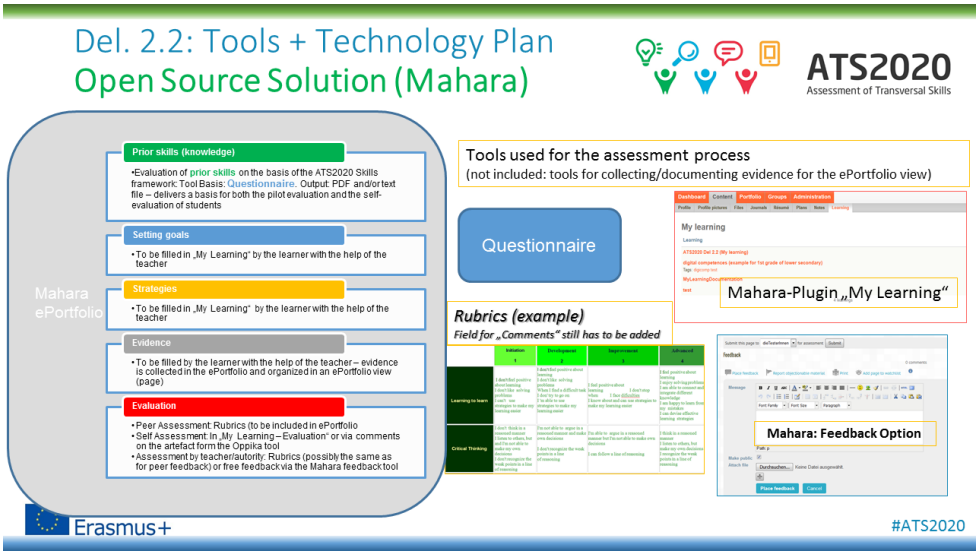


Fig. 19

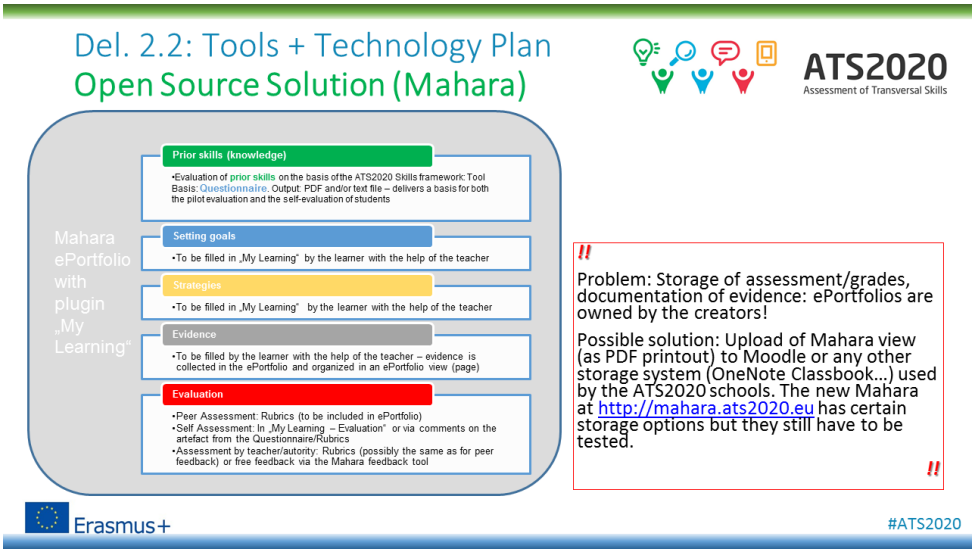


Fig. 20

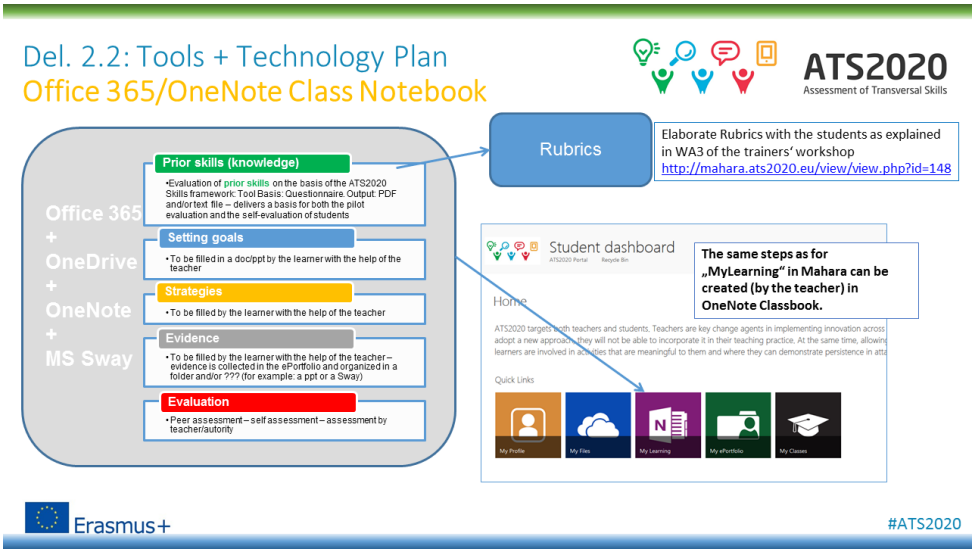


Fig. 21

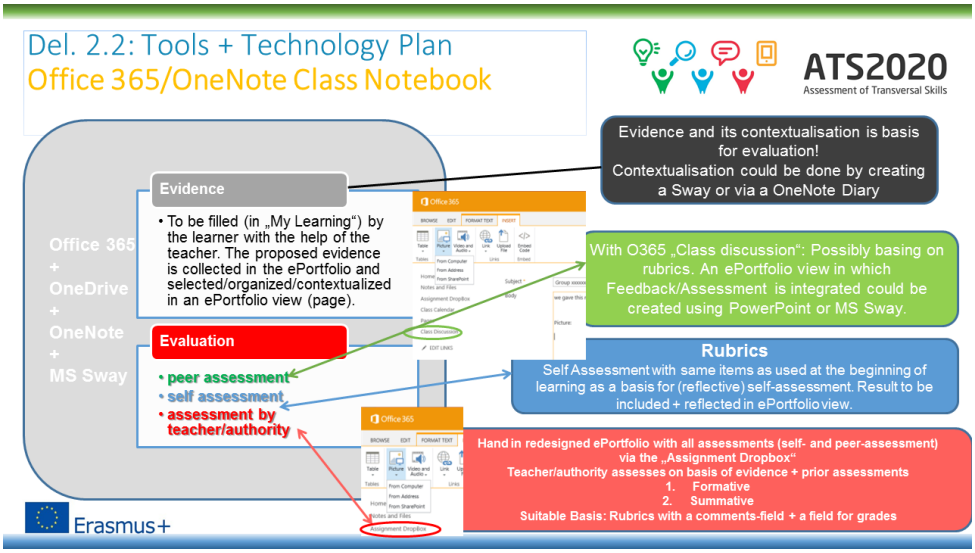


Fig. 22

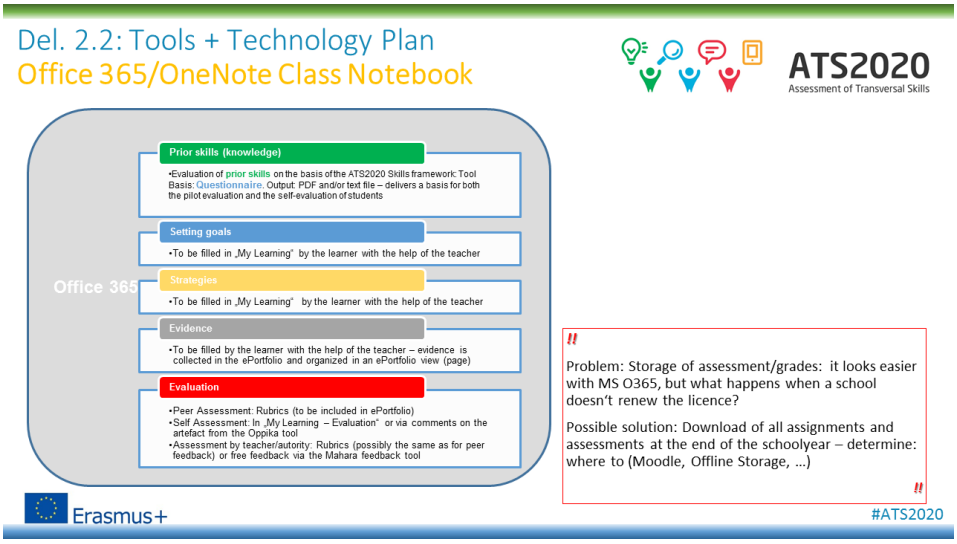


Fig. 23

Fig. 17-23: Slides from a WP2 presentation for ATS2020 partners in November 2015. Updated in May 2016.

4.1.2 Questionnaires/Quizzes/Tests

The list below shows some of the most popular tools to create questionnaires, quizzes, tests and to collect answers (also for brainstormings). These tools can be used by students and teachers alike for both formative and summative assessment.

- ClassDojo: https://www.classdojo.com (feedback tool)
- EdPuzzle: https://edpuzzle.com/ (interactive video lessons – track video understanding)
- Kahoot: https://kahoot.com (quiz-game, can be also used for surveys)
