ATS2020
Assessment of Transversal Skills

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Reflections and Policy Recommendations on Transversal Skills Development and Assessment

(based on ATS2020, Erasmus Policy Experimentation Project, 2015-2018)

April 2018

Co-funded by the
Erasmus+ Programme
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Anastasia Economou, Cyprus Pedagogical Institute

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Contents

Key Terms Used

Experimentation: the evaluation of the implementation of the ATS2020 Learning and Assessment Model as an innovative policy measure; it measured its potential impact by field trial testing on a representative sample of potential beneficiaries. Policy experimentations follow "experimental" or "semi-experimental" scientific methods that verify hypotheses in a "controlled" environment, i.e. through measurable direct interventions and comparisons (e.g. "before/after", or "treated"/"non-treated" groups)[3].

ATS2020 implementation: the implementation of the ATS2020 Learning and Assessment Model, independently of the experimentation evaluation.

ATS2020 Learning and Assessment Model: the policy initiative on learning and assessment of transversal skills, developed and applied by the ATS2020 project.

ATS2020 Transversal Skills Framework: the framework developed with the competence areas and transversal skills selected for the ATS2020 Learning and Assessment Model experimentation.

Competence Areas: the competence areas in the ATS2020 Transversal Skills Framework, consisting of sets of transversal skills.

Skills: the transversal skills identified under each competence area of the ATS2020 Transversal Skills Framework.

Learning Cycle: a learning unit within a sufficient period of time to allow a complete implementation of the ATS2020 Learning and Assessment model, through coherent learning goals, the students' My Learning Journal and students' ePortfolio.

My Learning Journal: a tool that guides students to design their learning, supported by a formative assessment process and includes the following steps: assessing prior knowledge; setting learning goals and negotiating success criteria; developing learning strategies; evidence of learning, reflection and feedback; self-evaluation.

[3] GUIDELINES FOR APPLICANTS, Call for proposals, EACEA No 10/2014, Key Action 3: Support for policy reform - Prospective initiatives.

Introduction

This booklet, Reflections and Policy Recommendations on Transversal Skills Development and Assessment (based on ATS2020, an Erasmus Policy Experimentation Project, 2015-2018) provides recommendations for policies aimed at developing and assessing transversal skills in the school context, targeting policy makers, school leaders, teachers and researchers, as well as anyone interested in the development and assessment of transversal skills in the digital era. These recommendations stem from the experience of the ATS2020 project, through the discussions and reflections of the *implementation* of the ATS2020 learning and assessment model, as well as the *experimentation evaluation* results. Information is also given, unveiling the practices that took place during the three years of the project.

Two main evaluation questions were explored through the experimentation evaluation: "To what extent did the ATS2020 learning model promote the development and the assessment of the transversal skills defined for the purposes of the project?" and "How has the ATS2020 model (and its critical aspects) on the development and assessment of the targeted transversal skills been implemented?". The answers to these questions allowed the ATS2020 consortium to address two points, critical for policy recommendations: "Was the intervention, or any of its aspects, successful?" and "Can the intervention model, or any of its aspects, be scaled up into an implementable policy?".

This document has two main goals: to give an overview of the ATS2020 project and to offer policy recommendations. It is divided in three sections:

- *ATS2020 Assessment of Transversal Skills Project in a Nutshell*, presents the project, the learning and assessment model and the model's basic elements (Chapters 1, 2, and 3).
- *Reflections*, describes three project activities, along with reflections and suggestions (Chapters 4, 5, and 6).
- *Policy Recommendations*, provides the project conclusions and policy recommendations for the ATS2020 scaling up (Chapter 7).

The policy recommendations are presented at: the *Macro level* (European and national policy), the *Meso level* (school leadership) and the *Micro level* (teacher and classroom). Additional recommendations for the Erasmus+ policy experimentation programme, build on the experiences of consortium members, piloting teachers and students.

We hope that the ATS2020 initiative for policy innovation will contribute to the effort of the European Commission to create opportunities for *organisations*, *teachers* and *learners* to innovate, through Opening Up Education[1] and stimulate innovative teaching and learning practices that support the Digital Education Action Plan[2], towards a digitally-enhanced transformation of education.

[1] COM(2013) 654: Communication on Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources

[2] COM(2018) 22: Communication on the Digital Education Action Plan

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Assessment of Transversal Skills Project in a Nutshell

1. The ATS2020 Experimentation Project

Assessment of Transversal Skills 2020 (ATS2020) is a policy experimentation project co-funded by the Erasmus+ programme (Key Action 3) of the European Union, for the period 1/3/2015 to 30/4/2018. The project consortium consists of 17 partners from 11 EU countries and is coordinated by the Cyprus Pedagogical Institute (Table 1).

The **ATS2020 project** developed a teaching and learning model, implemented a corresponding intervention in schools and explored its impact at a scale sufficiently large and diverse for valid conclusions, following a quantitative and qualitative evaluation methodology. During the school year 2016-2017, the ATS2020 learning model was implemented on a pilot basis in 10 of the project's participating countries, involving 224 schools, 747 teachers and 11.891 students. In addition to the learning that took place and the new knowledge produced, students, teachers and researchers expressed contentment and enthusiasm about their participation in the ATS2020 project; this subjective experience of a beneficial participation adds substantially to the objective research findings.

Through extensive dissemination activities, the project contributed to the growing discussion around the development and assessment of transversal skills within upper primary and lower secondary education. The experimentation evidence can help Education Ministries and the European Commission to formulate informed policies and implementation strategies for the development and assessment of transversal skills across Europe. At the same time, it enables school leaders and teachers to introduce innovative learning and assessment approaches, in order to transform learning for an effective education of the new citizens in the digital society.

ATS2020 partners

- Cyprus Pedagogical Institute, Cyprus (coordinator)
- Ministry of Education and Culture, Cyprus
- Centre for Educational Research and Evaluation, Cyprus
- Danube University Krems, Austria
- CVO Antwerpen, Belgium
- Croatian Academic and Research Network, Croatia
- Foundation of INNOVE, Estonia
- University of Tampere, Finland
- Computer Technology Institute & Press "Diophantus", Greece
- Monaghan Education Centre, Ireland
- H2 Learning Limited, Ireland
- Centre of Information Technologies in Education, Lithuania
- National Examinations Centre, Slovenia
- Ministry of Education, Science and Sport, Slovenia
- Educational Research Institute, Ljubljana, Slovenia
- National Education Institute Slovenia, Ljubljana, Slovenia
- Dirección Xeral de Educación, Formación Profesional e Innovación Educativa, Spain

Table 1: ATS2020 consortium

2. The ATS2020 Learning and Assessment Model

Preparing students for living and working in the 21st century requires education systems to provide citizens with a core body of knowledge along with a set of key competences. The rapid growth of digital tools used by youth challenges national ministries of education. Student exposure to web 2.0 tools, devices, and environments brings new affordances, challenges, opportunities, and demands new skills for teaching and assessment *of*, *for* and *as* learning. Education must reform to accommodate, facilitate and develop 21st century learning, teaching, assessment and skills (Griffin et al., 2012). Education stakeholders agree on this "Opening up"; but many are at a loss for its implementation and assessment, especially within current national curricula. It is clear to all participants in this discussion, and is confirmed by our experience at ATS2020, that development of 21st century skills calls not only for new teaching approaches but also and equally important for innovative assessment methods.

ATS2020 proposes a comprehensive learning model to enhance transversal, 21st century indispensable student skills, within the diverse EU national curricula, including provision of teachers with modern approaches and innovative tools for the assessment of these skills.

ATS2020 extends and builds on existing models, elaborating learning as both process and product. It introduces a web of learning activities leading to learning outcomes, supported by technological and scaffolding tools, extended and redesigned. Evidence of learning is collected using an ePortfolio three-level developmental process -repository, workspace and showcase (Abrami and Barrett, 2005), with an embedded continuous reflection cycle of "my learning"[4]. Teachers and students collaborate and make evidence-based decisions while (re)designing instruction and learning.

[4] As introduced in EUfolio: EU Classroom ePortfolios, a project funded by the European Commission under the framework of the Lifelong Learning Programme (KA1 - Implementation of the European strategic objectives in Education and Training) (2013-2015).

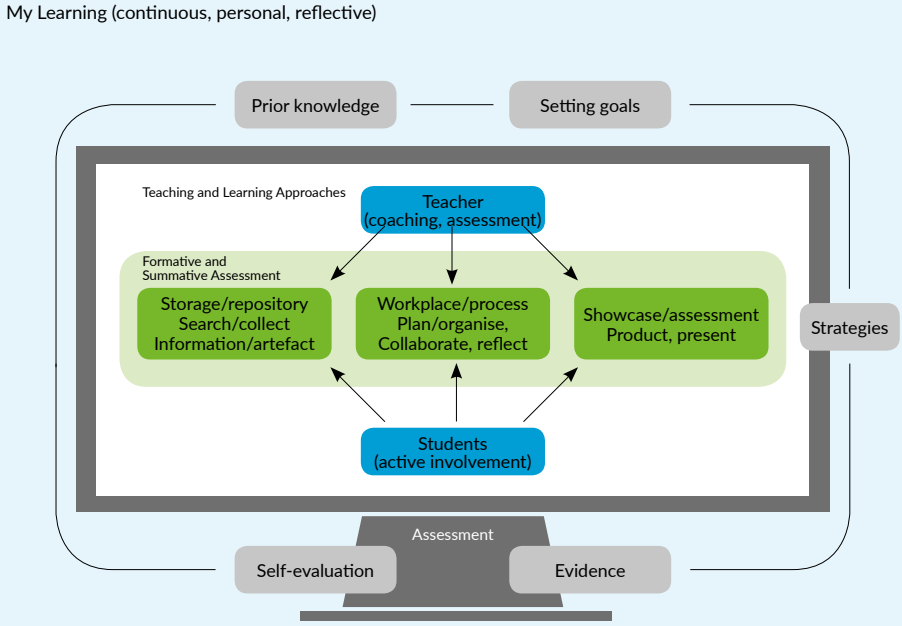

Figure 1: ATS2020 Learning and Assessment Model

The ATS2020 learning and assessment model includes:

- A learning design process for the development of selected transversal skills (Information Literacy, Collaboration and Communication, Autonomous Learning, Creativity and Innovation, Digital Literacy) within the curriculum.
- Incorporation of digital technologies in the learning design process. Learning activities take place in digital environments that support an ePortfolio process (mainly Mahara, Office365 OneNote), using digital resources and tools.
- Students maintaining a digital journal for their learning (*My Learning Journal*).
- Student ePortfolios for their learning process, as well as for their assessment.
- Assessment of student skills, using formative assessment scaffolding tools (teacher assessment, peer-assessment, self-assessment).

