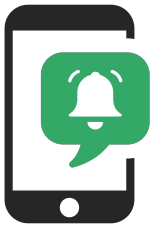

DIGI-Teens

WP1 Participatory Design

D1.1.1 Needs and Requirements

https://digiteens.polito.it

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Please see https://digiteens.polito.it for more information.

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DISCLAIMER

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1 Introduction and Objectives

This deliverable presents the design space, which provides a comprehensive overview of the key aspects to be considered in the design of a digital wellbeing platform. The design space is grounded in an extensive literature review aimed at identifying the main theoretical frameworks, existing solutions, and critical factors related to digital well-being and technology use among students.

In addition to the literature analysis, the design space has been co-developed with key stakeholders, particularly students and teachers, in order to capture their specific needs, expectations, and challenges in this domain. Their contributions help ensure that the platform design is aligned with real-world educational contexts and user requirements.

To support the empirical grounding of the design process, scientifically validated questionnaires - such as the Smartphone Addiction Scale for adolescents [**?**, **?**] - will be administered to participants.

2 Literature review

2.1 Digital Wellbeing and Teenagers

When examining the current landscape of digital wellbeing tools, it becomes evident that many existing solutions aim to support users' self-regulation through mechanisms such as redirecting attention, introducing friction, or leveraging gamification strategies [13]. However, several studies highlight that distractions are often embedded directly within the design of digital platforms themselves. For instance, features such as YouTube's autoplay and recommendation systems reduce users' agency by encouraging passive consumption, unlike mechanisms that require more deliberate actions such as playlist selection or active search [11]. More recent streaming services, including Netflix, further amplify these engagement-driven mechanisms, raising concerns regarding their implications for digital wellbeing and smartphone addiction, and reinforcing the need for effective interventions [18].

With regard to interventions, the current body of evidence on their effectiveness remains limited. As highlighted by [10], many studies suffer from methodological limitations, including weak experimental designs and small sample sizes, which hinder the assessment of long-term impact. Nevertheless, some research indicates that interventions can be beneficial when appropriately designed and implemented. For example, [14] shows that Digital Self-Control Tools (DSCTs), when used as integrated components of broader strategies rather than as standalone solutions, can support students and adolescents in developing self-regulation skills and reducing smartphone overuse. Similarly, [1] finds that interventions relying solely on awareness-raising are generally less effective than those introducing meaningful constraints on distracting behaviors, provided that such constraints are not easily bypassed.

A significant stream of research also emphasizes the role of self-regulation and media literacy. According to [2], approaches grounded in digital education can enhance users' awareness and reduce screen time more effectively than restrictive measures such as outright bans.

Likewise, [6] demonstrates that fostering self-control can lead to more sustainable behavioral change by reinforcing autonomy and personal responsibility.

Within this perspective, media literacy emerges as a promising strategy. By strengthening critical thinking, increasing transparency about platform mechanisms, and encouraging more intentional digital choices, media literacy initiatives can mitigate some of the negative effects associated with excessive technology use. Existing studies show that such interventions can promote greater autonomy and critical awareness among users [7, 4].

Complementary strategies include parental mediation and peer support. Active parental mediation—based on dialogue and context-specific rules—has been shown to be more effective than rigid restrictions, particularly with older children [9]. At the same time, peer-based initiatives leverage adolescents' social dynamics and have shown promising results in promoting digital wellbeing in ways that feel more relatable and engaging [20].

Finally, educational contexts represent a particularly effective environment for these interventions. Integrating digital wellbeing into school activities can help students develop healthier digital habits, strengthen their self-regulation skills, and encourage critical engagement with digital environments. Moreover, such approaches can empower students to reflect on and even design more sustainable and socially responsible technologies [16].

Building on these insights, this deliverable contributes by structuring the knowledge emerging from the literature into a design space that identifies the key dimensions, challenges, and opportunities for the development of digital wellbeing tools in educational settings. Within Task T1.1, this design space serves as a conceptual framework to guide the co-design activities with students and teachers, ensuring that the platform design is grounded both in scientific evidence and in the needs emerging from real educational contexts. The design space, therefore, provides the foundation for the subsequent design activities described in the following Sections.

3 Co-Design with students

3.1 Methodology

We organized a participatory workshop with teenagers aimed at collecting design insights and co-creating concepts for a mobile application intended to promote digital wellbeing and raise awareness about responsible technology use. The workshop involved four high-school classes and followed a structured protocol designed to combine awareness-building, data collection, and participatory design. The overall process was divided into three main phases.

