



# Report on the testing of the Educational Toolkit

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## Abstract of the report

Over the last few decades, the constant and exponential changes in the society's consumption of information, especially in online environments, have increased the awareness of practitioners from the education and training field, but also of scholars and society representative more broadly, on the need to adopt practices devoted to the promotion of media literacy (ML) and critical thinking (CT) skills among young people.

The Erasmus + KA3 NERDVET project (Think smart! Enhancing critical thinking skills and media literacy in VET) has made it its objective to support Vocational Education and Training (VET) providers with a set of practical tools (Educational Toolkit) for enhancing such competences in their students, who – as it emerged in the project's research phase – are less exposed to such training than their peers in traditional education pathways.

The present document reports on the experimental implementation (i.e. pilot action, hereafter referred to also as piloting or testing phase) of the NERDVET Educational Toolkit and examines the impact in its beneficiaries.

As a whole, 34 trainers and 458 students (306 directly as experimental and 152 as control group) from five different EU countries (i.e. Greece, Italy, Spain, Portugal and the Netherlands) were involved in the testing, which took place between February and November 2022 with varied duration. Prospective statistical analysis evaluated the testing's impact in nearly 400 of the participating students, while qualitative interviews examined the training's lived experience with a group of 15 students and trainers.

The overall testing experience produced satisfactory results in quantitative, qualitative and methodological terms, having fully reached its objectives to:

- implement the developed training techniques, practical exercises and video tutorials in real classroom environments;
- involve role models in concrete activities to maximise impact on the piloting students;
- gather insights on the integration of the training in VET curricula from the grassroots level, which will contribute to ensuring the transferability and sustainability of the model. In this regard, the willingness by the VET providers involved at this stage to consolidate the use of the Educational Toolkit in their current and future training offer, applying it to more classes of students, subjects and contexts, was reported as a promising premise;
- collect feedback from the learners and trainers on the efficacy of the instruments offered by the Toolkit, which were comprehensively deemed as a useful addition both to their training curriculum and daily lives.

Moreover, from a scientific point of view, the quantitative and qualitative analysis of pre/post- measures of critical thinking skills and media literacy of the experimental group, and the comparison with the control group, indicate an increase in these competences after the piloting and confirm the efficacy of the training intervention. The outcomes of this hands-on experience will therefore be crucial in the fine-tuning of the Educational Toolkit, with the ultimate aim of, on the one hand, promoting its widespread use by education and training institutions; on the other, proving the generated societal benefits and the need for a systematisation of the training at local, national and EU framework level.

## 1. Introduction

The NERDVET pilot action sought to test the Educational Toolkit designed by the partnership for the development and enhancement of critical thinking and media literacy skills in the previous phases of the project (namely, Work Package 2 – Development of the educational toolkit for improving students' critical thinking) by

- i) implementing it during training activities,
  - ii) examining the achieved impact
- and iii) evaluating its overall efficacy.

With the aim of giving a detailed account of the experimentation, this Report firstly illustrates the analysis of the state of the art and the theoretical background underpinning the NERDVET model, which is based around three training techniques implemented by means of the practices and exercised included in the Educational Toolkit.

Secondly, the piloting actions carried out by five VET providers from the countries represented in the project (American Farm School - Perrotis College in Greece, ENAIP NET in Italy, Centro San Viator in Spain, Inovinter in Portugal, and VONK<sup>1</sup> in the Netherlands) are presented highlighting their quantitative, qualitative and methodological results.

Thirdly, the full scientific system to assess the impact of the pilot action is introduced, a prospective statistical analysis of the evidence concerning the efficacy of the training in promoting CT and ML is offered, followed by a qualitative study of the lived experience of the participants and their perceptions of the training.

Lastly, based on the previous chapters, the overall results of the pilot action are discussed against the practical experience and theoretical background, providing also some implications for the future of the project and of the NERDVET model.

## 2. State of the art and theoretical background

In the current information-driven society, critical thinking skills and media literacy become a necessity as a key for social participation, civic engagement and equality. However, by vocation, a core part of the VET offer revolves around the provision of technical and practical training to prepare students for the labour market (Sartori et al., 2022). Running through the wide gamut of concerns around information society, there is a motive for scoping out new ways of fostering critical thinking and media literacy by multiple figures orbiting around the VET world (e.g., teachers, trainers, stakeholders, policy makers, academics).