3. The ATS2020 Learning and Assessment Model Basic Elements

The ATS2020 learning and assessment model is based on and further promotes innovative teaching and learning approaches enhanced by digital technologies. The learning model includes the following basic elements (Figure2): transversal skills, ePortfolio, active student participation in the designing of their learning (*My Learning Journal*), assessment *of*, *for*, and *as* learning, and digital technologies enhanced learning.

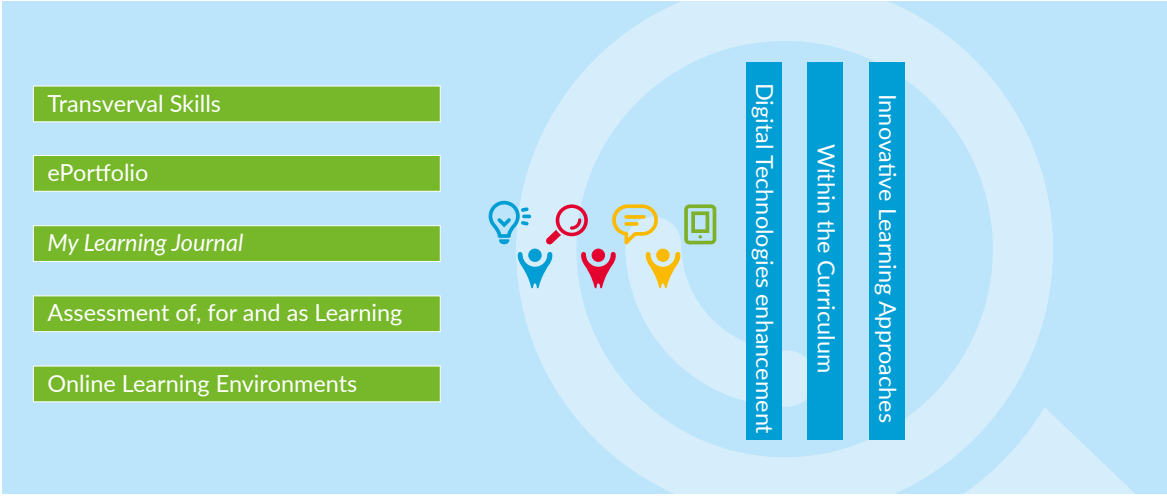

Figure 2: Basic Elements of the ATS2020 Learning Model

3.1. Transversal Skills

The rapid technological growth and digital transformation of our societies, have brought new affordances and at the same time new challenges in people's lives. While many opportunities arise from the use of digital technologies, citizens risk being unprepared for the future. In order to realise the potential of digital technologies, education systems must support students to develop the knowledge, skills and values for living and working in a digital environment.

Transversal skills refer to a broad set of key skills developed through different disciplines; they are critically important for success in school, further education, work, personal and social life. They include the ability to think critically, take initiative, use digital tools, solve problems and work collaboratively[5]. The ATS2020 project focuses on transversal skills for autonomous learning, collaboration and communication, information literacy, and creativity and innovation in a *digital context*.

[5] ET2020 Working Group on Transversal Skills (2014-2015).

3.2. ePortfolio

The ATS2020 model approaches ePortfolio both as a process and a product; it uses an ePortfolio three-level developmental process -repository, *workspace* and *showcase*-, with an embedded continuous reflection cycle of *My Learning Journal*, for student planning of their own learning.

For the purposes of ATS2020, ePortfolio has been adopted as defined in the framework of the European project EUfolio (2014).

> ***"ePortfolios are student-owned dynamic digital workspaces wherein students can capture their learning and their ideas, access their collections of work, reflect on their learning, share it, set goals, seek feedback and showcase their learning and achievements".***
>
> *EUfolio project (2014)*

The ePortfolio can provide students with the learning approach and the digital environment that will allow them to cultivate and develop transversal skills, to follow a process of self-reflection and self-assessment and cultivate skills of self-regulated learning. Additionally, the ePortfolio constitutes an innovative method of assessment of student learning and in particular assessment of transversal skills since it (re)presents each student's course of learning and progress.

3.3. My Learning Journal

The *My Learning Journal*, as a tool of ATS2020 embedded in the ePortfolio process, places students at the centre of learning by engaging them in a repeated spiral process, during which they design their own learning. During this process, students write down their prior knowledge about the topic that they engage in; they set their learning goals; they develop strategies for achieving these goals; they set assessment criteria as well as the learning evidence that they need to collect. In the end, they reflect on the process that they have followed and assess their learning. This is a spiral and continuous process. Students are expected to design and complete the *My Learning Journal* for each Learning Cycle, as well as for the whole school year. *My Learning Journal* for the school year refer to the transversal skills that students focus on, as well as their whole experience in ATS2020. Each *My Learning Journal* is gradually developed, and its content redesigned as needed.

Just like other skills, transversal skills are developed by exercising them. Thus, for autonomous learning, students through *My Learning Journal* become self-regulated learners, take control of what they are learning, set and share learning goals with teachers and peers, evaluate their own work and the work of their peers and understand feedback they receive.

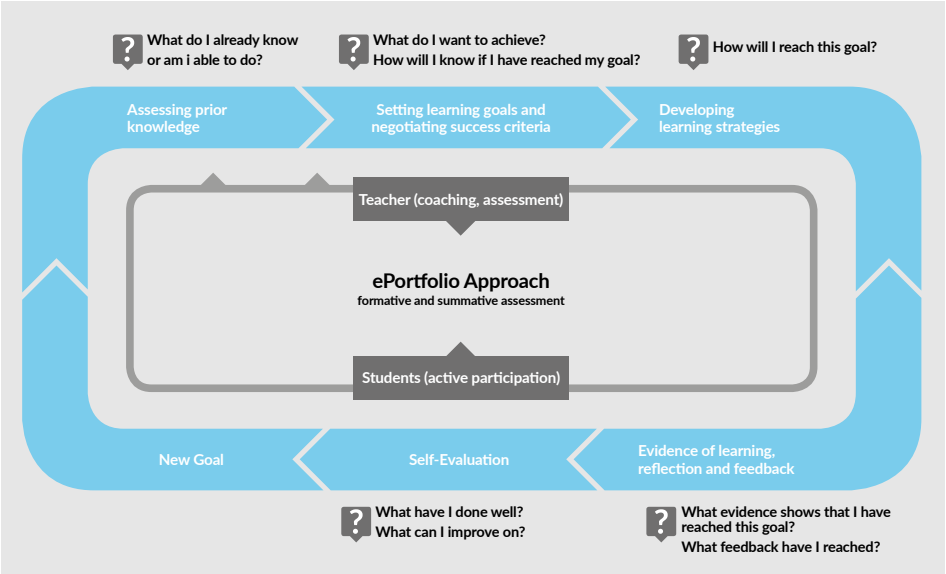

Figure 3: My Learning Journal

3.4. Assessment

Assessment is more and more seen as a tool for enhancing and informing learning, rather than just certifying it. To ensure effective formative assessment teachers need to share learning goals with students, enable them to self-monitor and self-regulate their learning, provide high quality constructive beyond informative feedback to students, making multicriteria judgments and help their students close their 'learning gap', involving them in the process of assessment. Assessment **of** learning, gives its way to assessment **for** learning and **as** learning, providing opportunities for students to develop new skills during their learning process.

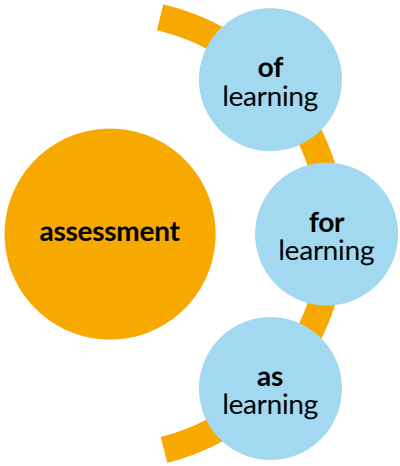

Figure 4: Assessment as, for and of learning

In such a context, traditional summative assessment methods that were exclusively measuring student classroom aptitude are facing a challenge in assessing transversal skills. The complex nature of transversal skills calls for new kinds of evidence of

learning, and new forms of assessment are needed to assess such complex performances. These forms of assessment move us away from traditional summative assessment methods towards forms which promote co-constructed formative assessment, where students are directly involved in making the relevant judgements. Portfolio-type self-assessments or observations of key competencies grounded within authentic learning situations are suggested as methods that are better suited to supporting learners to develop key competencies and to validly assessing key competencies (Hipkins, Boyd and Joyce, 2005). The ATS2020 ePortfolio approach aims to assess the development of transversal skills within the learning process, using innovative scaffolding assessment tools *for*, *as* and *of* learning. In reference to Taras (2005), summative assessment is approached in this process as formative assessment, by providing feedback which is used by the learner.

