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Higher Education Learning Methodologies and Technologies Online

4th International Conference, HELMeTO 2022
Palermo, Italy, September 21–23, 2022
Revised Selected Papers

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Editors

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Preface

This volume of Communications in Computer and Information Science (CCIS) contains the post-proceedings of HELMeTO 2022, the fourth International Conference on Higher Education Learning Methodologies and Technologies Online, which took place during September 21–23, 2022 in Palermo, Italy.

The conference was organized by the Department of Mathematics and Computer Science at the University of Palermo and by the Institute of Educational Technology of the National Research Council of Italy. The 2022 edition of HELMeTO also marked the return of the event in presence, as the previous two editions had been held entirely online due to the Covid-19 emergency.

The growing interest in the topics of learning methodologies and technologies in higher education, and in particular in the interdisciplinary approach that characterizes this research field, suggested a change from a workshop format to a conference event, thus promoting a more international perspective. The success of this approach was highlighted by the 126 submissions received (almost double those received for the previous event) from more than 400 authors in 24 countries.

These numbers not only confirm the growth trend of an event that was born just four years ago (39 submissions in 2019, 59 in 2020, and 65 in 2021), but above all they consecrate HELMeTO as a key event for researchers and practitioners working in Higher Distance Education Institutions or studying Online Learning Methodologies to present and share their research in a multidisciplinary and international context.

The conference included two general tracks on Online pedagogy and learning methodologies and on Learning technologies, data analytics and educational big data mining as well as their applications. Thanks to the growing attention that the conference has attracted over the years, this edition collected twelve special tracks, focusing on specific topics, previously proposed by their organizers and peer-reviewed by the Program Committee.

- Special Track 1 - Improving education via XR and AI
- Special Track 2 - Educational Approaches and Innovative Applications to Counteract Social Media Threats
- Special Track 3 - Hybrid Learning and Accessibility in higher education
- Special Track 4 - E-learning for providing “augmented” mathematics education at University level
- Special Track 5 - STEAM Education old and new challenges in distance teaching/learning approaches in Higher Education
- Special Track 6 - Online Faculty Development: Next Steps for Practice and Future Research
- Special Track 7 - Artificial Intelligence and Multimodal Technologies in Education (AI&MTEd ‘22)
- Special Track 8 - Experience-based training activities for online higher education
- Special Track 9 - Intelligent Analytics for Process-aware Higher Education

- Special Track 10 - The digital innovation of university teaching observed through the prism of emotions
- Special Track 11 - Empowering soft skills and digital competencies in higher education
- Special Track 12 - Manufacturing Education for a Sustainable fourth industrial revolution

An international Program/Scientific Committee with members from 17 countries (Austria, China, Cyprus, Ecuador, France, Germany, Greece, Italy, Morocco, Palestine, Portugal, Slovakia, Spain, Sweden, Turkey, UK, USA) was in charge of peer-reviewing the 126 papers submitted to HELMeTO 2022; 105 papers were selected for presentation at the conference. A final set of the best 59 papers (47% of the original submissions) were selected and extended for publication in this book after a separate double-blind peer-review process performed by at least three members of the Program/Scientific Committee.

We thank all the authors for their contributions and presentations, for their efforts, and for their presence at the event. Similarly, we would like to thank all the committee members, organizers, and contributors, for their involvement and help in the process of preparing and hosting both the conference and this book. Our thanks go also to the University of Palermo and the Institute of Educational Technology of the National Research Council of Italy and to SIREM (Società Italiana di Ricerca sull'Educazione Mediale).

February 2023

Giovanni Fulantelli
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Learning Methodologies and Technologies Online. HELMeTO 2022 Editorial: Introduction to the Scientific Contributions (Editorial)

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Keywords: Distance learning · Virtual learning environment · Online learning · eLearning

The HELMeTO 2022 Conference combined methodology, innovation, and technology. These three pillars represent the key to making significant progress in the educational world, specifically for this conference, in the university sector. But these are three pillars that must work in an integrated way. Coordination is essential and, above all, sensitivity to understand that in online and hybrid learning there are not such hard divisions. While it is true that the focus can be on methodology, innovation or technology, it is also true that they feed each other and that only through a joint work they could have a significant impact on both, the educational process, and the user performance. The proceedings book that we introduce following reflects significant contributions through almost 60 chapters. Making the division according to the tracks of the conference (2 general tracks and 12 special tracks) would have been something long and not especially effective. That is why we have clustered them by the main foci of each chapter. Taking into account that the three foci that we have commented before are interwoven, there is always a primary one and that is the one we have used to adhere the chapters to one section or another. We show, therefore, three sections focused on 1) general aspects; 2) methodology and education; and 3) technology and digital environment. Each chapter should be considered as a contribution about one of the main foci but which, without a doubt, considers the others.

