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UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

FASTWEB

BENESSERE DIGITALE

"The "Digital Well-being" project is the product of research work carried out by a research group in the department of Sociology and Social Research at the University of Milano–Bicocca. The project was developed and completed thanks to being selected in the "Innovation Project Grant" tender held by the University. This is another way in which Bicocca aims to promote the importance of the research work carried out within the University, and to transform it into added value for the local area.

In the case of "Digital Well-being", the funding obtained by Bicocca was matched by Fastweb, a partner that has been working with the University on digital competence for some years now.

We should highlight the fact that this project has resulted in cooperation between the University and many schools in the area, and that this productive relationship has contributed both to the development of training content and to the organisation of the trial illustrated by this report.

We are happy to be able to present the key results of this project first and foremost to such schools."

Danilo Porro
Pro-rector for the Exploitation of Research Results and Technology Transfer,
University of Milan-Bicocca

"Ever since its inception, Fastweb has invested in the digitalisation of Italy: not only in the installation of the latest-generation network infrastructure, but also in promoting internet use and digital skills. Fastweb is in fact convinced that digitalisation can act as a driver for growth in Italy.

In order to prepare for the digital future of young people and for business, Fastweb has launched a programme of initiatives, including the Fastweb Digital Academy − the new school for the digital professions set up in conjunction with the Cariplo Factory, and Digital IQ − the test developed with the support of the Sociology and Social Research Department of the University of Milan-Bicocca (www.digitaliq.it).

Fastweb hopes that by taking part in the "Digital Well-being" project, it can support media education in high schools. The training involves teachers and aims to make students proactively aware of the potential of digital media, and not passive users of technology."

Anna Lo Iacono
Head of Corporate Social Responsibility,
Fastweb SpA

HIGHLIGHTS

The "Digital Well-being - Schools" project carried out the **first randomised trial in Italy on the efficacy of media education**. The impact of a systematic media education course was tested in a sample of randomly selected classes, compared with a control sample.

How the Project Started

The Italian Education Ministry's Curriculum Guidelines identify digital competence as one of the learning goals for all Italian schools, but **there is no standard** for developing or accurately assessing it.
A team of sociologists, pedagogy researchers and evaluation experts at the University of Milan-Bicocca, working together in the **"Digital Well-being" Research Centre** (www.benesseredigitale.eu), won the "Innovation Project Grant" tender launched by the University of **Milan-Bicocca**. This allowed them to access funding, which was then matched by **Fastweb S.p.A**.
The philosophy behind the project was **to move beyond the concept of short training sessions** provided by external experts, and instead to offer teachers themselves the skills to work together with their students on the most critical areas of digital life. In this respect schools can become a training ground for developing a conscious relationship with new media and for **"digital wellbeing"** (Gui et al. 2017) **in every aspect of daily life**.

Development of the Training Course

During the 2016-17 academic year, the research team, together with a steering group made up of independent Italian experts and teachers from five high schools, developed a training course for **first and second-year teachers** to be delivered as blended learning (a mix of in-person and online training). The training course comprises **four modules**:

- Time and Attention Management
- Communication and Collaboration
- Information Research and Evaluation
- Digital Content Creation and Publication

The modules cover the main areas of the European Digital Competence Framework for Citizens **DigComp 2.1** (Carretero *et al.* 2017). After each training module, the course requires the teachers involved to carry out a **media awareness experience** in the classroom lasting around three hours. At the end of each of these, the class is invited to work together to select a **good digital habit**, which each of them commits to keeping to from then onwards both inside and outside of school. In the first module the students in the treatment classes were invited to download an **app onto their smartphone** (RescueTime) to monitor the quantity and quality of their time using digital media. In the second module they worked together on putting together **class netiquette** for the online groups. In the third they identified the key criteria for **assessing information** on the internet. Finally, in the fourth module they produced a **"meme"** by carrying out a conscious analysis of the audience and communication registers.
The project also **involved the families** of students, with an introductory video and awareness-raising evening meetings to instigate a dialogue between students and their parents on their everyday smartphone usage.

The Controlled Trial

The efficacy of the training exercise was tested in a **randomised controlled trial** during the 2017-2018 academic year in the second year (15-16 year-olds) of **18 high schools** in the north of Milan and the Brianza area. The classes were randomly divided into two groups: treatment classes and control classes, and the training course was then given to teachers of

the treatment group only. In total, **3,659 students** in **171 classes** were involved.
The students in all classes – the treatment classes and the control classes – were given **two assessments**: one before (November 2017), and one after the training (May 2018). The progress of the classes during the year was compared on the basis of three types of indicators: media usage habits, digital competence, and subjective well-being. The impact of the exercise on these indicators was then evaluated using **statistical counterfactual analysis techniques**.
As a specific indicator of **digital competence**, the Bicocca team developed a **test** based on the knowhow derived from a previous project (**www.digitaliq.it**), on which Bicocca and Fastweb had worked together. The test comprises multiple choice questions set in the context of **realistic situations on the internet**. It has been validated using psychometric techniques and is a tool for measuring awareness and competence in the use of digital technologies (see Box 2). The teachers' **participation** in the training programme was constant and the numbers high: **97% of the classes** that took part completed all of the activities included in each of the four training modules. The post-exercise questionnaires show a **high level of appreciation of the training**, which received positive feedback from more than 90% of participants.

The Results

The questionnaires filled in by students before the exercise highlight the **pervasive use** of digital media in their daily lives. Over 25% of respondents stated that they often use their smartphone at night, while **35%** of them start using it **as soon as they wake up**. Fifty percent said they use them frequently while doing their homework, and 60% use them while involved in other leisure activities (such as watching a film). These percentages are significant, especially when considering the negative link that emerges from literature between the pervasive use of smartphones and students' academic performance (see Gui and Gerosa 2018; Wentworth and Middleton 2016; Xu 2015).
In addition to a frequent use of smartphones at sensitive times, students also showed a significant level of **distress from the smartphone usage**. Application of the internationally recognised *Smartphone Addiction Scale* (SAS-A; Kwon *et al.* 2013) shows that, in the sample, an estimated **29% of subjects** could be classified as being at **risk of problematic smartphone use**.
Female students appear to be more affected by excessive smartphone use than male students. They use them more pervasively at important times of the day, and at the same time a greater number of them appear to be at risk of problematic use (32%). These results confirm previous studies in literature on the relationship between gender and digital media (see Van Deursen *et al.* 2015; Kwon *et al.* 2013).
Moving onto the test of digital competence, at the start of the year the students responded correctly to **62.5% of the questions included** (20 out of 32). This percentage becomes 66.1% in "lycée" schools, 61.4% in technical schools and 50.3% in professional schools. As far as the individual characteristics of students are concerned, there is a small gap between male (62.3%) and female students (61.8%). Furthermore, of students from families with less educated parents (with a middle-school diploma at most) 59.1% completed the test correctly, compared with 63.7% of those with graduate parents.
The area of the test in which students performed **worst** is ***Information & Literacy***, with an average of 52.2% correct answers. In *Creation* and *Safety,* performances rose respectively to 61.3% and 63.9%, while the area with the highest scores was in *Communication* (72.9%). Students therefore

appear to be less knowledgeable about the process of selecting and validating information and more **at ease with communication** using chats and social media. **How did this picture change after the project?** In comparison with the control classes, students in the treatment classes **significantly improved** in the three areas considered to be indicators of the impact of the trial.

- As far as **smartphone usage habits are concerned**, there was a significant fall in the pervasiveness of the devices in everyday life. In second place, there was a reduction in the risk of problematic use of such devices. This applied particularly to female students, and the project saw a 4.1% fall in problematic use of the devices by girls in the treatment group compared with the control group.
- In the **digital competence test**, treatment group students improved their performance by answering 21.4 questions correctly (+0.4% compared with the control groups), although this increase is not statistically significant. If the areas are examined separately, however, there is a **significant increase** in the ***Information & Literacy*** area (+2.0% compared with the control groups), which was initially the area with the lowest performance. Moreover, for the sub-sample of **female students**, all of the **increases are significant**: in the general test correct answers by female students in the treatment groups rose from 19.7 to 21.5, with a significant increase compared with the control groups.
- Finally, the positive effects of the trial were also seen on some components of **students' personal satisfaction**, in particular in the quality of family relationships and their physical appearance: satisfaction with their relationships with their parents rose by 1.7% compared with the control groups (probably thanks to the effort to involve families), while satisfaction with their physical appearance increased by 1.5% (particularly for girls, and probably thanks also to the discussion about digital identity - module 2).

In summary, the results show that: (1) there is an **urgency in education**, particularly in the areas of **smartphone overuse** and the search for and **evaluation of information** online; (2) the training course developed in the **Digital Well-being – Schools project produces** some significant **improvements** in the more critical areas; (3) **female students** are more affected than male students by digital over-consumption, and also appear to be **more ready to take on suggestions** for improvement; (4) the media education offered by this training course also has **indirect repercussions on subjective wellbeing**.

Future Developments

The research team plans to continue its work in this area. In the 2018-19 academic year, the Research Centre will guarantee a **new training course for all 18 schools,** so the teachers and classes not in the treatment groups can also receive the training. New qualitative data will be collected from this course, in particular to understand how **to increase the impact** of the project **on male students**. In addition, the research will continue with more sophisticated analyses: **adding the INVALSI (the Italian Institute for Education and Training Evaluation) data** from the treatment classes and updating the digital competence test. The **videos** and other materials created during the project are **available to all** on the website **www.benesseredigitale.eu.** The research team will present the final project results at the MIUR in order **to propose this method** as a standard for developing digital awareness **in Italian schools**.

INTRODUCTION

Marco Gui (Project Coordinator)

The “Digital Well-being - Schools” project was created with the aim of building and testing the efficacy of a comprehensive media education training course for Italian schools. In 2016 the project won the Bicocca University “Innovation Project Grant” tender and was subsequently co-funded by Fastweb S.p.A.