According to the research carried out in the previous phases of the NERDVET project, focused on the involved partner countries and, to some extent, the wider EU context, these figures operate in the absence of formal ways, systematic frameworks or dedicated programs for approaching the training and enhancement of CT and ML skills in their students. The NERDVET review of the available literature indeed reported a certain degree of uncertainty resounding in the lack of a common agreement on how to define critical thinking skills and media literacy, as well as how to address these dimensions in the context of VET. Ultimately, the lack of shared approaches and institutional guides leaves the promotion of such skills to the own responsibility of trainers, teachers and VET providers (Tommasi et al., 2021).

In an effort to overcome this academic and practical fragmentation, allied VET providers and academics have been applying research-based approaches for developing practical tools and sharing knowledge in the VET domain. Such efforts are supported by national and European institutions by providing funding opportunities to boost the cooperation among EU and non-EU countries to address these issues and stimulate a more fundamental change in relation to the identified gap.

Against this framework, the NERDVET partnership firstly worked to identify a shared definition of CT and ML in a cognitive psychology approach, coming to the conclusions that

- *The term critical thinking regards the human meta-cognitive ability to think clearly and rationally about something. Through critical thinking, individuals are able to (a) understand logical connections between ideas, (b) identify and evaluate arguments, (c) detect inconsistencies and common mistakes in reasoning and (d) achieve other fundamental daily processes, such as decision-making, choice-making and so on.*
- *Media literacy is the ability to identify different types of media and understand the messages they are sending. In the context of NERDVET project, media literacy is interpreted as digital and social media literacy.*

Approaching critical thinking and media literacy from a cognitive perspective, therefore focusing on how individuals analyse and understand information and concepts, including those coming from digital media, implies

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<sup>1</sup> Previously known as Clusius College, the project partner underwent a change in their name following a merge with another organisation.

helping them creating connections between concepts, break down information and rebuild it with logical connections, as – in doing so – their understanding of that information/concept will increase.

Transferring these concepts to the educational context, a range of training objectives was ultimately defined: supporting the use of procedures to detect misinformation; enhancing the awareness of cognitive biases; enhancing the individuals' ability to develop personal strategies and procedures to process information objectively and behaving critically in a digital environment.

In a further step, by coupling these cognitive aspects with the previously mentioned factors related to the development of critical thinking in iVET, the following three educational techniques have been identified by the NERDVET project and are the focus of the NERDVET training:

1. Debunking misinformation by using reliable sources.
2. Raising awareness on biases, irrational beliefs and heuristics.
3. Self-nudging.

By means of a training intervention based on such premises and embodied in the NERDVET Educational Toolkit, teachers and trainers from the involved VET providers launched the pilot action to foster a proactive commitment of learners in the processing of information, support the creation of specific individual strategies to critically evaluate information, assessing its reliability, and to create awareness of the risk of irrational beliefs and cognitive biases.

### 3. Results of the Pilot Action

#### 3.1 Quantitative Data

The collection of quantitative data regarding the pilot action in the five involved VET providers has been carried out by means of an ongoing monitoring activity, both during the testing phase, as well as right after its completion. The data included in this chapter draws from the final collected information, comparing it to the key targets foreseen by the project application.

Overall, at partnership level, satisfactory results were achieved as presented in the paragraphs below.

- *Duration of the pilot action*

*Baseline goal: around 6 months*

The pilot actions took place in a timeframe that ranged from 2 to 7 months as, it was deemed more efficient for VET providers to be able to arrange their testing phases in terms of frequency and length of the training during lessons – according to the needs of their students and to the trainers' work programmes.

- *Number of teachers/trainers involved*

*Baseline goal: 30 (at least 6 per VET provider)*

34 trainers (at least 6 per VET provider) took part in the testing of the Educational Toolkit.

- *Number of students involved*

*Baseline goal: 150 (at least 30 per VET provider)*

306 learners (at least 30 per VET provider) were reached in the testing of the Educational Toolkit. Their ages ranged from 15 to 50 years old, depending on the characteristics of the training provision of the partner countries. Out of the total number, 87 adult students were involved in Portugal, due to the challenges (later explained) in reaching iVET learners experienced by Inovinter.