- Padlet: https://padlet.com/ (brainstorming tool, micro-portfolio)
- Quizlet: https://quizlet.com (flashcards, can be used for quizzes)
- Socrative: https://www.socrative.com (create questions/quizzes "on the fly")

- SurveyMonkey: https://www.surveymonkey.com/ (free online survey tool)
- Tricider: https://www.tricider.com/ (brainstorming and voting)

One of the ATS2020 teacher trainers, Sarantos Oikonomides (Greece), structures the tools, which he is using for the ATS2020 learning cycle in a mind map. As can be seen, he also uses Google Forms (for questionnaires), EdPuzzle (for interactive videos/video comments) and Youtube to support the ATS2020 learning cycle.

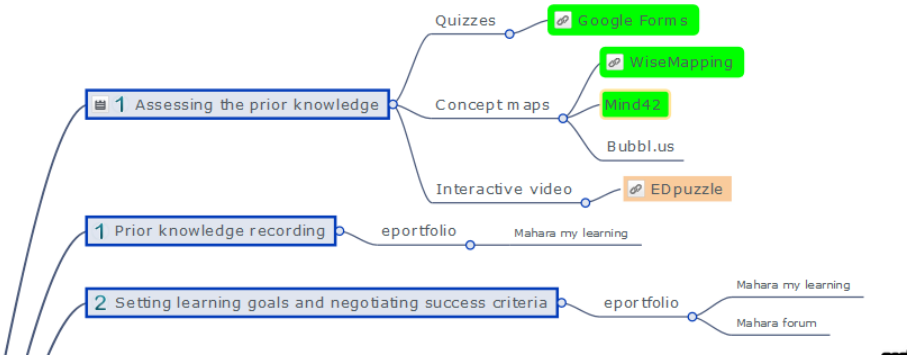


Fig. 24: Clipping from: Sarantos Oikonomides (2016f). ΠΡΟΤΑΣΕΙΣ. https://mahara.ats2020.eu/view/view.php?id=3789 (Only for logged-in users; created with WiseMapping)