Developing a conscious use of digital media is currently a goal of growing importance for Italian schools. The National Curriculum guidelines for lower secondary schools suggest that students should leave with good digital competence and have awareness about how to use communication technology. The National Guidelines for Lycée Curricula and the Guidelines for Technical and Professional schools encourage the development of a structured body of digital knowledge and skills both to support students’ studies and to develop their citizenship in a digitalised society. The National Teacher Training Plan for 2016-2019 identifies reinforcing teacher training in digital competence and new learning contexts as one of its main priorities. Furthermore, research carried out in Italian high schools shows that teachers’ main concerns surrounding their students’ use of digital media focus on excessive internet and videogame use, the improper use of social networks and the accuracy of content evaluation (Giusti *et al.* 2015; Gui and Micheli, 2017). These problems are not commonly discussed in schools and are also not tackled by investment in the “educational use of technology”. Here it is not in fact a question of using technology to develop skills or knowledge within a given discipline, but of developing a more conscious use of media where technology is used: inside and, above all, outside of school.

To tackle the urgent nature of these problems and the lack of structured responses, schools have equipped themselves in a variety of ways: by calling on external experts, asking for help from institutions (such as the Postal Service inspectors) and associations, and taking action in accordance with internal regulations and common sense. Such efforts have undoubtedly responded to the most immediate needs, but not to the need for a structural, sustainable project integrated into everyday teaching in order to develop media education. Furthermore, standalone projects do not tackle the problem in a long-term perspective. Particularly since smartphones have become so ubiquitous, the daily use of digital media has become increasingly linked to people’s quality of life and subjective wellbeing, regardless of individual contingent problems. The Italian Ministry of Education’s publication of its “Digital Citizenship Education Syllabus” in 2017 was an initial attempt to provide a comprehensive response. The initiative emphasised that it is imperative to develop critical thinking and a sense of responsibility in students’ use of digital media, in order to maximise the technology’s potential and minimise its side effects. So far, the Syllabus has gathered a collection of granular materials provided by various research centres in Italy, although these do not have the structure of a curriculum, and have not been tested for efficacy. With this framework of needs as a starting point, the “Digital Well-being – Schools” project aimed to create, validate and disseminate a training course of media education embedded into the lesson time of the teachers of the various subjects. The project does not call upon external experts, but is based on training teachers and on their direct, daily involvement in media education. This is not an additional “education” proposal to add to the many already on offer in schools. Instead, the aim is

to provide a foundation of knowledge and competences underlying the teachers' work, their approach to the subjects taught and their relationship with the students, and to increase their ability to discuss the critical issues of digital technology with them. This is also not a project that aims to increase or improve the quality of technology use in teaching, but an initiative to foster a conscious and responsible use of digital media.

The overall philosophy of the project is, therefore, on the one hand to move beyond the concept of standalone action, and on the other to approach education in a conscious use of media as a resource for students' "digital wellbeing".

This aim is pursued by creating and providing a teacher training course. The course offers: 1) a systematic programme of teaching modules; 2) materials to develop teaching activities available on an e-learning platform; 3) tools for measuring the level of students' digital competence and awareness.

In line with the European DigComp 2.1 framework, we focus on the evaluation of the accuracy of information, responsible management of online relationships, digital content creation and online safety, problem solving and, last but not least, what we call *digital well-being*, the ability to maintain "subjective well-being […] in an environment characterized by digital communication overabundance" (Gui et al., 2017).

In the course of the 2016-17 academic year, the Bicocca working party and a group representing teachers, head teachers and experts in media education in Italy put together the training course. The course was then tested in 18 high schools in the north of Milan and the Brianza area in the 2017-18 academic year. In line with EU impact analysis recommendations, the research group tested its validity using a "randomized controlled trial": a sample of tested classes (treatment classes) was monitored and compared with a sample of untested classes (control classes).

Two surveys were carried out, one at the beginning and one at the end of the trial year. The assessments covered both the treatment and the control classes, and measured various parameters: the habits, attitudes, digital competence and personal wellbeing of the students. The research team developed a digital competence test specifically for high school students based on prior experience of developing a test for adults in conjunction with Fastweb ("Digital IQ" www.digitaliq.it). As Chapter 3 shows, the test is the first tool in Italy for the statistically rigorous measurement of the competences identified in the European DigComp 2.1 framework.

The feedback from teachers and students in the trial sample was extremely positive. Analysis of the data collected shows the training had a significant impact both on the level of digital competence and on indicators relating to moderation in everyday use of smartphones and other technologies, as well as on some areas of overall life satisfaction (see the chapter on "Results").

This report describes the training course developed in this project, the methodology with which it was tested and the results of the trial. In the conclusions, the perspectives of this action-research field are discussed.

2. THE TRAINING COURSE

Andrea Garavaglia (Training Area Scientific Supervisor)
Livia Petti (Training Area Design and Development)

"Digital Well-being - Schools" is a teacher training project for high schools. The training course has been developed to propose classroom media education activities with students and is the result of a year (2016-17) of combined work by an interdepartmental team from the University of Milan-Bicocca (Andrea Garavaglia and Livia Petti from the Department of Human Sciences for Training, and Marco Gui and Marco Fasoli from the Department of Sociology and Social Research), teachers from five high schools and a steering group comprising experts from all over Italy (Antonio Fini, Maria Ranieri, Gabriella Taddeo, Gianluca Argentin, Alberto Pellai and Simone Giusti).

The training course aims to introduce teachers taking part to the main issues in digital citizenship, and the use of new media by students, and proposes "media awareness experiences" for use in class. In order to make the project sustainable and to ensure cooperation between teachers, the training was provided to two teachers in each treatment class, who were selected by the class council [comprising two parent-elected representatives, two student representatives and two teachers]. It was designed to be provided in a blended-learning format, using a dedicated online learning environment.

The training comprises four training modules, based on the main topics in the European DigComp 2.1 (*Digital Competence Framework for Citizens*), developed by the Joint Research Centre (JRC) and the European Commission (Carretero *et al.* 2017) and designed to offer Member-States a tool for identifying the main areas of digital competence and planning (Carretero *et al.* 2017), and designed to offer Member-States a tool for identifying the main areas of digital competence, and for planning education and training initiatives to develop with their citizens.

Table 2.1 – The Training Course Modules and Topics

Module	Topics	Reference to DigComp 2.1 Framework
Time and Attention Management	Awareness of time spent using digital devices (videogames, social networks, smartphones, etc.)	Safety + Problem solving
Communication and Collaboration	Simulation and management of social network conflicts, digital identity, online reputation and online collaboration	Communication and Collaboration + Problem solving
Information Research and Evaluation	Search for information, validity of sources, knowledge management	Information and Data Literacy + Problem solving
Creation of Digital Content	Content production and sharing, authorship and copyright	Digital Content Creation + Problem solving

The training structure also reflects the content of DigiComp 2.1, with some specific critical areas. These include time and attention management, included as a sub-area of competence in the framework (*Digital Well-being*, under *Safety*), which was considered a significant issue and forms the subject of the entire first module. This choice was made to respond to the emergence of the problem of

massive device usage, which is particularly important in this age group.
The four modules and topics were structured as shown in Table 2.1 below, again based on the architecture of the European Digital Competence Framework for Citizens, DigComp 2.1.
Each module is divided into a theoretical part and a practical part, and contains precise instructions about the classroom activities (in the form of a lesson plan) and about the specific media awareness to develop. At the end of each module, the teachers and students are invited to share a good habit to incorporate into their everyday classroom life.

Teacher Training Format

The teacher training format includes the following steps in each module.
1) Online preparatory work. Individual study time using video and other self-training resources, with insights highlighting the specific basic competence or knowledge (estimated time: 45 minutes – max. 1 hour)
2) In-person training. Revision of the basic elements, followed by an explanation of a typical work to carry out with students (lesson plan proposal including tools and materials) - (estimated time: 3 classroom hours).
3) Further online work. Self-training on materials to use to plan the work in the classroom (voluntary – needs-based – estimated time: max. 3 hours).
4) Online classwork planning. The proposed work may be tailored to individual needs and experts are available on demand (using Skype or a forum) (estimated time: 2 hours).
5) Application of the "Media Awareness Experience" in class. Implementation of the suggested classroom activities for the module, including an initial introduction to present and draw attention to the topic, group activities and a final debriefing (estimated time: 3 classroom hours for students).
6) Introduction of the habit. At the end of the work, the final outcome involves the class introducing a good habit linked to what they have learned in the module, which they must keep to from then onwards (at all times or at certain times, to be decided with the students) when in class. The introduction of a habit is a feature of this project, and serves to complete and reinforce the long-term efficacy of the teaching. Like the development of any competence or skill, the experience of media awareness must be able to last beyond the three hours of classroom activities in order to have a significant effect. This is why promoting a habit is crucial, especially in view of the limited number of classroom work hours.
*7) Project self-assessment***.** A post-work teacher questionnaire, containing notes and suggestions relating to the outcomes and observation of the process.

The Training Course Modules

The following is a brief description of the training modules, with a specific focus on the experiences of media awareness and habits proposed. The aim is to provide a comprehensive explanation of the structured teaching programme.

Module 1 – Time and Attention Management (developed by Prof. Marco Gui) The module aims to develop awareness of students' use of smartphones and apps (games, social networks, WhatsApp, etc.), by analysing and drawing conclusions about media consumption. Teachers suggested the following classroom activity. Students were invited to download the RescueTime app (or similar tools), which records all activities carried out using devices in detail, and produces a personal and private report. One week after registration, based on this quantitative data, students were invited to prepare an "Attention Management Plan" with a series of goals for improving their relationship

with their smartphone, which were then discussed in class.
The habit involved constant reference to the Attention Management Plan during the year, promoting forms of self-regulation among students in their use of media devices, and greater autonomy and awareness in the choice of whether or not to use devices and applications and various times of the day (e.g. at school, at home, while doing their homework, during meals, and so on.
Naturally, activities of this type require teachers and students to work together on creating rules, aided by discussions about the use of digital devices, both in the school environment and outside school with family and friends (see Box 1 for more details).