Contributions on General Aspects of Online Higher Education

The shift towards online learning for higher education has brought forth a number of general issues such as lack of interaction, technical difficulties, and reduced opportunities for hands-on learning. However, the COVID-19 pandemic has accentuated the need for universities to adapt to this mode of education delivery [1]. In response, online

pedagogy and learning methodologies have evolved to address these challenges, such as incorporating more interactive and engaging activities and leveraging learning technologies like virtual reality and simulations [2]. Furthermore, the use of data analytics and educational big data mining has become increasingly important in improving the online learning experience. These technologies allow for the collection and analysis of vast amounts of data about student learning and behavior, enabling universities to make informed decisions about curriculum design, student support, and the use of educational technology [3]. The application of these tools has the potential to enhance the overall effectiveness of online learning and provide a more personalized educational experience for students [4]. These general issues on online learning for higher education are covered by the chapters included in this section of the book.

Contributions on the Methodology and Pedagogical Issues in Online Higher Education

The use of technology and digital tools has dramatically changed the way education is delivered, making it necessary to evaluate the relationship between methodology and education in this context [5]. In online higher education, the combination of these two elements is crucial in ensuring that students receive an engaging and effective learning experience. The development of appropriate and effective methodologies is critical in online education as it directly impacts the quality of teaching and learning outcomes. Furthermore, the use of technology has created new opportunities for innovative methodologies to be employed in online higher education. The goal of these methodologies should be to facilitate active student engagement and interaction, and to enhance the development of critical thinking and problem-solving skills. The chapters that we present in the Methodology and Education section cover some of the key aspects of the methodological and pedagogical issues in online higher education. One of the aspects of online learning that has gained significant momentum, since the end of the Covid emergency, concerns hybrid approach to learning, combining online and face-to-face instructions. This approach not only increases accessibility for students, but also enhances the learning experience by incorporating the benefits of both modalities. Experience-based training activities, such as virtual simulations and hands-on projects, can also enhance the online learning experience and provide students with practical skills that can be applied in real-world situations. Furthermore, empowering soft skills and digital competencies in higher education is essential in preparing students for the digital age. By integrating these skills into the curriculum, students can develop the necessary competencies to thrive in a rapidly changing, technology-driven world. STEAM education (Science, Technology, Engineering, Arts, and Mathematics) is another key concept for our discourse, due to the fact that well-designed online education methodologies can enable particularly effective STEAM education processes [6]. Online learning has revolutionized the way education is delivered and has made education more accessible to a wider audience. However, it has also brought new challenges, such as the threat of social media distractions and cyberbullying, which can negatively impact the learning experience. A number of chapters in this book illustrate innovative applications to counteract social media threats. Finally, as

online education continues to evolve, faculty development programs play a crucial role in supporting the transition to online learning and ensuring that educators are equipped with the necessary skills and knowledge to deliver effective online instruction.

Contributions on the Technological and Digital Issues in Online Higher Education

Technology and the digital environment are a key tool for progress in online learning, online teaching, and online academic management [7]. Let us not forget that, although the usual speech is focused on learning, both teaching and management are key to producing a useful and interlaced ecosystem between all the actors involved in an educational process. We achieve through a well-integrated technology, a reflection of a digital society. And with a digital sensitivity such as the one we enjoy right now in much of the world, we can make use, distribution and production of resources, methodologies, assessments, analysis, predictions, and endless services to actively and positively influence the educational process. Let us not forget that technology is nothing more than a tool, and that what really makes the difference is what we do with it. That is why this section is meaningless without the other two sections, both on methodology and education, and on general and transversal aspects. A good strategy, well implemented, supports any tool. A good technology without a strategy is yet an empty device. The chapters that we present in this section of technology and digital environment talk about significant advances and effective technology-based approaches, such as artificial intelligence, augmented reality, data analysis, digital innovation, and a long etcetera. We should read between the lines to understand that all of them constitute fundamental actors in an online or hybrid environment. Further, and inevitably, they must be applied in a sensitive way, and with educational standards of the highest quality.

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Digital Wisdom Development and Self-reflection of Teacher Candidates

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Abstract. Being digitally wise allows today's students not only to strengthen their natural abilities through existing technologies, but also to respond appropriately to learning networks that are increasingly complex. As a result, it is crucial that teachers and educators continually update and expand their professional knowledge base and improve their practices in order to meet the learning needs of their increasingly diverse students.

The research has been conducted during the academic year 2021–2022 with the participation of 1173 teacher trainees enrolled in the Primary Education Degree Program at the University of Palermo. The trainees carried out their activities through digital tools. Brown and Green's Wisdom Development Scale (2006) tool was used to measure eight factors of wisdom development - across 79 seven-point Likert-type scale items: *self-knowledge*, *emotional management*, *Altruism*, *judgement*, *inspirational engagement*, *life knowledge*, *life skills and willingness to learn*. In addition, some items were selected from the SELFIE for Teachers Tool to help student teachers to review and get feedback on how they are currently using digital tools and technologies for their future profession.