3.5. Online Learning Environments

The online learning environments selected for ATS2020 are the open-source environments *Mahara* and the business solution *Office365 OneNote Class Notebook*.

The Mahara environment has been adjusted (mahara.ats2020.eu) to meet the requirements of the learning model. A closed (private) secure environment is provided, which allows users to create and save websites and documents, to upload and download files, to create learning groups providing them with material and lesson activities, to incorporate online tools, to participate in forum discussions, to provide and receive feedback, to complete the *My Learning Journal*, and put together ePortfolios in order to showcase their assignments and artefacts.

The Microsoft Office 365 group of online tools and applications has also been adjusted according to the requirements of the learning model (o365.ats2020.eu). The Office 365 environment utilises OneNote Class Notebook, OneDrive, SharePoint, Yammer, Lync as well as other embedded Web Apps and Office365 processing programs. A closed (private) secure environment is provided which allows users to create, save files, to organize their lessons in OneNote Class Notebook (materials, structure of activities, provision of feedback, utilisation of collaboration space), to fill-in *My Learning Journal*, and create their ePortfolios.

3.6. Learning Design for Technology-Enhanced Teaching and Learning

As the ATS2020 learning and assessment model aims that students take an active role in their learning for transversal skills; it also entails for teachers to actively participate in the design and adaptation of their teaching. Although we cannot expect all teachers in the national scale to be innovative and create new educational scenaria, we do require them to be able to adapt their teaching to the circumstances varying what they do, depending on the students, the learning goals and external

challenges and opportunities. For transversal skills, they will need to do this purposefully, in a focused and disciplined way and this is where learning design for all teachers and not just for the curriculum designers comes in.

Learning Design is a pivotal element of successful teaching and learning, especially when teaching and learning involve innovative approaches and methodologies. The assessment of transversal skills, through an ePortfolio process, involves and requires new skills and tools to support learning to take place. Thus, one important aspect of the ATS2020 teacher professional development programme was the introduction to Learning Design process, so as to guide teachers to explicitly include transversal skills in the learning goals and align learning activities with goals and assessment. ATS2020 teachers were expected to design their own educational scenarios or adapt existing ones that were developed at project level.

For that purpose, a Visualised Learning Design (VLD) approach has been adapted for the needs of the project, based on the work of the UK Open University and the European project "Design Practice – PREATY"[6], during which it was investigated how the VLD approach can support teachers in the design of technology-enhanced activities (Avraamidou and Economou, 2011).

The VLD approach was adapted to the needs of the ATS2020 learning model and its elements, in order to help ATS2020 trainers and teachers in the design of learning scenarios leading to successful ATS2020 learning goals, while at the same time to enhance communication among teachers and stimulate innovative teaching.

3.7. Innovation and Change Management

Although change and innovation initiatives are not uncommon in education, schools remain fundamentally conservative. Implementing an innovation such as ATS2020 requires leadership and management skills to facilitate change both at the school unit and at the educational system level. The role of school leaders is pivotal for creating a school culture that promotes innovation and change. At the same time, teachers as agents of change have a critical role in the successful implementation of the innovation, and their training and support are essential elements of the ATS2020 implementation.

[6] http://www.design-practice.org, http://www.pi.ac.cy/preaty

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Reflections

4. ATS2020 Transversal Skills Framework

4.1. The Process

A number of different terminologies and descriptions of competences can be found for transversal skills, across a number of initiatives defining and promoting such skills in national curriculum policy. The ATS2020 project team went through a systematic literature review on transversal skills and studied a number of existing frameworks worldwide. Based on the literature review and the needs identified by the participating countries, four competence areas (*Information Literacy*, *Autonomous Learning*, *Collaboration and Communication*, *and Creativity and Innovation*) were specified for the purposes of the ATS2020 experimentation evaluation (Figure 3). Digital Literacy competence area skills are embedded and activated in all four areas, as skills are developed and deployed in a digital context through the use of digital technologies. At the same time, the *Autonomous Learning* area skills are developed through the *My Learning Journal*, guiding the learning process for the development of all (*Information Literacy*, *Collaboration and Communication and Creativity and Innovation*).

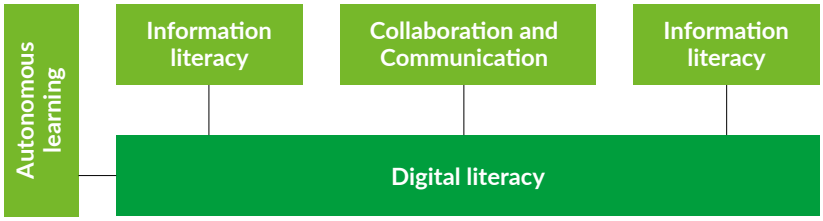

Figure 5: ATS2020 competence areas of skills under focus

The following *conceptual structure* was developed for the analysis of the framework:

- *competence areas* analysed into *skills*
- *attainment goals* set for each skill, with reference to digital competence area skills
- *attainment examples* given for each attainment goal
- three *proficiency levels* described for each skill

Figure 6 shows the analysis of the ATS2020 competence areas into skills, based on existing frameworks, in particular the Digital Competence Framework by the European Commission Joint Research Center (Carretero et al., 2017), the ISTE Standards for Students (ISTE, 2007) and the ATC21S KSAVE Model (ATC21S, 2012).

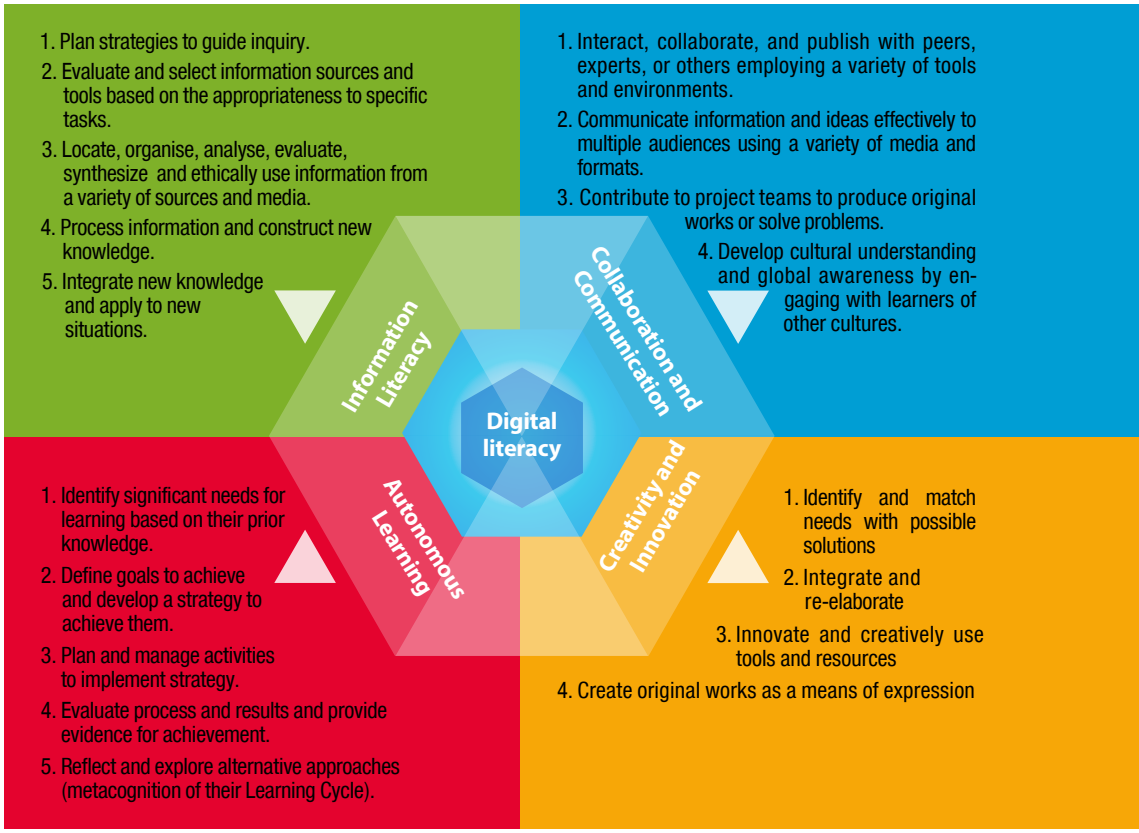

Figure 6: ATS2020 competence areas of transversal skills

The framework includes five broad **competence areas** (four plus digital literacy were specified and selected for experimentation), with several specific **skills** in each competence area (Figure 6). Skills are described at three **proficiency levels**; a number of **attainment goals** are set for each skill with explicit reference to digital skills; and **attainment examples** (for each attainment goal) help students, teachers, trainers and designers obtain a common understanding and through it guide transversal skill assessment -which is the objective of the whole project. The attainment examples are approached under the lens of *ways of thinking* (stands), *ways of working* (actions) and *ways of living* (ethics), so as to scaffold the learning designers to address the broader spectrum of learning.

The example presented in Figure 7, shows the analysis of the attainment goal *Create new content in different formats* under the skill *Process Information and construct new knowledge* of the competence area of *Information Literacy*, to digital skills, attainment examples and proficiency levels.

The ATS2020 Transversal Skills framework was the base on which the learning designs, the scaffolding assessment tools and the experimentation evaluation tools were developed.