Explanation with interactive questionnaires (1 hour) The first phase aimed to provide participants with the conceptual background necessary to meaningfully engage in the design activities while simultaneously collecting quantitative and qualitative data about their digital habits and attitudes. During this introductory session we presented three key topics: (i) *mobile computing*, to provide context on how mobile applications are designed and used; (ii) *gamethinking*, as an approach to enhance user engagement in digital systems [19]; and (iii) *digital*

wellbeing, in order to frame the main theme of the workshop and introduce the challenges associated with excessive or unbalanced technology use.

Following these introductions, participants were asked to complete a series of questionnaires designed to stimulate self-reflection and to gather structured data about individual characteristics that may influence digital behaviour. In particular, we administered the Ten-Item Personality Inventory (TIPI) [5] to capture the main personality traits, a 12-item version of the Hexad scale [8] to identify gamification user types, and the Italian version of the Smartphone Addiction Scale – Short Version (SAS-SV) [3] to assess potential levels of problematic smartphone use. These validated instruments were complemented with additional questions investigating participants' familiarity with the concept of digital wellbeing, the time spent on their smartphones on the previous day, and the applications they reported using most frequently. The collected data served both as a baseline for understanding participants' digital habits and as an input to inform the subsequent design activities.

Co-design session (3 hours) The second phase consisted of a collaborative co-design activity aimed at eliciting teenagers' perspectives, needs, and ideas regarding digital wellbeing interventions. Participants worked in small groups and were asked to design a mobile application targeting their peers (i.e., other teenagers). The co-design session was structured into four shorter design rounds in order to progressively guide participants in exploring different aspects of digital wellbeing.

To scaffold the design process while leaving room for creativity, we introduced four conceptual modules that could potentially be integrated into the application. These modules were intended to represent different dimensions of digital wellbeing and to help participants reflect on possible educational and behavioral support mechanisms.

The first module addressed the concept of digital wellbeing, aiming to help users understand its relevance and reflect on the impact of digital technologies in everyday life. The second module focused on the attention economy and the use of dark patterns, which are often exploited to capture and maintain users' attention [17]. This module aimed to provide users with a basic understanding of these mechanisms and help them recognize persuasive design strategies commonly used in popular applications.

The third module focused on time management and self-control, introducing participants to Digital Self-Control Tools (DSCTs) [15], some of which are already integrated into modern smartphones. This module encouraged reflection on personal digital habits and possible strategies to regulate technology use. Finally, the fourth module focused on the development of healthy digital habits, promoting a more conscious and balanced relationship with digital technologies.

Participants were free to decide whether to include all modules or only those they considered most relevant for their peers. This flexibility allowed the activity to capture participants' priorities and perceptions of what types of interventions may be most effective for their age group. To support the design activity, groups could create either low-fidelity mockups on paper or higher-fidelity prototypes using digital tools such as Canva.

Mobile apps presentations (10 minutes per group) In the final phase of the workshop, each group presented their application concept to the rest of the participants and facilitators.

Presentations focused on the core functionalities, the design rationale, and the specific digital wellbeing issues addressed by the proposed solution. Each presentation was followed by a short Q&A session aimed at encouraging discussion and reflection among participants. These presentations also provided additional qualitative insights into participants' motivations, design priorities, and perceptions of effective digital wellbeing interventions.

3.2 Participants

The workshop was conducted within the *Paths for Transversal Skills and Orientation* framework (in Italian, Percorsi per le Competenze Trasversali e per l'Orientamento or PCTO). This program promotes collaborations between schools and external institutions in order to expose students to real-world learning experiences and interdisciplinary topics.

Participation in the study followed established ethical and legal procedures. Consent for participation in the activity, as well as for the collection and storage of data, was obtained through signed forms. For students under the age of 18, consent was provided by their legal guardians, while students over 18 signed the forms directly. The forms were collected by school teachers and subsequently submitted to the legal office of the University of Bologna. This procedure ensured full compliance with the European General Data Protection Regulation (GDPR) regarding the protection of personal and sensitive data. The study protocol was reviewed and approved by the ethics committee of University of Bologna.

The workshop involved four high-school classes—two from the third year and two from the fourth year—resulting in a total of 74 participants aged between 16 and 18 years. The sample included 42 male students (56.8%) and 32 female students (43.2%). Students were organized into small groups of three or four participants from the same class. Each group was asked to design a prototype of a mobile application aimed at promoting digital wellbeing, resulting in a total of 20 design projects produced by 20 groups.

Regarding prior familiarity with the topic, 53 participants (71.6%) reported being already familiar with the concept of digital wellbeing, while 56 participants indicated that they had previously used some form of digital wellbeing tools. This suggests that, even when the specific term *digital wellbeing* was not explicitly known, many students were already aware of and engaged with issues related to responsible technology use.