Keywords: Digital wisdom development · Self-reflection · Initial Teacher Education

1 Introduction

Given the increasingly digital nature of our societies, an educational planning that intends to develop the technological competence linked to the concepts of digital wisdom and digital citizenship becomes essential [1].

No doubt that information technology is a fundamental and innovative revolution that has touched human life considerably in the last century, indeed it has just been exploited in all aspects of life, including the educational field [2]. As a result, today's world requires students to have skills, knowledge and abilities in technology, media and information, learning and innovation skills as well as life and career skills [3]. At the same time, the education in this era is expected to obtain graduates who are competent

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in terms of utilizing digital technologies but also competent in literacy, critical thinking, problem solving, communication, collaboration, and have good character quality [4].

On the other hand, the increasing online risks raise ethical questions about how to use digital technologies in a critical, competent and responsible way with users required to engage in processes of moral decision-making online, from observing copyright laws to navigating forms of incivility on social media platforms [5, 6].

This way of experiencing technologies identifies a relationship in which there seems to no longer be the distinction between being connected or disconnected; technologies, in fact, have pervaded our daily life so much that they are invisible. This leads to a reality in which the Internet has changed the way in which knowledge, information and services are produced, consumed and exchanged, also modifying the way of expressing emotions [7, 8]. As stressed by Ferrés & Piscitelli, digital culture therefore requires the development of different skills and abilities, both instrumental and cognitive, intellectual, socio-cultural, axiological and emotional [9].

2 Theoretical Framework

2.1 The Importance of Self-reflection in Teaching

Self-reflection is an ultimate prerequisite and core competency associated with wisdom. According to Weststrate wise people differ from others mainly in terms of why and how they reflect on their past, rather than how much they reflect [10]. Compared to others, wise people engage in an exploratory, self-critical, and non-defensive mode of self-reflective processing that is aimed at deepening their self-insight and fostering a more complex and realistic understanding of human life.

Finlay defines reflective practice as “learning through and from experience towards gaining new insights of self and practice”. All teachers know that self-reflection is an extremely crucial part of the profession as it is the key to their self-awareness. It allows them to look more neutrally at their thoughts, feelings, emotions and actions. Through this practice, teachers and teacher candidates are able to look at themselves with more interest and curiosity by helping to learn, develop, appreciate and understand themselves and their profession [11].

The benefits of self-reflection enable teachers and trainee teachers make sense of their day-to-day experiences, come to decisions, create a course of action to move forward, challenge themselves to switch off from their habitual ways of ‘just doing’, learn from their experiences and crucially take this learning into the future, realise where they may want to develop and improve next time, realise where and how they use their personal and methodological skills and attitude successfully.

Practicing self-reflection can allow teachers to recognize and make changes not only to mature in their profession but also to grow as a person. To this end, as Rieckhoff and her colleagues strongly suggest pre-service, teacher candidates and in-service teachers need tools for self-reflection and strategies to facilitate and understand the context, culture, and identities of their students within the classroom and society [12].

2.2 Digital Citizenship and Wisdom Development in Initial Teacher Education

Today we all interact using various technologies and this interaction has created a digital society that affords its members opportunities for education and social interaction. According to Sillat and his colleagues, while the concept of digital competence was once considered mainly to comprise skills related to computer use, today the concept refers to a wider sense of knowledge, skills, and attitudes that are largely affected by the labor market [13].

Most of today's students are entirely comfortable with technology. However, a minority of them use it appropriately or understand their roles and responsibilities in digital society [14].

Mossberger and Tolbert defines digital citizenship as the ability to participate in society through digital means and depends on aspects including access to technology, digital skills and wider issues of inclusion and inequalities [15]. Numerous digital competency models and frameworks have been developed for different target groups. In European context, most remarkably these include the DigComp Frameworks for Citizens [16]. Moreover, the UNESCO ICT Competency Framework for Teachers. [17] aims to help countries to develop comprehensive policies and standards for teachers. The Dig-CompEdu framework was published late 2017 with the aim of creating standards for evaluating the digital competence of educators in Europe [18].

Promoting Digital Citizenship Education is perceived across multiple countries in the world as the most pressing global challenge of the digital age, over both the tackling of online risks such as cyberbullying and issues of digital divide [19, 20]. Schools are adopting strategies that promote character by encouraging adolescents to engage in conversations about the qualities necessary for using digital technologies as citizens of the digital age. The Council of Europe have provided useful resources to promote both a character and a competencies approach to digital citizenship education [21]. Harrison's analysis of some frameworks shows they all draw implicitly on moral theory [22].