- *Students' control group*

*Baseline goal: 1 control group (number of participants non set) per VET provider*

Each VET provider established a control group, for a total of 152 learners, with the aim to compare the impact of the training on the experimental group.

- *Engagement of role models*

*Baseline goal: 5 (at least 1 per VET provider)*

6 role models (at least 1 per VET provider) were involved, also by exploiting additional, complimentary initiatives, ranging from Social Warning (an Italian project aimed at raising awareness among young people and their parents on the risks linked to the use of internet), to the Peace Journalism Lab (of the Aristotle University of Thessaloniki), to the Global Shapers community in Bilbao (an enterprising platform for young students), to Merkle (data-driven customer experience management company), along with inspiring former students from Spain and the Netherlands.

The following tables present the country-specific data collected by the involved partners.

**Italy – ENAIP NET**

Duration	5 months (February – June 2022)		
Piloting Trainers	Number: 8		
Piloting Students (experimental group)	Number	Training Pathway(s)	EQF Level(s)
	105	Mechanics, graphics, logistics, electricians, car body repair, ICT	3
Control Group Students	Number: 39		
Role Model	Davide Dal Maso – Social Warning		

**Greece – American Farm School - Perrotis College**

Duration	3 months (March – May 2022)		
Piloting Trainers	Number: 8		
Piloting Students (experimental group)	Number	Training Pathway(s)	EQF Level(s)
	30	Agriculture, animal production, agri-food, environmental, sustainable development	5
Control Group Students	Number: 10		
Role Model	School of Journalism and Mass Media Communications of the Aristotle University of Thessaloniki - Anthi Baliou, Peace Journalism Lab member		

**Portugal – Inovinter**

Duration	7 months (April – November 2022)		
Piloting Trainers	Number: 6		
Piloting Students (experimental group)	Number	Training Pathway(s)	EQF Level(s)
	iVET - 22	Health and family care; Hotel industry;	
	cVET - 87	Communication and digital services;	
	Total - 109	Technical English; Soft Skills	2 and 4
Control Group Students	Number: 73		
Role Model	Eduardo Dias – Merkle Inc., AI, Machine Learning and Data Science		

**The Netherlands – VONK**

Duration	3 months (February – April 2022)		
Piloting Trainers	Number: 6		
Piloting Students (experimental group)	Number	Training Pathway(s)	EQF Level(s)
	32	Combination class animal care, equine and livestock	2
Control Group Students	Number: 23		
Role Model	Jesse Drent – Former student and social influencer Giovanni Antkowiak – Equine champion		

**Spain – Centro San Viator**

Duration	4 months (March – June 2022)		
Piloting Trainers	Number: 6		
Piloting Students (experimental group)	Number	Training Pathway(s)	EQF Level(s)
	30	Electricity, metalmechanics	2
Control Group Students	Number: 7		
Role Model	Iratigm Bilbainita – former student Global Shapers community in Bilbao		

### 3.2 Qualitative Data

Besides the quantitative targets set for the pilot actions, shared indications on how to manage the key content and quality aspects of the testing, together with the expected results, were agreed prior to their beginning by means of a specific set of guidelines. In parallel to the rules set as common ground, trainers were still granted a degree of freedom to decide how to transfer the contents of the NERDVET Educational Toolkit to their students. An ongoing monitoring of the testing’s qualitative aspects was carried out by the partners in order to progressively share their achievements, adopted solutions or encountered challenges.

The paragraphs below present, having provided the general reference agreed at partnership level first, which was the collective feedback collected for the considered aspects.

- *Use of training techniques and teaching strategies*

*Baseline goal: each one of the training techniques, a) Debunking misinformation by using reliable sources; b) Raising awareness on biases, irrational beliefs and heuristics; c) Self Nudging, is tested with at least one exercise.*

All three training techniques were tested and the overall feedback reported by teachers and trainers was positive, as they were deemed as useful strategies to involve and engage their learners with a higher level of commitment than average. Experimental students were described as more motivated to ask questions, incorporate different points of view, make connections between ideas, and brainstorm with their peers, thus inspiring their creativity. Some trainers shared an appreciation of the techniques not only for project’s purposes but also for trainers’ development in general.