Results from the Smartphone Addiction Scale (SAS) questionnaire further highlight the relevance of the topic for this age group. According to the collected scores, 15 students (20.3%; 8 males and 7 females) fell within the range indicating smartphone addiction, while 37 students (50%; 16 males and 21 females) showed scores associated with a risk of addiction. These findings reinforce the importance of investigating digital wellbeing interventions for teenagers and confirm the relevance of focusing on this target group when designing educational tools and applications.

3.3 Results

By analyzing the projects submitted by the students, we categorized the features that emerged into four key themes: Learning strategy; Users' engagement; Time management; and Healthy habits.

3.4 Projects Description

The workshop resulted in a total of 20 design projects, each proposing a different concept for a mobile application aimed at promoting digital wellbeing.

Project 1 proposed an app based on daily challenges, quizzes, points, and rankings among friends, also including avatars and a mock social network designed to explain the concept of dark patterns.

Project 2 combined questionnaires and quizzes with time-tracking features, including visualizations, app usage limits, and an AI chatbot ("Beddy") that provides wellbeing advice.

Project 3 focused on data visualization of smartphone usage, a list of common dark patterns, and tools for setting app time limits, complemented by a social chat feature where users can exchange advice.

Project 4 structured the application into two main modules: one focused on tracking reduced app usage and the other on promoting good habits, both supported by interactive quizzes on dark patterns.

Project 5 included three sections: personalized challenges with friends, screen-time statistics, and a quiz dedicated to recognizing dark patterns.

Project 6 presented a storytelling-based application in which users guide a character through different wellbeing-related levels by making choices.

Project 7 proposed a game where a child avoids digital distractions in order to reach a park, with quiz results influencing the available time to complete the task.

Project 8 combined quizzes—some presented through storytelling—with self-estimation of daily smartphone use and suggestions for offline activities.

Project 9 organized the application around four wellbeing modules including quizzes, leaderboards, offline activity recommendations, and operating-system-level digital wellbeing tips.

Project 10 consisted of four modules: quizzes, a dark pattern game based on collecting coins, a planning calendar, and daily questionnaires that generate personalized advice.

Project 11 introduced a fantasy storytelling environment with four modules dedicated to curiosities about digital wellbeing, dark pattern quizzes, a physical activity game, and personalized suggestions.

Project 12 designed a racing game in which the player's character and performance depend on the results of an introductory quiz, also including a ranking system.

Project 13 used a persona named "Leo" to teach good digital habits through quizzes and time-tracking tools, complemented by an additional application called "Time Store" where time functions as a form of currency.

Project 14 adopted a concept similar to the "Forest" application, linking the growth of a digital tree to reduced phone usage and including levels, quizzes, and suggestions for offline activities.

Project 15 structured the application into three modules: minigames illustrating time loss caused by dark patterns, activity tracking with personalized advice, and a flower-care game connected to time spent away from the smartphone.

Project 16 included four modules: a quiz about digital habits, a quiz-based game, a self-control tool allowing notification management or app blocking, and a section dedicated to digital wellbeing advice.

Project 17 proposed a storytelling journey game integrating quizzes, time-tracking features, self-control tools, and recommendations for more productive uses of time.

Project 18 designed a quiz-based application where correct answers allow users to collect travel-related items, with the final goal of earning a virtual trip.

Project 19 focused on a game aimed at identifying dark patterns, combined with a questionnaire that generates personalized advice for improving digital habits. Finally,

Project 20 proposed quiz-based mini-games (such as a hot-dog game and a dancing game), complemented by notifications suggesting offline activities that reward users with discount codes.

3.5 Key themes

3.5.1 Learning strategy

Learning strategies refer to the approaches adopted to improve users' understanding and awareness of digital wellbeing concepts. Across the analyzed projects, several strategies emerged to support knowledge acquisition and self-reflection.

Most applications (19 out of 20) included either quizzes (15 projects) or questionnaires (12 projects), sometimes combining both. These elements were mainly used to assess users' knowledge about digital wellbeing topics or encourage reflection on personal digital habits. Some implementations adopted creative approaches. For example, group 7 embedded quiz questions within a playful interaction with digital objects representing different topics (e.g., toys for digital wellbeing questions and digital items for dark pattern questions). Group 8 instead framed questions from the perspective of a company attempting to exploit dark patterns, encouraging users to critically reflect on persuasive design practices.

Questionnaires were often used to stimulate deeper reflection on daily digital routines. For instance, group 15 designed a self-evaluation activity in which users first reported the activities they performed during the day and then indicated what they would have preferred to do instead. The questionnaire also explored the motivations behind these desired activities, enabling the system to generate more personalized recommendations.

In addition to interactive elements, almost half of the projects (9 out of 20) included textual information sections explaining key concepts such as digital wellbeing or dark patterns. In some cases, these sections were also used to introduce the app's modules or to clarify data visualizations. Finally, a few projects experimented with alternative learning mechanisms: group 11 proposed a mentoring feature encouraging users to share their knowledge with younger peers, while group 2 introduced a chatbot capable of answering users' questions about digital wellbeing and providing personalized suggestions.

