FACULTADE DE CIENCIAS DA EDUCACIÓN

Case study report on pilot implementation of the ATS2020 model in Galician schools (Spain)

ATS2020

Authors:
Dr. Carmen Fernández Morante[1]
Dr. Beatriz Cebreiro López

Faculty of Education Sciences
University of Santiago de Compostela

Co-funded by the
Erasmus+ Programme
of the European Union

---
[1] carmen.morante@usc.es / Research Group of Educational Technology /
http://www.usc.es/tecnoedu/

Chapter 1: Introduction

1.1. The Spanish Education System (National Context)

The Spanish state defines educational policy by means of a basic regulation (basic curriculum) that is flexible enough to regulate the common elements that determine the teaching and learning processes throughout the country and allow a degree of decision to the 17 autonomous regions (cultural identity and/or language, socio-political, economic, geographical reality, etc.). It is the responsibility of regional education administrations (such as the Galician Ministry of Education) to contextualise and materialise these basic teachings within the margins of autonomy established in the Law (see Appendix XI).

The set of basic educational guidelines of the Spanish state defines a flexible educational model in the design of which the state and the autonomous communities participate. The subjects determined by the LOMCE law are of three types:

- *Core Subjects*, whose content and schedule are set by the Ministry (State). This is the case for the two subjects to which the ATS2020 methodology was applied in the case study in Galicia: Spanish Language and Literature (IES Rosalía de Castro) and First Foreign Language: English (CPI O Cruce).
- *Specific Subjects*, whose content and schedule are set by the Autonomous Communities (Regional Education Administration) based on evaluable learning standards set by the Ministry (State).
- *Subjects of Free Configuration*, whose definition falls within the autonomous communities' competence (Regional Educational Administration).

Education in Spain is compulsory from the first cycle of Primary Education (6 years of age) to Compulsory Secondary Education (16 years of age) and free education extends from the second cycle of Early Childhood Education (3 years of age - compulsory offering) until high school and vocational training (post-secondary) (18 years old).

The ATS2020 case study was carried out in two Compulsory Secondary Education (CSE) classrooms, with students from 12 to 16 years of age. It was organised in two cycles: 1st cycle of CSE (2 years) and 2nd cycle of CSE (1 year) that gives access to the Certificate of CSE.

In order to explain how the transversal competences of the ATS2020 model fit in the Spanish educational curriculum, it is important to note that the current Spanish educational legislation (LOMCE) follows the European Parliament and Council Recommendation 2006/962/EC of December 18, 2006, on key competences for lifelong learning. In this sense, the educational process "is aimed at the development of competences, and these are a combination of practical skills, knowledge, motivation, ethical values, attitudes, emotions, and other social and behavioural components that work together to achieve effective action" (RD 1105/2014[2] , p.170). There is, therefore, a clear fit between the Spanish curriculum approach and the ATS2020 project model. Both start from an aligned and coherent approach to the teaching-learning process. In addition, the Spanish curriculum for Compulsory Secondary Education (Decree 86/2915 and order ECD/65/2015[3]) establishes the seven **key competences** to be

---

[2] *Real Decreto 1105/2014, de 26 de diciembre, por el que se establece el curriculum básico de la Educación Secundaria Obligatoria y del Bachillerato.*

[3] https://www.boe.es/boe/dias/2015/01/29/pdfs/BOE-A-2015-738.pdf

developed in this stage through the different subjects, which fit perfectly with the transversal competences of the ATS2020 model.

The following table shows the relationships or correspondences between the key competences of the curriculum of the current Spanish Education Act (LOMCE) and the transversal competences of the ATS2020 project.

	Key Competences (LOMCE)		Transversal Competences (ATS2020)
1	LCC: Linguistic Communication		
2	MSTC: Mathematics, Science and Technology	1	IL: Informational Literacy
3	DC: Digital Communication	2	DL: Digital Literacy
4	LLC: Learning to Learn	3	AL: Autonomous Learning
5	SCC: Social and Civic	4	CC: Communication and Collaboration
6	SIESC: Sense of Initiative and Entrepreneurial Spirit		
7	CAEC: Cultural Awareness and Expressions	5	CI: Creativity and Innovation

Table 1. Correspondence between LOMCE Competences and ATS2020 Competences
(Alberto Sacido, responsible for planning teaching at IES Rosalía de Castro - pilot school 2)

The planning of the 4 learning cycles implemented in the two experimental groups of this study was developed from these relationships. It can be concluded, therefore, that the key transversal competences of the ATS2020 model fit into the Spanish curriculum and the model could be applied in a generalised way in the Spanish education system if it demonstrates its pedagogical effectiveness.

1.2. The School the Class Context

The pilot implementation of the ATS2020 methodology in Spain was done in two Galician public schools: The Rosalía de Castro Secondary Education Institute[4] located in an urban nucleus (Santiago de Compostela) and the O Cruce Integrated Public School[5] located in a semi-urban environment (Cerceda). Both are in the province of A Coruña.

1.2.1. Case Study 1: CPI O Cruce

CPI O Cruce is medium-sized, enrolling 381 students from Early Childhood Education to Compulsory Secondary Education (between 3 and 16 years of age) and currently has 41 teachers. It is a multilingual school that teaches Physical Education and Art Education in English in the primary grades and offers bilingual sections in CSE. It is a

---

[4] http://www.iesrosalia.net/
[5] http://www.edu.xunta.gal/centros/cpicruce/

school with a long experience of participating in European educational projects, which received 3 European seals in 2003, 2005 and 2006 in recognition of their innovative approach and results, especially in the application of Information and Communication Technologies (ICT) and the teaching of foreign languages. It received the national prize in European projects in 2011. The socio-economic profile of the students of this school is medium-low and the cultural level of the families is generally low. This is because it is an area without industry, in which the main sources of employment were mining and the thermal power station. These areas of employment, which in the past gave a high level of purchasing power to families, no longer exist, and jobs are currently linked mainly to the services sector with average salaries.

The ATS2020 experimental group at CPI O Cruce was the 2nd class of the Compulsory Secondary Education, which was composed of 21 students (11 girls and 10 boys) between 12 and 13 years of age. A student with special educational needs (Down Syndrome) also participated in the group. The physical environment of the classroom was large with groups of desks in pairs and equipped with a Wi-Fi connection, and enough tablets and laptops for each student (1:1). The teacher in charge of the group had many years of teaching and management experience as the school director. The teacher also had very broad participation in innovative educational projects and European projects. She had previously worked on all the transversal competences of the ATS2020 model using different methodologies and her teaching method and leadership profile as the school's director gradually incorporated these keys in a generalised way in all classrooms. The students of this group therefore had a previous culture of teamwork, use of ICT (digital platforms and resources) and autonomous and creative work in their learning processes. The culture of this pilot school aligned perfectly with the ATS2020 model.

Focusing now on the instructional context, it should be noted that the ATS2020 methodology was applied in the core subject First Foreign Language: English. The teacher designed and applied the following 4 learning cycles in the ATS2020 experimental group whose macro and micro plans are included as Appendix I of this report.

Briefly described below are the four cycles, with references to transversal competences and their application in each cycle, to methodological development, the creation of materials, roles of participants and assessment. Since the competences were applied in each cycle with some specific characteristics, they are laid out in Appendix XII in detail and in this report they are mentioned in the description of each cycle.

Learning Cycle 1: Dickens (December 2016 to January 2017)

This didactic unit was oriented to learning different elements of English grammar (the correct use of the Simple Past of English verbs both orally and in writing), and to learning the main features of the way of life of England in the 19th century. Therefore, it covered content in the areas of the English language and culture.

All the transversal competences of the ATS2020 model were integrated (Appendix XII), and Mahara, Movie Maker and XMind were used in the Digital Literacy competence.

Figure 1 Cycle 1 CPI O Cruce Dickens[6]

For the development of this didactic unit, students had IPads, laptops and a digital whiteboard, as well as a Wi-Fi connection in the classroom. The methodological sequence was based on a group research project through a webquest designed by the teacher. The students, in pairs, took a trip back in time to 19th-century England and, through different activities, learned about the living conditions back then and developed their own knowledge about them. They learned and practised the English language with grammar exercises, films, simulated interviews, guided information searches with the support of rubrics, preparation and presentation of a videotaped group interview, etc. As final products of the unit, the students created, in digital video format, a simulated interview with Charles Dickens and a digital conceptual map with the application XMind that they shared with the whole group in the virtual environment. A formative assessment was carried out through self-evaluation, peer evaluation and teacher evaluation.