Some remarks were made on the necessity to provide more practical hints and suggestions on concrete applications of the techniques.

- *Implementation of exercises*

*Baseline goal: at least three exercises, one for each of the proposed techniques, are tested.*

The proposed exercises were, in general, tested successfully and judged as useful and impactful resources for the preparation of the trainers’ lessons. However, the need for adaptations, especially in terms of simplification or the use of classroom content in a reduced form, emerged from all involved partners. Some partners have additionally found ways to thematically modify them to integrate them in the topics of the lessons: the closer the objectives of the exercises were to the general training objectives of the class, the easier they were to carry out. Moreover, other cases of teachers creating their own exercises, taking inspiration from the training techniques, or translating them in their national languages to foster efficacy were registered.

- *Use of the video tutorials*

*Baseline goal: the available video tutorials are used as part of the training.*

Five animations were available for teachers’ use during the pilot action, as the NERDVET partnership decided to wait for the end of the piloting to produce the five remaining ones, so to better understand the needs of the learners, as well as how to make the videos as impactful as possible. The video tutorials unanimously proved to be useful tools to expose topics and ideas for discussion, present visual stimuli to accompany the exercises, as well as to allow brainstorming and debate. The involved trainers have found them to be well designed, clear, and

thought-provoking. They were, in general, appreciated also by the students, despite having to be often accompanied by the trainer's explanation to ensure their full understanding.

- *Assessment of the training activities*

In this regard, some of the involved trainers have chosen more structured methodologies, while others relied on more informal feedback collection procedures in order to assess whether a specific training activity had reached the desired outcomes in the students. Solutions ranged from using group assessment through practical activities and then repeating the process after a period of time to verify the acquisition of methods and procedures, to the creation of ad-hoc short questionnaires, from the direct to the recorded observation of behaviours.

- *Involvement of role models*

Role models are individuals whose story can make an impact and positively influence young people; the role models involved in the testing phase came from varied backgrounds, with successful personal and professional stories, sometimes having had to overcome some challenges in life, helping them grow and become resilient. During and following the testing phase, it was generally agreed that the involvement of role models proved to be very beneficial to support the implementation to the pilot action, specifically in boosting the learners' engagement, widening the discussions and making them more relevant and up-to-date for those involved, opening direct exchanges on hot topics such as biases and risks connected to the learners' online presence.

### 3.3 Methodology

As for the methodology used in the set-up and implementation of the pilot actions in their training centres, this was again left to the partner VET providers to decide, so to accommodate their specific needs and institutional procedures. The following chapter aims to summarise some of the most relevant methodological practices that emerged.

- *Choice of students involved in the pilot action*

A part of the partner VET providers opted for a closed selection of the students reached through their pilot action, aiming to involve those who, for their age or learning needs, could benefit the most from the training. Some of the experimental groups were informed of their inclusion in the testing and some of them were not.

On the other hand, some partners decided not to apply any criteria for the learners' involvement and/or to leave the students themselves the opportunity to manifest their interest in adhering to the piloting after having been informed with communication announcements. This latter choice was positive in terms of motivation and engagement of the participants, but more complex to organise logistically due to their different schedules.

While the majority of the partners was successful in involving iVET students through the presented strategies, Inovinter had to choose alternative solutions, given that the minimum target numbers were not being reached initially. As a result, firstly, young trainees from medium-term courses aimed at the unemployed people (mixed courses for young people and adults) were addressed, and finally, and as the number of trainees continued to be insufficient, short-term adult trainees were chosen in the courses that were being taught by the trainers involved in the project. Despite these challenges, partly depending on external factors<sup>2</sup> influencing the VET provider, the Portuguese experience still proved to be valuable as the use of the Toolkit was deemed to be beneficial also with adult learners.

Control group students, for the nature of the pilot action, were mostly not chosen based on specific factors, bringing together varied groups and thus amplifying the characteristics of the pool of participants.