3.5.2 Users' engagement

User engagement strategies were widely used to maintain users' interest and motivate them to interact with the educational content of the applications.

A large portion of the projects (15 out of 20) incorporated either mini-games (10 projects) or gamification elements (10 projects), including rankings (4), badges (1), points (5), levels (3), avatars (4), and real-life rewards (2). Several projects combined multiple elements to create more comprehensive gamified systems. For instance, project 12 designed a racing game where the vehicle's performance depended on the user's answers to a quiz, while group 11 developed an "infinite runner" game in which players collected coins while avoiding distracting apps such as TikTok or Instagram.

Gamification was implemented in various ways. Group 1 designed both competitive and collaborative leaderboards, enabling users to compare their results with friends or as part of a class group. Group 9 introduced customizable avatars, while group 14 structured the application around progressive levels that gradually reduced the allowed smartphone usage time. In project 20, the score was visualized as a sandwich where each correct answer added a new ingredient.

Storytelling was also used as an engagement strategy in six projects. In most cases, narratives evolved based on users' responses to quizzes related to digital wellbeing or dark patterns. For example, group 7 created a story about a child trying to cross a road to reach a park, where progress depended on answering questions correctly, while group 11 designed a fantasy narrative in which digital wellbeing was represented as a guiding entity.

Some projects (3 out of 20) also explored simulation techniques to increase awareness of persuasive design. For instance, group 15 recreated a social media feed with infinite scrolling to illustrate how dark patterns capture users' attention. Finally, two projects (groups 3 and 4) introduced social features that allowed users to share progress and exchange ideas about alternative activities to smartphone use.

3.5.3 Time management

Time management features aimed to support users in reflecting on their digital habits and managing smartphone use more effectively.

Nine projects included tools such as timers to monitor daily app usage or reports summarizing overall smartphone activity. Some applications also provided personalized suggestions for reducing time spent on distracting apps. For example, group 3 implemented a flexible timer system that could be configured both by the user and by the application, enabling gradual reductions in screen time. Group 4 integrated time tracking with gamification elements, transforming weekly monitoring into a challenge supported by progress bars and badges.

Data visualization was another common strategy used to increase awareness of digital habits, appearing in seven projects. These visualizations presented usage data through graphs or alternative visual metaphors. For instance, group 3 designed highly customizable graphs, while group 14 represented smartphone usage as the growth of a digital tree, inspired by the concept of data humanism [12].

3.5.4 Healthy habits

Several projects focused on promoting healthy digital habits through recommendations, suggestions, and offline activities.

Half of the groups (10 out of 20) incorporated recommendation systems providing tips or suggested activities to reduce excessive smartphone use. These recommendations ranged from simple advice about maintaining a balanced relationship with technology to daily suggestions for productive or recreational activities. In some cases, the recommendations were personalized based on questionnaire responses (e.g., groups 15 and 19).

Additionally, three projects (groups 4, 5, and 20) proposed tasks encouraging users to engage in offline activities such as walking in a park or practicing sports. These features aimed to temporarily detach users from their smartphones and help them break patterns of excessive digital engagement.

4 Co-development with teachers

4.1 Methodology

To collect the teachers needs and preferences, and co-develop with them our system, we developed a questionnaire. The purpose of the questionnaire was to explore how digital well-being and related educational practices can be integrated into the school environment. Specifically, it aimed to investigate current usage of digital devices and the level of awareness surrounding this topic. In addition, the questionnaire sought to identify potential features and requirements that could inform the development of a project focused on digital well-being.

4.1.1 Questions

Table 1, 2, 3, adn 4 present the questions included in the questionnaire.

Table 1: Demographic Questions

Demographic Questions	**Options**
How old are you?	29 or younger; 30–39; 40–49; 50–59; 60 or older
What is your gender?	Female; Male; Other (specify); Prefer not to say
Which subjects do you teach?	Open-ended response

Table 2: Questions on Technology Use

Technology Use	**Options**
How comfortable do you feel using technological tools?	Not at all; A little; Moderately; Quite; Very
How often do you use technological tools in your lessons?	Never; Less than once a month; At least once a month; At least once a week; Every day
If you use them, which ones and how?	Open-ended response
What restrictions do you impose on the use of the following devices during your lessons?	Grid question: smartphone, tablet, PC, smartwatch Forbidden; Allowed only in case of necessity; Allowed with explicit permission; Allowed only for educational purposes; Always allowed
How useful do you think technology can be for learning and personal growth within the school environment?	Not at all; A little; Moderately; Quite; Very
Why?	Open-ended response