The nine-component framework outlined by Ribble places a strong emphasis on character, virtue and teaching young people to make autonomous decisions [14]. The Digital Competence Framework for Citizens that introduces eight proficiency levels and examples of use focuses on digital literacy and knowledge of technological use but does include netiquette as one of its components [16].

The tension between online risks and opportunities raises ethical questions about how to use digital technologies responsibly, with users required to engage in processes of moral decision-making online. Recently, in the international literature, the term cyber-wisdom is emerging. Cyber-wisdom is the ability to think critically, autonomously, independently and in the moment, when faced with an online moral dilemma.

In this sense, how we can educate children and young people to make free use of the Internet and through making wise moral judgements to utilise its reach and connectivity to improve the lives of individuals and society more broadly [22].

In the digital age, wisdom is broadly understood as "the capacity to realize what is of value, for oneself and others" [23, 24]. The idea behind cyber-wisdom is that internet users are confronted today with the challenging task of navigating a complex environment that provides both opportunities and risks. For this reason, in this digital age, it is essential to provide children with the ability to make decisions online that are

driven by virtues such as honesty and compassion and that enable them to choose the right course of action. Having cyber-wisdom literacy means to understand the nature of multiple virtues online, the ethical dimensions of online opportunities and risk, such as understanding the value of accessing a wide range of information online in ways that are emphasized by virtuous curiosity, while reducing the spread of online misinformation, which is amplified by digital technologies, by sharing or producing content in ways that are honest [4].

To sum up, it is essential to promote cyber-wisdom and self-reflection as these terms refer to the ability to reflect on the moral dimensions of one's own experiences online in ways that are grounded in awareness of one's own biases and how these can clash with the perspectives of others, and the ability to regulate one's own emotions (e.g., when experiencing moral dilemmas online) and to navigate the emotions of others.

3 Methods

This study makes use of an exploratory survey to explore student teachers' awareness of their digital skills and to measure eight fundamental factors in their wisdom development. The focus of the research was decidedly pedagogical: therefore, the main purpose was not to determine statistical averages regarding the dimensions of wisdom, but rather to push for a reflection that could lead in the future to a didactic-educational design which takes into account the pluralistic and conflictual feature of the media system and to enhance students' digital competencies by contributing to their digital wisdom development.

3.1 Sample

During the academic year 2021/22 an exploratory survey was conducted with a sample of 1173 trainee students attending the Primary Education degree course at the University of Palermo (Fig. 1).

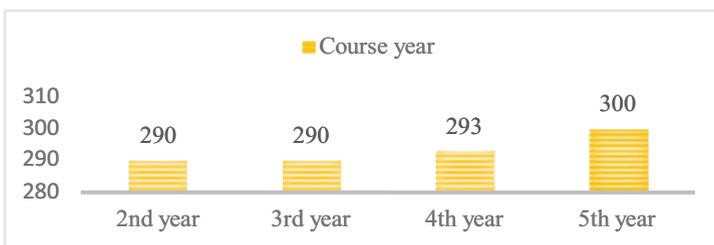


Fig. 1. Participants per course year

4 Data Gathering Tools

The survey was conducted using two tools with different exploratory purposes: Brown and Green's Wisdom Development Scale (2006) and the SELFIE for Teachers tool, which

has DigCompEdu as its reference framework. The survey allowed us to verify the degree of awareness that students have about their digital skills and to measure eight fundamental factors of wisdom development. The choice to integrate these two tools arises from the awareness that developing a wise attitude in the various dimensions of existence can lead to the continuous reflection of one's own practices, a wise person knows how to use technologies to enhance his intelligence, to find the most effective responses to complex problems, doing it with a critical sense, awareness and responsibility towards the effects that the use of these technologies could derive for others.

4.1 Wisdom Development Scale (WDS)

The Wisdom Development Scale (WDS) is designed by Brown and Green (2006) to measure a person's level of self-knowledge, emotional management, altruism, judgment, inspirational engagement, life knowledge, life skills and willingness to learn. In this study, the use of WDS aims at guiding students to reflect in order to promote their maturation and sensitize them to the above stated factors. It describes wisdom, how wisdom develops and the conditions that facilitate wisdom development. Moreover, it aims to investigate what students gain from their educational experiences. Specifically, it measures eight factors that are considered fundamental for the development of wisdom through a seven-point Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (7):

- *Self-Knowledge* describes how well a person knows his or her own interests, strengths, weaknesses, and values.
- *Emotional management* and *altruism* describe a person's deep understanding of a wide variety of people in varying contexts, a genuine interest in learning about others (attentiveness, empathy), the capability of engaging them (various approaches), a willingness to help them, and possession of advanced communication skills that enable one to articulate thoughts in a way meaningful to another person.
- *Judgment* refers to the knowledge that there are different ways of looking at an issue when making key decisions, and that one must take into account a variety of viewpoints, the past, and the present context, as well as one's own background influences.
- *Inspirational engagement* and *life knowledge* are characterized by a capacity to grasp the central issue, find one's way in a time of darkness, and understand the realities and uncertainties of life, over the life span.
- *Life Skills* includes the ability to manage one's daily multiple roles and responsibilities effectively. Life Skills is practical competence, an ability to understand systems and anticipate problems, with tools and strategies for dealing with multiple contexts in life.
- *Willingness to learn* describes a basic humility in what one knows and continual interest in learning about the world.