Skills	Attainment goals	Digital skills	Attainment examples			levels of "proficiency" 1	levels of "proficiency" 2	levels of "proficiency" 3
			Stands (way of thinking)	Actions (way of thinking)	Ethics (way of thinking)			
4. Process information and construct new knowledge 1. Plan strategies to guide inquiry 2. Evaluate and select information sources and tools based on the appropriateness to specific tasks 3. Locate, organise, analyse, evaluate, synthesize and ethically use information from a variety of sources and media 4. Process information and construct new knowledge	4.1 Create new content in different formats	• Create and edit digital content • Use software tools to create and edit text, presentations, videos and other formats	• See the potential of technologies and media for self-expression and knowledge creation • Know which tool/application fits better the kind of content s/he wants to create • Know that digital content can be produced in a variety of forms • Understand how meaning is produced through multimedia (text, images, audio, video)	• Create knowledge representations (e.g. mind maps, diagrams) using digital media • Create original works as a means of personal or group expression • Use basic packages to create content in different forms (text, audio, numeric, images	• Judge constructively and appreciate the work of others	Process information to create or edit content in a variety of formats, using different tools.	Process information to create or edit content in a variety of formats, using different tools. Construct their own (and new) knowledge.	Process information to create or edit content in a variety of formats, using different tools. Construct their own (and new) knowledge, in a creative and innovative way. Publish new content with respect to others.

Figure 7: An example of the analysis for the ATS2020 framework

4.1.1. Refining the ATS2020 Transversal Skills Framework

The first version of the framework was developed with the input of the ATS2020 project team members and trainers. It was then used by the trainers to develop the ATS2020 learning designs and formative assessment scaffolding tools, as well as the researchers to develop the experimentation evaluation tools. During this phase, feedback was given leading to the revision and refinement of some descriptions, as well as to the enrichment of attainment examples. This second version was presented in three views: (i) *full view* of each competence area with all the levels of analysis presented, i.e. skills, attainment goals, attainment examples, and proficiency levels, (ii) *proficiency levels view* of each competence area, i.e. skills, attainment goals and proficiency levels of analysis only, and (iii) *attainment*

examples view of each competence area, i.e. skills, attainment goals and attainment examples only.

The framework was revisited after the classroom implementations for further refinement and its final for the ATS2020 project version.

4.2. Reflections on the ATS2020 Transversal Skills Framework

The process of developing the ATS2020 framework was a rich learning experience and enabled the development team to further understand how transversal skills can be developed and assessed. The analysis of each competence area into skills and setting goals to attain these skills, enabled the learning design for developing such skills within the curriculum. Moreover, the description of attainment examples and proficiency levels, facilitated the development of the assessment tools for these skills. The final ATS2020 Transversal Skills Framework as an output guided and supported the learning model implementation and triggered teachers' involvement in the design of more formative assessment scaffolding tools.

Developing, such a framework took a great effort and a strong team. The involvement of researchers, evaluation experts, curriculum developers, and teachers during the process proved to be indispensable. The development was a continuous process and the framework, as well as the process itself, allowed for flexibility and adaptations after its employment. The revision of the framework after its employment in real teaching and learning is a necessary step as, the theoretical analysis and description of terms, is revised in real situations.

It is not expected that each school, research project, large-scale experimentation, and even national curriculum, should try and develop their own framework. Rather, they can adopt existing, tried frameworks, such as the ATS2020 one. It is important that the framework to be adopted, should be revised and adapted based on the context-specific needs. To revise the framework after its use in real classroom situations is a necessary and valuable part of the process of its improvement.

In the event of developing a new framework, from our experience what is important is: (i) to allocate at the beginning sufficient time and effort in a clear and rigid approach for describing the framework, including an ontology of the levels of analysis, from which the identification and descriptions of all elements will follow, and (ii) to include the revision of the framework after its use in actual school education as a necessary and valuable part of the process.

5. ATS2020 Implementation

5.1. The process

ATS2020, a policy experimentation project, introduced the ATS2020 Learning and Assessment model as a policy initiative. For the project experimentation and monitoring, activities and tasks were organised under the following scheme: Planning, Implementation, Evaluation, Dissemination, and Management. Providing a common ground and understanding among the project stakeholders and focusing on teacher training and continuous support, as well as the experimentation evaluation methodology and tools, were the guiding principles (Figure 8).

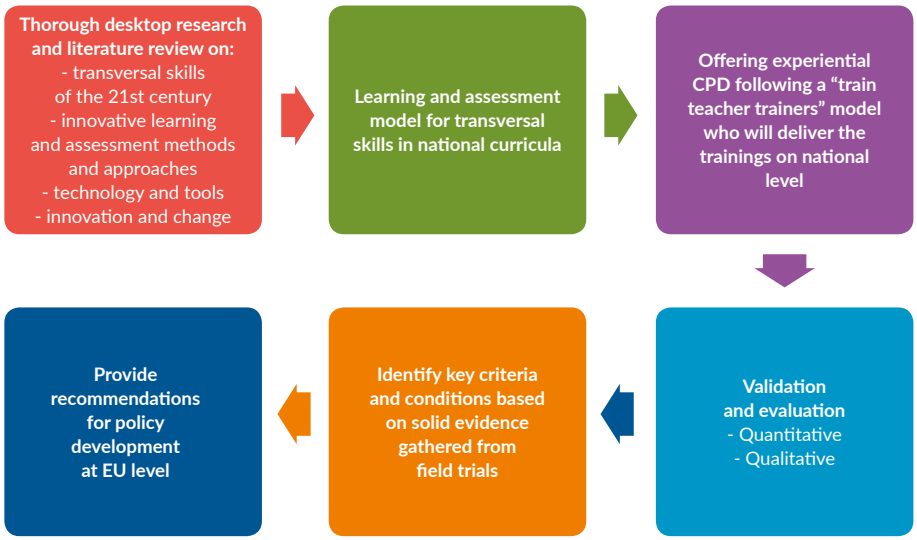

Figure 8: Project implementation scheme

The countries' implementation of ATS2020 Learning and Assessment model, as well as the experimentation evaluation, was planned for effectiveness in three levels (project, country and teacher level), involving teachers' professional development, classroom implementations and experimentation evaluation (quantitative and qualitative). The organisational structure presented in Figure 9 was introduced.

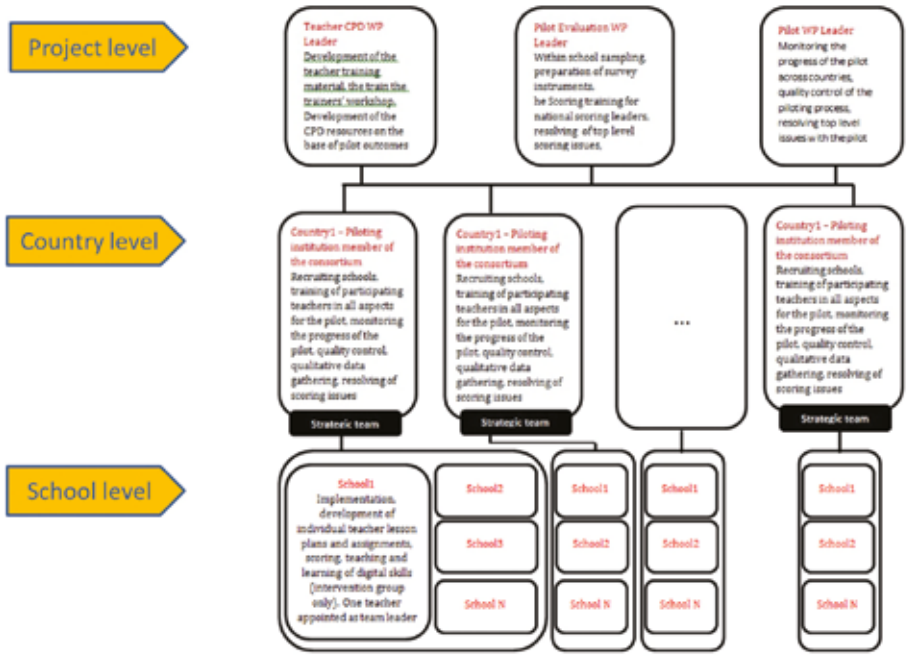

Figure 9: Project implementation organisational structure

ATS2020 implementation addressed 10-15 years-old students of upper Primary and lower Secondary Education.

The professional development programme and the educational resource development began with the recruitment of the teacher trainers from all implementing countries. Trainers were involved in a series of training activities starting as early as September 2015, with emphasis on workshops with active participation in experiential learning activities and continuous reflections, taking the role of the trainer, teacher and student.

Schools were invited to participate through an open call. Schools' recruitment started in Spring 2016 and was completed in the beginning of the piloting school year (September 2016). Schools interested in implementing ATS2020 informed their teachers, in order to schedule participation.

The teachers through their training actively participated in the development of the ATS2020 learning and assesment model, its elements and assessment and learning resources and tools. Their training was continuous and enhanced through the individual support provided by their assigned coach (trainer) both in-school and online.

School implementations, depending on the national and school context, deployed one of the following implementation models:

- 1 teacher in 1 class
- 2 teachers in 2 classes
- 2 or more teachers in 1 class
- 1 teacher in 2 or more classes

Typically 3-4 learning cycles were implemented by each ATS2020 teacher in a variety of subjects, aiming at skills from the ATS2020 framework competence areas. The implementation outcomes include a rich pool of learning designs, ePortfolios and learning and assessment resources (hosted in the ATS2020 resource portal and in national portals), enriched by the sharing of experiences and good practices among the project teachers and trainers, through online meetings, several national events and at the final project conference on February 2, 2018.

5.2. Reflections

The ATS2020 implementation was successful in its goals: a realistic scientific model for the development and assessment of transversal skills in school education was developed; a large-scale multi-country implementation was carried out; appropriate teacher professional development was organised and carried out; students had the opportunity to develop their transversal skills via innovative learning approaches and tools, and these skills were assessed with novel, appropriate methods; finally quantitative and qualitative evaluation of the impact was carried out -which verified the suitability of the model and the success of the implementation.

Some reflections on the implementation of the ATS2020 project, which may prove useful to future similar endeavors, are presented here. They have to do with *time*, *sound model* to *follow*, and *people*.