Table 3: Questions on Digital Well-being

Digital Well-being	**Options**
How would you evaluate your own use of technology?	Extremely unhealthy; Unhealthy; Neutral; Healthy; Extremely healthy
And that of your students?	Extremely unhealthy; Unhealthy; Neutral; Healthy; Extremely healthy
How familiar are you with digital well-being?	Not at all; A little; Moderately; Quite; Very
How would you define digital well-being?	Open-ended response
How useful would additional training for teachers on this topic be?	Not at all; A little; Moderately; Quite; Very
How much do you think your students know about the topic?	Not at all; A little; Moderately; Quite; Very
How much space should schools dedicate to digital well-being education?	Not at all; A little; Moderately; Quite; Very
Why?	Open-ended response
How often could you dedicate time to digital well-being within your lessons?	Never; Less than once a month; At least once a month; At least once a week; Every lesson; Other
How could moments dedicated to digital well-being education be implemented?	Open-ended response
How do you think students would perceive discussing digital well-being with their teachers?	Not interested at all; Slightly interested; Neutral; Interested; Very interested

Table 4: Questions on the Educational Project Implementation

Educational Project Implementation	Options
How useful would a technological tool be for supporting students' digital well-being in class?	Not at all; A little; Moderately; Quite; Very
How often would you use such a tool in class?	Never; Less than once a month; At least once a month; At least once a week; Every lesson; Other
In what context could such activities be included?	Dedicating time within any subject; Within a specific subject (specify); Through a dedicated course during curricular hours; Through a course during extra-curricular hours; Other (specify)
How positively do you think students would perceive an app-based educational approach to digital well-being?	Not at all; A little; Moderately; Quite; Very
Why?	Open-ended response
When would you prepare the activities to be carried out with such an application?	Before the lesson; During the lesson; After introducing the digital well-being activity to students
From which device would you prefer to plan and manage learning activities and goals?	Smartphone; Tablet; Laptop; Desktop PC; Other (specify)
Which level of customization would be most useful?	Pre-made generic activities; Activities modifiable for each class; Activities modifiable for each student
How would you prefer to view students' progress and indicators?	Graphs; Textual report; Detailed activity data; Other (specify)
How important is it that students can: – see their own progress – see class results – remain anonymous among peers – remain completely anonymous	Not at all; A little; Moderately; Quite; Very
Which educational approaches would be most suitable for teaching digital well-being? (multiple choice)	Cooperative; Competitive; Individual and reflective; Goal-oriented; Reward-based; Other (specify)

4.2 Participants

A total of 18 high-school teachers participated in the survey. Regarding age, the distribution was as follows:

In terms of gender, the sample consisted of 15 females and 3 males.

The most frequently taught subjects among respondents were:

- Mathematics and Physics (3 respondents);
- Mathematics (3 respondents);

- Physical Education (2 respondents).

  More details are presented in Figures 1, 2, 3, and 4.

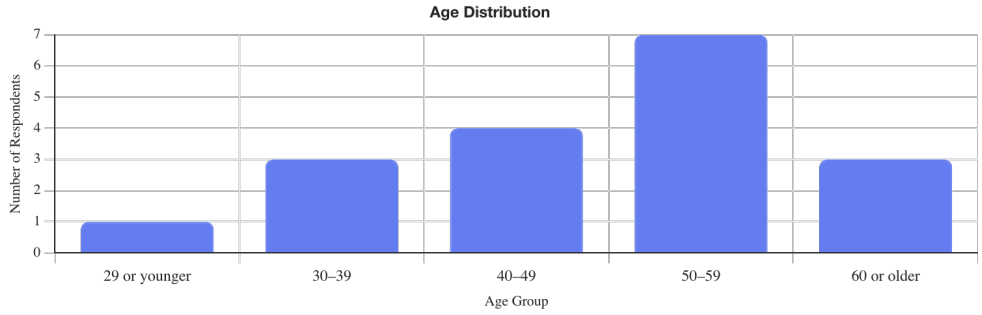

Figure 1: Age distribution of the respondents.

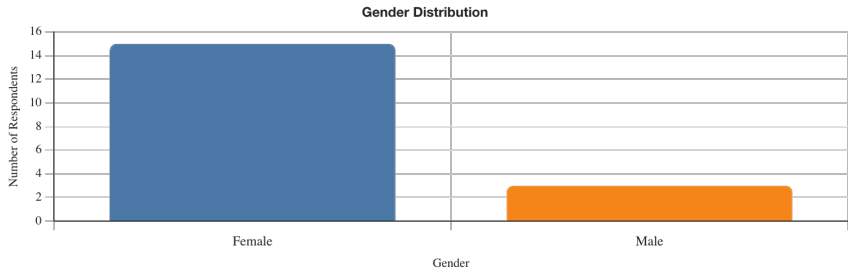

Figure 2: Gender distribution of the respondents.