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<sup>2</sup> Firstly, out of the three iVET courses planned to be involved since 2021, only one of them started, which forced to look for young trainees in medium-term courses. Afterwards, and despite this second strategy, not only were young trainees in small numbers in relation to the intended objective of the project, but in some groups their adherence was weak.



- *Choice of teachers/trainers and supporting staff involved in the pilot action*

As it happened for the involvement of students, partner VET providers either proceeded with an intentional selection of the trainers and teachers part of the pilot action, or opted to include those that openly expressed their interest in the testing after having developed some awareness on it. The latter approach proved to be particularly successful in bringing together professionals that were personally motivated and inclined to provide the NERDVET training in their lessons. Supporting staff (tutors, project managers, administrative personnel from the VET centres) also flanked the teaching personnel in the organisation of the work.

None of the partners reported difficulties in reaching trainers and supporting staff, as the implementation of the pilot action was a shared priority in the context of the project. A common element that emerged from the feedback collection is that all VET providers made sure to keep a good communication flow with the piloting team before, during and after its completion, which allowed for a continuous commitment.

As concerns the training subjects, some partners experimented the Educational Toolkit not only in humanistic subjects (e.g. civic education, national and foreign language, history, etc.), but also in thematic or sectoral subjects – managing to integrate it with the vocation of their students' training pathway.

- *Remedial measures adopted to face challenges in the pilot action*

Overall, the five VET providers having carried out the piloting phase did not report major or systematic problems, challenges or risks internally linked to the implementation of the Educational Toolkit. The partners unanimously agree on the value and richness that the experience brought to their trainers/trainers, students and training centres overall, which is further illustrated in the Qualitative Assessment section of the present document.

However, some lessons were learned in terms of ensuring a successful integration of the Educational Toolkit in training programmes despite hindering factors:

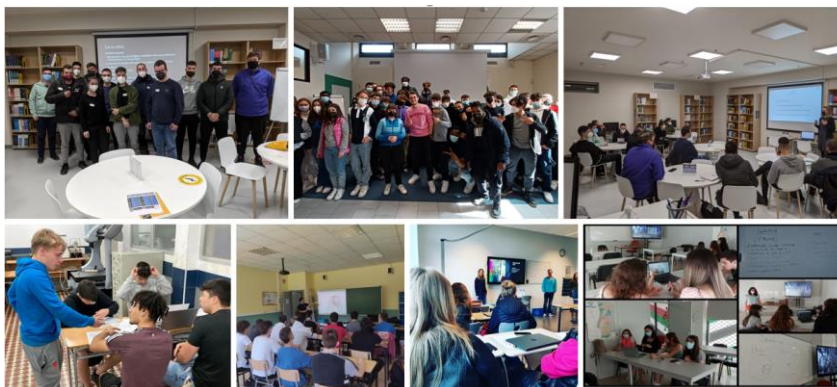
- In the Portuguese experience, the difficulty in reaching young trainees, besides their low adherence to the training courses and drop-outs, may be due to the fact that the project was first presented as something external to the training, which might have been discouraging to them, as they felt that it would not be a "mandatory" activity. What worked best in response to this challenge were the pedagogical strategies adapted by the trainers when adapting the activities to the topics of technical training and the trainees' life experiences. Furthermore, enthusiastic results were achieved via the involvement of adults, who have well received the training, which leads to interesting implications for the NERDVET project overall.
- Some partners had to deal with the structural organisation of their centres' training curricula that, because of the way in which they are provided to teachers, did not leave enough space for the teachers to offer the NERDVET training. An impactful remedial strategy adopted to overcome this was to break down the training in smaller but more frequent sessions, as well as to involve tandems or groups of teachers that could join forces in the use of the Educational Toolkit, thus capitalising their efforts.
- The COVID-19 Pandemic inevitably affected part of the training provision, as the pilot action partially took place as lessons were still carried out online for some of the involved VET providers. Following the needed adaptation of the contents for a remote learning environment, the affected partners were still able to successfully reach their testing's goals.

- *Collection of the best practices and materials experimented among the teachers involved in the pilot action*

As previously mentioned, the NERDVET pilot action did not simply inspire the involved teachers and trainers to adapt the exercises and practices to their students' needs in terms of language used, complexity/deepness of the activity, accordance with their available time. As a matter of fact, by leveraging and building on their pre-existing inclinations and competences, the piloting motivated the teaching group to develop new lessons that they also tested for future use.