Module 2 – Communication and Collaboration (developed by Dr. Livia Petti)

This module looked at the management of online relationships and conflicts, with the focus on communication using mobile instant messaging (MIM) applications. It involved working together to create netiquette for the online class group. In class, the activity proposed began by analysing extracts from real-life chats taken from WhatsApp groups, to get students thinking about the problems that can result from communication not based on good etiquette, and to propose alternative methods of communication to deal with unpleasant situations. After the analysis stage came the production stage. Students discussed the importance of establishing shared rules in online communication and were invited to create a netiquette for their online class group. The rules were written with the focus on a number of topics: conflict, listening to each other, respect for individual identities and respect for our own and other people's time.
The teacher carried out the debrief, and helped students produce their definitive class netiquette, which was hung up in the classroom as a poster.
The habit adopted in this module was application of the netiquette in online interaction between members of the class (in the class WhatsApp group), encouraging ongoing assessment and improvement in communication behaviour.

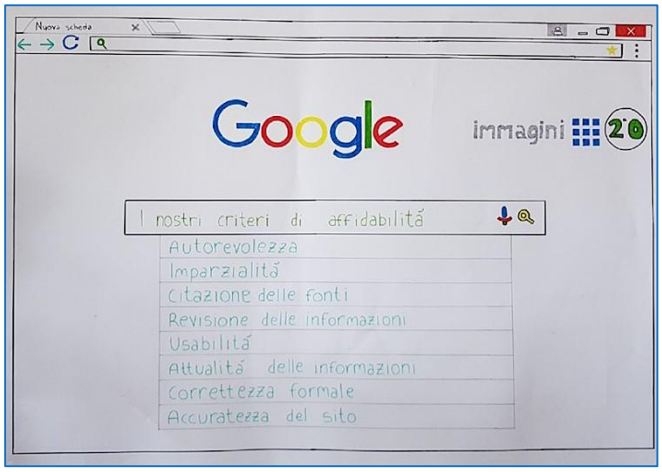
Figure 2.1 – One of the posters produced as the basis for the habit in Module 2

Module 3 – Information Research and Evaluation (developed by Dr. Marco Fasoli)

Module 3 covered the topic of searching for information using specific techniques, checking

the validity of sources and knowledge management. The activity used the students' familiarity with well-known search techniques (using Boolean Operators, changing advanced settings, etc.) as a starting point to establish common ground. An online search on a specific topic was then proposed to the class, which was divided into groups and asked to rank the results in order of reliability. During the debrief, the teacher highlighted the selection and validation criteria found by the groups and asked students to explain how they used them. The collected selection and validation criteria made up the definitive guide for the class, which was put together in the form of a poster and hung up in the classroom.

Figure 2.2 – One of the guides produced by the students for Module 3.



The habit consisted of using the guide to evaluate the type and reliability of information when carrying out online research.

Module 4 – Creation of Digital Content (developed by Prof. Andrea Garavaglia)

This module concerned online authorship, specifically responsible online content production and publication and content promotion and sharing, looking at the goals, the target and copyright issues.

The classroom activity began with an analysis of content disseminated online in recent years using a grid provided by the teacher, which was used to analyse the meaning of the communication and the levels of responsibility. This was followed by an interim debriefing session. The notes that came out of this were used to create a simple checklist to use as reference for designing digital products responsibly.

Figure 2.3 – One of the checklists produced by students from the classes involved for Module 4.

Ho ben chiaro *cosa* voglio comunicare?
Ho ben chiaro *a chi* voglio comunicare il mio messaggio?
Ho usato il *linguaggio adatto* a chi leggerà il mio messaggio?
La mia comunicazione è *chiara*? Non sarò frainteso?
Riuscirò ad essere *interessante*? A catturare l'attenzione?
Potrei *offendere* qualcuno?
Mi piace ciò che ho creato? Mi fermerei a leggerlo se lo vedessi mentre navigo in rete?
Il testo è *troppo lungo* o troppo sintetico?
Si capisce subito di cosa parlo o devo prima leggere buona parte del testo?
Suscita le emozioni che volevo comunicare? *Diverte?* · *Fa riflettere?* · *Crea indignazione?*....
Esteticamente è *piacevole*?
E' *originale*? Non è banale?
Ho usato immagini o frasi riproducibili *senza infrangere il copyright?*
Sono sicuro che *non mi pentirò/vergognerò* di quello che sto per pubblicare? Neanche tra qualche anno?

In the second part of the module the class was divided into groups, each of which was asked to create a simple product for publication online, using the checklist (for example, a photo with text to promote a positive attitude or an event).
The checklist was shared with the rest of the class (e.g. in cloud storage or on a poster), in order to promote the habit of consistently using the checklist every time there is an opportunity to create digital content.

BOX 1 – Time and Attention Management (Module 1)

Marco Fasoli (responsible for operational training 2018-19)

The "permanent communication overabundance" (Johnson 2012; Gui 2014) to which we have become used has been accompanied by problems in managing new technologies. In recent years, many users have started to complain about spending more time using their smartphones and devices than they would like. The data we collected from the two surveys confirm this general trend. In one section of the questionnaire the students had to give a score of between 1 and 6 on to what extent they agreed with a number of statements about their relationship with devices. In the first survey, 24% of students said they "quite agreed" with the statement "I try to spend less time on my smartphone/PC/tablet but I don't manage to", while almost 20% said they "very much" or "totally" agreed with it. Sometimes technology overuse can be detrimental to other activities that we ourselves feel are more important. Module 1 tackles this and other issues relating to the relationship between technology and well-being. The aim is to help students identify the cognitive strategies and technological solutions that can limit overuse of their devices.

Figure B1.1 – iOS and RescueTime (Android) screenshots monitoring time spent on smartphone usage

In order to to do this, this module introduces the use of an app to monitor usage time (Rescue Time for Android), a function that is now also a default feature in iOS and will soon be incorporated into new Android versions. From a cognitive point of view, having an objective overview of time spent online makes it easier to change our behaviour and to bring it back into line with the way we would like it to be, making it easier for us to realise when our device use is becoming excessive. In technical terms, this type of solution is called a "nudge" (Thaler

and Sunstein 2009; Viale 2018), and has been shown to be very effective in various behavioural and decision-making contexts.
In addition to this tool, module 1 aims to strike up a group discussion about the best solutions for limiting smartphone usage in more sensitive social and learning contexts, such as meal-times, night-time, and when doing homework. Finally, the production of a poster summarising the strategies for conscious digital media consumption that students have themselves identified has a cognitive and self-educating function, as the poster is always visible in the classroom as a clear reminder.

3. STRUCTURE OF THE TRIAL

Tiziano Gerosa (responsible for impact assessment)

In line with the latest European recommendations on the assessment of education policies (Council Recommendation 2018/C 189/01), the effects of the Digital Wellbeing training course have been evaluated using a Clustered Randomised Controlled Trial, or CRCT, which clustered the participants at the class level.

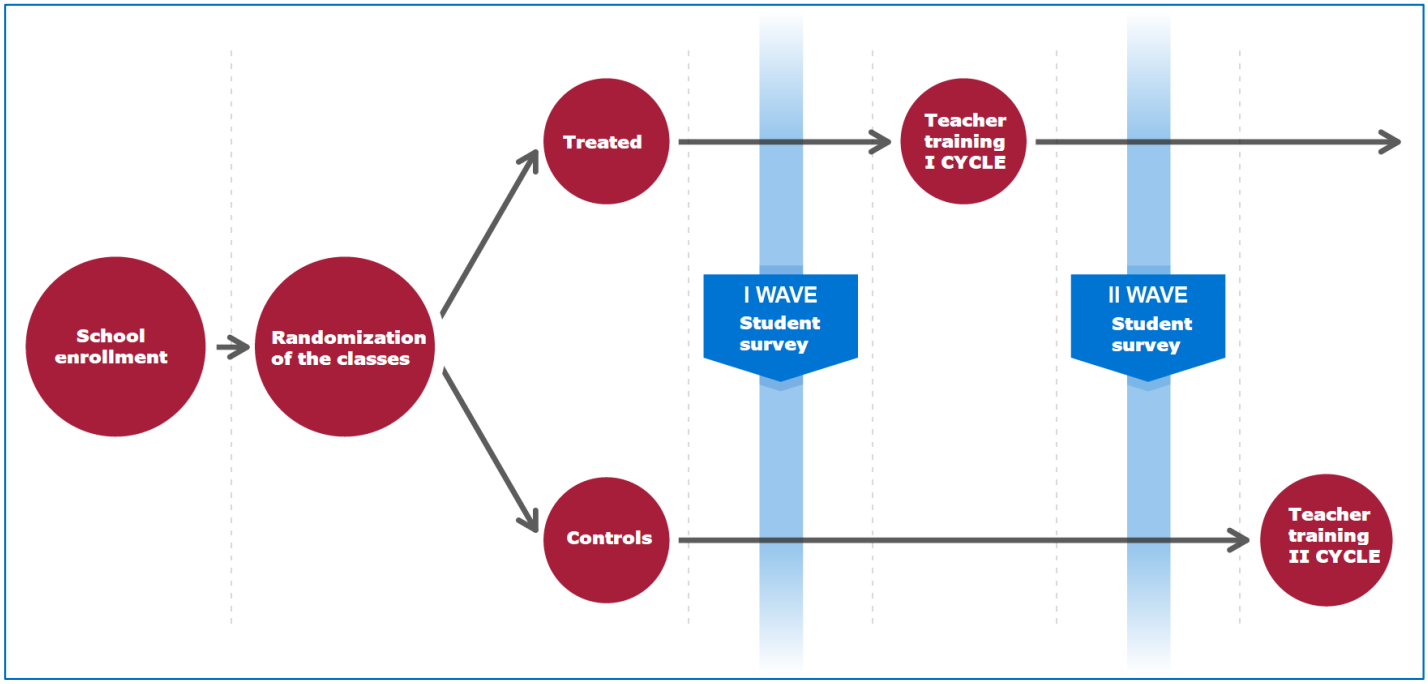
In order to meet the requirements of this counterfactual methodological approach and, at the same time, to ensure that the training was accessible to all teachers, the project was divided into two separate training sessions. In practical terms, 10th grade classes of all the participating schools were randomly divided into a treatment group and a control group. The class council of each of the treated classes was then asked to independently and collectively choose the participants of the first trial training session (academic year 2017-2018), while the teachers in the control group were asked to wait until the following year to take part in the project (academic year 2018-2019).