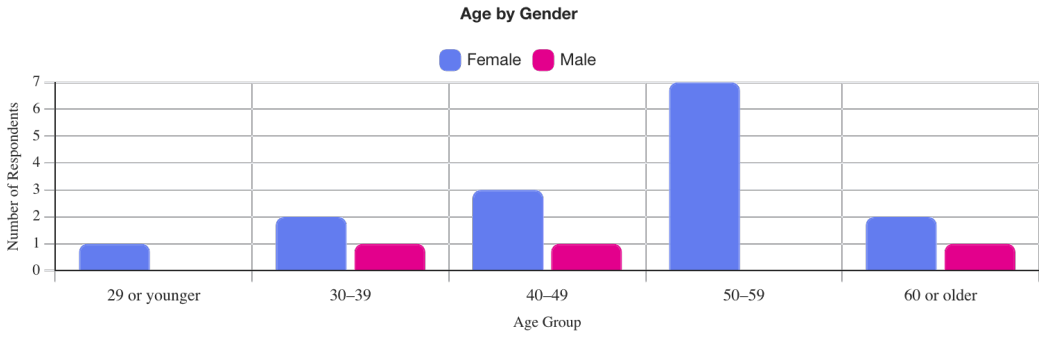

Figure 3: Age distribution by gender among the respondents.

4.3 Teachers' Technology Use

Across the responses, teachers reported varying levels of confidence and frequency in using technological tools in their teaching practice. Most respondents indicated that they feel very comfortable or fairly comfortable with technology, and a large majority stated that they use technological tools daily during lessons. The most frequently used tools include interactive whiteboards (LIM/Smart boards), computers, tablets, web applications, and subject-specific software such as GeoGebra, Desmos, Tracker, QGIS, and educational platforms like Google

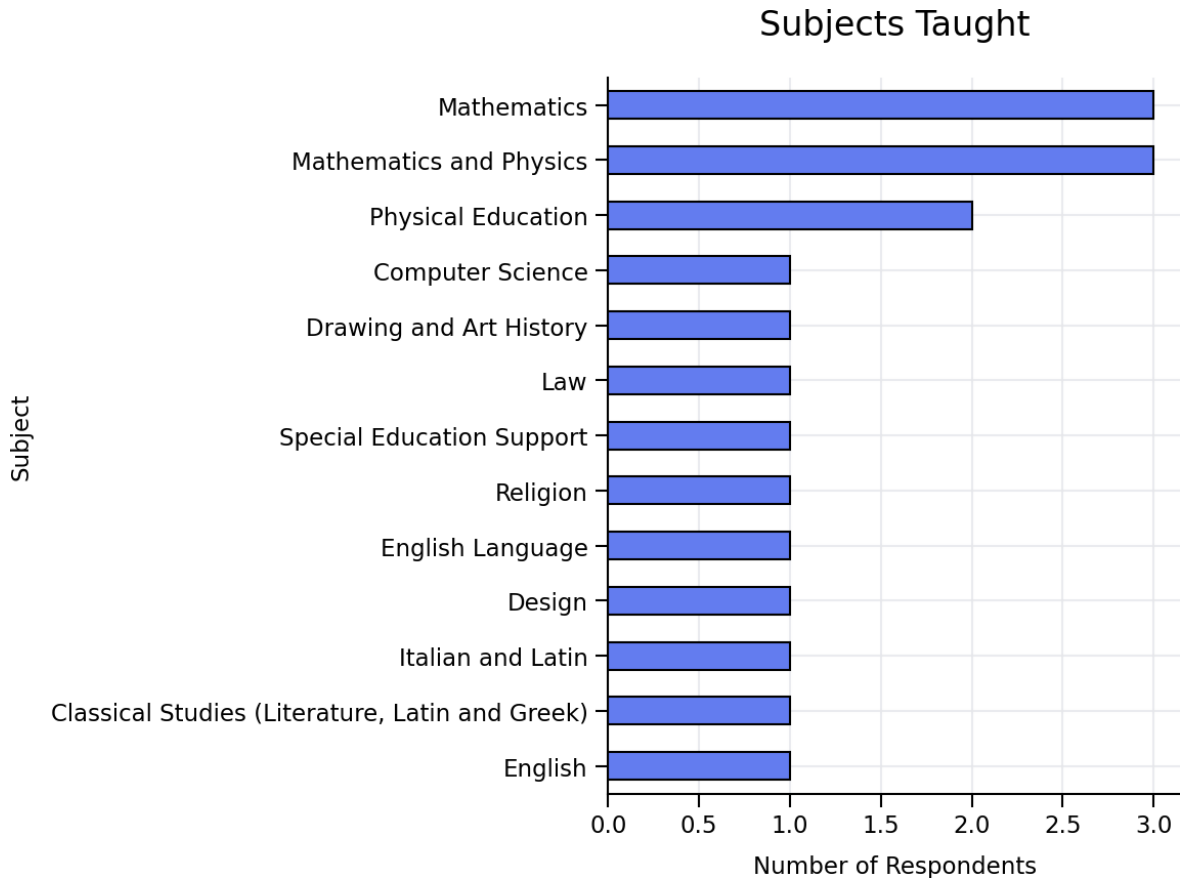

Figure 4: Distribution of subjects taught by respondents.