Due to the considerable number and variety of format of the produced materials (e.g. lessons' templates, PowerPoints, online resources, physical tools), the NERDVET partnership has decided to store them in a

dedicated archive on its working space, so to make them available for consultation and further exploitation in the following stages of the project.



Picture 1 NERDVET pilot students, trainers and role models in Greece, Italy, Spain, the Netherlands and Portugal.

## 4. Assessment of the Pilot Action

### 4.1 Assessment System

In order to assess the impact of the NERDVET pilot action, it was used the mixed methods approach for purposes of (a) expansion (extending breadth and scope), to allow exploration of multiple levels of influence and (b) triangulation, to assess the extent to which qualitative and quantitative findings corroborate each other (Morse, 2016; Shorten & Smith, 2017). As a result, both a quantitative and a qualitative approach were used, complimenting each other.

The quantitative part had a theoretical and deductive approach: self-report measures (described below) were used to assess the levels of critical thinking skills and media literacy in the involved learners, both before and after the pilot action. Data collected were then analysed in order to find evidence of significant differences between two different survey moments (time 1, pre-training vs time 2, post-training), and two groups (one control group without training and one experimental group of students).

The qualitative part had an inductive structure, as it was meant to examine the experiences and perceptions of teachers/trainers, as well as of the students, who participated in the testing. Data collected were then analysed to explore the experience and find indications for the improvement of the training, as well as to expand the knowledge on the factors contributing to the enhancement of critical thinking skills and media literacy. Quantitative and qualitative data were collected concurrently, analysed independently, then merged and integrated to create the research narrative.

#### 4.1.1 Quantitative Assessment

An online survey protocol including two scales and demographics was first developed. Using the online software “LimeSurvey”, students of the VET centres were invited to complete the survey by their teachers and trainers, before and after the training, involving both the experimental and control groups with similar ages and training courses. The survey took between five and seven minutes to fill in. Analyses have been conducted using SPSS (version 22).

In particular, it was used the California Critical Thinking Scale developed by Facione, Facione, and Giancarlo in 1998, and adapted it to Dutch, Greek, Italian, Spanish and Portuguese. It consists in 27 items on a five-point Likert-type scale (1 = Strongly Disagree to 5 = Strong Agree) and the internal consistency coefficient of the scale was 0.88. The other assessment tool employed was the Self-Nudging Scale, which has been purposefully developed for the NERDVET project. It is a seven-point Likert scale consisting of nine different but connected behavioural-cognitive dimensions for 27 items related to self-nudging for behaving critical, namely:

- a) managing information (3 items),
- b) simplifying information,
- c) reframing alternative information (3 items),
- d) behaving critical explicitly (3 items),
- e) social influence (3 items), d) using alternative strategies,
- f) managing data (3 items),
- g) using self-incentives (3 items),
- h) emotional affections (3 items), and
- i) using self-reminders (3 items) (

The reliability of each scale ranged from .80 to 91.

After the first data collection, the time fatigue and efforts manifested by the students were taken into account, and the scale was reduced from 64 items to 54 by cutting the number of items of the California Critical Thinking Scale (7 items) and the Self-nudging scale (eliminating the scale “using self-incentives”).

### 4.1.2 Qualitative Assessment

A field study has been devised by involving a mix of qualitative data collection and analysis methods, coupling semi-structured interviews with the grounded theory approach (Charmaz, 2008; Glaser et al., 1968). On the one hand, qualitative data collection was considered to conduct an exploratory investigation from the standpoint of the experiences and views of the participants. On the other hand, the grounded theory approach allowed to generate new knowledge by valuing the experiences and narratives of participants. This method has been used in similar research contexts (Tacconi, 2011; Tacconi et al., 2019), since it also helps considering unexpected elements that may occur in qualitative data.

The data collection was carried out via semi-structured interviews to keep the focus on the research object, without a strict structure of questions. As such, this method helped to let participants tell and present their opinions and link episodes and situations that may be relevant for them. Following the principles of grounded theory, the starting reference track was fixed after each interview, with the aim of better investigating the perspectives and experiences reported by the subjects involved (Charmaz, 2008).