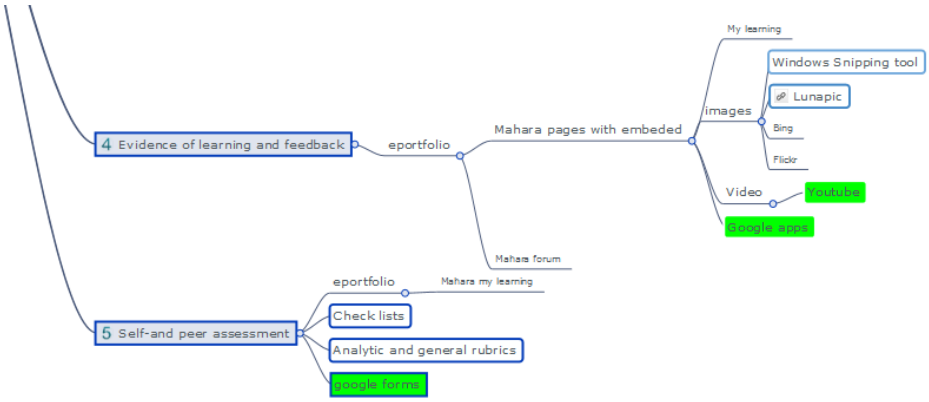


Fig. 25: Clipping from: Oikonomides 2016f

However, checklists and analytic and general rubrics are another important tool for formative assessment.

4.1.4 Rubrics

Rubrics were developed on the basis of the ATS2020 Framework of Skills. They are available via the ATS2020 resources Portal (https://resources.ats2020.eu/scaffolding-tools) as Scaffolding Tools.

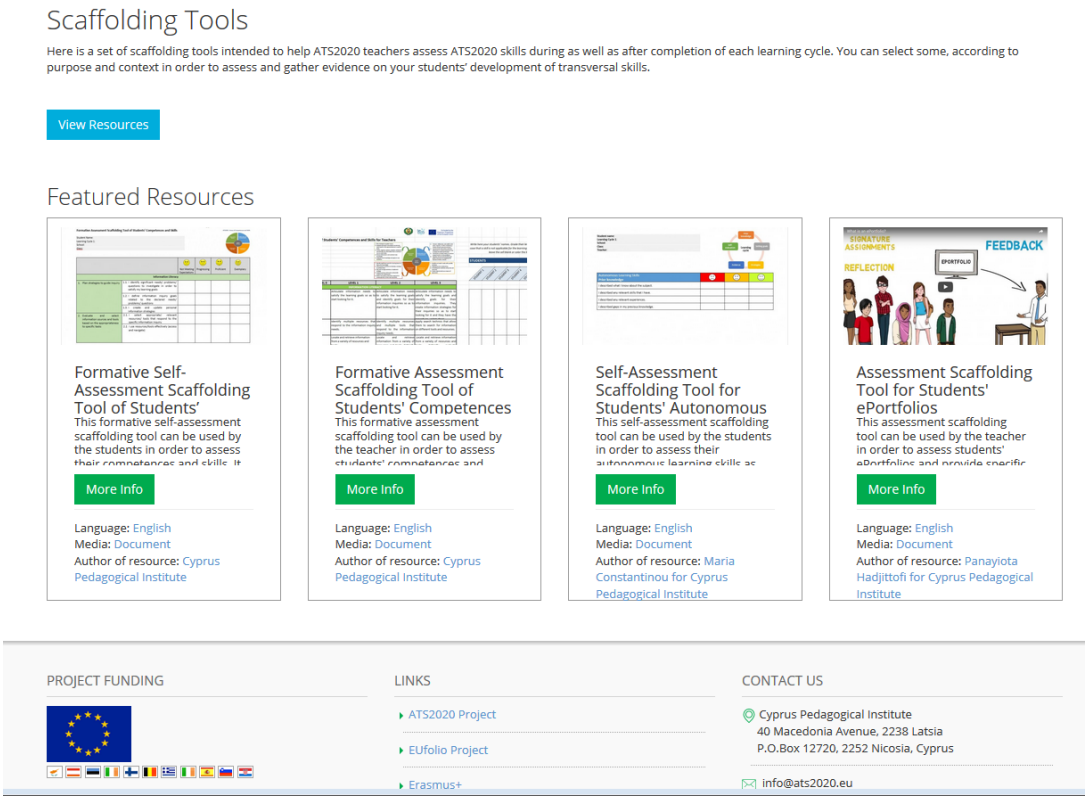


Fig. 26: Scaffolding Tools (as featured on the ATS2020 resources portal). Screenshot from https://resources.ats2020.eu/scaffolding-tools

Rubrics were usually offered to the students as a Word-document. Students would fill the rubric either themselves or as peer assessment. A "virtual printout" (pdf) of the filled rubric is included into the ePortfolio and can serve as a basis for reflection on learning (which is another way of formative self-assessment).

4.1.5 Reflective Sentence Starters

As students are not used to reflection, self-evaluation and formative feedback, they need support in giving themselves (and each other) formative assessment. Irish partners of ATS2020 developed a poster with reflective sentence starters.