The WDS can help researchers identify whether individuals are developing wisdom and what intrapersonal factors and experiences are affecting it. It can indicate which types of experiences seem to be most likely to promote the development of wisdom

in all aspects of human activity. These experiences can include school, relationships, community engagement and these factors could help design more integrative and holistic learning experiences.

4.2 SELFIE for Teachers

Designed and launched by European Commission (2021), SELFIE for Teachers Tool aims at helping educators and teachers reflect on how they are using digital technologies in their professional practice. Teachers can use the tool to learn more about the digital skills they have and identify areas where they can develop further [25]. In this study, seven items of the instrument were selected as they are in line with the activities carried out by the trainees in remote mode and therefore essential to bring students to reflect on their practices:

- *Managing online learning environments taking data management and ethics into account.*
- *Using searching and selection criteria to identify digital resources for teaching and learning.*
- *Creating digital resources that support and enhance teaching and learning aims.*
- *Sharing digital content with respect to intellectual property and copyright rules.*
- *Designing, developing and support learning with the use of digital technologies to enhance learning outcomes.*
- *Using digital technologies to foster and enhance learner collaboration for individual and collective learning*
- *Using digital technologies to enhance students' self-regulated learning processes, fostering active and autonomous learning making students more responsible for their own learning, thereby shifting the focus from teaching to learning.*

As a tool and associated reflection process, SELFIE for Teachers is designed to support systematic and transparent development of ongoing practice through reflection, thereby improving student, professional and organizational learning. SELFIE can enable school communities to periodically self-reflect on their progress and help them plan future steps in realizing effective digital-age learning.

5 Results and Discussions

5.1 Wisdom Development Scale

This section analyzes four of the eight factors that the Wisdom Development Scale investigates. Specifically, we wanted to measure a person's level of *emotional management, judgment, life knowledge* and *life skills*. The data collected show high levels of agreement of the respondents with all the factors analyzed. The emotional management factor describes the attention and empathy towards others, how much one is willing to involve and help them. It also investigates the level of emotional management in stressful situations; in the case of stress management, students declare that they are partially able

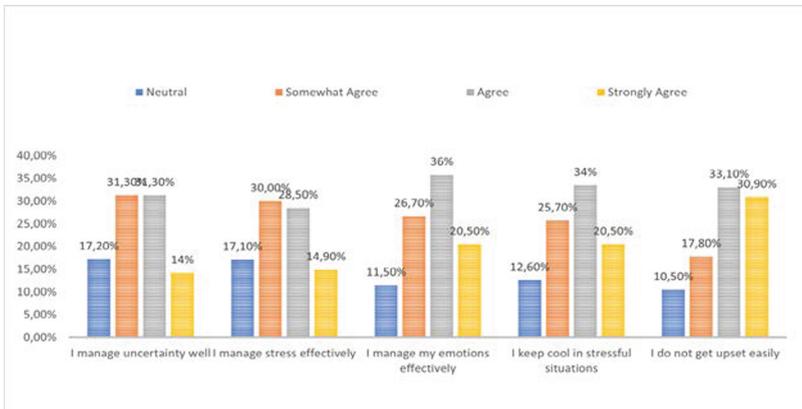


Fig. 2. Emotional Management

to manage it effectively (30%), only 14,9% declare that they strongly agree with the statement presented (Fig. 2).

The altruism factor describes the attitude of openness towards others, the willingness to help and involve them, but also the solidarity we show towards others. Students’ responses show a very strong agreement in treating others with respect (83%), but also in helping others, in accepting and respecting the needs of others. The only claim in which there is a minor agreement is to make amends when one hurts someone, as it could testify to a difficulty in admitting one’s mistakes (Fig. 3).