---

[6] http://mahara.ats2020.eu/view/view.php?id=2420

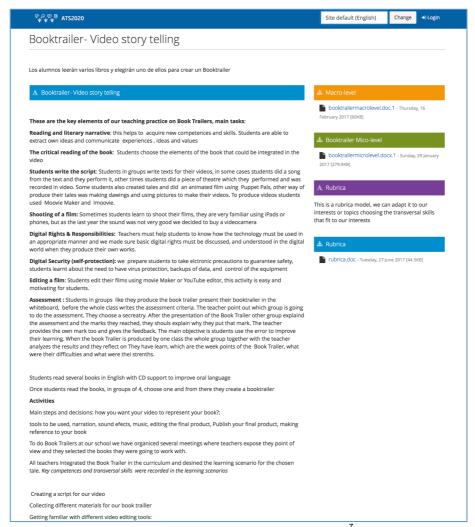**Learning Cycle 2: Book Trailer (February 2017)**

Figure 2 Cycle 2 CPI O Cruce BookTrailer[7]

This didactic unit was aimed at developing the habit and pleasure of reading among students. To do this, the methodological strategy proposed was the creation of a book trailer in English with Puppet Pals (App). That is, a short video to promote a work of Spanish literature that was previously read by students, to strengthen oral expression in English.

All the transversal competences of the ATS2020 model (except for the Autonomous Learning competence) were integrated (Appendix XII), and Mahara, Puppet Pals and YouTube editor were used in the Digital Literacy competence.

Learning Cycle 3: Gymkhana-London (March to the first week of April 2017)

This didactic unit was oriented toward getting to know the city of London by means of preparing for a school visit to this city that took place from May 6 to 8 during the

---

[7] http://mahara.ats2020.eu/view/view.php?id=9231

academic year. The students learned about the important places and monuments of the capital of Britain, learned to navigate in the Tube and planed routes to follow in the city. They also created a biography of a well-known English person.

All the transversal competences of the ATS2020 model were integrated (Appendix XII), and Mahara and Padlet were used in the Digital Literacy competence.
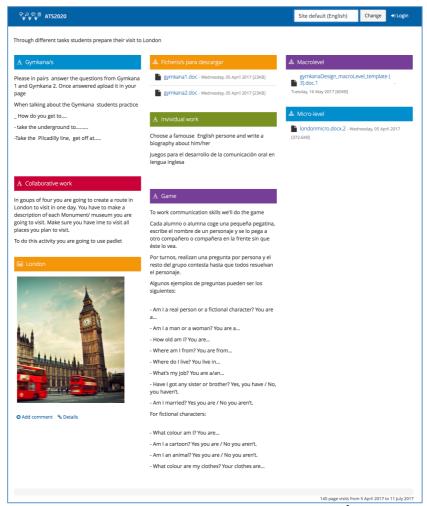

Figure 3 Cycle 3 CPI O Cruce Gymkhana-London[8]

For the development of this didactic unit, students had IPads, computers and a Wi-Fi connection in the classroom. The methodological sequence was based on problem solving aimed at a gymkhana designed by the teacher. The students performed several tasks: they solved the gymkhana in pairs, planned a day trip to London, presented it on a digital whiteboard and shared it with classmates. As the final product of the didactic unit, the students created a route for a one-day trip to London. They prepared it with the Padlet application and it was incorporated into the virtual environment of the whole group. A formative assessment was carried out through self-evaluation, peer evaluation and teacher evaluation.

---

[8] http://mahara.ats2020.eu/view/view.php?id=13155

Learning Cycle 4: Radio Programme (April and May 2017)

This didactic unit was aimed at improving students' oral and written expression in English through the creation of a radio programme. To do this, they worked on vocabulary and pronunciation in depth and learned radio language and its presentation.

All the transversal competences of the ATS2020 model were integrated (Appendix XII), and Mahara, Movie Maker, XMind were used in the Digital Literacy competence.
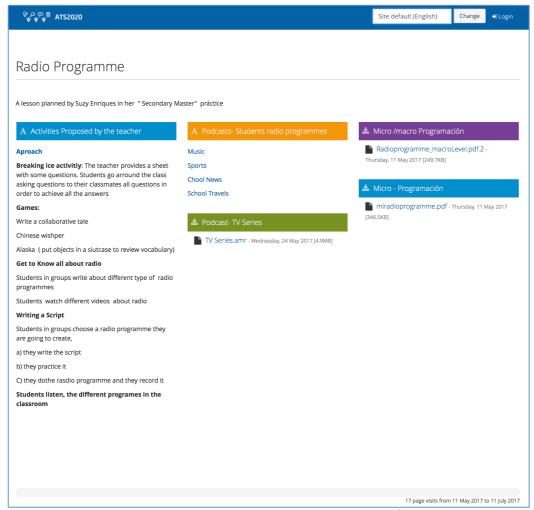

Figure 4 Cycle 4 CPI O Cruce Radio Programme[9]

For the development of this unit, students had IPads, computers and a Wi-Fi connection in the classroom. The methodological sequence was based on the creation of a radio programme as a team. With the help of the teacher, students learned the language and process of radio creation, listened to different radio programmes and wrote the script of their programme, practised it and recorded it, and made it available in the virtual space. As the final product of the unit, the students prepared a podcast of their radio programme in English. A formative assessment was carried out by observation by the teacher and evaluation of the oral and textual production of the programme.

---

[9] http://mahara.ats2020.eu/view/view.php?id=15037

1.2.2. Case Study 2: IES Rosalía de Castro

IES Rosalía de Castro is a large school, enrolling 1112 students from Compulsory Secondary Education to Baccalaureate and Advanced Vocational Training (between 12 and 20 years of age), and currently has 110 teachers. As a multilingual school, it offers bilingual teaching in some courses and subjects areas in CSE and in Advanced Formative Cycles. It is a school with broad training offerings focused on the secondary stage, characterized by an intense linking of its educational activity with the surrounding environment (business, activity and cultural heritage of the city, university life, etc.). It is known for long experience in educational innovation and the promotion of a scientific, technological and research culture in the field of youth. It is the only public school of the city of Santiago that offers the International Baccalaureate and one of only two in Galicia. It has received several awards such as the National Award for Research in 2010 and the first prize in the third edition of the Ethics and Science Award (2016). The socio-economic profile of the students in this school is medium-high and the cultural level of the families is generally high, being located in an environment with a large presence of civil servants and individual professionals. However, there is certain diversity since the school also receives displaced students from peripheral environments near Santiago that may have a medium-low profile.

The ATS2020 experimental group at IES Rosalía de Castro was the 1st class of the Compulsory Secondary Education (CSE), which was composed of 31 students (9 girls and 22 boys) between 11 and 12 years of age. Two students with special educational needs (Attention Deficit Hyperactivity Disorder "ADHD") also participated in the ATS2020 experimental group. The physical environment of the classroom was small for a group of that size (barely enough space to move or change the arrangement of working groups), with groups of desks in pairs. In terms of equipment, the teacher had a computer connected to the Internet and there was an interactive whiteboard in the classroom. The students did not have tablets or laptops in the classroom. The teacher shared his computer with the students during the course of the sessions. The students had access to some work computers located in a common area of the school, outside the classroom. The teacher in charge of the ATS2020 experimental group had many years of teaching experience, had performed management tasks as an educational innovation adviser in the Regional Ministry of Education, and had an important previous record of implementation of innovative methodologies in the classroom and participation in school competitions. His teaching method usually included all transversal competences of the ATS2020 model, but these were not generalised in all the subjects and educational levels of the school. The students of this group therefore had no previous culture of teamwork, use of ICT (digital platforms and resources) and autonomous and creative work in their learning processes. The professional culture of this teacher aligned perfectly with the ATS2020 model, but was not generalised in the school. That is, other subjects of the same year, previous or subsequent years did not apply this methodology.

Focusing now on the instructional context, it should be noted that the ATS2020 methodology was applied in the core subject of Spanish Language and Literature. In the ATS2020 experimental group, the teacher designed and applied the following 4 Learning Cycles according to the ATS2020 model, whose macro and micro plans are included as Appendix II of this report. The first two cycles can be considered as pre-modelling (learning journalistic strategies) for the completion of the third and fourth cycles of learning, which required the implementation of these strategies in the preparation of a newspaper in digital and printed format.