Time is a most critical resource. Classroom time was not sufficient, and students often had to supplement with work at home when engaging in such learning activities; but they were happy ('satisfied' is the research finding) with what they were doing. Teacher's working time was not sufficient for training, developing new activities and reflecting on their work. The whole implementation duration was short for the students to fully develop transversal skills and for the feedback of the project to allow another round of model development. Experimentation and impact evaluation also requires more time than was available.

A sound model to follow is a crucial element for introducing an innovation. Solid learning approaches such as ePortfolio, a consistent and clear if complex model, and mature research on which to base school implementation were sine qua non aspects; if they are replaced, they should be replaced with same quality.

The human aspect is the soul of the implementation. The human aspect of this ambitious collective effort contributed to positive resolutions through various difficulties, more than anything else. The challenging encounter of practitioners, researchers and policy makers, together, in a constructive interaction and collaboration, allowed the approach of the ATS2020 innovation from different perspectives, and found solutions to satisfy the needs of everyday practice, research and policy. The enthusiasm of a group of people believing in the development of transversal skills in the digital world that we live in, supported innovative teaching, learning and assessment approaches in an ePortfolio learning process. This is reflected in the overall satisfaction from partners, participating teachers and students for implementing the ATS2020 learning model in the schools. The classroom observations, the implementation outcomes (teachers' and students' artefacts), the trainers', teachers' and students' reflections, showed enthusiasm and enjoyment of the teaching and learning ATS2020 experience.

In addition to the reflections above, during the "Structured Dialogue" among partners on implementation reflections and policy recommendations that took place in the 7th project meeting, the following aspects of the implementation were considered important to address and reflect on:

- Transversal skills
- ATS2020 model
- ePortfolio
- My learning journal and formative assessment
- Framework and scaffolding tools
- Training and resources
- Learning design
- Online environments
- School and education system context

5.2.1. Transversal Skills

All competence areas were tackled during the implementation within the learning cycles. Lesson designs involved learning activities to support the development of transversal skills, reflecting the learning goals. Many activities targeted *Information Literacy* and *Collaboration and Communication skills*, while Autonomous Learning skills were identified as the most difficult to pursue. The fact that through the ePortfolio process students were gathering evidence of their learning, made their learning visible, which supported and encouraged further the skills development.

5.2.2. Model

The ATS2020 learning and assessment model, involves innovative elements which require at the early start, time for teachers to familiarise with and acquire basic knowledge about, then deepen their knowledge and adapt it to their own

practice, and finally adopt it to their teaching practice and even expand it to new possibilities (UNESCO, 2011). The fact that teachers' support by a coach during the implementation was an integral part of their training, facilitated the reported progress of teachers' engagement with the model. Both teachers and students were more able to employ the model and its elements towards the end of the school year while during the first learning cycle they needed more support.

Moreover, where two teachers implemented the learning model for the same class, in two different subjects, students seemed to perform better as they had more time and diverse aspects to familiarize and engage with the model.

5.2.3. ePortfolio

ePortfolio, reflecting learning as a process and recording learning as a product is a key aspect of the model. *ePortfolio* enabled students to monitor their own learning, give and receive feedback, as well as provide evidence of their learning and reflect on it. *ePortfolio* puts the students at the center of the learning process. It is time consuming but not mundane; students also worked fruitfully at home on it.

5.2.4. My Learning Journal and Formative Assessment

MyLearning Journal was used as the tool for students to plan and design their own learning. It is a key strength of the model, as it also provides opportunities to apply assessment *of*, *for* and *as* learning, as well as to develop autonomous learning skills. Even though found to be one of the hardest parts of the model to achieve, students showed progress on their Autonomous learning skills after the first learning cycles. As one teacher noted "*I was surprised to spot posts and messages coming through to me through the online class notebooks, and not only that but asking each other for assistance or clarification, all being done in the online space. And there's no problem, you can see that they are doing their work independently but that they are able to help each other as necessary and that just because I'm not there, they are able to collaborate to get the work done.*"

5.2.5. Framework and Scaffolding Tools

Assessment scaffolding tools were developed, but more were needed, both as global tools for the ATS2020 Transversal Skills Framework (for example a tool for *assessing critical evaluation of information*) and as contextualised tools, referring to particular activities (for example a tool for assessing *Creativity and Innovation* skills during the process of a poster design).

5.2.6. Training and Resources

A strong aspect of the teacher training was the support during the school implementation, school-based and teacher need-driven. Integrating the

implementation of a new teaching and learning approach in real classroom situations as part of the training scheme, is essential for such complex initiatives. The evidence of teachers' learning progress during the school year supports the claim that a long supporting process is needed for teachers to familiarize with a new approach, understand it better and adopt it in their teaching practice. At the same time, teacher training prior to the implementation is crucial for models targeting transversal skills (Yoko, 2015).

5.2.7. Learning Design

The Visualised learning design process, helped teachers to explicitly refer to the transversal skills in their learning designs as well as align the learning goals with the activities, outputs and assessment. It also supported the communication of their ideas with their coach and other colleagues, facilitating giving and receiving feedback. The time needed for designing new scenarios was not always available for the teachers. Thus, the learning designs pool of examples was very helpful for teachers; they could fruitfully exercise their learning design skills for adapting these examples.

5.2.8. Online environments

Mahara or Office 365 OneNote Class Notebook were used for the implementation. In small number of cases, teachers chose to continue using other online platforms already in use with their students, provided that these platforms satisfied the ATS2020 tool affordance specifications. Where teachers had already Information and Communication Technologies (ICT) skills, it was evidently much easier to use these environments with their students and take advantage of their affordances for learning.

5.2.9. School and Education System Context

School context was a critical factor for supporting or hindering the implementation of the ATS2020 model. The ATS2020 learning model implementation was facilitated in schools which already had in place supportive mechanisms for collaborative teaching, had transversal skills under focus for teaching and learning, had leadership and school culture open to innovation and change. Teachers in many schools had to overcome difficulties related to limited access to technology and most particularly good internet access.

Students' and teachers' expertise in basic computer usage skills was as expected a supportive factor. Additionally, where two teachers used the model in the same class of students, it was considered as a supportive factor. Similarly, 80/90 minutes lessons were more effective, as activities with students' involvement need more time to complete.

5.3. Suggestions

Here follow some suggestions stemming from the discussions and reflections on the project implementation:

What the Educational system can do for the Teacher

- Allow enough time for teachers to get acquainted with the ATS2020 learning and assessment model and its elements, before they can adapt, use, and adopt it and only then expect a change in their teaching practice. Experimentation projects facilitate this process and support such professional development schemes.
- Provide opportunities for teachers prior to (and during) implementation of the ATS2020 or other model on transversal skills, for more in-depth study of the elements (ePortfolio, My Learning Journal, formative assessment and constructive feedback, transversal skills, online learning environments), through extensive literature review and opportunities for their own research. More trainings dedicated to different aspects of the learning model could be offered.
- Provide opportunities for teachers to develop and assess their own transversal skills, both during their pre- and in-service education.
- Ensure that teachers are digitally competent and provide training opportunities on technology-enhanced pedagogies.

What the School can do for the Teacher

- Encourage the implementation of the ATS2020 learning model in more than one subject in each class of students, with the participation of one or more teachers, promoting at the same time collaborative teaching.
- Allow the school time table to support lessons within two consecutive teaching periods (that is at least 80/90 minutes instead of two teaching periods of 40/45 minutes) as experiential activities and active involvement of students take more time.
- Promote collaborative teaching among teachers for co-teaching and peer support during the school hours.
- Allow time within school hours for reflective discussions among teachers on their teaching practice, sharing of resources and good practices.
- Involve the whole school community in introducing innovation and change, involving all school leaders and teachers, school inspectorate, students and parents.
- Promote transversal skills to be included in school strategy and curriculum.

What the Teacher can do for the Student

- Make sure that students become familiar with concepts and materials used for the ATS2020 model.
- Explicitly include transversal skills in the learning designs, aligning goals with activities, learning outputs and assessment.
- Focus on the development of specific transversal skills and not all of them when designing a learning cycle, so as to include explicit assessment practices.
- Allow time for students to set prior knowledge, goals and strategies and take their goals and strategies into account during the lesson.
- Allow time during the learning process for the My Learning Journal with specific activities rather than the whole learning cycle. Scaffold students with constructive feedback so as to facilitate their autonomous learning skills.

6. Experimentation evaluation

6.1. The Process

The ATS2020 learning and assessment model, was tried out and its impact was evaluated, following a quasi-experimental and qualitative research design, involving 224 schools, 747 teachers and 11.891 students in 10 piloting countries (Figure 10).

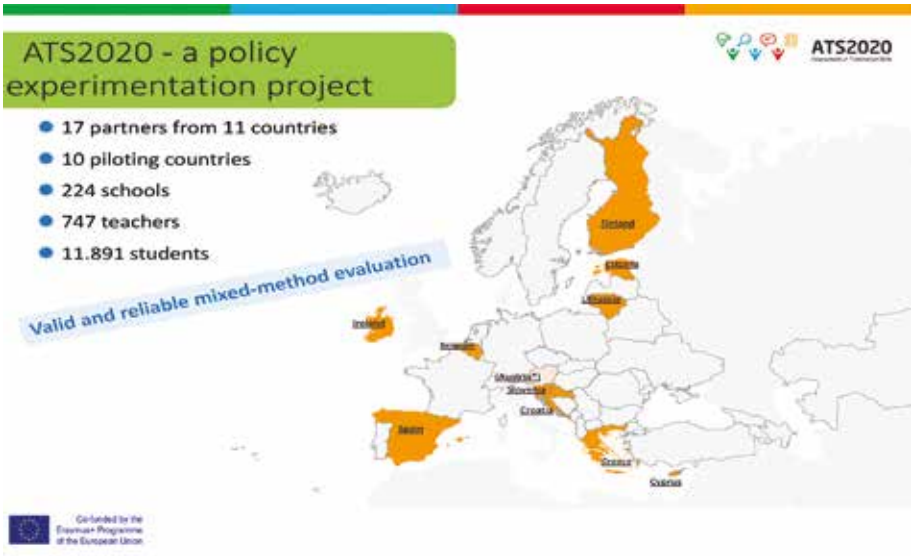

Figure 10: ATS2020 experimentation

Due to the nature of the study and the complexities of the issues investigated, a mixed-methods design was employed, in order to provide a more comprehensive evaluation framework.