Thanks to this random turn-taking, it was possible to evaluate the efficacy of the project with a rigorous counterfactual approach without excluding any of the control group teachers from the treatment. The following description outlines the main stages of the research carried out in the project, which are summarised in fig. 3.1.

Enrolling the Schools

The invitation to take part in the Digital Well-being project was extended to all high schools in districts 23, 27 and 28 of the provinces of

Figure 3.1 – The Research Phases of the Digital Well-being Project



Milan and Monza-Brianza, offering each school the same opportunities to be involved.
A total of 42 schools were contacted, using a three-stage enrolment procedure designed to ensure the school principal and teachers were all properly informed about the project structure, content, aims and requirements.
The first expressions of interest from school principals were received by phone in March and April 2017, after they had been sent a presentation document with details about the project organisers, ultimate recipients, aims and information about how to apply.
In the following months, the research group organized meetings in all the schools in order to discuss the opportunities offered by the project with the school principal and the teaching staff.
Finally, in June 2017 school principals were asked to fill in and countersign a "training contract" setting their seal on a mutual cooperation agreement between the school and the research group.
At the end of the recruitment period, 18 out of 42 schools signed the training agreement, with a total participation rate of 43%. Each of the involved schools was asked to appoint a project leader, whose duty was to facilitate communication between the research group and the teachers, as well as to support the researchers in organising the training activities and handing out and collecting the student questionnaires.

Randomisation process

In July and August 2017 all the schools were asked to provide the research group with their study programmes and the complete list of their classes for the 2017-2018 academic year. This information was then used to plan a randomisation of the classes, in order to ensure an equal distribution of treatment and control units in the various courses of study (COS) introduced by the secondary school reform (Presidential Decrees 87, 88 and 89 of 2010). Overall the schools taking part in the project had 171 classes at grade 10, which were divided by COS into five macro-groups:

- Science Lycée;
- Other Lycée (Classics, Art, Languages, Human Sciences);
- Economics Technical School;
- Technology Technical School;
- Vocational School (Services, Industry and Crafts).

Of the 18 schools involved, four 4 had a single COS, while the remainder offered a variety of COS. In order to ensure the direct involvement of all the schools in the first year of intervention, and, at the same time, to ensure an equal distribution of the 10th grade classes from each of the above mentioned COS between treated and control groups, it was decided to use a block randomisation method based on blocks of classes defined by COS within each of the participant schools. Using this method, 31 intra-school randomisation blocks were identified, together with two inter-school blocks covering COS that counted only one class within a specific school.
The classes belonging to the 33 blocks were then randomly assigned to the treatment and the control groups in the following proportions: one treatment class was drawn if the block contained six or less classes; and two treatment classes were drawn if the block contained seven or more classes. A total of 41 treatment classes were selected, divided among the macro-programmes as shown in table 3.1.
Between September and October 2017, the research group visited the participant schools to present the project, inform them about the outcome of the randomisation process and describe how the teachers would take part in the training.

Table 3.1 – Classes Involved in the Trial by Course of study and Treatment Group

Course of study	Treatment	Control	*Total*
Science Lycée	8	26	34
Other Lycée	12	39	51
Economics Technical School	6	21	27
Technology Technical School	8	25	33
Professional School	7	19	26
Total	41	130	171

For each of the treated classes, the class councils were invited to freely choose a maximum of two teachers to be involved in the training. It was suggested to choose them from among Italian language teachers and those already involved in digital innovation projects, and it was requested that the sum of the total hours per week spent by the selected teachers on the individual classes would be equal or greater than 7.

Pre- and Post-intervention data collection

The first wave of data collection was carried out on students of all the 10th grade classes in November 2017, before the training began, and without them knowing whether they had been added to the treatment or the control group. The second wave of data collection was carried out in May 2018, after the Digital Well-being training activities had been completed. In both cases, the data were collected in the multimedia laboratories of the schools through a CAWI method (Computer Assisted Web Interviewing), during the school day and under the supervision of external observers appointed and trained by the research group.

In each wave students were asked to complete:

- A digital competence test;
- A student questionnaire focussed on the collection of their attitudes, behaviours and background variables.

The total time required to respond to the test and fill in the questionnaire was set at two hours, including the time needed to move the classes into the multimedia laboratories where the survey took place.

The digital competence test comprises 32 multiple-choice questions with four response modes to choose from, and aims to measure the participants' level of knowledge and skills in four areas: *Information & Literacy, Communication, Creation and Safety* (see "Box 2 – The Fastweb-Bicocca Digital Competence Test"). The maximum time for completing the test was set at 40 minutes. In the questionnaire students answered questions about their ICT usage habits, attitudes toward new media, everyday experience at school and in their leisure time, and their perceived level of personal and relational well-being. The questions were structured in several batteries of items (in part taken from previous literature and in part developed *ex novo* by the research group), to which there were four to six possible responses depending on the topic and the existing measurement indications for the constructs being analysed. The only exception was represented by the measure of personal and relational well-being, defined by single-item questions with ten possible answers.

In the introduction to the questionnaire, students were asked to answer the individual questions by freely choosing the options they felt were most appropriate. It was explained to them that there are no right or wrong answers and that their work would not be judged in any way. The maximum time to complete the questionnaire was set at 50 minutes, and all the data collected was processed to protect respondents' anonymity, in full compliance with

personal data protection laws (Decree-law 196/2003). Overall, the information obtained from the questionnaire enabled the research group to identify two main sets of dependent variables (pervasiveness and risk of problematic use; personal and relational well-being) which, together with the digital competence test, were used in the project impact evaluation.

Pervasiveness and problematic use of smartphones. Two previously validated scales were used to quantify the level of smartphone pervasiveness in students' everyday lives and their risk of problematic use: the *Smartphone Pervasiveness Scale (SPS-A)* and the *Smartphone Addiction Scale (SAS-A)*. The first was taken from a previous study of Italian high school students (Gerosa and Gui 2018), and measures the frequency of smartphone use in relevant moments of the day. The resulting index summarises the interviewees' perceptions of their smartphone use at dinner with family, while they spend time with friends, while doing their homework, at night, in the morning when they wake up, and while they are watching a movie or a tv programme. The resulting scale works with negative values, so the higher the score, the more pervasive is the smartphone usage habit.

The risk of problematic smartphone use, regardless of its pervasiveness, is measured by the SAS-A scale (Kwon *et al.* 2013). This is an index defined by a set of 10 items mainly taken from previous literature on internet addiction (Lortie and Guitton 2013; Cheever *et al.* 2018). It focuses on the interviewees' perceptions of problems resulting from smartphone use and their effects on everyday life. The resulting score does not therefore indicate the onset of a serious condition of dependency, but simply quantifies the expressions of distress in the use of smartphones that have similar characteristics to those of other internationally recognised addictions (such as gambling).

Despite retaining the same number of questions as in the SAS-A original version, the set of items was revised and adapted to the Italian context and the age range of the participants. Symptoms indicating difficulty managing abstinence from using smartphones were investigated, such as thinking about them at all times of the day, and not being capable of not having their smartphones with them without becoming extremely irritable and agitated. Then the pressure interviewees felt to be online was measured, probing their fears and feelings of isolation when they are not connected to the internet and social networks, and their need to keep tabs on everything happening online and to be always available. Interviewees' perceptions of the negative effects produced by their smartphone use on their everyday lives were also collected (e.g. productivity at school, interpersonal relationships, quality of sleep). As in the measurement of pervasiveness, the resulting scale worked with negative values, so the higher the score, the more severe the problem.

Personal and Relational Well-being. Single-item measures with 10 possible answers were used (1 "not at all satisfied" and 10 "completely satisfied) as self-assessment of the level of satisfaction with important aspects of everyday life, such as students' physical appearance and relationships with family members (Huebner and Gilman 2002).

The dimensionality and factorial validity of the constructs were tested using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), while their internal reliability and measurement invariance between the treatment and control groups were evaluated respectively using Cronbach's Alpha and Multi-Group Mean and Covariance Structure Analysis (MG-MACS).

To facilitate the interpretation of the training effects on the dependent variables of interest, the range of the digital competence test, of its sub-dimensions and of all the indices extracted

from the questionnaire was normalised into values of between 0 and 100.

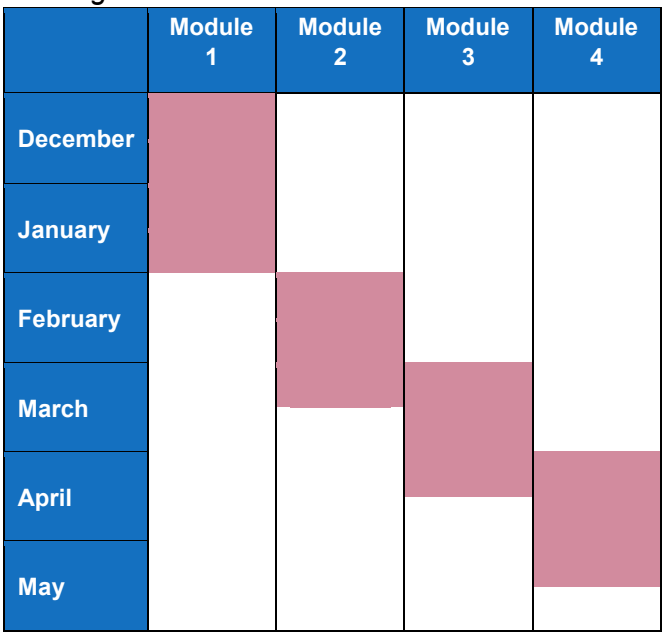
In addition, a relative risk threshold was identified for the problematic smartphone usage index. Using the guidelines offered by previous research (Kwon *et al.* 2013) as a starting-point, a male respondent with a score of 31 and a female respondent with a score of 33 or more were defined "at risk of problematic use". As well as the set of dependent variables used to evaluate the impact of the training, the two waves of data collection made it possible to obtain background information about the students, such as their gender, age, migration status (natives and first or second-generation immigrants) and social background, estimated on the basis of the highest academic qualification achieved by both parents (for more details, see the 2002 Buchmann review). This set of additional information was used to compare the pre-treatment distribution of the digital competence test scores and indices of problematic use of new media, and then to analyse the heterogeneity of the effects of the training on people with different characteristics. The ultimate goal of the analysis was to identify categories of students initially equipped with fewer "digital resources" and who, at the same time, could have benefited more from participation in the Digital Well-being project.