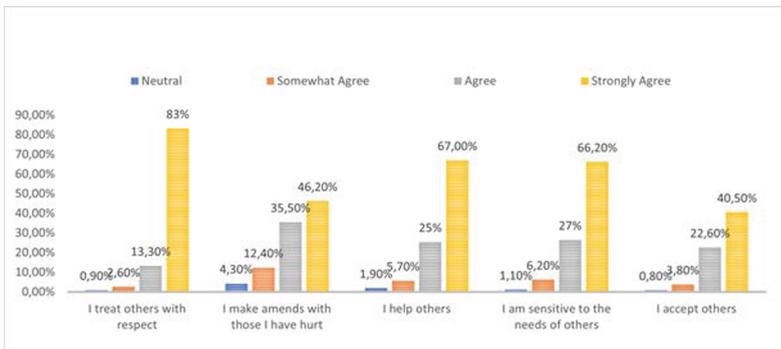


Fig. 3. Altruism

The ability to judge concerns the awareness of knowing how to adapt one’s behavior in different situations and the importance of integrating and applying knowledge in different life contexts. Most of the students are strongly aware of the importance of context when making a decision (51,5%), but report having less awareness of how to behave in a variety of situations (37,40%). Finally, 59% of students declare that they show

curiosity in various life contexts, which presupposes a non-judgmental attitude towards others (Fig. 4).

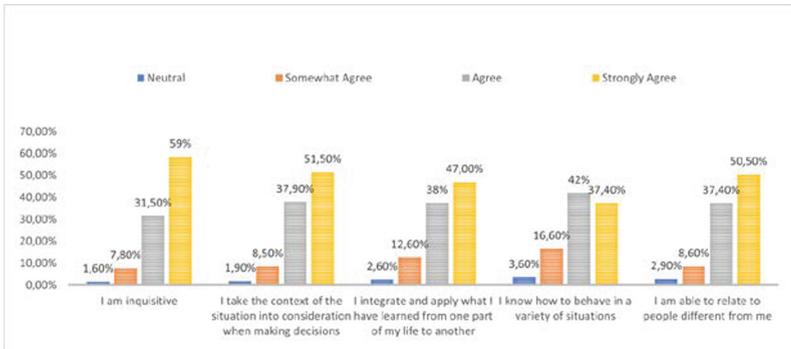


Fig. 4. Judgement

Figure 5 shows the students’ responses to some items of the life knowledge factor. This factor measures the awareness on the uncertainties in life and aspects that cannot be changed. Students report that they regularly reflect on their life (55%), but there is no strong acceptance of life’s uncertainties.

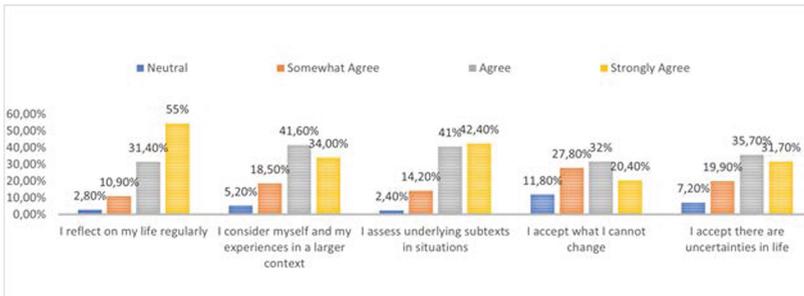


Fig. 5. Life Knowledge

Regarding life skills, 53.9% of students report they have a sense of purpose in life, as it comes with strong agreement in affirmations about achieving their goals (35,80%) and effectively managing time to give priority to their projects (33%). Positive scores are also recorded in making healthy decisions and in the awareness of being multitasking and, therefore, of being able to manage different activities at the same time, maintaining a high level of attention.

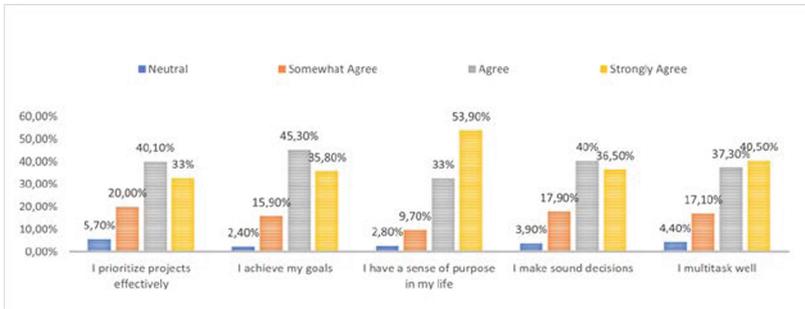


Fig. 6. Life Skills

Wisdom is a complex concept which makes it quite difficult to explore. The items proposed to the students were intended to be a part of a reflection exercise that would stimulate them to reflect on different aspects of their life. Becoming aware in emotional management or judgement, reflecting on life skills and life knowledge has led them to reflect on their past life experiences and will likely lead them in the future to develop reflective thinking in different contexts, even when facing problematic situations in digital environments.

We are aware of the fact that the WDS tool investigates the factors of the development of wisdom, but in today’s society there is a need to investigate the wisdom manifested also in digital environments. Starting from this exercise of reflection, we want to investigate more on the development of a tool that is able to measure the level of wisdom in the different contexts of today’s life.