Workspace and Classroom. Many teachers also use videos, digital resources, online materials, and presentation tools to support instruction, assessment, and student engagement.

Regarding the frequency of technology use, most teachers reported using technological tools every day, while a smaller number use them weekly or monthly. Technology is used for a variety of purposes: preparing lessons, presenting content, conducting interactive activities, accessing multimedia resources, showing simulations, sharing materials, administering tests and questionnaires, and supporting students with diverse learning needs.

Teachers were also asked about the restrictions they impose on technological devices during lessons. Overall, respondents tended to allow the use of PCs, tablets, and smartphones primarily for educational purposes or with explicit permission. Smartwatches were generally forbidden or allowed only in specific cases. A smaller group of teachers reported stricter rules for smartphones—sometimes banning them entirely—while others permitted limited use for in-class quizzes or activities. PCs and tablets were more widely accepted as instructional tools.

When asked about the usefulness of technology for learning, most teachers rated it as very useful or quite useful. They highlighted several reasons:

- Technology aligns with the digital world students already live in.
- It supports immediate access to resources, simulations, videos, and updated materials.

- It facilitates creativity, productivity, and meaningful engagement.
- It reduces the need for paper handouts and enables more efficient lesson delivery.
- It offers valuable help for students with disabilities or learning difficulties.
- It fosters digital competencies essential for students' future academic and professional paths.

A few teachers expressed more cautious views, emphasizing that technology should remain a tool, not a substitute for teaching, and that reading, discussion, and interpersonal interactions must still play a central role. Some remarked that technology must be used responsibly, and that students need proper guidance to avoid misuse.

Overall, the responses indicate that teachers see technology as a powerful and relevant resource for the learning process, provided it is used thoughtfully, responsibly, and in balance with traditional teaching methods.

4.4 Teachers' Perceptions of Digital Well-Being

Teachers provided varied but generally aligned views regarding digital well-being, both in reference to themselves and to their students. Most respondents described their personal use of technology as healthy, highlighting balanced and conscious habits, moderation, and the ability to use technology intentionally without developing dependency. In contrast, many teachers perceived their students' digital habits as less healthy, frequently describing them as "unhealthy" or "absolutely unhealthy", often due to overuse, dependence, or limited awareness of digital risks.

Regarding their own familiarity with the topic of digital well-being, teachers expressed levels ranging from low to moderate, with a few reporting higher familiarity. When asked to define digital well-being, respondents provided a wide range of perspectives, but several recurring themes emerged. Digital well-being was commonly described as:

- the conscious and responsible use of technology;
- maintaining a healthy balance between digital activities and real-life experiences;
- using technology as a tool for learning and daily functioning;
- avoiding compulsive or dependent behavior;
- the ability to disconnect without discomfort;
- adopting a critical and informed awareness of risks, limitations, and potential harms.

Most teachers considered digital well-being education useful or very useful. Many expressed the need to support students in developing self-awareness, self-regulation, and the ability to recognize the risks and benefits of their digital habits. Several teachers noted that students often appear isolated, overly reliant on screens, or unaware of the consequences of their online behavior. For these reasons, digital well-being was viewed as an essential educational topic, increasingly relevant in a rapidly digitalizing society.

Teachers were also asked how frequently they could dedicate time to digital well-being within their lessons. Responses varied: some teachers indicated they could address the topic **weekly**, others monthly, and some only occasionally, depending on their subject or available teaching time. Several highlighted the importance of shared responsibility across the teaching staff, or of integrating the topic within subjects such as civic education, computer science, or interdisciplinary modules.

Respondents also proposed various preferred methods for implementing digital well-being education. Suggested approaches included:

- lessons or workshops led by external experts;
- class discussions, reflection activities, and debates;
- analysis of real-life cases or shared experiences;
- the use of videos, articles, and practical examples;
- interactive activities such as group work or games;
- embedding digital well-being into regular lessons or offering dedicated curricular or extra-curricular sessions.