A *quantitative* status-quo study on students' transversal skills (with pre- and post-tests for students' skills with 60 items in 4 distinct thematic item blocks, across 6 testlets) and on teachers' teaching practices (with pre- and post-questionnaires) was applied before and after the pilot implementation (Figure 11). The students' post-test, included a survey on students' attitudes on transversal skills. Moreover, a *qualitative* evaluation took place during the implementation process (with in-classroom observations, interviews with teachers and students, and students' and teachers' artefact analysis, in two case studies in each country). At the same time a *counterfactual impact* evaluation approach was applied, comparing the outcomes of the experimental groups (the "treated group") with those of a group similar in all respects to the treatment group (the "comparison/control group)[7] (Figure 12).

Figure 11: Evaluation progress in time

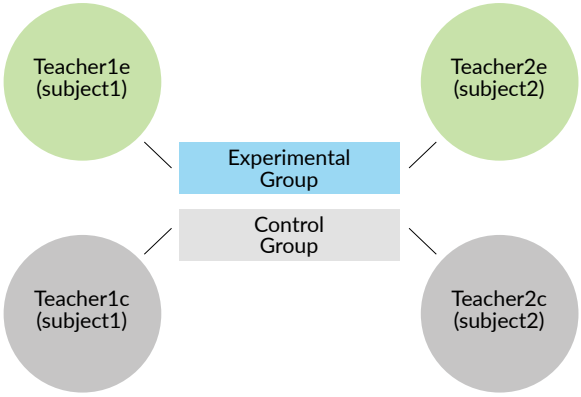

Figure 12: Counterfactual impact evaluation

[7] https://ec.europa.eu/jrc/en/research-topic/counterfactual-impact-evaluation

The experimentation evaluation aimed to answer *"What kind of impact, if any, an implemented ePortfolio learning approach might have on the students' development of transversal skills and assessment"*, and more specifically, the following questions:

- *'To what extent did the ATS2020 learning model promote the development and the assessment of the transversal skills defined for the purposes of the project?' (outcome-oriented)*
- *'How has the ATS2020 model (and its critical aspects) on the development and assessment of the targeted transversal skills been implemented?' (process-oriented)*

A detailed description of the experimentation evaluation methodology is given in "D5.1: Research Methodology", while the experimentation evaluation findings are discussed in "D5.3: Final Experimentation Evaluation Report".

6.2. Discussion of the Findings

In response to the research question *"To what extent did the ATS2020 learning model promote the development and the assessment of the transversal skills defined for the purposes of the project?"* the quantitative evaluation analysis showed statistically significant difference of transversal skills in post-test in favor of the experimental classes in 4 out of the 10 implementing countries (Belgium, Croatia, Lithuania and Finland). This finding is also supported by the qualitative evaluation analysis of results, which showed that there was a progress on the students' transversal skills after their exposure to the ATS2020 learning model. It is the belief of the ATS2020 partnership that had the experimentation lasted longer, all countries would have shown similar results, since:

- Implementing an innovative learning model and its critical elements, such as ePortfolio, assessment of, for and as learning, development of transversal skills, and technology-enhanced learning design, is a complex process for both teachers and students, and it needs time to be adopted.
- Both teachers and students need longer engagement in activities promoting transversal skills.
- Assessing student prior and achieved learning is more meaningful and reliable for longer periods.

Some other interesting findings include comparisons between boys and girls, older and younger students, association between student attitude and performance and between teacher attitude and student performance; for the specifics see "D5.3: Final Experimentation Evaluation Report". Such findings can inform further research regarding teacher professional development and learning design.

In response to the research question *"How has the ATS2020 model on the development and assessment of the targeted transversal skills been implemented?"*

the qualitative evaluation analysis showed that the level of satisfaction of the ATS2020 participation was high, with participants overall satisfied with the implementation of the ATS2020 model, while the students enjoyed having a more active and creative role and receiving support from the teacher.

The critical aspects of the ATS2020 model (Transversal skills, ePortfolio, My Learning Journal, Assessment, Innovative Learning Approaches using Online Environments and Digital Tools) also received a high level of satisfaction regarding their level of success, despite the difficulties or obstacles faced (Table 2).

	Satisfaction	Difficulties
Transversal Skills	• Information Literacy (e.g. **CY, HR, EE, SI**) • Collaboration/Communication (e.g. **CY, HR, EE, SI, GR, IE**) • Autonomous Learning (e.g. **IE, BE, SI**) • Creativity/Innovation (e.g.**BE**)	• Information Literacy (e.g.**ES, GR, EE**) • Collaboration/Communication (e.g.**ES, GR, EE**) • Autonomous Learning (e.g.**HR**)
ePortfolio	• Satisfied with the outcome (e.g. **LT**)	• Time consuming (e.g.**CY, ES, GR, IE**) • Confusing and difficult fields (e.g.**CY, ES, GR, IE, LT, HR**) • Questioning ePortfolio (e.g.**EE**)
MyLearning Journal	• Satisfaction (e.g.**LT**) • Useful for students' self-assessment and self-reflection (e.g.**CY**) • Student-centred approach (e.g.**IE**)	• Time consuming (e.g. **CY, GR, LT, HR**) • Understand the fields setting goals and strategies (e.g.**CY, LT, IE, HR**)
Assessment	• Satisfaction (e.g.**ES, GR**)	• Unfamiliar participants (e.g. **ES, HR, EE**) • Self-assessment and its wording (e.g.**CY, LT**) • Monotonous procedure (e.g. **BE**)
Innovative learning approaches using online environments and digital tools	• Great satisfaction from all countries • Mahara (e.g.**ES**) • Virtual environments (e.g.**GR**) • Students' satisfaction (e.g.**CY, HR, EE**) • Opportunities offered (e.g.**IE**)	• Technical issues (e.g.**CY, HR, EE**) • Schools' infrastructure (e.g.**CY, HR, EE**) • Teachers familiarity with technology (e.g.**HR**) • Difficulties with platforms (e.g.**ES, GR, EE, LT, HR**)

Table 2: Participants' satisfaction on level of success and difficulties on the critical aspects of the ATS2020 learning and assessment model

6.3. Reflections (on the experimentation evaluation process)

The process of developing the test items for the students' test on skills was particularly challenging. Even though the ATS2020 Transversal Skills Framework, provided descriptions for each skill (along with attainment examples), as well as proficiency levels for each competence, it proved that standardised tests need a lot of expertise and time for items to be developed in order to be proper tools for skills assessment.

Moreover, clear, detailed and specific procedures and guidelines should have been given at all stages of the experimentation evaluation process.

Furthermore, as the test items needed to be contextualised in order to test performance (as distinguished from knowledge of or opinion about) a special-purpose digital environment to host the test items must be developed. Even

though evaluation time and procedures were planned (for example to have dedicated researchers and scorers), the adaptation to the national languages and context, as well as the scoring of the items (even though automated in most part) proved to demand more time than expected.

Finally, more time was needed for the partners to discuss and reflect on the evaluation findings, in a meeting fully dedicated for that purpose, preceded and followed by online preparatory and closing tasks.

6.4. Suggestions (on the experimentation evaluation process)

Based on the above reflections, the following suggestions could help partnerships on similar experimentations:

- Involve from the very beginning, experts on test items development and experts on specialised areas (for example creativity and innovation).
- Involve all project partners in items design and writing (or reviewing).
- Deploy a digital environment that can host the test items, from the early beginning of the project.
- Have a pre-pilot so as to test the items in real classroom situations in all countries and validate the test items and test procedures, as the context in a multinational experimentation varies a lot.
- For such policy experimentation projects, the time needed should extend, so as to cover two consecutive school years (taking into consideration that the experimentation is closely related to the school year calendar). Thus, five years are needed for the experimentation project to define the intervention, design the research methodology, develop the tools and procedures, adapt them to the participating countries languages and context, implement a pre-pilot, refine the tools and procedures, implement the actual experimentation for a whole school year, collect and analyse data, and report on the findings.
- Comparative analysis among countries with such a diverse context should be done very carefully.

ATS2020
Assessment of Transversal Skills

ATS2020

Policy Recommendations

7. Conclusions and Recommendations

The ATS2020 experimentation with the answers to the two evaluation questions (section 6.1), allow the consortium to address two critical points for policy recommendations:

- *Was the intervention, or any of its aspects, successful?*
- *Can the intervention model, or any of its aspects, be scaled up into an implementable policy?*

The experimentation evaluation findings in combination with the implementation discussions and reflections lead to policy recommendations, at three levels:

- *Macro level* for European and national policy
- *Meso level* for school leadership
- *Micro level* for teacher and classroom strategies

Other recommendations cover the level of the Erasmus+ policy experimentation programme, building on the experiences of the consortium members, and the piloting teachers and students.

The ATS2020 implementation was successful in its goals: a realistic scientific model for the development and assessment of transversal skills in school education was developed; a large-scale multi-country implementation was carried out; appropriate teacher professional development was organised and carried out; students had the opportunity to develop their transversal skills via innovative learning approaches and tools, and these skills were assessed with novel, appropriate methods; finally quantitative and qualitative evaluation of the impact was carried out -which verified the suitability of the model and the success of the implementation. On a different plane but equally important, subjective satisfaction of all participants (partners, trainers, teachers and students) was high.