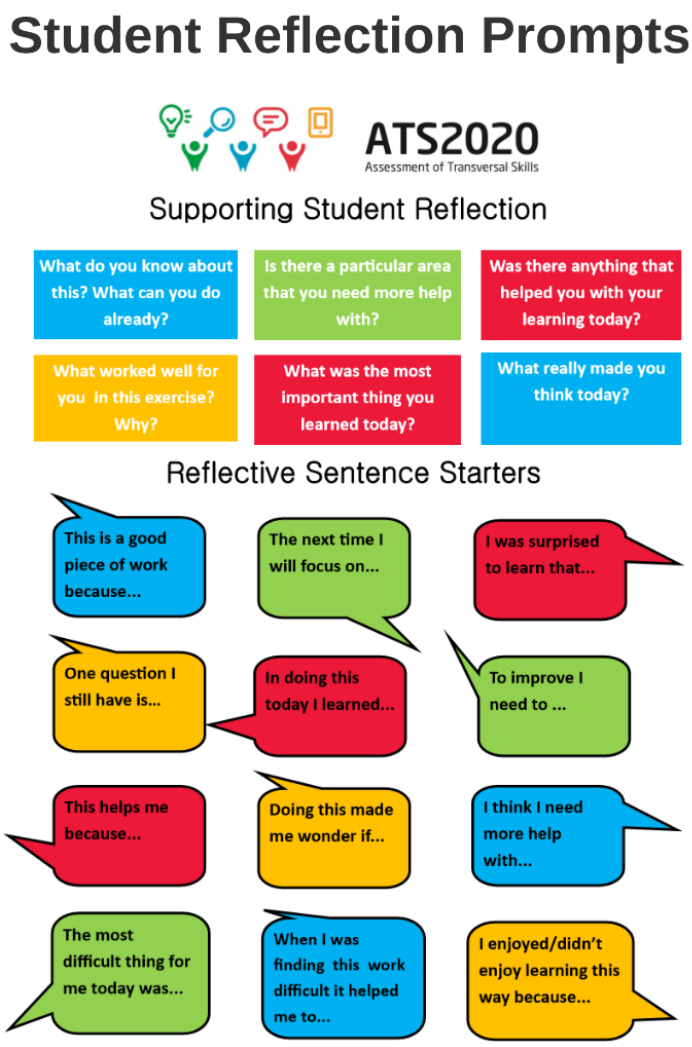


Fig. 27: Hurley & Tuohy (2017): https://prezi.com/sn57iolth9rt/using-eportfolios-to-foster-transversal-skills/?utm_campaign=share&utm_medium=copy

It could be considered to incorporate such "reflection prompts" into a plugin, as well. However, to offer too much technical help also means to pre-determine many of the teaching and learning methods.

4.2 TOOLS TO SUPPORT THE ATS2020 PILOT EVALUATION (SUMMATIVE ASSESSMENT)

The tool which will serve to support the ATS2020 pilot evaluation will assess how successful the Assessment for Learning approach of ATS2020 was. The pilot evaluation will base on a pre- and a post test to be done by the students participating in the ATS2020 pilot. Outcomes will be communicated to the students, but the students won't have the opportunity to see what exactly they did right or wrong. This assessment is summative. A broad range of tools can support summative assessments. Our selection is presented below.

4.2.1 Assessment Master

Assessment Master is an online assessment software solution based in Australia. This online testing software provides a platform to allow flexible, adaptive assessment from any location using multiple delivery methods. Assessment Master provides task-oriented and task-simulated assessments of performance in any situation – meaning, it assesses skills rather than knowledge. By simulating processes, software, behaviours and situations, the Assessment Master software is a self-managed, highly sophisticated assessment system. Tests can be created without time-consuming training and/or programming efforts. Assessment is possible independently from the user's operating-system, meaning that content can be delivered to students online or offline, via appliance or memory stick.

The Assessment Master is offered by SoNet (http://sonet.com.au/).

For ATS2020, Mitja Cepic Vogrincic of WP5 and Andrea Ghoneim for WP2 tired to negotiate the use of Assessment Master for the ATS2020 pilot evaluation. However, pricing schemes of the Assessment Master were far beyond the budget foreseen for quantitative pilot evaluation by ATS2020. (Correspondence between the mentioned ATS2020 partners and Stephen Birchall <StephenB@sonet.com.au> and Mike Janic <mailto:m.janic@sonet.com.au> between October 6 to October 20, 2015).

4.2.2 EIS – Examination Information System (Innove)

The Estonian educational system is using a variety of IT solutions that provide learning opportunities and foster communication between teachers, students and their parents. One of the newest IT solutions for Estonian education is EIS (Electronic Assessment Bank). EIS is an electronic system which provides an opportunity to write and store e-items and e-tests, carry out tests and rapport about results. The development of EIS was started by the Estonian Examination Centre in 2010, and continued by Foundation Innove after the Examination Centre had merged with the Foundation.

EIS (https://www.innove.ee/en/examinations-and-tests/examination-information-system/) is divided into three modules: item and tests bank, a management module (giving rights to roles, assigning roles to persons) and a test organisation module (participants registration). Once the system is in use new modules can be added as the need arises.

The main focus of the developing of assessment bank is on the item bank, which consists of a systematised collection of individual items. All items have been written by professionals in the field, they have been pre-tested, and their quality is assured. Each item is provided with its quality indicators and IRT item parameters and facility value in tests – level of difficulty, discrimination index and item type.

The main goals of EIS are

- to supply high-quality items and tests in all subjects and provide wider access for usage;
- to encourage usage of e-tools in the learning process;
- to modernise and update existing testing tools;
- to raise the interest to different forms of assessment

- items and tests could be used by examination centre for making high stakes tests, for teachers to conduct ad hoc tests (semi-public items and tests) and for children to rehearse at home

EIS supports more than 20 different item types (from multiple-choice questions and excessive use of graphics items to open-ended response questions), which can be used separately or combined into original e-items. E-items can be marked automatically, by markers or both. Flexible marking matrixes have a wide range of characteristics to mark every single answer. Moreover, the system enables students to get fast feedback about their performance and see expected right answer, if option is switched on. The system has instruments for flexible item layout in different languages as well as for translation and edition; the use of high-quality media and different tools (calculator, Periodic table etc.) is possible.

In 2015, EIS has been used for standardized e-tests for grades 6 and 9 in Estonian, Maths, Chemistry, Geography and Social Studies. The developments for using EIS for the national exam for grade 12 in Estonian and for the final examinations for grade 9 in Estonian and Maths are ongoing.