Learning Cycle 1: The Interview (December 2016)

This didactic unit was aimed at introducing the students to the journalistic field and its different genres, specifically: the journalistic interview. It covered content in Spanish Language and Literature related to oral and written communication.

All the transversal competences of the ATS2020 model were integrated, and Mahara, Google Classroom, digital whiteboard, digital press, Google Docs and mobile devices for voice recording were used in the Digital Literacy competence.

For the project, the students had access to the Internet and printed and digital press, as well as laptops. The methodological sequence was based on: previous documentation work in pairs with examples of journalistic interviews; group research - supervised by the teacher - to learn the different types of interviews; planning and creation, in a group, of an interview protocol for a person of interest to the group; conducting the interview; recording, creation and final publication in the virtual environment. As final products of the unit, the students produced a collaborative journalistic interview in digital format on a theme or a person of interest. The teacher performed a formative assessment by observing and supervising the group work in the classroom and the final product published in the virtual space. The students performed a formative reflection of the process through the virtual space.
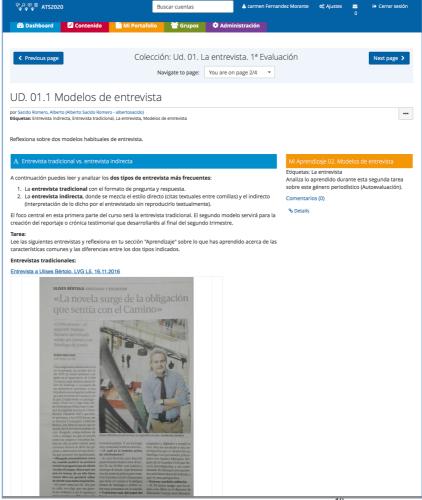

Figure 5 Cycle 1 CPI IES Rosalía: The Interview[10]

---

[10] http://mahara.ats2020.eu/view/view.php?id=5109

Learning Cycle 2: The Short Story (January 2017)

This didactic unit was aimed at introducing students to the field of literary creation and specifically to the genre of the short story based on the study of literary works by reference Spanish authors, such as Valle-Inclán. It covered content in Spanish Language and Literature related to written communication.

All the transversal competences of the ATS2020 model were integrated, and Mahara, Google Classroom, Google Docs were used in the Digital Literacy competence.

Figure 6 Cycle 2 CPI IES Rosalía: The Short Story[11]

For the development of this unit, students had Internet access and laptop computers. The methodological sequence was based on: an initial brainstorming session on the characteristics of the story; an individual Internet search for information to contrast with their previous ideas about this literary genre; classroom exposure and large group discussion of the findings; and, finally, the study of two different examples of Valle-Inclán's short stories. In addition, using these examples and touring in groups with the teacher, they visited the places in the city of Santiago de Compostela to which they refer. Thus, the students became familiar with the different expressive resources and how the author used them in his work. As a final product each student, from their

---

[11] http://mahara.ats2020.eu/view/view.php?id=5109

knowledge of the types of short stories, individually created a schema on the basic aspects of this literary genre and, based on it, wrote a 3-5 page average story to be published in the virtual space. The teacher performed a formative assessment by observing and supervising the group work in the classroom and the published final product. The students performed a formative reflection of the process through the virtual space. A hetero-assessment, based on rubrics, of the initial findings and the pairwise co-evaluation of the schemas on the basic aspects of the short story was used.

Learning Cycle 3: Individual and Group Creation of a Digital Newspaper (February to 1st week of May 2017)

This didactic unit was the most extensive and complex of the whole process. Its objective was to deepen understanding of the journalistic field by means of the creation of a digital collaborative school newspaper. To do this, not only were the skills and knowledge acquired in the two previous cycles applied, but also all the basic, individual and collective journalistic tasks carried out while writing for the press. The final product was presented to a national junior school think tank of the newspaper El País. Therefore, it covered content in the Spanish Language and Literature related to oral and written communication.

All the transversal competences of the ATS2020 model were integrated, and in the Digital Literacy competence the students used: Mahara, Google Classroom, Google Docs, Google Drive, their own mobile devices for voice, image and video recording, a digital layout application and an on-line edition of a newspaper "El País de los Estudiantes".

For the development of this unit students had access to the Internet, laptops (belonging to the school) and audiovisual equipment. The methodological sequence began with brainstorming and sharing how a newspaper is structured, to define the basic organisational characteristics of a newspaper, with the help of the teacher. Once again, making the most of the arrival at the school of the weekly papers, and working in teams, the students explored different newspapers focusing on their internal organisation. The teacher directed the analysis of the model to be followed. First, an example of an interview (genre already known from cycle 1) was searched for and analysed. Other examples of journalistic genres were then researched and explored (reports, chronicles, opinion pieces and other complementary materials such as infographics, videos, comic strips or advertising). The teacher showed the digital tools and methods to be followed for the creation of the version of the digital newspaper called *SCQInfo*. The topics and interviews that led each of the 5 sections of the newspaper were negotiated in the classroom and decided by consensus, and 5 working teams and a managing editor for each one were chosen. These teams created the sections (content, people to interview, etc.). Using Google Docs, each work team shared their interview proposal in the virtual space. It was then reviewed and improved with the other group members. Once the interview proposals of each section were completed and corrected, the tasks for their execution (coordination and logistics of the interview, recording, photographs, transcription and editing) were distributed among the work teams. The technological tools used were the specific editing tools of the digital newspaper El País, Google tools for collective word processing, file management and the link to the virtual space. As a final product, the students produced a collaborative digital newspaper. The teacher performed a formative assessment by observing and supervising the group work in the classroom and the published final product. The students performed a formative reflection of the process through the virtual space. A constant hetero-assessment, supported by rubrics, was used for the products of each work team.
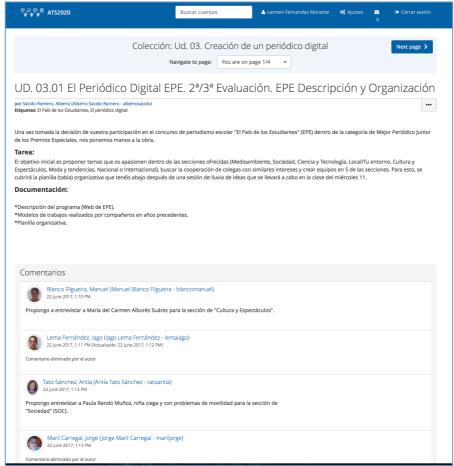
Figure 7 Cycle 3 CPI IES Rosalía: The Digital Newspaper[12]

It should be noted that the digital newspaper *SCQInfo*[13] prepared by the experimental group of IES Rosalía de Castro in the framework of the ATS2020 project, won the first prize as the best junior newspaper in the 2017 national competition of "El País de los Estudiantes", in which students from all over Spain competed[14].

Figure 9. Award-winning digital newspaper SCQInfo prepared by the experimental group of the ATS2020 project

---

[12] http://mahara.ats2020.eu/view/view.php?id=16234

[13] To access *SCQInfo*: http://estudiantes.elpais.com/periodico-digital/ver/equipo/975#1

[14] Press references to the ATS2020 award-winning experience:
http://scqinforosalia.blogspot.com.es/2017/06/scqinfo-premiado-como-mejor-periodico.html

Learning Cycle 4: Individual and Group Creation of a Digital Newspaper (May 2017)

This didactic unit complemented and relied on the previous one. Its objective was to further deepen understanding of the journalistic field by means of the creation of a **printed collaborative school newspaper.** The students who so wished, were able to present their final product (interview) to a regional press conference of the daily newspaper La Voz de Galicia in its Press-School section (XIIX Competition Best Young Journalist, Interview Modality). It deepens content in Spanish Language and Literature related to oral and written communication.