Training delivery

As mentioned in chapter 2, the teachers selected during the councils of the treated classes took part in the training during the 2017-2018 academic year. The others had to wait until the beginning of the following year (2018-2019).

For teachers in the treatment classes, the in-person lessons with media education experts took place at the same time in three training venues strategically selected in the area in which the 18 schools were located. The purpose was to offer all the participants the chance to choose the place easiest for them to reach, and to incentivise participation by those less able to travel.

Figure 3.2 – Project Activity Calendar for the Four Training Modules



The four training modules were provided at variable intervals, every month or every two months, depending on the teachers' workload distribution over the year and on school holidays. The aim was to ensure all participants had the chance to make the most of the time spent on self-training and on planning the supplementary classroom activities. Fig. 3.2 shows, for each of the training modules, the calendar of the lessons and the dates set for the delivery of the materials produced in class. At the end of each module, teachers were also asked to access the online course platform and to fill in a questionnaire. The aim was to collect opinions and comments about the training activities to help identify any weaknesses to address and to improve the quality of future training sessions. In addition, the last teacher questionnaire contained a section for evaluating the overall training programme.

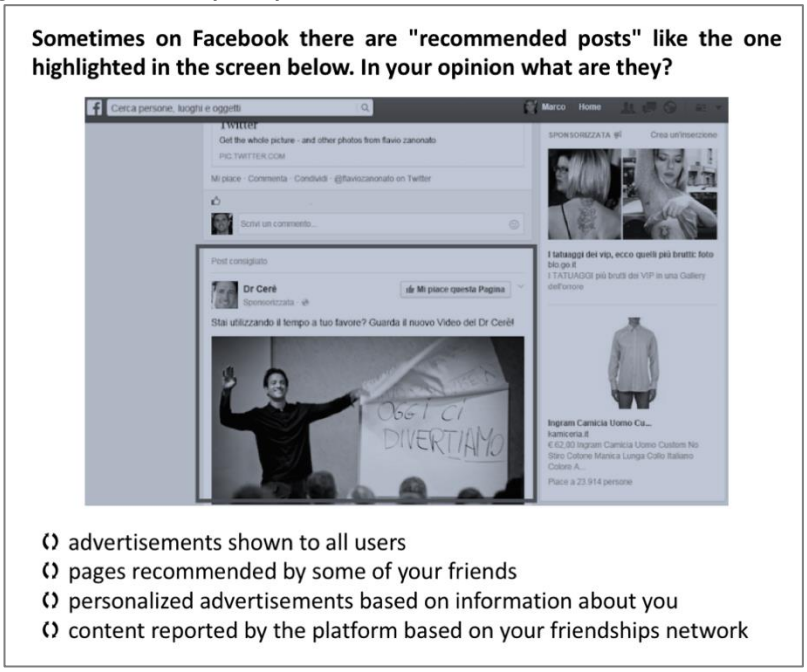
Box 2 – The Fastweb-Bicocca Digital Competence Test

Unlike other tests of digital literacy that aim to measure respondents' technical and operational competences, the Fastweb-Bicocca test focuses on quantifying the level of awareness respondents have in using and producing information, in communicating and in managing their online identity. The test was developed by the Digital Well-Being research group, and was based on the guidelines provided in the European framework DigComp 2.1. The guidelines were reinterpreted in accordance with the specific needs and resources available to the adolescents taking part in the study, which led to the identification of four digital competence content areas:

- *Information & Literacy;*
- *Communication;*
- *Creation;*
- *Safety.*

Information & Literacy aims to measure the competences required for the effective search, selection, assessment, understanding and cataloguing of information available online.
Communication focuses on the competences needed for proper communication, resource sharing and effective management of social relationships in digital environments.
Creation concerns the creation and editing of online content (text, images, videos, etc.).
Safety collects together the competences required for correctly managing communication/information overabundance, protection against possible threats to privacy, keeping devices safe, managing one's online identity, financial security and personal dignity online (cyberbullying and trolls).

Fig. B2.1 – Example question similar to those used in the test



The test structure was devised by a team of experts of the University of Milano - Bicocca based on previous research projects (Gui and Argentin 2011; Pagani *et al.* 2013) and knowhow deriving from the partnership with Fastweb SpA to create the Digital IQ test (**www.digitaliq.it**). The competence assessment methodology involves multiple-choice items based on realistic stimuli typical of the internet (screenshots, situations etc.). Fig. B2.1 shows an example question similar to those actually used.
After an initial qualitative analysis of the validity of the content of the questions, taking into account the degree to which they matched the European framework DigComp 2.0 and their appropriateness to the age range of the project's target population, the test was pre-trialled on 125 10th grade students from the high schools taking part in the Digital Well-Being project (May 2017, the academic year before the trial). Based on the data collected, the items were analysed using the Classical Test Theory (CTT) and Item Response Theory (IRT). The most problematic questions were then revised and reformulated in order to increase the tool's discriminatory power and to ensure that the scores obtained by students appropriately reflected their ability levels.
The final version of the test, comprising 32 items (Table B2.1), was given to students in the first wave of data collection of November 2017, and proved to have good psychometric properties. In order to estimates students' scores, the assumptions of unidimensionality, local independence and invariance of the test between groups of students had to be evaluated (DeMars 2010; Embretson and Reise 2000).

Table B2.1 – Items in the Digital Competence Test by Content and Competence

Content domains	Competence domains		
	Knowledge	*Skills*	*Total*
Information & Literacy	3	5	8
Communcation	5	2	7
Creation	2	4	6
Safety	8	3	11
Totale	18	14	32

The validity of the general construct has been tested using the confirmatory factor analysis technique and the WLSMV estimation method for dichotomous variables (Muthén *et al.* 1997). The results of the analysis confirmed the adequacy of the monofactorial model to the data (RMSEA = 0.021; CFI = 0.939; TLI = 0.935) and the absence of covariances worthy of note between the 32 item residuals.
The construct has proven to have a sufficient degree of internal reliability (coefficient KR-20 = 0.740), and its unidimensionality has been confirmed using a bifactor model defined by a general dimension and, in parallel, by the four dimensions of content areas. The analysis shows that over 76% of the common variance between the items is explained by the general

construct of digital competence, while the four content areas only absorb minority shares (5% to 8%).

Finally, the measurement invariance test was assessed on groups of students divided by type of treatment, gender, migratory status and social origin, using the Multi-Group Mean and Covariance structure analysis (MG-MAC). The Multi-Group analyses confirmed the test had a sufficient degree of invariance for each of the characteristics of the respondents examined.

Given the presence of a minority share of variance explained solely by the constructs inherent to the four content areas, added to the research interest in estimating the impact of the project also on the various areas of digital competence, the analyses of validity, dimensionality, local independence and invariance described above were also carried out on each of the test content areas, and gave equally satisfactory results.

4. THE RESULTS

Tiziano Gerosa (responsible for impact assessment)

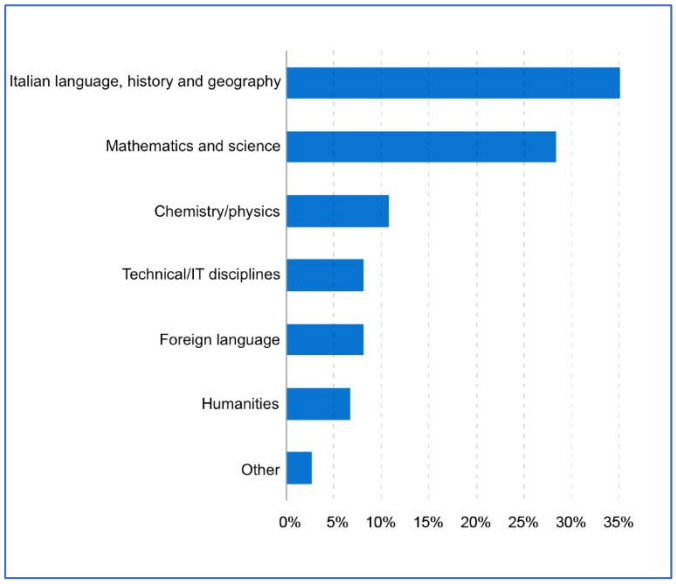
This section of the report presents the main results of the Digital Well-Being project. First, it describes how the training programme was provided in the treated classes, then it goes on to analyse the level of participation and involvement of the teachers as well as their overall views on the training experience. After this, the rest of the section is dedicated to the project's impact evaluation, with an analysis of the effects it had on students' smartphone usage habits and perceptions of problematic use, digital competence and, finally, on personal and relational well-being.

Teachers participation and satisfaction toward the initiative

The first training session was provided between December 2017 and April 2018 in all the treatment classes of the 18 participant schools. A total of 41 classes and 78 teachers were involved. In 37 of the 41 treated classes, two teachers decided to sign up for the training. This choice was strongly encouraged by the research group, in order to avoid the risk of workload management issues and, at the same time, to increase the opportunities for daily interaction between treated teachers and students during the academic year.

Figure 4.1 shows that more than 60% of the participants teach Italian language or Mathematics in the classes under study These subjects have a higher average number of teaching hours per week than others (99 to 165 hours per year depending on the type of school and the programme). The rest of the treated teachers are equally distributed between second languages and sciences subjects, technical subjects, IT and humanities (7% to 11%), while just 3% of the overall sample teach other disciplines.

Figure 4.1 – Distribution of Teachers Trained by Subject



Once teachers had formally confirmed their participation, they were invited to access the project platform, read the training material, take part in the in-person training meetings and carry out the teaching activities with students within the established timeframes.

The entire process of providing the training and carrying out the activities in the treatment classes was monitored by the research group at all times. Teachers' presence at the training meetings was recorded for each of the four modules. In addition, teachers were invited to fill in a questionnaire after each workshop in class summarising the work they had carried out and the material they had produced with the students.