5.2 SELFIE for Teachers

Through the seven items of SELFIE for Teachers tool (selected from different areas), the students’ opinions on the use of technologies in their practice were collected. These were at the same time the sources of a reflection exercise on the conscious use of technologies.

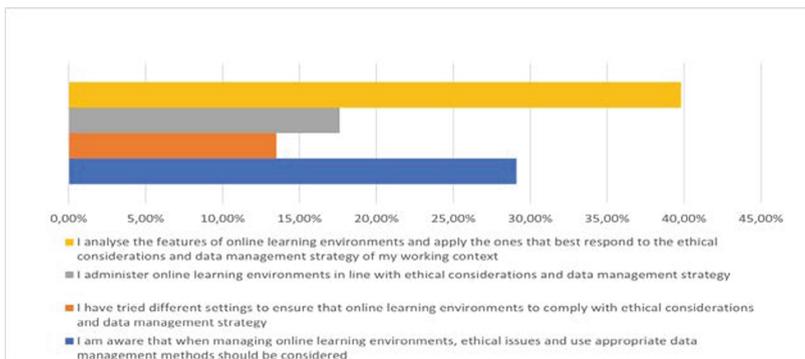


Fig. 7. Professional Engagement – Online learning environments

As regards the management of online learning environments, most of the participants state that they analyze the functionalities of these environments in order to be able to apply in practice those that most reflect ethical considerations. In fact, 39.8% apply data management strategies to promote ethical conduct (Fig. 7).

As regards the search and selection criteria in identifying digital and online resources, students declare that they use different tools and portals to use resources that are in line with the different educational needs (39.7%); however, only a small part (3.4%) indicate to reflect on online searches and then adapt them to different contexts (Fig. 8).

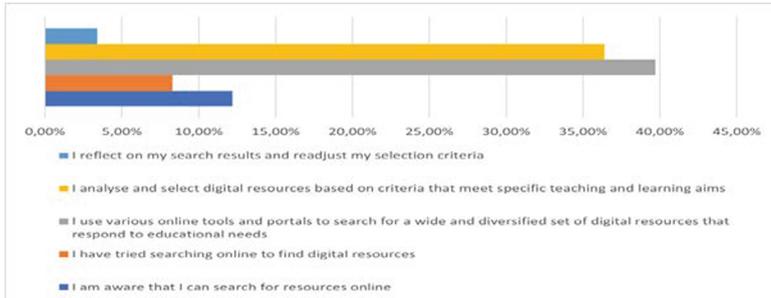


Fig. 8. Digital Resources - Searching and selecting

As for the creation of digital resources to improve teaching and learning objectives, 48.3% of trainee students are careful in selecting the tools that best meet their learning needs. Only a small percentage (6.9%) declare that they pause to evaluate and adapt them based on the feedback received (Fig. 9).

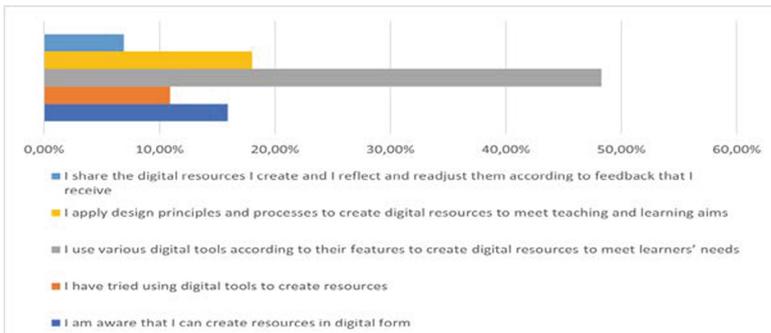


Fig. 9. Digital Resources – Creating

When using digital resources, 41.3% of students are aware that intellectual property and copyright rules should apply to them, but only 10.7% actually state that they apply these rules when sharing digital assets created (Fig. 10).

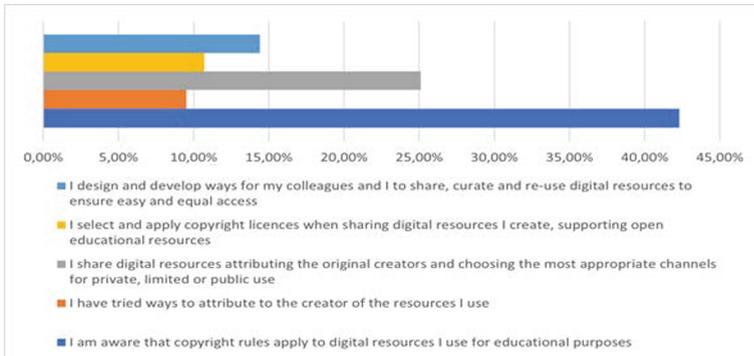


Fig. 10. Digital Resources – Sharing

Regarding the design, development and carrying out of activities with technologies, 38.7% use them to improve the active participation of students, in line with innovative pedagogical approaches, even if there is little reflection and redesign of the on the basis of the results obtained (9.7%) (Fig. 11).