When asked how students would perceive activities on digital well-being, most teachers expected students to be interested or very interested. A smaller number anticipated neutral or limited engagement. Several teachers commented that student interest would depend heavily on the teaching approach, emphasizing the importance of concrete examples, relatable materials, and interactive, student-centered methods.

Overall, teachers recognized the importance of digital well-being education and considered it a valuable opportunity to equip students with the tools needed to navigate an increasingly digital world in a healthy, informed, and responsible way.

4.4.1 Teachers' Views on the Implementation of a Digital Well-Being Tool

Teachers expressed generally positive attitudes toward the introduction of a technological tool designed to support students' digital well-being. Many respondents considered such a tool to be useful or very useful within the school context, while a smaller group expressed limited enthusiasm, often due to concerns about students' awareness of the topic or doubts about entrusting part of this educational effort to an application.

Regarding frequency of use, responses varied widely. Some teachers indicated they would use the tool every lesson, integrating it into regular teaching, while others preferred weekly or monthly use. A few explained that their usage would depend on the tool's quality, relevance, and compatibility with the time available in their subject.

Teachers identified several contexts in which these activities could take place. These included dedicated curricular courses, short recurring segments within regular lessons, extra-curricular sessions, specific projects, or cross-disciplinary activities shared among the teaching staff. Civic education was often mentioned as an ideal setting.

When asked how positively students might perceive an app-based approach, many teachers expected moderate to high levels of acceptance. They noted that digital tools are familiar

to students and may therefore increase engagement. Some teachers, however, believed that students' interest might depend on their initial level of awareness or the perceived relevance of digital well-being.

Reasons provided for positive perceptions included the relevance of digital well-being to students' everyday lives, the alignment with their habitual modes of communication, and the potential for more immediate and interactive learning experiences. More cautious responses pointed out that students may not immediately recognize digital well-being as a real concern.

Most teachers preferred to prepare activities before the lesson, while a smaller group indicated they might prepare them after introducing the topic or even during the lesson, depending on the context.

Regarding the device they would use to plan and manage activities, many teachers selected laptops or desktop computers, while others preferred smartphones or tablets. Some indicated that using multiple devices interchangeably would be ideal.

Teachers expressed a clear preference for activities that can be adapted to the needs of each class, with some also favoring customization at the level of the individual student. Only a small number preferred ready-made, generic activities.

Preferences for how to visualize student progress varied. Teachers indicated interest in graphical representations, detailed activity-level data, or textual reports. Several respondents expressed the need for mixed formats.

Teachers also commented on how important it is for students to access information about their progress. Many considered it important that students be able to see their own results, and many also supported access to class-level results. Opinions on anonymity were more diverse: some teachers saw moderate value in keeping students anonymous among peers, while complete anonymity was generally considered less important.

Regarding pedagogical approaches, teachers selected a variety of strategies, often combining several. Cooperative learning, goal-oriented activities, reflective individual work, and in some cases competitive or reward-based approaches were all identified as potentially effective.

Overall, teachers recognized the relevance and importance of digital well-being education and considered a technological tool a potentially valuable resource, provided that it supports meaningful educational objectives, allows appropriate customization, and aligns with students' everyday digital practices.

ATTACHMENTS

The following resources complement the content of the deliverable and the work conducted in the WP, and serve as dissemination:

- Paper: "Towards Digital Well-being Education in High-School", Luca Scibetta, Francesco Ballarini, Chiara Ceccarini, Alberto Monge Roffarello, Catia Prandi, Luigi De Russis, Publication date 2025/4/26, In Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA '25). Association for Computing Machinery, New York, NY, USA, Article 534, 1–6. DOI: 10.1145/3706599.3720101.
- Workshop descprition: "Digital Wellbeing for Teens: Designing Educational Systems (DIGI-Teens 2024)", Ceccarini Chiara, Prandi Catia, Monge Roffarello Alberto, and De Russis Luigi, In Proceedings of the 2024 International Conference on Advanced Visual Interfaces (AVI '24), 1-3. DOI: 10.1145/3656650.3660538.
- Paper: "Enhancing digital wellbeing through co-design: some preliminary results. Digital Wellbeing for Teens: Designing Educational Systems (DIGI-Teens) Workshop", Ceccarini Chiara, Ballarini Francesco, and Prandi Catia, Digital Wellbeing for Teens: Designing Educational Systems (DIGI-Teens) Workshop.
  PDF: https://sites.google.com/view/digi-teens/program
- Submitted publications: "Enhancing Digital Wellbeing in Education: Co-Designing Classroom Solutions with Students", Ceccarini Chiara, Ballarini Francesco, Scibetta Luca, Monge Roffarello Alberto, De Russis Luigi, Prandi Catia. Submitted to the Behaviour & Information Technology Journal, Taylor & Francis.
- Post on the website: https://digiteens.polito.it/updates/2024/03/codesign-2024/

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