All the transversal competences of the ATS2020 model were integrated, and in the Digital Literacy competence, the students used Mahara, Google Classroom, Google Apps for education, a digital layout application and an on-line edition of a newspaper "El País de los Estudiantes", Word layout of the Press-School contest, and WhatsApp.
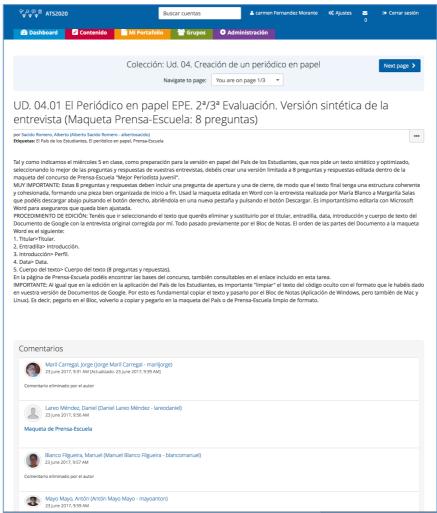

Figure 10. Cycle 4 CPI IES Rosalía: The Printed Newspaper[15]

For the development of this unit students had access to the Internet, laptops (belonging to the school) and audiovisual equipment. The methodological sequence began with the presentation of extensive digital interview models - previously made by the students - that the teacher shared in the virtual environment. In work teams of six students, the examples provided were reviewed, and the synthesis techniques

---

[15] http://mahara.ats2020.eu/view/view.php?id=16236

necessary for the transformation of extended digital text into a printed brief summary were used. The students individually adapted the digital version of their interview to a synthetic and classic version for the press. These individual syntheses were shared in the virtual environment using Google Docs and were reviewed and improved by team mates. Once the interview was reviewed, each student individually adapted their proposal to the Word layout for the Press-School contest. The teacher supervised the process through the use of the change control tool until its final printed edition and submission to the contest, if desired by the students.

The learning cycle was completed with the layout and adjustment of all interviews in the Press-School contest tool until the collaborative printed newspaper was set up. To this end, teamwork was used again and since all the students participated to the creation of printed newspaper, an organisational chart was used to coordinate the distribution of tasks. The set of work teams created the newspaper by adapting the same methodology as for the reports and chronicles of the different sections of the extensive digital newspaper and performed the complementary tasks of graphic design of headers, advertisements or opinion articles. All sections and contributions were reviewed by team members and final decisions were adopted by consensus until the final version of the printed paper was produced. To support communication and group work outside the classroom during this process, a WhatsApp communication channel was used.

As a final product, students produced a collaborative printed newspaper. The teacher performed a formative assessment by observing and supervising the group work in the classroom and the published final product. The students performed a formative reflection of the process through the virtual space. A constant hetero-assessment of the individual productions of the members in each team was used.

Figure 11. Award-winning interview developed by a student of the experimental group of the ATS2020 project

It should be noted that one of the interviews conducted by a student of the experimental group of IES Rosalía de Castro in the framework of the ATS2020 project won the **first prize for the best interview of the contest "Best kid and young journalist of the Press-School programme"**, La Voz de Galicia 2017, attended by students from all over Galicia. The award-winning interview was with the internationally renowned scientist Margarita Salas (Biochemistry), disciple of Severo Ochoa, winner of the Nobel Prize in Medicine.

Chapter 2: Methodology

2.1. Data Collection

In order to guarantee the accuracy of the ATS2020 pilot assessment, several data collection instruments were used: observations, interviews, digital artefacts and records and two types of key informants: teachers and students from the experimental groups of the two schools. This allows the triangulation of sources and data. We detail the data types below:

- Classroom observations (and interactions in the virtual space) through the observation protocol included in Appendix III. Three observations were made per cycle (beginning, development and end). A total of 24 observations (12 in each classroom-school).

- Teacher evaluations on the experience and the model through the interview protocol included in Appendix IV. Two semi-structured interviews were carried out with the teachers of the experimental groups (1 in each school).

- Student evaluations on the experience and the model through the interview protocol included in Appendix V. We conducted 4 semi-structured interviews (2 in each school) with the three students selected in each experimental group for the in-depth follow-up (one student each with high, intermediate and low academic level).

- Analysis of artefacts produced by the students during the educational process through a rubric of evaluation of the level of acquisition of transversal competences demonstrated, which is included in Appendix VI.

No modification was made to the data collection instruments in the application. The only incident occurred in the number of interviews done with the students. According to the planning guidelines the interviews were supposed to be done in a group, but because of difficulties of availability it was not possible to interview them together. Two interviews were carried out in each school: one with two of the students and another with the third one at a different time. The three students from each school were interviewed but at different times. Instead of two interviews a total of four were done.

2.2. Quality of the design

To ensure the validity and consistency of the results, different strategies were used:

1. Neutrality and objectivity in data collection: non-participant observation (without intervention in the process), systematic records in the two schools.

2. Confidentiality of data: guarantee of anonymity of data from students and teachers of experimental groups (see Appendix VII)

3. Rigorous treatment and analysis of the data. All interviews were recorded. The analysis of the interviews was performed using MaxQDA12 qualitative data analysis software. For this purpose, the 6 interviews were transcribed intact (see Appendices VII and VIII). Depending on the questions and objectives of the ATS2020 research, different categories of analysis were established and within these different codes and sub-codes (see Appendix IX). The interviews were codified through the identification of segments of information and once

coded, the identified segments were selected to answer each question. Initially the experience of teachers and students was studied independently. Then the two sources (students and teachers) were combined to answer the questions for the assessment of the ATS2020 model and its formative impact.

4. Triangulation of information. The research responses were obtained by combining the findings from all sources: interviews, observations (systematic classroom records, analysis of digital interactions in Mahara, Google Classroom, etc.) and analysis of artefacts and using the same categories of analysis.

Chapter 3: Findings

3.1. How were the critical aspects of the model implemented in schools by those involved (teachers, students)?

3.1.1. What aspects of the model were implemented as planned?

1. The use of the e-portfolio

In both schools the implementation of the ATS2020 model entailed the use of e-portfolio as a central methodological strategy throughout the pilot. In case study 1, we worked with the Mahara tool as the only virtual environment, while in case study 2, in addition to Mahara, Google Classroom was used to support the interaction, communication and co-editing needs derived from its learning proposal. Observations in the classroom, access and use records of teachers and students of both schools (see Figures 2 to 6, Chapter 1), as well as the numerous artefacts published and available in the portfolio are the main evidences of use.

The types of uses of the e-portfolio were mainly the following:
- Reflecting on the learning process followed and the results (students)
- Publishing the students' own creations derived from the learning cycles implemented (students)
- Providing methodological guides, teaching tools and study materials for students (teachers)
- Communicating asynchronously to give and receive feedback and advice (students and teachers)

As for the forms and places of access to the e-portfolio, the technological and network infrastructure defined the possibilities so that:
- In case study 1, students and teachers had access from both the classroom and home, since the school had laptops and Wi-Fi in the classrooms.
- In case study 2, the students had access from home because they had availability of means and network, but in the classroom it was only possible to work with the teacher's computer and the interactive projection screen. During school hours the students of this school had access through the computers in the common areas of the school, outside the class schedule.

As we will see later, the learning cycles implemented in the two schools imply a high dynamism and creative activity by the students that requires an availability of means and continuous connection. It should be noted that all creation, editing and co-editing activity was carried out through multiple tools (software, APPs and Social Software) external to Mahara, since the e-portfolio does not have tools for these functionalities and Mahara was used to publish and share by integrating the final productions.

2. The Implementation and Acquisition of Transversal Competences

In both schools, **the implementation and acquisition of digital competences** (O1 to O12) were checked. See Designed Learning Units, (Appendices I and II) and Artefacts Produced (Appendix IX). As the participants themselves (teachers and students) indicated:

- The students of School 1 created digital content with multiple tools that they previously did not have access to. They used other complementary ICT tools and developed new ICT skills. For example, materials in augmented reality.
- The students of School 2 developed new ICT skills (video editing, collaborative editing of materials, communication, layout, transcribing, spreadsheets, etc.).
- Positive attitudes towards ICTs were developed, leading to a change of habits and types of use (follow-up, giving continuity to classroom work). A vision of the technologies as learning tools was developed among the students.

Representative segments: (E6 A2.1., 7-7), (E1 PR1, 81-85), (E1 PR 1, 86-89) (see Appendix VII[16]).

In both schools, **the implementation and acquisition of Informational Literacy competences** (O3, O6, O9, O12, O17, O18, O21, O24) were verified (see Appendices I and II - Designed Learning Units, and Appendix IX - Artefacts Produced). As the participants themselves (teachers and students) indicated:

- The Informational Literacy competence was essential in the learning of the two subjects piloted in the ATS2020 model (Spanish and English language). Therefore, all the learning cycles carried out incorporated activities that work with this competence.
- It was also essential in the elaboration of the work carried out (digital newspaper, interviews, book trailers, interactive presentations, etc.), so that the analysis of the selected artefacts allowed verification.

Representative segments: (E1 PR 1, 57-57), (E5 PR 2, 4-4) (see Appendix VII).