By cross-referencing the information about attendance with the information collected from the questionnaires, it was possible to calculate the number of teachers that successfully received the entire training programme and, at the same time, the level of students' exposure to the training stimuli. Overall, 89% of teachers

carried out all the activities required for each module. In addition, if we consider that 9 out of 10 teachers chose to work in pairs or took turn to organise and produce the workshops with the students, we can conclude that more than 98% of classes were involved in all the project activities. Only one of the treated classes did not complete the entire training programme, although it successfully completed the first two training modules.

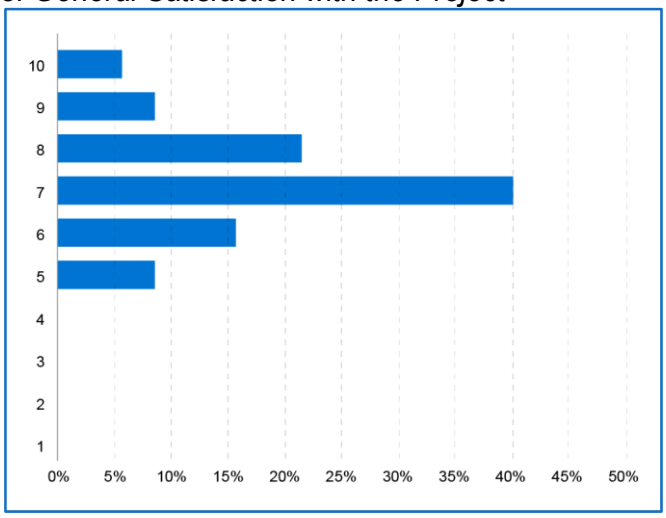
As well calculating attendance rates and checking the activities carried out, the teacher questionnaires were designed to collect detailed information about their experience with the students and their opinions about the adequacy of the training course. As far as implementation of the activities is concerned, approximately three out of four teachers said that the majority of students were interested in and engaged by the topics discussed and the activities carried out. This is undoubtedly an encouraging result, although it highlights the existence of minor situations in which the issues surrounding the conscious use of digital devices and media were less engaging. However, it should be specified that, with the exception of a single class in which the students were not particularly interested in any of the activities carried out in the course of the year, this was a sporadic phenomenon and affected one or maximum two of the training modules.

As regards the teachers' opinions of the training, each of the four modules taught during the year was considered to be essentially satisfactory by more than 90% of participants.

The level of satisfaction expressed with the entire training programme was similar. On a scale of 1 to 10, where 1 means "not at all satisfied" and 10 means "totally satisfied", average teacher scores were 7.2 (SD=1.2).

Figure 4.2 shows the distribution of teachers along the scale, and highlights that only a small number of interviewees, around 8%, gave "a score that was not satisfactory". These were mainly those working in the classes where there was less interest and less participation by students.

Figure 4.2 – Distribution of Teachers on the Scale of General Satisfaction with the Project



In addition to analysing the teachers' overall opinions of the training, the main critical areas they identified during the entire programme were also explored. The most frequent of these focused on: i) the few classroom hours available to complete the activities in each module and ii) the lack of time between each module. On the one hand teachers complained that the work in the classroom often took longer than the three hours allowed per module, both because the discussion was often difficult to keep within the timeframe, and because some activities (especially making the poster) took longer than the time allowed. On the other hand, the trial required the four modules to be contained within a single academic year. This meant the modules had to be back-to-back: the classroom training, classroom activities and feedback provision on the platform were too close together in the teachers' opinion. These are issues to take into account for future training programmes (see the Report Conclusions).

The Impact on Students

The Digital Well-Being project involved two waves of data collection on students from all the 171 classes. At the beginning of the 2017-2018 academic year, a total of 6,659 students were enrolled in these classes. The randomisation process resulted in them being divided into two groups comprising 874 treated students and 2,785 controls (table 4.1).

The first wave of data collection was carried out the month before the teacher training began (November 2017) and achieved a 92% response rate. The missing respondents were mainly due to student absences on the dates of the survey and any rescheduling dates. A smaller number of students did not take part due to serious medical conditions or learning disorders, at the request of the individual schools and/or families.

Table 4.1 – Sample Numbers and Response Rate by Treatment Group

	Treatment Group	Control Group	*Total*
Population	874	2.785	3.659
Pre-intervention	789 (90.3)	2.572 (92.4)	3.361 (91.9)
Post-intervention	773 (88.4)	2.516 (90.3)	3.289 (89.9)
Pre-Post dataset	695 (79.5)	2.302 (82.7)	2.997 (81.9)

The second wave took after completion of the training programme (May 2018) and achieved a total response rate of 90%. The slight drop compared with the first phase (2%) can be attributed in part to students being withdrawn from schools or giving up their course, and in part to the higher number of absences that characterise the end of the academic year. The data collected from both waves was merged using an alphanumerical code assigned to students, which they then provided when filling in both questionnaires. The overall dataset, which collects together the interviewees' opinions before and after the training, contains 2,997 participants, with a response rate of 82% of the total number of students enrolled at the beginning of the year.

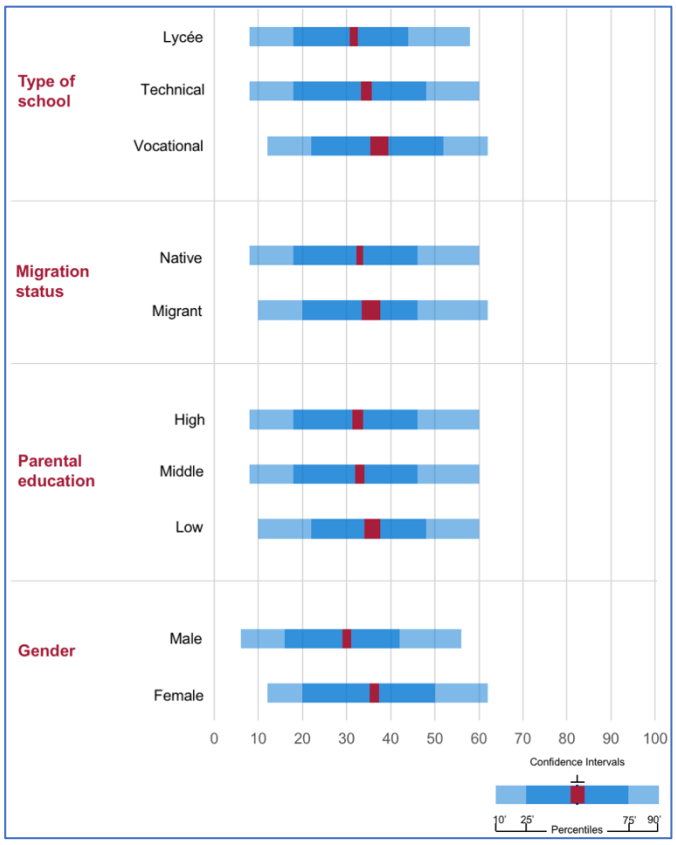
A comparison of the figures for the students in the treated and the control classes shows a slightly higher drop in the former, which reaches 3% in the final phase of construction of the pre-post longitudinal dataset. Despite this, analysis of the balance between treatment and control groups in the sample showed a substantially even distribution of the main socio-demographic characteristics between respondents in the two groups, as well as in the scores they achieved on the outcomes measured in the pre-intervention survey. These results confirm that the two reference groups are statistically similar in all their observable characteristics, confirming the efficacy of the randomisation process and further strengthening the reliability of the impact evaluation described later on in the chapter. The impact evaluation were carried out using Ordinary Least Squares (OLS) regression models with controls for the 33 randomisation blocks and for the dependent variable measured pre-intervention. They also took into account clustered standard errors at the class level.

Pervasiveness in Daily Life and the Risk of Problematic Smartphone Use

At the beginning of the 2017-2018 academic year, a significant number of students in the 18 schools showed clear signals of pervasive smartphone use at specific times of the day. The data extracted from the first pre-intervention survey showed that over 25% of interviewees said they often use their smartphone at night, while 35% of them need to have to handle it as soon as they wake up. School life also appears to be strongly influenced by smartphone usage: half of respondents use it frequently while doing their homework, while around one in three often also use it in class without the teacher's permission. Smartphones are also invading and dominating interpersonal relationships and leisure time, with 60% of respondents often using this device when they spend time with their friends or during various leisure activities (for example, watching a movie). The smartphone pervasiveness scale groups together the above phenomena into a single score validated using psychometric techniques and normalised to give values of between 0 (no pervasiveness) and 100 (extreme pervasiveness). In the pre-intervention survey, students' average score on the scale was 49. This initial result shows that the frequent use of smartphones at key times of day is widespread among participants and should not be underestimated, especially considering its potential negative effects on biorhythms (Lemola *et al.* 2015; Pecor *et al.* 2016), interpersonal relations (Rotondi *et al.* 2017), productivity and academic performance (Gui and Gerosa 2018; Xu 2015).

When we observe the distribution of the score based on the students' main sociodemographic characteristics (fig. 4.3), we note that those most prone to a pervasive smartphone use are female students (50.3) and those with fewer family-cultural resources (52.7). The schools most affected by this issue were professional schools and, to a lesser extent, technical schools, with an average score of 54.8 and 51.7 respectively. These results are in line with previous literature on the subject (see Kwon *et al.* 2013).