E-tests can be put together of items from the Electronic Item Bank, assessment bank has a reporting system of results for students, parents, teachers and test organisers and are provided with statistics (student standing in class, school and countrywide in test and parts of test, item-wise). People in different roles (teacher, students, parents, experts etc.) can enter the system using a secure login with a password or an ID-card. The responses can be linked and the student could be not punished for repeated mistakes. The responses are saved on the server therefore technical problems do not affect the test results.

More Information at https://www.innove.ee/en/examinations-and-tests/examination-information-system/ and via the video at https://www.youtube.com/watch?v=RK7Pbm8sX7c#t=35 (Uploaded 6 Dec 2011)

4.2.3 Opeka and Oppika-services (TRIM/University of Tampere)

Opeka and Oppika are web services for assessment of ICT usage of individual schools. Together they can be by a school or municipality to assess their level and quality of ICT usage. Both tools have been developed by TRIM in the University of Tampere in close collaboration with ICT teams of Finnish cities. Opeka and Oppika are connected services, but they can also be used independently.

Opeka forms the teacher part of the survey. Opeka is essentially a web-survey tool. The teachers of a school answer questions about their ICT usage, self-assess their skills and ICT infrastructure and environment of their school. The questionnaire takes about 20 minutes to complete. After filling out the survey the teachers are presented with simple user report where they can compare themselves to other users in their own school, town, subject or country.

As well as providing users with feedback, Opeka forms a data-gathering tool for schools and towns. When the teachers fill out the survey, both school and city level reports are compiled. These reports can be used by towns and schools to create new plans for their ICT usage.

All gathered data is kept confidentially. Reports about specific teachers are only given to the teachers themselves. Otherwise the reports include data about averages of organizations.

Currently Opeka has been used by more than 15 000 teachers in Finland and it is an important part of the ICT development cycles of many municipalities and schools. As well as forming a useful tool for individual organizations, Opeka offers a unique way of gathering data for research purposes and data for decision makers on the country level.

Opeka is at the moment available in Finnish, Swedish and English.

Oppika forms the student part of the survey. Oppika is a web-survey created for schools to assess the ICT skills of their students. Students fill out a survey about ICT related topics. The survey includes items that assess the know-how of the students, questions about the preferences and opinions of the students about ICT related fields as related to their school.

The surveys can be opened for specific schools by their teachers. The teachers are asked to fill out basic information about each group. The teachers then ask their students to go to a website and complete a survey. Some information is again given to the students after they complete the questionnaire. At the same time reports are compiled about individual classes, schools and municipalities. The students are handled anonymously. Only the ID of their class is recorded.

At this time Oppika is in under development. TRIM has completed its first pilots of the survey in selected schools across Finland. The first module to be developed was the questionnaire for 8th graders (13-14 year-olds). Next steps will include further developing the 8th grader questionnaire and also creating additional modules for 2nd graders (7-8 year-olds), 5th graders (10-11 year-olds) and 1st year high school students (mostly 15-16 year-olds).

Opeka can be used after registration. The assessment questionnaire is available in English. (www.opeka.fi/en)

Oppika (https://oppika.fi/) offers some information in English. However, the service/testing tool itself is (in 2015) only in piloting state and available in Finnish only.

4.2.4 TAO Open Source Assessment Tool

TAO (http://www.taotesting.com/) is an open source e-Testing platform that allows you to build, deliver, and share innovative and engaging assessments online. The TAO framework was developed by the Education, Culture, Cognition and Society (ECCS; http://wwwen.uni.lu/recherche/flshase/education_culture_cognition_and_society_eccs) research unit of the University of Luxembourg (formally the Educational Measurement and Applied Cognitive Science) and the Luxembourg Institute of Science and Technology CRP Henri Tudor (since renamed the Luxembourg Institute for Science and Technology LIST: http://www.list.lu/en/).

In 2013 LIST decided to spin-off TAO-related software development activities and founded Open Assessment Technologies S.A. (OAT) to manage the development and exploitation of TAO. OAT makes money through professional services including: consulting, platform customization, development of new features, cloud-based hosting, technical support and maintenance. Any time TAO Authorized Partner delivers TAO-based services to a client, they share a portion of this revenue with OAT.

Platform for PIAAC/PISA

A substantial investment of the German government into the TAO platform speeded up its development and enabled its use by the OECD in PISA 2009 for the Electronic Reading

Assessment (http://www.unescobkk.org/fr/education/news/article/technology-based-assessment-challenges-and-solutions/). Through further PISA cycles and its use in PIAAC, TAO has developed into a mature platform to be used both in large-scale surveys and school-based assessments.

The OECD uses TAO as the core platform to deliver both the background questionnaire and the cognitive assessment test. The participation in the PIAAC study has enabled TAO to extensively test the platform in a large-scale multi-lingual environment, spanning 27 countries and 35 languages. The platform has been expanded to provide advanced scenario-based items such as complex problem-solving in technology-rich environments and provides fully automatic scoring of these items based on user action log analysis (http://www.oecd.org/pisa/pisaproducts/PISA-2015-computer-platform.pdf).

The TAO framework provides an open architecture for computer-assisted test development and delivery. The Cloud based service provides access to a range of functionalities to develop and deliver computer-based assessments, and report test results to relevant stakeholders. By letting you define your own ontologies and data models, TAO mirrors your processes, rather than you having to adapt your workflows to the platform.

The TAO Item Creator is a standards-based content authoring application built on top of a scalable item bank. You can create QTI 2.1 compliant tests ensuring content interoperability. The TAO platform can be used to deliver the entire assessment cycle including tools for test creation, learner registration and results reporting.

Question Types and Response Modes

The TAO authoring tool can be used for a range of item types including:

- multiple-choice;
- fill-in-the-blank;
- matching;
- ordering;
- text entry;
- selecting a word or hotspot.