In both schools, **the implementation and acquisition of Autonomous Learning competences** (O2, O8, O11, O14, O17, O20, O23) were verified. See Appendices I and II - Designed Learning Units and Appendix IX - Artefacts Produced. As a result, the participants pointed out that students:

- Were more independent in the process of learning (teachers and students).
- Were able to transfer strategies for self-regulation to other subjects (students).
- Reflected on the cognitive processes associated with the creation tasks (students).
- Developed a focus on learning rather than the mark or the award (students).
- Improved self-esteem (students).

Representative segments: (E5 PR 2, 3-3), (E4 A1.3., 70-71), (E2 A1.1., 13-14) (E6 A2.1., 38-38), (E7 A2.2., 79-80), (E6 A2.1., 58-58) (see Appendix VII).

In both schools, **the implementation and acquisition of the Creativity and Innovation competences** (O2, O5, O8, O11, O14, O17, O20, O23) were verified. See Appendices I and II - Designed Learning Units and Appendix IX - Artefacts Produced. As the participants indicated:

---

[16] **Codes used for the interview segments:**

- E: interviewer
- PR: Teacher (PR1 Case 1-CPI O Cruce) (PR2 Case 2 IES Rosalía)
- A: Student (A1-A3 Case 1) (A4-A6 Case 2)
- X - X (number referring to the paragraph labelled in the application of qualitative data analysis: MaxQDA. They can be found in Appendix VII with full transcripts of interviews and assignment of categories and codes)

- They used imaginative and expressive resources other than the usual ones to adequately solve the classroom tasks.

Representative segments: (E6 A2.1., 44-44), (E5 PR 2, 4-4), (E5 PR 2, 44-44), (E1 PR 1, 67-67) (see Appendix VII).

Finally, in both schools, **the implementation and acquisition of the Communication and Collaboration competences** (O2, O3, O5, O6, O8, O9, O11, O12, O14, O15, O17, O18, O20, O21, O23, O24) were also verified. See Appendices I and II - Designed Learning Units and Appendix IX - Artefacts Produced. As indicated by the participants themselves through the execution of this competence, they found that:

- When working with others it is easier to learn (students)
- Cooperative learning took place (teacher)

Representative examples that illustrate this:

> "Yes, I really like working in groups, because you can put everything in common and that makes it easier." (E4 A1.3., 26-27)
> "Of course, this has led to the fact that, as in life itself, people with these competences end up being able to manage groups, and hence cooperative learning is acquired, another competence. This was developed a great deal, especially with this central project." (E5 PR 2, 44-44)

3. The Formative Assessment

In the two schools studied, a formative assessment was carried out, supported by various strategies (self-evaluation, peer evaluation, and hetero-assessment), ensuring feedback and supervision throughout the process. As observed in the micro planning, all learning cycles involved various assessment strategies (see Appendices I and II). Different agents participated: teachers and students, and different aspects were evaluated: processes (reflection through the virtual environments especially in Mahara My Learning), acquisition of competences and knowledge, both transversal and specific to the subjects of English Language and Spanish Language (fundamentally through artefacts produced and level tests taken). Section 1.2. in Chapter 1 describes in detail the assessment strategies implemented in each learning cycle. The formative assessment was a constant element throughout the classroom sessions (O1 to O24) and outside the classroom through virtual space.

Representative segments: (E1 PR 1, 3-3), (E3 A1.2., 27-28), (E1 PR 1, 61-61), (E1 PR 1, 63-63) (see Appendix VII).

4. The ATS2020 Pedagogical Model (Planning and design of teaching, teacher and student roles, continuous assessment and active participation)

As stated throughout the report, the ATS2020 model was implemented in all its complexity in the Spanish schools (see Designed Learning Units (Appendices I and II) and Artefacts Produced (Appendix IX), activity recorded in the e-portfolios), highlighting especially as a critical aspect the change in the traditional roles of teachers and students that is accredited in all the observations made (O1 to O24):

- The teachers took on the role of guide and supervisor of the students and the

process, providing constant feedback. (E6 A2.1., 72-73), (E1 PR 1, 36-36), (E1 PR 1, 53-59) (see Appendix VII).

- The students developed an active role with high degrees of autonomy in the process. (E8 A2.3., 53-59), (E1 PR 1, 69-69), (E5 PR 2, 58-58) (see Appendix VII).

5. **The processes of creation and preparation of learning materials by the students.**

The learning process developed in both schools was supported by the **creation of a great variety of digital educational materials** by the students. As can be verified through the list of analysed artefacts of the students under study (see Appendix IX) and the statements of the participants themselves (teachers and students):

Representative segments illustrating these findings:

> "Yes, We did each one [...] It was a marker and you inserted a link of a page and then downloaded the application Blippar, which was called the augmented reality application, and with a marker, scanned the marker and clicked on the link and it took you to the website." (E3 A1.2.,61-62)
> "People came [...] to teach us how to use it. And I took the initiative in this case, and tried to make a creation with a race car." (E3 A1.2., 69-70) (E3 A1.2., 69-70)

3.1.2. What aspects of the model had to be modified (or redesigned) when applied?

In general, **no changes or adjustments were made to the ATS2020 model**. In both schools it was possible to apply it without deviations. Regarding the technological tools provided for the implementation of the project (Office 365 or Mahara), it was necessary to complement them with other tools. For example:

- In case study 1, more tools and technological services were used to support the creation and co-publishing of materials. In this case study, the following applications were incorporated, among others: Puppet Pals, Blippar, App inventor, YouTube Editor, Movie Maker, XMind, Padlet, Aurasma, Augmented 3D.

- In case study 2, more tools and technological services were used to support the creation and co-publishing of materials, group work, and synchronous communication outside the classroom. In this case study, the following applications were incorporated, among others: Google Classroom, Google Apps for education, WhatsApp, Movie Maker.

Representative segments: (E1 PR1, 12-13), (E1 PR 1, 13-15), (E1 PR 1, 98-101), (E5 PR 2, 60-60), (E5 PR 2, 63-66) (see Appendix VII).

3.2. How did participants feel about the implementation of the ATS2020 model?

3.2.1. To what extent were the participants satisfied with the implementation?

1. **The use of the e-portfolio and virtual environments for monitoring and interaction**

Students showed a greater degree of satisfaction focused on the following possibilities of work and management of the teaching process:
- The ease of use of Mahara, its simplicity of operation.
- Being an alternative to the textbook, its linearity and traditional model of learning upon which they rely. As a motivating factor, they mentioned being able to work with computers.
- The continuity of the teaching process which extends beyond the classroom, to hours spent studying at home.
- The possibility of having access to the works and materials in the "virtual classroom" and to teachers' monitoring.
- The possibility of sharing work with their peers and see how others solve the activities.

In the case of teachers, the experiences were very different, and they coincide highlighting the strengths of the portfolio. Thus, in case study 1, high levels of satisfaction with Mahara are shown, whereas in case study 2, the level of satisfaction is low, due to the above-mentioned infrastructure difficulties and to the experience of previous work with other tools. These tools include or allow integrating in the same environment e-portfolio functions, communication tools and group work, editing and creation of contents, etc.

Representative segments: (E7 A2.2., 5-5), (E8 A2.3., 2-3), (E1 PR 1, 27-32) (see Appendix VII).

2. **In relation to the acquisition of transversal competences, the participants showed high levels of satisfaction, and were able to specify the acquired knowledge:**

In relation to the acquisition of the **Digital Literacy competence**, students showed satisfaction for having learned how to:

- Use various applications to prepare specific works.
- Use various applications to communicate and work in a network.
- Use various applications to edit certain digital materials (images, videos, texts, etc.)
- Use technologies to learn, not just for leisure.

Teachers pointed out the instrumental value of the Digital Literacy competence as a mediator and subject learning support, because when handling numerous and diverse technological tools to perform tasks and create different materials, students are more focused on the objective (what ICTs are used for) than on the tools themselves. Thus, the digital literacy competence goes beyond the knowledge and management of one or other technological tool, and technology becomes a learning tool.

Representative segments: (E8 A2.3., 28-33), (E3 A1.2., 4-5), (E7 A2.2., 25-26), (E1 PR 1, 55-55), (E6 A2.1., 56-56) (see Appendix VII).