The field trials indicated the following:

- Where two teachers implemented the learning model to the same class, in two different subjects, students seemed to perform better as they had more time to familiarise and engage with the model.
- Teachers' digital skills and familiarity with ICT was identified as a supportive factor, while limited digital skills were related to implementation challenges.
- Time is needed for teachers to get acquainted with the ATS2020 learning and assessment model and its elements, before they can adapt it, use it, adopt it and only then to expect a change in their teaching practice. Experimentation projects facilitate this process and support such professional development schemes.
- The Visualised learning design process helped teachers to explicitly refer to the transversal skills in their learning designs, as well as align the learning goals with the activities, outputs and assessment.

- ePortfolio enabled students to monitor their own learning, give and receive feedback, as well as provide evidence of their learning and reflect on it. ePortfolio put the students at the center of the learning process.
- Through the ePortfolio process students were gathering evidence of their learning and made their learning visible, which supported and encouraged further the skills development.
- My *Learning Journal*, was used as the tool for students to design their own learning. It was a key strength of the model, as it also provided the opportunities to apply assessment *of*, *for* and *as* learning, as well as to develop autonomous learning skills.
- School context was a critical factor for supporting or hindering the implementation of the ATS2020 model.
- Time and infrastructure (computers and internet access) were restrictive factors.

The experimentation findings allow us to claim that the intervention of the ATS2020 learning model and its aspects had an impact and supported the development and assessment of transversal skills. In order for the ATS2020 learning and assessment model or some of its aspects to be scaled up and transformed into an implementable policy, certain conditions should be considered.

Furthermore, the ATS2020 learning model, its processes and tools, cannot alone lead to the effective assessment of transversal skills. It requires the whole ecosystem of the education system and/or the school to enable teachers and students (and the entire school community) to use such tools and technologies effectively (as these were discussed in "D1.4: Technology and tools for a formative assessment process" and D1.5: Change Management and Implementation Models"). In D1.5 we discussed the critical elements for innovation and change in the school system as an open social system. In D1.4 we discussed the critical elements of formative assessment, meaningful feedback and tools to support this process. Extensive trainings of teachers are essential, as well as supportive leadership.

While the assessment of knowledge is facilitated by well-established if questionable tools and approaches, the assessment of skills shows a tendency to assess what can easily be assessed with existing tools. As a result, what is assessed is not always the skills, but often opinions about these skills. As skills are complex entities, we need new assessment approaches and tools in order to capture both the width and depth of their development.

Based on the above, the following policy recommendations are provided (some of the recommendations under the Macro level might be suitable for the Meso level (and vice versa), depending on how (de)centralised the education system is):

7.1. Macro level (European and national policy)

• Support ***new pedagogy*** on systemic level

A number of European educational systems are going through a reform process. New pedagogies and technological developments push education in new teaching and learning practices, as for example more learner centered approaches, integrated transversal skills within the curriculum, technology-enhanced teaching and learning. The whole process, needs to be enabled by scientific evidence and support. Communications and initiatives on European level, such as the *Opening up Education Communication*[8], the *New Skills Agenda for Europe*[9], and the *Digital Education Action Plan*[10], provide essential tools to countries' education strategic planning.

→ Education systems must engage in full-scale reform processes, following large-scale experimentation based on research and evidence on teaching and learning approaches.

→ European level communications and initiatives must continue facilitating this effort.

• ***Open up*** education to the digital world

Education systems are by nature traditional and conservative. At the same time, schools as open social systems, are exposed to external inputs (such as societal and economical changes). The ATS2020 learning and assessment model, introduces a number of innovations (for the development and assessment of transversal skills for the digital world, through innovative learning and teaching approaches, providing open education tools and resources) that an education system can forward to the schools, enabling a transformation process for teaching and learning.

→ Education systems must be open to take advantage of and interact with external inputs, facilitating a transformation process so as to bring desirable outputs on student learning.

• Initiate ***new assessment*** approaches

In a number of European countries, student learning is considered an outcome captured at the end of their school year through final tests, defining in many cases their future studies and lives as the final tests exams constitute their entrance ticket to higher education. New learning and assessment approaches, however, emphasise the student role in the learning and assessment process (Bell & Cowie, 1997; Sadler, 1998; Torrance & Pryor, 1998), as well as the process of learning

[8] COM(2013) 0654: Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources.

[9] COM(2016) 381: A New Skills Agenda for Europe.

[10] COM(2018) 22: Communication on the Digital Education Action Plan.

and not the product of learning alone. Moreover, assessing transversal skills particularly need new assessment approaches in order to capture the progress of these skills. Portfolios grounded within authentic learning situations are suggested as methods suited to supporting learners develop and assess key competencies (Hipkins, Boyd, and Joyce, 2005). ATS2020 suggests such assessment approaches and provides tools for their employment.

→ Adopt innovative assessment approaches in order to measure students' competences and skills.

→ Summative assessment must be enriched. In addition to final tests, involve different assessment methods (with a weight distribution accordingly), such as students' ePortfolios which can capture the process of learning, as well as demonstrate transversal skills, such as critical thinking, reflection, autonomous learning, collaboration, communication, creativity and innovation.

→ Standardised (assessment) tests must be embedded in a continuous assessment process; ePortfolios are appropriate tools for that.

→ Promote synergies with existing international large-scale assessment studies (such as OECD PISA and IEA ICILS studies) for the assessment of transversal skills, to allow having comparable data among countries.

• Further promote and support ***transversal skills*** within the curriculum

Education faces the challenge to provide citizens with the skills needed in an information society. Even though a number of education systems do reform their national curricula to support the development of transversal skills, the ATS2020 experimentation evaluation results showed that teachers do not always have sufficient time to develop and implement activities for transversal skills fostering and assessment.

→ Education systems must further promote and support transversal skills as specific and integrated curriculum objectives, along with the necessary resources and tools.

→ Curriculum schedule must provide the time for activities that foster transversal skills through student-centered experiential learning.

• Provide, maintain and update ***technological infrastructure*** and tools

Teachers (in almost all ATS2020 partner countries, at different levels) expressed difficulties in implementing the ATS2020 learning model because of limited technology availability, such as functional equipment and good internet access.

→ Education systems must ensure that technology is available and easily accessible for all, in the classroom, school, and home. Technology should be "invisible", and granted in the same sense as a utility.

• Facilitate continuous quality ***teacher training and support***

Teacher training and professional development as life-long learning is important for improving the quality of teaching (Serdyukov, 2017). At the same time, teachers comprise one of the most critical aspects in promoting innovation and change in teaching and learning in their classrooms. Guskey's (2002) model of change, regards change as a gradual and difficult process for teachers and highlights the need for regular feedback and on-going support. It is also argued that teachers' practices are influenced by the professional development they are involved in and only after improvement in students' learning is identified by teachers, their beliefs and attitudes change. Specifically, regarding the assessment of transversal skills, teachers request more support in accessing and developing appropriate assessment tools (Care and Luo, 2016). ATS2020 findings pointed out the progress of teachers' understanding and implementing the model from the first learning cycles towards the end of the year, which also affected the student learning progress. Furthermore, it was evident that teachers' transversal skills, including ICT competence, was an enabling factor, whereas its lack was an impediment.

→ Ensure continuous support and opportunities for quality professional learning, adapted to teachers' needs, along with the necessary time needed to exploit these opportunities.

→ Encourage teachers to implement the learning model in their classrooms, with the support of a coach, as real classroom implementations are an integral part of their training and facilitate the progress of teachers' engagement with the model.

→ Teachers' time table must include time (apart from teaching time) needed to take advantage of the support provided, in order to design, create, implement and reflect, as well as collaborate with their colleagues for co-teaching.

→ Provide more opportunities to teachers for experiential professional learning and involve them in pilot implementation processes, in order to enable a shift in their teaching practice.

→ Pre-service and in-service institutions must introduce or give greater importance to transversal skills and digital competence in their programmes of study.

7.2. Meso level (school leadership)

• Create a ***supportive school culture*** and ***leadership***

School leaders are considered to be the basic key for developing and managing change in schools. Fullan (1991) states that leaders should be innovative, creative, visionary and reflective, when adopting the dynamic role of change agents. At the same time teachers need to be supported in this effort by the school leadership

and are provided with the necessary assistance and encouragement (Zuljan and Vogrinc, 2010). Peer learning, school-based support, communities, and co-teaching are some of the recommendations of the ATS2020 teachers.

- → Schools must provide constructive leadership to teachers and create a supportive school culture.
- → Allow non-teaching time to teachers for collaboration, reflection practices, learning design meetings and co-teaching, towards their professional learning.
- → Encourage the development of transversal skills, using of ePortfolios and the ATS2020 model, and involve more than two teachers in the same class, so as to engage students more frequently and through different disciplinaries.
- → Allow flexibility in the school timetable for co-teaching and consecutive periods of teaching (e.g one 80-minutes period instead of two 40-minutes periods, or one 90-minutes period instead of two 45-minutes, as needed).
- → Take initiatives to create a supportive culture in the school for transversal skills and innovative learning approaches and provide opportunities for the teachers' own learning and reflective practices on transversal skills and innovative teaching and learning.
- → Ensure that all classes are equipped with the necessary technology and infrastructure (especially good internet access) and that every single student and teacher have equal and easy access to it at all times.
- → Appoint one teacher as the ICT school coordinator for the use of digital technologies in teaching and learning.

• Take ***ownership of the school digital competence*** as an ***innovative organisation***

Applying a systematic approach and strategic planning in the school unit, with the involvement of all stakeholders (leaders, teachers, students and parents), can reinforce a school to promote and encourage innovative learning and assessment practices. Introducing a planning cycle (School ATS2020 "My Learning Journal" and "ePortfolio"), by identifying the existing situation, setting goals and priorities, defining a strategy and action plan, implementing and reflecting on it, schools can progress to a higher level of maturity in being innovative and digitally competent organisations. A number of tools and resources already exist for such a purpose, such as for example SELFIE[11], a self-assessment tool on schools' digital competence based on the European Framework for Digitally-Competent Educational Organisations (Kampylis et al., 2015), which enables schools to identify their digital competence and monitor their progress, and the *Cyprus Innovative Schools* Programme[12], providing a complete methodology, resources and tools, along with

[11] https://ec.europa.eu/jrc/en/digcomporg/selfie-tool

support, for schools to promote, acknowledge, cultivate and encourage the use of innovative teaching and learning in the digital society.