A range of response modes can be used including:

- clicking;
- typing;
- dragging information on the screen.

Open web items are based on standard Web technologies: XHTML, CSS and JavaScript. This allows implementation of items that are highly complex and include custom interactions. There is an extensive user guide with video tutorials available online (http://userguide.taotesting.com/).

System Requirements: *TAO system requirements as per website and TAO data sheet (*http://www.taotesting.com/wp-content/uploads/2014/09/tao_datasheet.pdf).

Browsers: Google Chrome 11 or higher, Mozilla Firefox 10 or higher, Microsoft Internet Explorer 8 or higher, Apple Safari 5 or higher, locked down browsers. Most widely used mobile devices such as recent iPads and Android Jelly Bean.

Operating Systems: All Linux/Unix distributions, Microsoft Windows, Mac OS X or OS X Server.

Web Servers: PHP 5.3 or higher, MySQL 5.0 or higher, Apache 2.2.9 (recommended). Possibility to use TAO with PostGRE (9+), MSSQL (2008+), and Oracle (11g) with some restrictions.

Mobile Devices: Apple iOS 7 or higher; Android 4.2 or higher.

Technical Support: Free support is available through the TAO "forge" community website at http://forge.taotesting.com. This provides access to the platform developers and the TAO Open Source community. The TAO User Guide online provides a good source of information.

OAT offers dedicated support & maintenance agreements for clients with large scale production deployments at a cost. Clients can purchase Technical Support from TAO Authorized Partners listed on the website (http://www.taotesting.com/partners/find-a-partner)

5 RECOMMENDATION: COMBINATION OF EASSESSMENT TOOLS AND PLATFORMS FOR ATS2020

5.1 OPEN SOURCE SOLUTION

The following slides (drafted by Andrea Ghoneim as a result of WP2 discussions for the ATS2020 online meeting on September 3, 2015) show the combination of tools within the ePortfolio platform Mahara. Oppika – an evaluation tool for students – is not connected with Mahara. A link to the tool should should be placed either within the teaching portfolio of the teacher or be provided within the Mahara plugin "My Learning". Oppika would assist the student in finding out about her/his Prior Knowledge. The results can be incorporated into my learning as a pdf printout of the results.

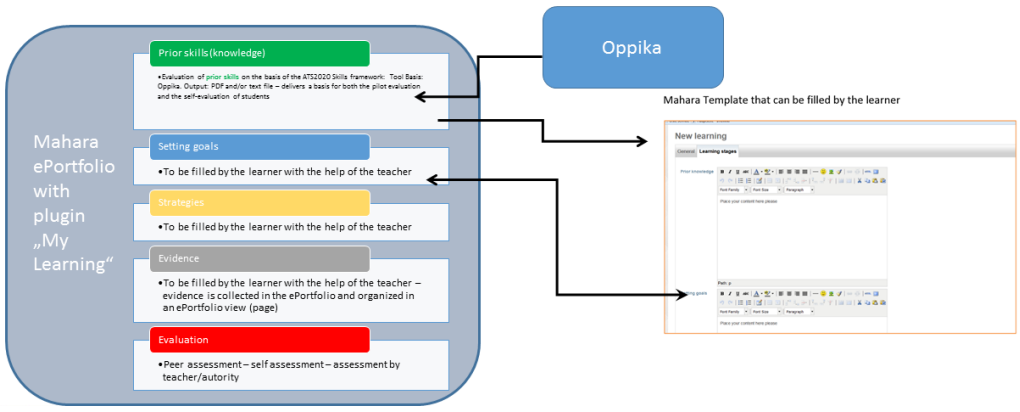


Fig. 28. Presentation of Andrea Ghoneim (for WP2) at ATS2020 Online Meeting in September 2015

When looking at the final stages of one cycle of "My Learning", we focus on the stages "Evidence" and "Evaluation". "Evaluation should consist of

- Peer Assessment (formative), carried out, after a first version of the ePortfolio/ePortfolio page is ready to be assessed by a peer. The basis can be both rubrics (if completed with a field for comments) or feedback given via an assessment field (compare Del. 2.1 for details).

- Self-Assessment (formative), basing on another self-evaluation with Oppika (the result will be again incorporated in the ePortfolio), which has to be reflected by the student her-/himself.
- Assessment by the teacher or another authority (formative and summative)

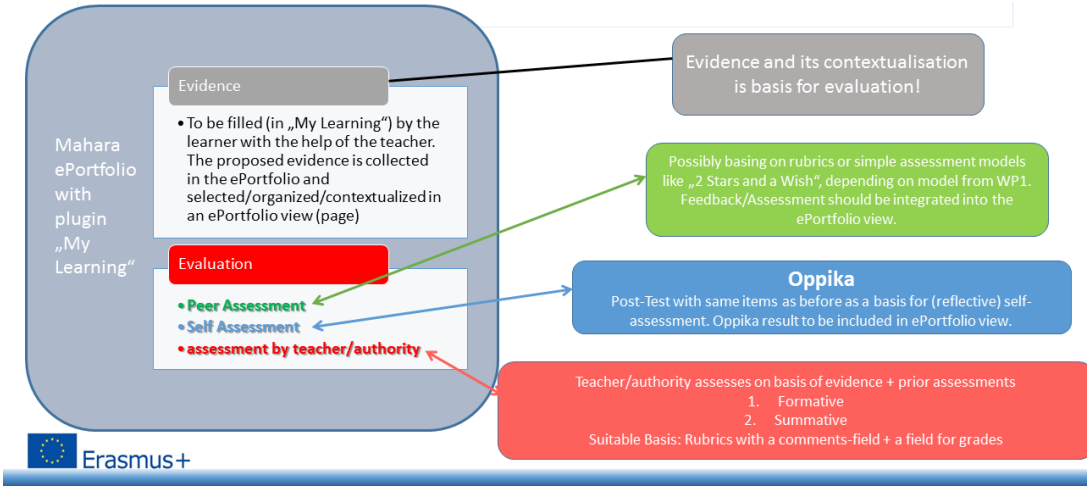


Fig. 29: Presentation of Andrea Ghoneim (WP2) at ATS2020 Online Meeting in September 2015

Below is another visualisation of the assessment process with/within Mahara, showing the recommended assessment tools.