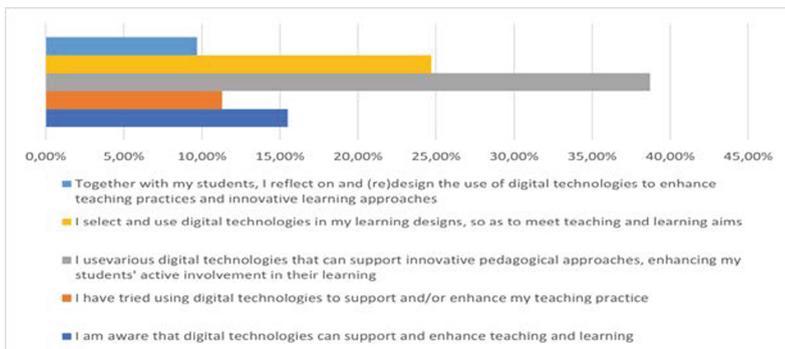


Fig.11. Teaching and Learning - Teaching

40.3% use digital technologies based on their functionalities to foster and support collaborative learning, but only 6.6% reflect on the use of these tools and redesign them for individual or collaborative learning (Fig. 12).

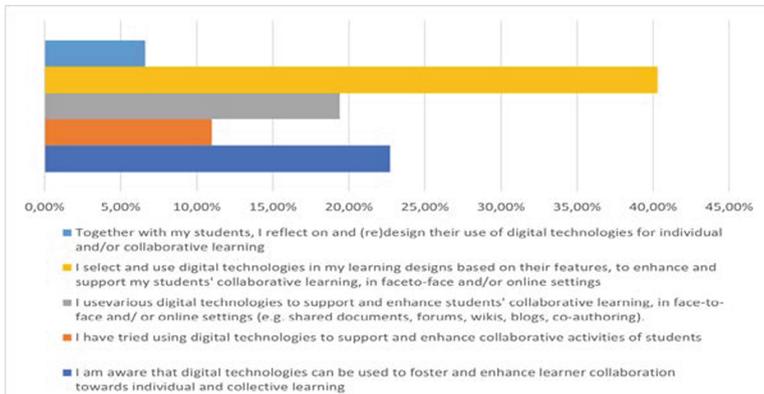


Fig. 12. Teaching and Learning - Collaborative Learning

Finally, 38.4% choose and use digital technologies based on their functionalities to foster self-regulated learning skills (Fig. 13).

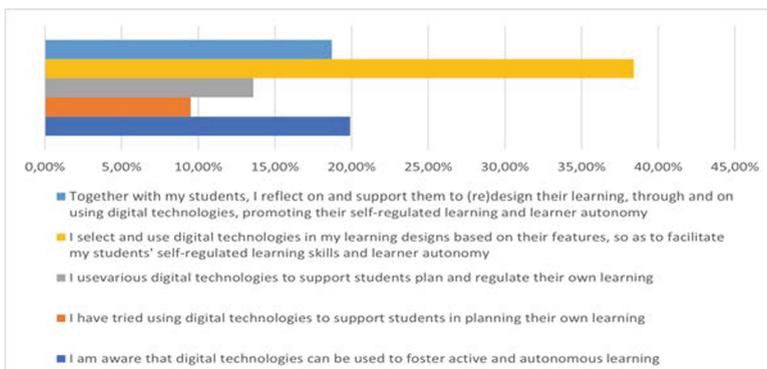


Fig. 13. Teaching and Learning - Self-regulated learning

6 Conclusion

In this digital age, wise students must possess cognitive knowledges and skills that allow them to face the complexities arising from online environments so as to be able to show creativity and critical thinking and be able to recognize the potential of an online resource. Being digitally wise allows not only to strengthen one’s skills through existing technologies, but also to respond appropriately to the challenges of increasingly complex learning.

The challenge that the researchers face is therefore to claim the superiority of the didactic pedagogical model over the technical one inherent in the technological tool, so as to be able to transform digital media into individual and social empowerment tools.

It is essential to offer students skills-based learning that considers citizenship education an essential element to build critical, responsible and ethical citizens who are active and aware inhabitants in the society of the future.

From the theoretical framework and the survey conducted, the need for greater reflection on the ethical implications in the use of technology emerges. Following the exploratory investigation, a crucial question arose whose answer will be the basis of future research. What kind of wisdom do users need to develop in the digital age and how to investigate such a complex construct?

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