In relation to the **Informational Literacy competence**, both students and teachers showed satisfaction for having learned how to:
- Compare and discriminate the available information, in order to understand that not everything is equally rigorous or valid, and to set the selection criteria. (teachers and students)
- Develop strategies to process the information found and elaborate their own: for example, make their own diagrams or summaries, cross-checking with data from other sources, identify reliable sources, differentiate between types of information and channels, write their own stories or interviews, audiovisual scripts, etc. (teachers and students)

Representative segments: (E4 A1.3., 67-67), (E3 A1.2., 53-53), (E4 A1.3., 52-53), (E5 PR 2, 44-44) (see Appendix VII).

In relation to the **Autonomous Learning competence**, students and teachers showed satisfaction for having learned:
- The importance of:
  - working constantly on the learning process and the application of what they learned to other situations
  - making efforts to solve the activities and take the initiative
  - setting goals and working to achieve them
- Being aware of:
  - the limitations
  - the intrinsic motivation as a key factor in learning.
  - the fact that learning is a complex and reflexive process that also results from errors and self-evaluation (meta-learning).
  - the fact that one can learn on their own, not only from the teachers.
  - the fact that a constant and organised work guarantees a better performance/learning
  - the existence of different levels of work (in group and individual settings)

Representative segments: (E2 A1.1.,12-12), (E2 A1.1., 56-56), (E4 A1.3., 37-37) (E6 A2.1., 52-52) (see Appendix VII).

In relation to the **Creativity and Innovation competence**, students and teachers showed satisfaction for having learned:

- The importance of creativity and its added value in the professional world when linked to innovation.
- To differentiate conventional creations from innovative creations.

Representative segments: (E2 A1.1., 47-48) and (E6 A2.1., 44-44). For example:

> "We had to make up a scary story, [...] and we had to let go of our creativity ... We had to evaluate the stories of our peers, and it was noted who had developed the creativity and who hadn't. Because there were the typical stories of the girl in the mirror, or the zombie, the witch or things like that. " (E6 A.1., 44-44)

In relation to **the competence of communication and group work**, students and teachers showed a high level of satisfaction, repeatedly pointing out a great diversity of learning on teamwork and communication (see Appendix VII), such as:

- By working in teams in the classroom, students also assume a driving role in the learning process of their peers (E3 A1.2., 22-23, 25-26), (E6 A2.1, 13-13), (E1 PR1, 65-65).

- Good leadership is a key factor in the success of group work. (E2 A1.1., 22-23), (E6 A2.1., 25-25)
- Importance of a clear and rigorous communication between the team members, differentiating between contexts and types of relationships (formal/peer vs non-formal/ friendship) (E2 A1.1., 26-27), (E6 A2.1., 25-25)
- Importance of the involvement and coordination of all members of the group. Joint responsibility, interdependence, mutual support in relation to "the sum of the parts" (E4 A1.3., 30-33), (E2 A1.1., 35-36), (E6 A2.1., 23-23), (E6 A2.1., 32-32).
- Importance of acting with empathy, tact and objectivity in order to obtain good group-work results. (E2 A1.1., 37-38)
- Awareness of the individual differences and different levels of relationship to differentiate friendship from work of different registers. (E6 A2.1., 52-52)
- Strategies to solve conflicts and regulate as a group (reach a consensus, come to terms, improve or intensify communication, etc.) (E3 A1.2., 30-35, 36-39), (E7 A2.2., 13-17)

3. **In relation to formative assessment, participants showed high levels of satisfaction because they understood that:**

- It stimulates students' reflection. (E1 PR1, 73-73)
- It helps students to be more aware of their learning process, their evolution and promotes autonomy. (E1 PR1, 46-47)
- It encourages students to make efforts to better communicate their ideas and internalise them. (E1 PR1, 46-47)
- The process becomes flexible and it provides continuity. (E6 A2.1., 56-56)
- It allows teachers to keep track of the educational process. (E5 PR2, 18-18)

We should highlight some segments of the representative interviews that illustrate these findings: (E1 PR1, 73-73), (E1 PR1, 46-47), (E1 PR1, 46-47), (E6 A2.1., 56-56), (E5 PR2, 18-18) (see Appendix VII).

4. **Participants showed important levels of satisfaction regarding the ATS2020 Pedagogical Model (Planning and design of teaching, teacher and student roles, continuous assessment and active participation)**

These are the most significant elements (see Appendix VII):
- The model adapts to applied and practical teaching: competence approach (teachers) (E5 PR2, 2-3)
- Students think that the model significantly helped them to learn (E4 A1.3., 67-67)
- Students consider that the role of the teacher and supervisor of the formative process has a positive impact (E4 A1.3., 70-71)
- Students consider their active and creative role has a positive impact on the process and they are committed to a high level of personal demand (E6 A2.1., 34-34)
- Students prefer the ATS2020 model instead of traditional models. (E6 A2.1., 46-46)

5. **In relation to the processes of "creation and development of learning materials", participants showed high levels of satisfaction both regarding their quality and the execution process.**

Their levels of satisfaction are based on the following ideas (see Appendix VII):

- Because they learned, while making the process more fun. (E3 A1.2., 11-15)
- They outperformed their expectations of achievement. (E6 A2.1., 5-5)
- Because of the quality of the materials produced and the external recognition (from the teachers or by being awarded a prize or an honourable mention) (E6 A2.1., 15-15)
- Because of the closeness of the teachers and the support of the group throughout the process. (E6 A2.1., 34-34)
- Due to the quality of the materials produced and the external recognition materialised in two awards to the students of case study 2 (E5 PR2, 4-4), (E5 PR2, 46-46)

3.2.2. What difficulties did the participants encounter in the application of the ATS2020 model?

1. **In relation to the difficulties encountered in working with the e-portfolio and in particular with Mahara, students and teachers of the two schools reported the same type of difficulties:**

- It requires dedication and work outside and inside the classroom (students).
- It requires an initial basic training to learn how to use the tool (students and teachers)
- It does not allow the personalisation of the spaces (students).
- It poses limitations to the work in group regarding the possibilities of sharing and co-editing all the documents (students and teachers)
- It does not allow seeing the detailed evolution of the process of individual and collaborative reconstruction of students' materials, with the contributions of each one of them (version of changes), only the final product.
- It is a very suitable environment for analysis, personalised feedback and reflection on the process, but not for the educational interaction or monitoring, and assessment required by the process. It does not include tools of collaboration, communication, creation and shared edition. It should get integrated into other technologies (teachers).
- It is difficult to use on mobile devices (teachers)
- Space limitations to store contents in Mahara (teachers)

Representative segments: (E4 A1.3., 86-87), (E2 A1.1., 66-67), (E1 PR1, 21-21), (E1 PR1, 22-23), (E5 PR2, 19-20), (E5 PR2, 16-16), (E5 PR2, 60-60), (E5 PR2, 61-62) (see Appendix VII).

2. **In relation to the development of transversal competences, the following difficulties were identified:**

Teachers did not mention any difficulties in the development of **digital literacy competence**, while students indicated the following:

- Poor prior knowledge on the creation of videos and audiovisual formats, as well as on the use of different devices. Use of ICTs for information only.

- Habit of learning how to use ICTs by a trial-and-error approach. Belief that it is easy and does not require strategy.
- Difficulties in the shared creation of digital products derived from different rhythms and previous digital skills.
- Difficulties in the management of virtual group work due to problems in on-line communication and in the management of group tools.

We point out certain segments of the representative interviews that illustrate these findings:

> "At first, it was very difficult, I had many problems when editing and uploading videos. [...] when the project was in a more advanced phase, I was able to search the Internet by myself: "How to upload a video to [...] and things like that" (E6 A2.1., 52-52)
> "I've learned how to lead a group and above all, for example, how to do these things on a computer, with everyone at their home, which is different, it's more complicated because you don't know how they may be reacting. (E2 A1.1., 42-42)

Students did not mention any difficulties in the development of the **informational literacy competence**, while teachers pointed out as follows:

- Bad habits such as "cut and paste" information or not respecting copyright

For example:

> "When they are asked to perform a task, they used to copy and paste whatever they found on Google. I encountered people who used to do this along the way, and I had to explain what plagiarism was, even that it was a criminal offence, and they had to be careful. (...) Besides, "copy and paste" is something they do constantly. (E5 PR2, 42-42)

Students did not mention any difficulties in the development of the **Autonomous Learning competence**, while teachers referred to:

- Students' lack of working habit and constant study.