- Oppika
- My Learning
- Rubrics
- Feedback form as provided by Mahara

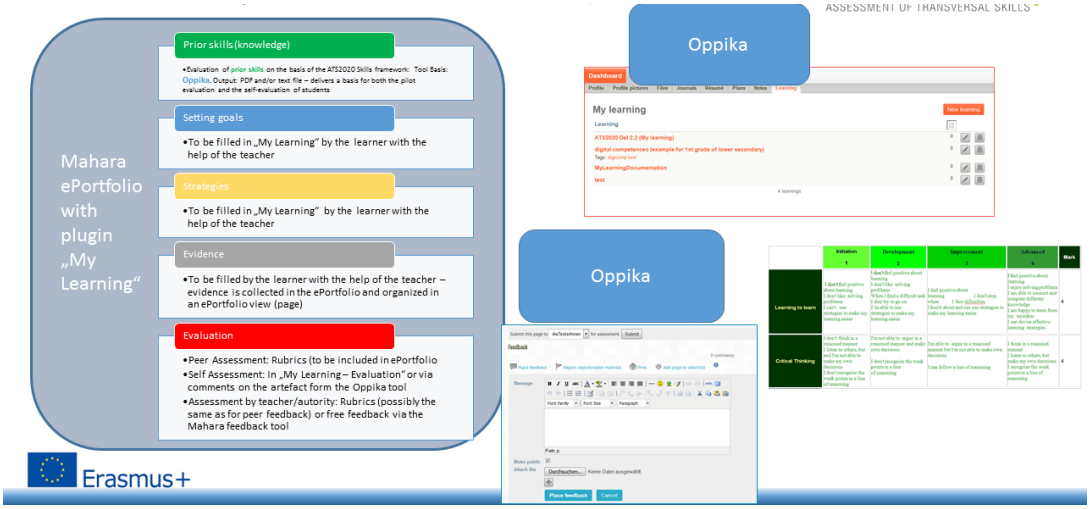


Fig. 30: Presentation of Andrea Ghoneim (WP2) at ATS2020 Online Meeting in September 2015

5.2 Commercial Platform/Hybrid Solution (Microsoft)

The following slides (drafted by Andrea Ghoneim for the ATS2020 online meeting on September 3, 2015) show the combination of tools within a Microsoft environment basing

on Office 365 (O365), OneDrive, OneNote and possibly MS Sway. Oppika – an evaluation tool for students – is not embedded in the Microsoft solution. A link to the tool should should be placed either within the teaching portfolio of the teacher or be provided within the virtual classroom of O365. Oppika would assist the student in finding out about her/his Prior Knowledge. The results (as a pdf or any other form of easily compatible file) can be incorporated into the student's OneDrive, together with reflections on the results.

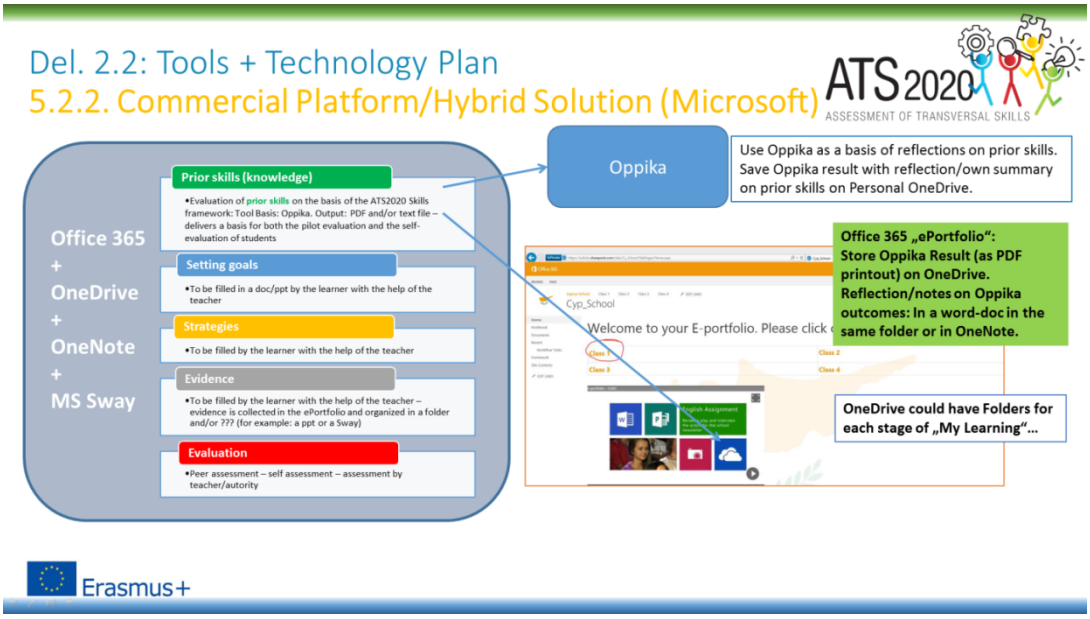


Fig. 31: Presentation of Andrea Ghoneim (for WP2) at ATS2020 Online Meeting in September 2015

If there is no other solution for the features of "My Learning", each student could set up a folder for each stage of "Learning" (Prior skills – setting goals – strategies – evidence – evaluation) to collect the documents related to each learning stage there.