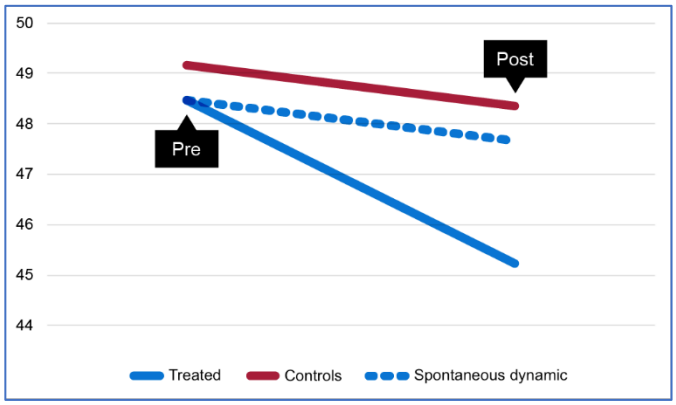
Figure 4.3 – Smartphone Pervasiveness by Type of School, Migration Status, Social Origin and Student Gender. Average School, Confidence Intervals and Percentiles



Moving onto the impact evaluation, fig. 4.4 shows the effects of training on the smartphone pervasiveness score. The blue line shows the variation observed in the frequency of use in the treatment group between the beginning and end of the academic year, while the red line represents control group. In case of convergence in the group trends over time (increase or reduction in either), perceptible differences in the inclination of the two lines represent an effect of the treatment on the outcome under study. Specifically, the wider

the angle of inclination of the treatment group line compared with the x axis is indicative of an effect of the project.

Figure 4.4 – Project Impact Assessment on Smartphone Pervasiveness. Comparison between Treatment and Control Groups during the Year.

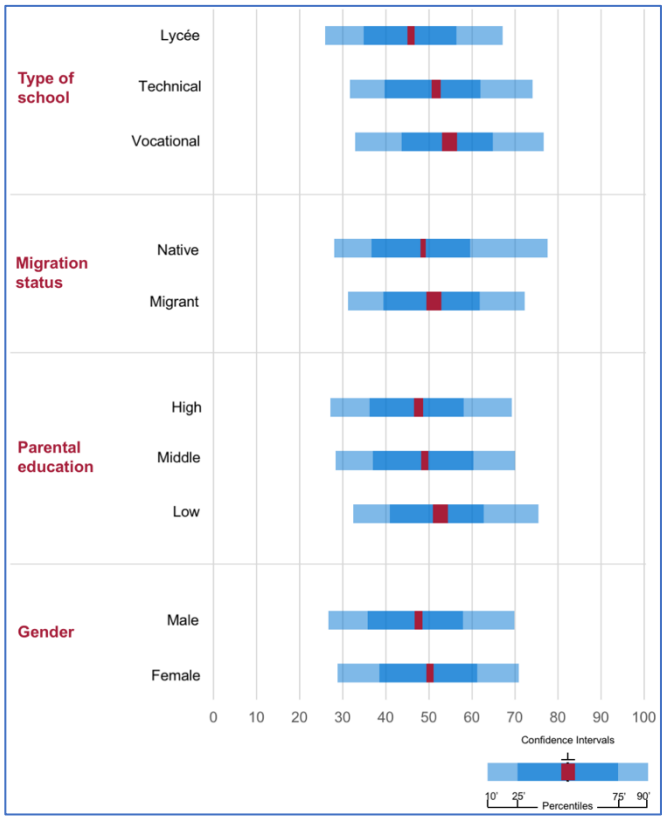


ùThe graph shows that the treatment and control groups start from very similar stated pervasiveness levels, which then tend to differentiate over time. The initial gap between the two is 0.7 percentage points and not statistically significant. By the time of the post-intervention survey, students in the control group marginally reduced their smartphone usage frequency, giving rise to a spontaneous dynamic that we can suppose: 1) applies to everyone regardless of their involvement or otherwise in the project training activities; ii) is, at least in part, due to uncontrollable contamination between treatment and control classes (for example, peer education between students that are friends but in different classes). The students in the treatment group, on the other hand, saw a more marked reduction over the year: after subtracting the spontaneous dynamic recorded in the control group (the broken blue line), it is estimated that the project produced a significant reduction of 2.5 points in the stated pervasiveness index. We can therefore conclude that participation in the project training activities led students to significantly reduce their smartphone usage at socially and physiologically important times of the day. Finally, further heterogeneity analyses of the effects on specific subgroups of participants show that this reduction was more marked in some categories of students initially more vulnerable to the problem of pervasiveness, such as female students and students of technical schools. In the case of female students, the project reduced smartphone pervasiveness by 3.0 points, while in technical schools there was a 3.6-point reduction. In addition to confirming the presence of widespread smartphone pervasiveness in everyday life, the pre-intervention survey probed their perceptions about the biggest problems resulting from their use. For example, 20% of interviewees agrees that they are impatient, easily irritated and tend to feel alone and useless when they do not have their smartphone with them. Furthermore, 40% of the sample has problems concentrating on homework due to their smartphone use and are often told off by friends and acquaintances for using their phones in social occasions.

The overall index of problematic smartphone use summarises 10 items of this kind in a single measure validated and normalised on a scale from 0 (non-problematic use) to 100 (extremely problematic use). This index is associated with a relative risk threshold, above which the interviewee is judged to be at effective risk of problematic smartphone use (Kwon *et al.* 2013).

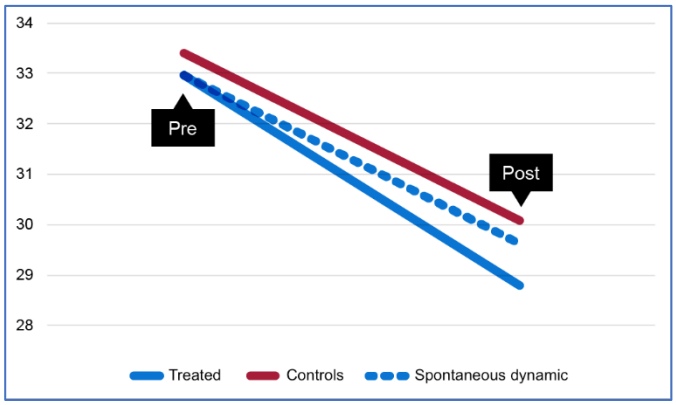
Students' average index score was 33.3, and around 30% of those interviewed are at actual risk of problematic use. As fig. 4.5 shows, female students are at greatest risk of problematic use, with an average score of 36.3 (6.3% higher than their male peers). As regards the type of school, the problem is less widespread at lycées and technical schools (respectively 31.6 and 34.5), while vocational schools are the most problematic context, with an average score of 37.4 (+5.8 points).

Figure 4.5 – Problematic Smartphone Use by Type of School, Migration Status, Social Origin and Gender of Students. Average Score, Confidence Intervals and Percentiles



Looking at the index trend over time, all students saw a reduction along the year (fig. 4.6). Again, in this case we can attribute the reduction to a spontaneous dynamic unrelated to the training and/or to contamination between treatment and control classes that cannot be monitored. In any case, in addition to this tendency to a reduction seen in both groups, there was a further reduction in the final score obtained by students in the treatment group (blue line), that can be attributed purely to their exposure to the training content. The effect is statistically significant, with a reduction of 1.2 points on the problematic smartphone usage scale, indicating the efficacy of the intervention on students in the treatment group.

Figure 4.6 – Assessment of the Project's Impact on Problematic Smartphone Usage. Comparison between Treatment and Control Groups during the Year

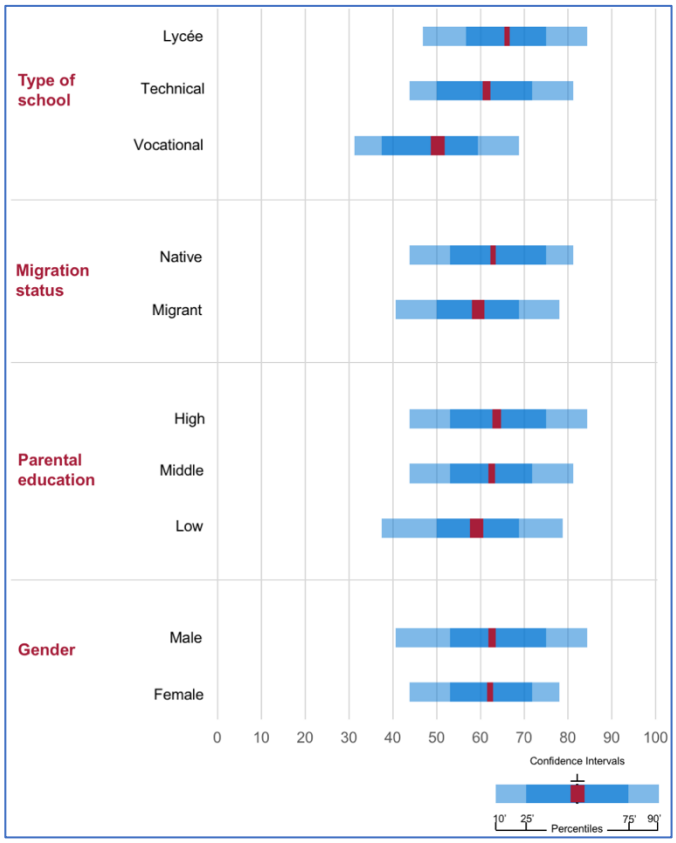


As for Smartphone pervasiveness in everyday life, we found the project had a more decisive impact on female students. The score for female students in the treatment group in fact fell by over 2.3 points compared with the control group, along with a reduction in those above the relative risk threshold of 4.1%.
Given the higher level of problematic use found in female students in the first survey, the impact of our project can therefore be interpreted as having reduced the gender imbalance in smartphone management.

Digital Competence

Fig. 4.7 shows the distribution of the scores obtained by the students in the pre-intervention digital competence test. Given that the test range was converted into a scale of 0 to 100, the test results may be interpreted in terms of the percentage of correct answers on the total. On average, participants correctly answered 62.5% of the test questions (20 out of 32).
An initial analysis of the disaggregated data by type of school shows that students at lycées had greater digital competence, with 66.1% of correct answers.