For example:

> "What they like least is the effort they sometimes have to make, because they are not used to it, you know? [...] obviously they will feel a little overwhelmed at times, especially when a task is due. And this idea that there is an exam, and one-day preparation is enough to pass it, which is a generalised idea [...], in this case it won't work, here we have to work for it daily. " (E5 PR2,10-10)

Students did not mention any difficulties in the development of the **Creativity and Innovation competence**, while teachers pointed out:

- The rigidity of Mahara, which took concrete shape in the inability to personalise the personal spaces, limiting the creativity.

For example:

> "As A1.2 said, I also see Mahara as a more reliable tool, more suitable for work than Padlet, because Padlet lets your creativity run free, you can also use it to work and express yourself, more or less, but it depends on the content and the photos that you use." (E2 A1.1., 63-65)

Finally, in relation to the **Communication and Collaboration competence**, teachers and students mentioned as main difficulties:

- Students' different levels of involvement and different learning rhythms.
- Different approaches of the group members to solve tasks.
- Lack of skills in planning and managing tasks.

3. **In relation to the formative assessment, the following difficulties were identified:**

Participants mentioned three types of difficulties when conducting formative assessment in the classroom (see Appendix VII):

- Students' difficulties to objectively evaluate their peers. They need to develop skills and agree on criteria in order to ensure rigor. (E2 A1.1., 24-25)

- The culture settled among the students undergoing a summative assessment through an exam and lack of habit for the work and continuous assessment. (E5 PR2, 10-10)

- The need for technological tools which, besides reflecting and sharing (such as Mahara, and especially e-portfolio), allow seeing the processes of individual and shared creation of artefacts (versions, changes, different contributions, etc.) (E5 PR2, 58-58)

4. **In relation to the ATS2020 Pedagogical Model (Planning and design of teaching, teacher and student roles, continuous assessment and active participation) the following difficulties were identified:**

Participants mentioned two types of difficulties in carrying out the ATS2020 Model in the classroom:

- The model requires high levels of student involvement and demand, to which they are not accustomed. (E5 PR2, 10-10), (E6 A2.1., 15-15) (see Appendix VII)
- The closed proposal of tools, which does not provide the opportunity to the teacher to use other tools, with more functionalities than e-portfolio, involved work overload in case study 2. (One of the project requirements was to use Mahara or Office 365) (E5 PR2, 22-22) (see Appendix VII)

5. **Finally, in relation to the processes of "creation and development of learning materials", the following difficulties were identified:**

- Students' tendency to adopt common and uncreative strategies in their own elaboration. (E6 A2.1., 13-13)
- In terms of collaborative materials, the different levels of involvement and work rhythms. (E6 A2.1., 23-23) (see Appendix VII)

What are teachers' opinions/beliefs about the development of transversal competences in the school environment?

In general, teachers give much consideration to the work on transversal competences in the teaching processes. They understand that they provide students with strategic skills to learn different curricular contents (subjects) and to manage autonomously in social and professional contexts.

They also attach great importance to the fact that these competences could be explained in the designs of the didactic units and they should not be treated on a secondary level. These competences should systematically be addressed as proposed in the ATS2020 model.

Some of the transversal competences (collaboration and autonomous learning) are deemed necessary for Secondary students. For example:

> "[...] Teamwork, because they learn from one another and learning from others is a positive experience. The same thing happens when making decisions, because they have to choose between this and the other. Critical thinking is an important factor, as well. And then being responsible for their own learning, that is, they understand what they learned and what they didn't, they are more aware, and not thinking so much about: "Ah, I've got a good mark on my exam" (E1 PR1, 44-45)
> "As I said already, in the portfolio we were assessing the transversal competences, as we put a little more emphasis on those skills. They are already included in the teaching plans, that is, as an objective and makes us focus more on that part. " (E1 PR1, 71-71)

3.2.3. What are the main strengths of the model according to the participants?

1. **In relation to the strengths of the e-portfolio and the use of virtual environments for monitoring and interaction, participants pointed out the following:**

From students' point of view:

- Continuity of the process. Not depending on the school schedule (once a week) to get in touch (permanent connection).
- Permanent access to support from teachers and students (feedback).
- Possibility of solving questions that are not asked in the classroom due to lack of time (tailored attention).
- Having all the works organised at any time and place.
- Possibility to work from home, in a more relaxed manner and at a personal pace.
- Motivational factor of using a computer to study.

From teachers' point of view:

- Students' follow-up, feedback and project-specific work. Students are at the centre of the process.
- Possibility of reflecting on their own learning process.
- Students' awareness of the process and the importance of planning and self-regulating the learning process

We should highlight some segments of the representative interviews that illustrate these findings: (E6 A2.1., 56-56), (E1 PR1, 7-7), (E1 PR1, 26-26), (E5 PR2, 2-3), (E1 PR1, 39-40) (see Appendix VII).

2. **In relation to the acquisition of the transversal competences, the following strengths were identified:**

From students' point of view, the following strengths were identified, associated with the numerous benefits of the **acquisition of digital literacy competence**, such as:

- Possibility of performing all kinds of educational tasks (writing, creating, conversing, etc.) useful to learn and improve school performance.
- Opportunity of tailoring their creations (formats, colours, aesthetics, etc.)
- Possibility to work collaboratively.
- Acquiring study habits and active participation (consult feedback, review tasks of other people, etc.).
- Work at different rhythms and from different spaces (school, home).

Teachers mentioned as strength associated with the development of digital skills the fact that:

- They turn ICTs into a daily resource in the classroom, not an exceptional one.

Representative segments:

"I didn't use to get home and read my email for example, to check whether I had things to do or whether someone had sent me information to do something. But now, I made a habit out of getting home every day and, before having lunch, turning the computer on, in case I receive a notification or something like that. So I think this also helps when it comes to using technologies." (E6 A2.1., 7-7)
 "What I liked the most was that we did not have to bring books or notebooks. We could do everything from home or on classroom computers." (E7 A2.2., 5-5)
"Our students already have enough ICT skills, because it is one of the school priorities (...). But what I think it does is that it contributes to making the tool invisible and integrating it "(E1 PR1, 55-55)

Teachers mentioned as strengths associated with the development of competences the following:

The actors did not refer to specific strengths in relation to the other digital competences, except in the case of the **informational literacy competence**. They consider it, as we have already pointed out, a basic tool for learning both subjects.

Teachers mentioned as strengths associated with the development of the **Communication and Collaboration competences** the following:

- They reinforce classroom cohesion and mutual knowledge. (E2 A1.1.,50-50, 51-53) (see Appendix VII)
- They improve mutual knowledge and communication levels and channels between students in the classroom (E2 A1.1., 50-50, 51-53), (E6 A2.1., 54-54), (E7 A2.2. , 59-66) (see Appendix VII)

3. **In relation to the formative assessment, the following strengths were identified:**

- The implementation of self-assessment activities fostered greater levels of control and self-regulation of students' learning process. (E4 A1.3., 37-37) (see Appendix VII)
- The combination of different strategies and agents improved the assessment processes and results. (E1 PR1, 73-73) (see Appendix VII)

4. **In relation to the ATS2020 Pedagogical Model (Planning and design of teaching, teacher and student roles, continuous assessment and active participation), participants pointed out numerous strengths:**

- High motivational value for students by incorporating technologies into teaching as mediators, not as an end in themselves. (E8 A2.3., 2-3), (E1 PR1, 90-91)
- It guarantees the continuity of the process by means of tools, roles and active didactic strategies. (E6 A2.1., 56-56)
- Incorporating teamwork as a basic strategy has a positive impact on students' achievement and success (E6 A2.1., 17-17)
- The model promotes the idea of surpassing oneself and improves communication and relationships in the classroom. (E3 A1.2., 11-15), (E6 A2.1., 5-5), (E6 A2.1., 5-5), (E6 A2.1., 40-40), (E6 A2.1., 34-34)
- The model promotes among students attitudes and skills of regulation and monitoring of their learning process (E2 A1.1., 9-10), (E2 A1.1., 12-12)
- The Model adjusts to students' different needs, styles and preferences (E4 A1.3., 4-5), (E4 A1.3., 16-17)
- The Model guarantees the learning of transversal competences by means of any curriculum subject (E1 PR1, 74-75)
- The Model not only allows the development of transversal competences, but also leads to a better learning of the contents of the subjects in which it has been implemented (E2 A1.1., 39-40), (E3 A1.2., 4-5)

Representative segments referred (see Appendix VII)

5. **In relation to the elaboration of "artefacts" or their own materials as part of the formative process, participants pointed out the following strengths:**