→ Schools must identify and take advantage of existing resources and tools, that enable them to become innovative and digitally competent organisations, bringing forward skills for the 21st century to the organisation, teacher and student level.

7.3. Micro level (teacher and classroom)

• Promote ***assessment of, for and as learning***

Assessment *of*, *for* and *as* learning is one of the core elements of the ATS2020 learning model. Formative assessment and constructive feedback constitute an essential part of the design and re-design of learning, on behalf of both the teachers and the students. From the ATS2020 experimentation evaluation it seems that it takes time for a change in teachers' practice regarding formative assessment to occur, as towards the end of the implementation such practices were more evident in the learning cycles.

→ Teachers must invest more into their understanding of formative assessment, use formative assessment approaches for their own practice, and allow more time to reflect on their teaching and their student learning.

• Employ students' ***My Learning Journal*** in the learning design

Students' *My Learning Journal*, was a tool for students towards their active involvement in the process of their own learning in order to develop autonomous learning skills, supporting assessment *of*, *for* and *as* learning. The qualitative evaluation findings of the ATS2020 experimentation showed that teachers considered *My Learning Journal* as a strong element of the ATS2020 learning and assessment model. Though in the beginning it was difficult for students to set their own learning goals and the teachers to adapt them and build on them within the curriculum, there was an evolvement towards this aim as the implementation was progressing and after the first learning cycles.

→ Teachers must be open to new teaching and learning practices.

→ Gradually transfer the lead to the students for the design of their learning and teachers to undertake the role of a coach.

→ Plan time and activities for My Learning Journal and provide constructive feedback to the students.

→ Allow a co-constructive approach for designing learning with their students, with flexibility to embed students' needs and personal goals.

[12] https://innovativeschools.pi.ac.cy

• Encourage the use of ***ePortfolios as a learning process and a learning product***

ePortfolios are considered to be another strong element of the ATS2020 learning and assessment model. ePortfolios, provided both the teacher and the student with an excellent approach to plan, monitor and reflect on the learning process. At the same time, it enabled students to develop transversal skills and provide evidence of their learning.

→ Use ePortfolios as a learning process and not only as a product, incorporating new learning and assessment approaches such as assessment *of*, *for* and *as* learning.

→ Consider ePortfolios as part of the student evaluation, allowing a weight of the student final grade in addition to exams.

• Engage in ***collaborative teaching and learning***

ATS2020 teachers valued the opportunity to work in collaboration with colleagues as well as their coach, in co-designing learning lessons and activities, co-teaching, and reflecting on their implementations.

→ Teachers must plan their personal time schedule so as to take advantage of opportunities for school-based support and peer-learning.

• Take ***ownership*** of ***teachers' digital competence***

ATS2020 findings indicated that teachers' transversal skills and competence with ICT was an enabling factor for introducing the ATS2020 learning and assessment model, whereas its lack was an impediment. As new learning approaches position the learners in the center of their own learning, a number of initiatives are providing tools and resources to facilitate teachers to develop their digital competence and innovative teaching and learning technology-enhanced pedagogies. Some examples include the self-assessment tool *MENTEP*[13] and the corresponding ecosystems with resources such as the Cyprus[14] and Slovenian[15] *MENTEP* ecosystems, which aim to facilitate the teachers to engage in a process for their professional learning on digital competence, and the *European Framework* for the *Digital Competence of Educators* (Redecker and Punie, 2017).

→ Teachers must take ownership of their own professional learning, by taking advantage of existing resources and tools.

[13] http://mentep.eun.org

[14] https://mentep.pi.ac.cy

[15] https://www.zrss.si/iekosistem

7.4. Erasmus+ policy experimentation level

- Policy experimentation initiatives for ***promoting a transformational change*** in education
  - → Use policy experimentation projects to provide an opportunity to bring together education practitioners, researchers and policy makers, allowing and enhancing the approach and study of innovative teaching and learning initiatives from different perspectives and spectrums. Allowing findings to provide recommendations on a more holistic approach and applicable on different levels of policy making, from the European and political level to the classroom and teacher level.
  - → Exploit experimentation policy projects as an opportunity for model teachers' professional development and schools' maturity and competence in innovation and change.
  - → Allow more time to run policy experimentation initiatives, so as to ensure scientific research methodologies and validated tools as needed.

- ***Employ policy experimentation findings and recommendations*** in the Open Method of Coordination of the European Commission
  - → Build on the existing model of Education and Training 2020 (ET 2020) Open Method of Coordination, for the Commission and Member States to cooperate in the work of furthering policy development, through informed dialogue on mutual learning and good practices, to achieve greater convergence towards the main EU goals[16].

- Introduce ***longitudinal studies*** to compare results through time
  - → Provide opportunities for research projects to be extended in a period of time that allow to study the long-term impact and change of educational initiatives. The ATS2020 findings indicate that initiatives in the area of transversal skills and their development and assessment, need to be studied through a process in a longer period of time in order to be able to have more concrete and reliable results on their impact on students' learning, teachers' practice and schools' scope of work and culture.

[16] https://www.eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/open-method-of-coordination, https://eur-lex.europa.eu/summary/glossary/open_method_coordination.html

Concluding this section, we would like to note that the context in which the experimentation took place, along with personal factors (such as previous experience with transversal skills, ePortfolios and formative assessment) and systemic factors (such as school infrastructure, curriculum, leadership), had a high impact on the implementation of the ATS2020 learning and assessment model. More specifically, the different education systems and the variance of different factors at student, teacher and school level affected the implementation of the ATS2020 model within each country and led to modifications in its implementation across countries. This resulted in having different aspects of the model in focus in different countries, based on the national context (for example emphasis on formative assessment and effective feedback, emphasis on coaching students towards autonomous learning skills, emphasis on collaborative teaching within the school, emphasis in the ePortfolio as a learning process, peer and self-assessment practices, and so on), bringing up in the surface the ***richness*** of the ATS2020 model and the ***flexibility*** that it provides for each education system to ***focus*** on ***priorities*** set.

ATS2020 TOOLKIT-How to implement the ATS2020 learning model in your school and your classroom

Based on the above results, reflections and recommendations, the ATS2020 consortium believes that the ATS2020 learning and assessment model can enhance teaching and learning in the European school context, leading to learning outcomes towards transversal skills, including knowledge, skills, and attitudes.

In order to enable the exploitation of the ATS2020 learning and assessment model, the "ATS2020 TOOLKIT: How to implement the ATS2020 learning model in your school and your classroom" has been developed, which includes a step-by-step guide on how to implement ATS2020 in the school units and in the classroom.

Preparation	Initiation	Implementation	Completion	Reflection/ Sharing
- Inform the school teaching staff - Set up a project team (coordinator, technical support manager) - Present the project to parents, inspectors, and other parties - Ensure sufficient infrastructure is put into place - Obtain relevant permissions (where applicable)	- Obtaining of consent for students' participation, selection of online environment, creation of students' and teachers' accounts - Training and provision of support to teachers - Planning of Learning Cycles - Designing of Learning Cycles and activities - Overview of the implementation for the whole school year	- Introductory lesson about the ATS2020 learning model and the online learning environment to be used - Description of participants' roles	- Completion of the Final ePortfolio and *My Learning Journal* - Certification	- Reflection and self-assessment regarding the implementation for the whole school year - Sharing of outputs, good practices and learning outcomes

Figure 13: An overview of the steps to follow for the ATS2020 implementation in the schools and classrooms

The "ATS2020 TOOLKIT - How to implement the ATS2020 learning model in your school and your classroom" can be viewed and downloaded from https://resources.ats2020.eu/resource-details/ADM/toolkit.

Useful links

- The ATS2020 website: ats2020.eu
- The ATS2020 deliverables: ats2020.eu/deliverables
- The ATS2020 final conference: ats2020.eu/final-conference
- The ATS2020 resources portal: resources.ats2020.eu
- The ATS2020 Mahara online ePortfolio environment: mahara.ats2020.eu
- The ATS2020 Office365 online ePortfolio environment: o365.ats2020.eu
- The ATS2020 EIS online testing environment: eis.ats2020.eu
- The ATS2020 students ePortfolios: resources.ats2020.eu/ePortfolios
- The ATS2020 students video stories: resources.ats2020.eu/students-video-stories
- The ATS2020 learning designs: resources.ats2020.eu/learning-designs

Project deliverables

The list below indicates the main project deliverables, which can be found at the project website (ats2020.eu/deliverables), for the reader who wants to go into more depth in the ATS2020 model and its elements, its implementation and outputs, as well as the experimentation evaluation methodology and results.

D1.1: Research Report on Transversal Skills Frameworks
D1.2: Research Report on Innovative Assessment for Learning Approaches
D1.3: ATS2020 Learning and Assessment Model
D1.4: ATS2020 Technology and Tools
D1.5. Change Management and Implementation Model
D2.1: Specification for Tools for a Formative Assessment Process
D2.2: Tools and Affordances for Student-centred Learning and Assessment
D3.1: Professional Development Programme
D3.2: Training Material and Resources
D3.3: Learning Scenarios
D3.4: Consolidated Country Reports on the CPD Programmes
D4.1: Pilot Implementation Plan
D4.4: Final Pilot Implementation Report
D5.1: Research Methodology
D5.2: Data Collection and Analysis
D5.3: Final Report
D5.4: Policy Makers' Report

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