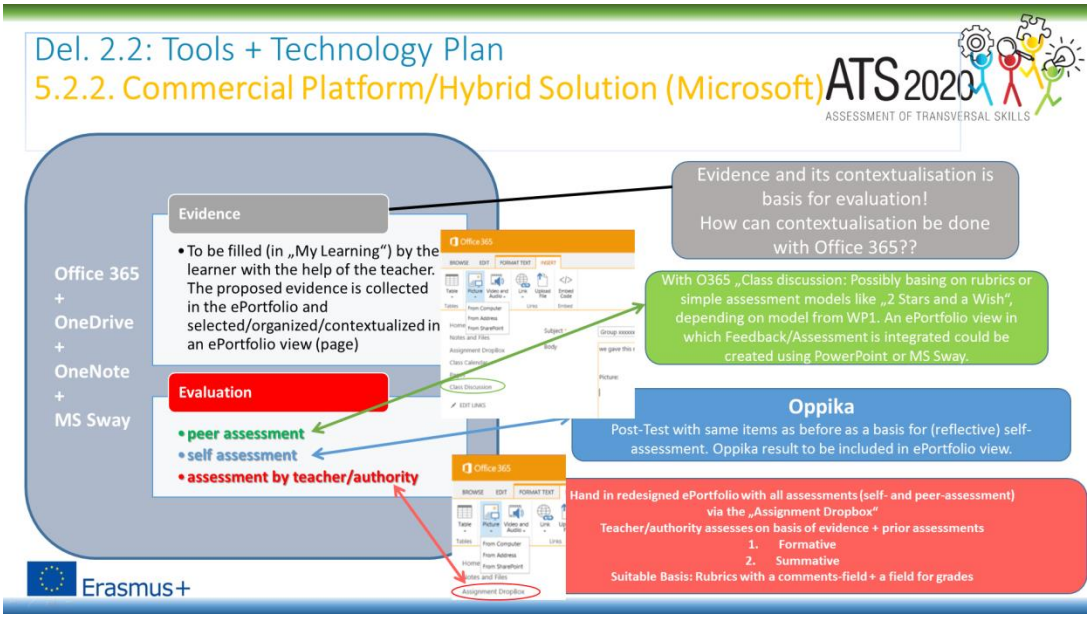


Fig. 32: Presentation of Andrea Ghoneim (for WP2) at ATS2020 Online Meeting in September 2015

Peer assessment has to be done – ideally – in the same way as chosen for the Open Source solution. Peer feedback could be done with O365's feature "Class Discussion" or via

sharing a file from the OneDrive with the chosen (or determined) peer. Oppika would serve as a basis for self-assessment. The Oppika results (again as a pdf) are now stored with "evaluation", accompanied by the student's reflections on her/his Oppika results.

5.3 Final Tools and Technology Plan

At/around the meeting in Krems (Nov. 2015) the tool „Oppika" (student self-evaluation tool made by UTA, Finland) was opted out, because the development efforts necessary to adapt the tool could not be foreseen. Instead, the Estonian Exam Infosystem EIS should be adapted for the quantitative pilot evaluation on basis of a Functional Specification delivered as D. 2.1.2 ("Assessment Platform. A functional specification". Available via https://mahara.ats2020.eu/view/view.php?id=182).

The use of Opeka (for the teacher questionnaire) still remained an option, however, it was decided that the teacher questionnaire should be set up on the EIS Exam Infosystem, as well.

Therefore, the final Tools and Technology Plan for ATS2020 looks as follows:

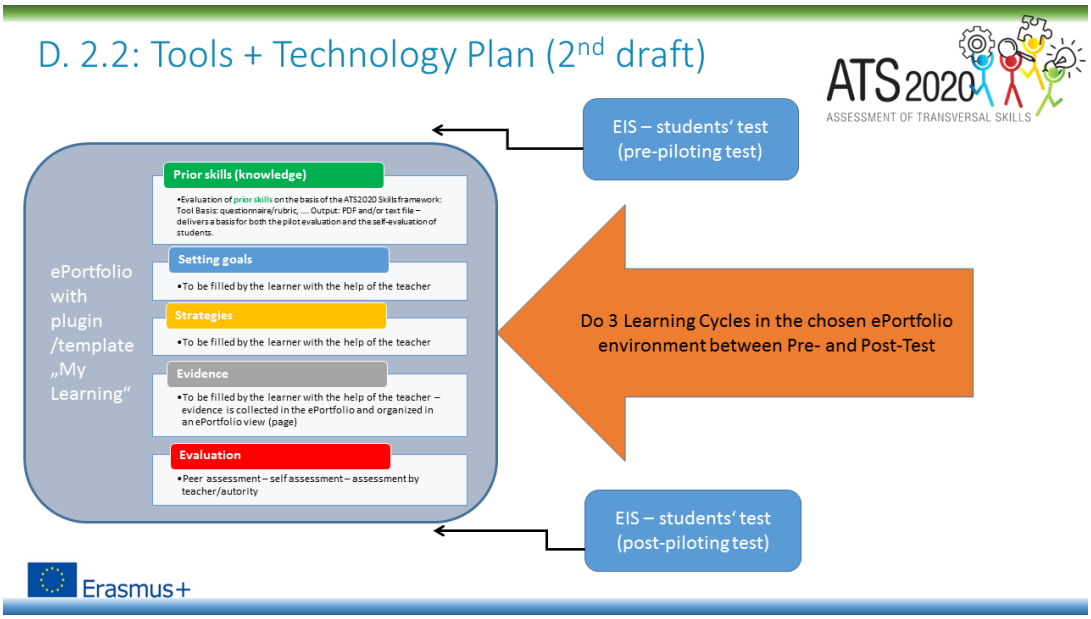


Fig. 33: Drafted by Andrea Ghoneim (for WP2) after the ATS2020 meeting in Krems in December 2015

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