- The practical component of having to create a product motivates students and helps them to understand the applied nature of the learning contents. (E1 PR1, 48-49), (E4 A1.3., 18-19)
- The motivational value of "learning-by-doing". (E3 A1.2., 11-15)

Representative segments referred (see Appendix VII)

3.2.4. What did the participants suggest regarding the future implementation of the model?

Participants made many suggestions to bear in mind for future implementations of the ATS2020 Models:

- The model should be assumed by all the school teachers, and its implementation cannot be limited to a classroom or a subject alone, if our aim is

to change the predominant "school culture". (E1 PR1, 35-36), (E5 PR2, 12-12)

- The model should offer increasingly varied technologies, allowing teachers and students to choose those which they consider suitable to develop within their subject and planning. (E5 PR2, 74-76)

- Teachers' support and mutual support are extremely important, thus synchronous tools are needed so that students could stay in constant communication. (E5 PR2, 63-66)

- The number of students per classroom should be reduced, given the intensity of work involved and the requirements of tailored and group follow-up. (E5 PR2, 63-66)

- Adequate organisational conditions should be guaranteed: spaces, furniture, schedule, etc. (E5 PR2, 68-68)

- Basic initial teacher education should be planned for the ATS2020 model and tools. (E1 PR1, 16-17)

- It should not be assumed that students already master the most common technologies and tools. From the very beginning, they should be explained that they are going to be used for learning purposes, not leisure, in which case usage habits should be modified. (E2 A1.1., 80-81) (E3 A1.2., 98-99), (E2 A1.1., 5-5)

Representative segments referred (see Appendix VII)

Chapter 4. Discussion, reflections, recommendations

Conclusions

How did the ATS2020 model work in your country and what aspects were successful?

The Model worked successfully in both Spanish schools (Galicia). Despite being very different schools, the results obtained in terms of academic performance and teachers and students' level of satisfaction were excellent. The resources provided to implement the model were also successful, along with the dynamics of teamwork that took place in the classroom, the formative supervision carried out by the students, and the quality of the final productions, which were even recognised externally with two prizes, as previously mentioned.

Other successful elements were the reflexive and self-regulation processes, initiated by the students. Significant levels of reflection and meta-learning were observed among all participating students, especially those with lower starting levels.
Finally, another successful aspect is that the experience led to greater classroom cohesion, improvement of the relational climate, and improvement of the teacher-student relationship.

What contextual factors proved to be of support and which were impediments?

The identified contextual factors that had an impact on the implementation of the ATS2020 methodology were as follows:

Factor 1. Infrastructures and technological equipment in schools and classrooms

The two pilot schools started from very different realities with respect to this factor that has a clear impact on the implementation of the ATS2020 model. School 1 has a favourable ICT infrastructure, i.e. with numerous technological resources and connectivity in the classrooms, with access for both teachers and students (computers, tablets, interactive whiteboard, Wi-Fi connectivity). On the other hand, School 2 has significant shortcomings: poor or slow connectivity (historical building with difficulties for extending the cable network and Wi-Fi), classrooms too small in relation to the number of students, which do not allow group work. They have to go to specific laboratories to be able to use these technologies (more power and speed), and they are not diversified enough or they are outdated (with desktop computers only). Although this factor did not prevent the application of the model in School 2, it significantly conditioned the process in the classroom and posed an added challenge for the teacher and students (E5 PR2, 31-32) (see Appendix VII).

Factor 2. Digital literacy competence and experience of ICT use in a previous learning process

The two pilot schools started from very different realities with respect to these factors, which have a clear impact on the implementation of the ATS2020 model. School 1 had had a long trajectory of use of technologies in the classrooms, and with high levels of digital competence among students. However, in School 2, the experience of using ICT in teaching was much more limited, being identified with already outdated traditional models, in which only the teacher uses technology in the classroom:

The students of School 2 also started from an almost non-existent level of digital literacy competence and ICT use occurred mainly outside the classroom and for leisure (watching videos on YouTube, searching for information on the Internet, checking the email, playing games, etc.).

This issue, along with the Mahara limitations, mentioned by the School 2 teacher, and with the indicated infrastructure limitations, explains the major difficulties encountered at School 2 to obtain the portfolio tool of the project.

On the other hand, the students of School 1, with greater digital competence and experience of ICT use in the classroom, despite not having previously worked with Mahara, did not make reference to such difficulty:

Representative segments (E6 A2.1., 7-7) (E5 PR2, 40-40) (E2 A1.1., 5-5) (see Appendix VII)

Factor 3. Teacher-student ratio in the classroom

The application of the ATS2020 model requires balanced ratios, as the preparation of diversified activities and materials used to work on projects, maintenance of the virtual environment, tailored monitoring and counselling inside and outside the classroom, and continuous assessment intensify the teachers' work. The ratio difference in the two cases under study is very high. While in the classroom of School 1 the teacher worked with 21 students in the classroom, in School 2 there were 31, which is 150% more. Surpassing these ratios renders the application of the model unfeasible or implies unsustainable overexertion for the teaching staff. In other words, a motivated teacher may end up abandoning the initiative.

To what extent did the project activities support the development of transversal competences?

It was observed by means of observations, artefacts analysed, and interviews carried out that the activities implemented in the experimental groups favoured the development of all transversal competences. The intensity of learning in each of them is different and varies according to the activities proposed by the teachers, the nature of the subject, and students' motivations and attitudes in each case.

To what extent did the project activities support the assessment of transversal competences?

The design model of the ATS2020 teaching and learning process (Macro and Micro planning) requires explaining the transversal competences which are analysed in each learning cycle. It also requires explaining the methodologies and assessment strategies that are going to be used. This reflexive and anticipatory model ensures that transversal competences are not diffused or forgotten within the educational process, and they become a useful tool. This process also depends on the learning outcomes of the subject (either English Language and Culture, or Spanish Language and Literature). The classroom observation and the analysis of the interactions maintained in the virtual environments showed that teachers performed a formative assessment of these competences (providing constant support, indications and aid to the students).

Recommendations and final reflections

In addition to the suggestions made by the participants, included in section 3.2.4, the following recommendations should be made:

Regarding the technologies and the basic digital literacy competence of students/teachers

- To train/ensure digital competences in order to use ICTs in teaching and learning processes. The absence of these competences restricts their opportunities in the learning processes. (both in teachers and students) It involves resistance to innovation.

- To ensure the provision of equipment in classrooms not only in common spaces or laboratories, so that technology could be a resource for both teachers and students, not only for the former.

- To promote the use of ICTs in all disciplines as a learning resource (provide with infrastructures, spaces and appropriate means; and stimulate, reduce ratios, make examples of good practices visible and reward them, recognise the duplication of preparation, planning and follow-up effort required by the technologies in classrooms)

Regarding the implementation of the ATS2020 model

- To promote its interdisciplinary application, that is, to extend it beyond the classroom of a single teacher and to be focused on the development of learning activities that address competences of several subjects involving the entire teaching staff who work with the group (of the course). Only in that way is it possible to change the methodological and learning culture.

- To incorporate more technological tools, complementary to the e-portfolio, which support all classroom functions and activities (not only aimed at formative assessment, reflection and self-management of learning, but also at group work, collaborative creation and synchronous communication, among others). The application of innovative Pedagogical Models, such as ATS2020, requires articulated, flexible and customisable technological environments, where the e-portfolio is an essential resource, but it is not the only one.

LIST OF APPENDICES

Appendix I. Lessons/learning cycles designed and implemented in the CPI O Cruce in the context of the core subject First foreign language: English of the 2nd year of Compulsory Secondary Education.

Appendix II. Lessons/learning cycles designed and implemented at the IES Rosalía de Castro in the context of the core subject Spanish Language and Literature of the 1st year of Compulsory Secondary Education.

Appendix III. Classroom observation protocol.

Appendix IV. Teacher interview protocol.

Appendix V. Student interview protocol.

Appendix VI. Rubric of evaluation of the artefacts created by students.

Appendix VII. List of codes for the identification and segments cited from the interviews performed, transcribed and analysed for the location and identification of the segments cited in the report.

Appendix VIII. List of categories and codes defined for the interview analysis.

Appendix IX. Examples of analysed artefacts of the students observed in the case studies.

Appendix X. List of codes for the observations made for the identification of the observations cited in the report. (Monitoring Case Study).

Appendix XI. Contextualisation-description of the Spanish Education System.

Appendix XII. Transversal competences analysed in each case and learning cycle

APPENDIXS