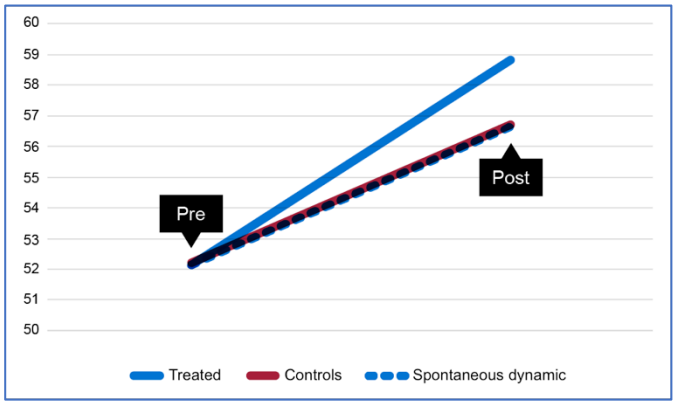
Figure 4.7 – Digital Competence by Type of School, Migration Status, Social Origin and Gender of Students. Average Score, Confidence Intervals and Percentiles



The technical school students were immediately behind them (-4.7%), while the vocational schools were more markedly behind, with a 15.8% gap. Similar results were found also with the indices referring to the four competence areas underlying the general test. Looking in greater details at the characteristics of the students surveyed, male students obtained a slightly higher average score than females (+0.4%). The variation is however relatively moderate, and not sufficient to indicate particular gender gaps. Moving on to an analysis of the construct sub-dimensions, female student always obtained moderately lower scores than their male peers.

There is a more marked gap for students from immigrant families and those who had less educated parents. The gap in the scores is estimated to be -4.6% on the general index for those whose parents had a middle-school diploma at most (compared with graduates) and 3.5% less for first and second-generation immigrants (compared with natives). Also in this case the results were very similar for the various content areas of the test.

Figure 4.8 – Assessment of the Project's Impact in the Information & Literacy Area of the Digital Competence Test. Comparison between Treatment and Control Groups during the Year



When we come to the second survey phase, there was an improvement in both groups. This general result was undoubtedly influenced by the fact that the students found the second test less difficult because they had already been familiarised with the test content and method. There was in any case a slightly better result in the treatment group, which stood out with a slightly higher level of learning than that of their peers in the control classes. The estimated effect on the test as a whole was however moderate, equating to a 0.4% increase in the number of correct answers, a level not sufficient to achieve statistical significance.

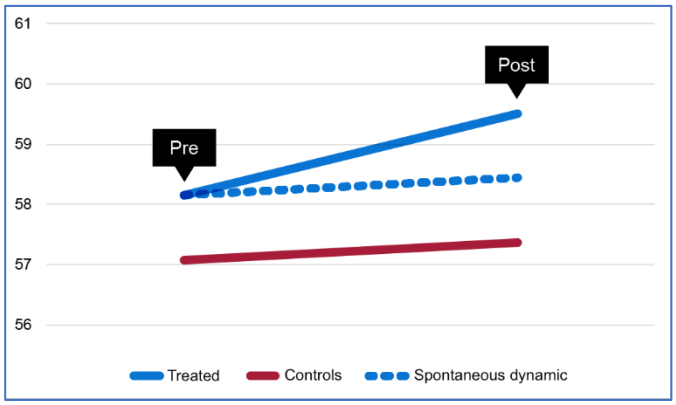
It is in the *Information & Literacy* area that the project had a clearly positive effect, with a 2% increase in the number of correct answers (fig. 4.8). Moving onto analysis of the heterogeneity of the effects of the project by gender, it can be seen that the, net of the spontaneous dynamic of peers belonging to the control group, there was a significant rise of 1.3% in the percentage of correct responses in the general test by the female students. This increase was driven in

particular by their performance in the two competence dimensions of *Information & Literacy* and *Security*, where their scores increased significantly by 2.4% and 1.8% respectively.
Finally, while the trend for slight improvements that emerged from the previous analyses was further confirmed, there were no statistically significant differences in the progress achieved by the treatment group students belonging to the other sub-categories analysed (migratory status and family-cultural resources).

Personal and Relational Well-being

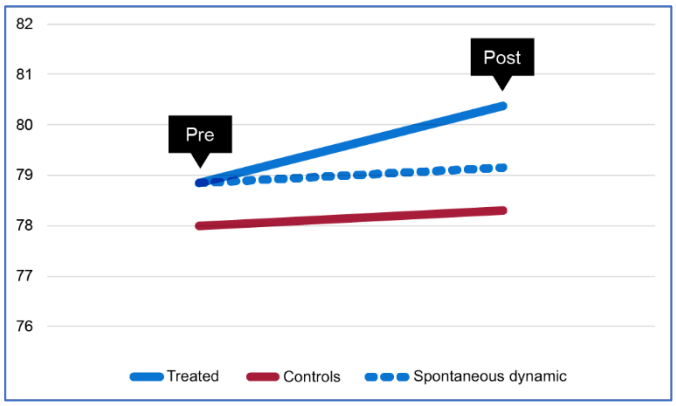
The last group of indices on which the impact of the Digital Well-being project was assessed measures participants' level of satisfaction with their physical appearance and their family relationships. Unlike the previous indices, which focused on the student's direct relationship with digital media, these measurements were used to evaluate whether the acquisition of greater competence and awareness in managing digital media could lead to greater well-being in areas indirectly influenced by them.
The interest in physical appearance is based on the focus in the training activities on issues relating to managing online identity. In module 2 real examples of potentially problematic social profiles were used to try and deconstruct the stereotypes used by young men and women to make themselves socially attractive by means of the image of themselves they project using social media.
As regards family relationships, the training extended self-monitoring in smartphone use and online time management activities to the family, involving parents in awareness-raising meetings held in the evenings and inviting students have more interaction with their parents, and to talk with them about the topics dealt with in class.

Figure 4.9 – Assessments of the Project's impact on Satisfaction with one's Physical Appearance. Comparison between the Treatment and Control Groups during the Year



In order to assess whether, on the whole, the project had also been able to affect students' well-being, they were asked to express their level of satisfaction with their appearance and with their family relationships on subsequently normalised scales of 0 (not at all satisfied) to 100 (completely satisfied). In the pre-project assessment, the students expressed an average score of satisfaction with their appearance of 57.3, and a higher score of 78.2 with their relationships with their family members (fig. 4.9 and fig. 4.10).

Figure 4.10 – Assessments of the Project's Impact on Satisfaction with Family Relationships. Comparison between the Treatment and Control Groups during the Year



The treatment group had slightly higher scores than the control group, but the gap between the two groups is not statistically significant. At the

second survey, however, the average values remained essentially the same for the control group, while there was a clear improvement in the opinions of students in treatment group on both scales. As far as satisfaction with their appearance is concerned, the positive effect of the treatment translated into a 1.5-point increase on the overall scale. Similarly, the satisfaction of the treatment group with their family relationships rose significantly by 1.7 percentage points.

5. CONCLUSIONS AND FUTURE OUTLOOK

Marco Gui (Project coordinator)

The research we have presented here is the first attempt in Italy to carry out a randomized controlled trial of a project aiming to develop a conscious use of digital media. Thanks to funding from the Bicocca University and Fastweb, we were able to develop and test a teacher training programme. This includes classroom activities to develop a conscious use of digital media and to identify good habits to enter as part of the classroom culture after the project is over. The results of the trial were very positive. In the first place it led to an increase in digital competence, although this was only statistically significant in the female student sub-sample, which appears to be the group that benefited the most from the project. There was also a significant improvement in the *Information & Literacy* area for the whole sample. In the third place, there were significant changes in digital media usage habits. Students reduced the pervasiveness of smartphones in their daily lives, and there was a reduction in media overuse and internet-related distress. Finally, there were also interesting results at an even more indirect level in relation to life satisfaction and some dimensions of the happiness indices.

In general, in the beginning female students suffered more than male students from problems relating to smartphone overuse but also saw a greater improvement after the project!

These results confirm that developing a more conscious use of digital media is beneficial on many levels, both on a core level in terms of digital competence – especially as regards information research and management – and on a secondary level in terms of digital well-being in everyday life. In summary, the path that this project has set out for the future of media education is one that confirms the role of schools in the discovery of and critical discussion about the world, which today is a digitalised world. For this reason it 'dirties its hands' with the current issues that make up the worlds of both young people and adults. The teachers provided important feedback, which confirmed the general structure of the project, and that is that educating young people about a conscious use of digital media should not be confined to a few specific lessons or become another "education" to join all of the others that schools are already adding to the curriculum. A conscious use of digital media is a basic tool for dealing with any discussion, any subject that nowadays cannot avoid dealing with the internet. As one of the teachers taking part rightly pointed out to us, the issue of fake news cannot be ignored when dealing with subjects such the Donation of Constantine, the Protocols of the Elders of Zion and other major historical myths. In this sense, what students need in the classroom is not so much teachers who are able to use the latest technology and applications perfectly, as people with whom to have a critical discussion about their experiences online. This confirms the efficacy of an approach to media education that covers all disciplines (Mastermann 2003). It is why the future activities proposed by the project and the training course should not be confined to the three hours that the experiemtal trial dedicated to each module, but should be expanded and rolled out as part of everyday teaching. In this sense this training course aims to be a resource available to all teachers, however

familiar they are with digital technology, who wish to tackle the major issues posed by the internet, such as for example digital reputation, privacy, well-being in a context of over-stimulation, the economic interests existing online and democratic discussion using digital media. In a context in which literature has shown the "zero impact" of investments in teaching technologies on learning (Gui *et al.* 2018; Argentin & Gerosa 2017; Checchi *et al.* 2015), this research shows that targeted digital media education can have a significant impact on competences across the board.

In the 2018-2019 academic year, the research group will guarantee the 18 participant schools receive an additional year of free training, to cover the classes selected as controls the previous year. This training will collect additional qualitative data, above all to get a better understanding about why the project had a greater effect on female rather than male students, and to increase the impact on the latter.

The team will also submit the results of the research to various international scientific journals. As agreed with the participant schools, the researchers will then ask the national institute for education evaluation (INVALSI) to link the data to their standardised learning performance data, in order to look at new research pathways to explore. Another step will be to update the digital competence test to make it into a resource to offer the Italian education system. In fact, during the first phase of training in the Digital Well-being project, the test results were used solely as a dependent variable for the impact assessment. Whereas in the second phase of training and in the future, the research group intends to make the test available to all the participating schools as a tool for measuring students' competence as digital citizens.

The researchers also made sure that all the videos and materials created during the project were made available to everyone, by publishing them on the website **www.benesseredigitale.eu**.

Finally, the research group will be presenting the final results of the project to the Italian Ministry of Education, in order to propose that the experience is used as the basis for building a standard for developing digital awareness in Italian schools.

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