Participants were invited via email, and a brief description of the study accompanied the invitation. A total amount of 15 students and trainers were involved in the study. The interviews were conducted via Zoom according to the availability of the interviewees (average interview time,  $M = 35$  minutes, standard deviation 10.23).

### 4.2 Data Analytic Plan

Quantitative data were analysed with independent *t-test* and paired-sample *t-test* in order to verify the alternative-hypothesis of significant difference in pre/post training.

Interviews were audio-recorded and then transcribed at the end of the data collection. For anonymity concerns and analysis purposes, a progressive code was assigned to each phase of the interviews to make each extract traceable. For example, the code [INT004/03] indicates the interviewee number INT04 in the/03 turn of the interview. In the end, data were analysed according to the guidelines of grounded theory as proposed by Charmaz (2008). Sets of information were grouped into categories and sub-categories to systematize the interviewees' contributions to the research focus. The use of codes allowed a continuous analysis and re-categorization of the original interview texts and providing the sketching of a model anchored to the data on which it was built. Such a procedure was administered manually.

## 4.3 Results

### 4.3.1 Quantitative Assessment

With respect to the quantitative part of the assessment, firstly were run descriptive statistics of the involved groups. Table 1 reports the descriptive statistics for each partner at time 1 and time 2 of data collection.

**Table 1,** Samples descriptions at time 1 and time 2 of data collection

	Time 1					Time 2				
	Group		Gender		Age	Group		Gender		Age
	Pilot	Control	Male	Female		Pilot	Control	Male	Female	
AFS – Perrotis C.	12	/	12	/	21	48	9	29	28	20
VONK	50	16	56	9	18.2	50	16	23	3	18.2
ENAIP NET	114	17	113	18	17.2	114	17	113	16	17.2
Inovinter	37	39	26	50	17.3	71	58	33	96	28.5
Centro San Viator	15	11	26	/	18.3	15	11	26	/	18

As first, it was tested the hypothesis assuming significant higher levels of critical thinking skills and media literacy within the experimental group of students at the end of the training, i.e., pre-post comparison, using paired-sample *t*-tests. Secondly, it was tested the comparison between the experimental group and the control group for each partner via independent-sample *t*-test. It were run pre/post- and experimental vs control group comparisons for the variable California Critical Thinking Scale and the Self-nudging dimensions ( $N = 8$ ).

- *Greece*

In respect to the first group of hypotheses, first, students from Greece reported an improvement for the general level of critical thinking ( $t(11) = 4.58, p = .001$ ), plus improvements for the dimensions of self-nudging linked with the behavioural strategies and the management of information in a critical modality. Particularly, students reported higher levels of reframing alternative information ( $t(10) = 2.34, p = .042$ ), behaving critical explicitly ( $t(10) = 2.89, p = .02$ ), social influence ( $t(10) = 3.49, p = .01$ ) and managing information ( $t(10) = 2.3, p = .04$ ).

- *The Netherlands*

Second, students from The Netherlands showed higher levels for all the dimensions of critical thinking and self-nudging scale except for the dimension of reframing alternative with a p-value slightly higher than the cut-off of  $p < .05$ .

- *Italy*

Third, students from Italy reported improvements as well. Participants of the training program resulted to have higher levels of critical thinking ( $t(98) = 2.85, p = .001$ ), and the self-nudging dimension of simplifying information ( $t(95) = 1.95, p = .03$ ), b) social influence ( $t(94) = 2.34, p = .01$ ), managing data ( $t(94) = 2.96, p = .002$ ), and emotional affections ( $t(94) = 2.86, p = .003$ ).

- *Portugal*

Fourth, students from Portugal reported to have similar results with higher levels of critical thinking ( $t(36) = .43, p = .001$ ), and self-nudging dimensions of simplifying information ( $t(30) = 3.19, p = .003$ ), social influence ( $t(29) = 1.97, p = .05$ ), using alternative strategies ( $t(29) = 5.05, p = .001$ ), managing data ( $t(29) = 2.56, p = .02$ ) and emotional affections ( $t(29) = 2.23, p = .03$ ).

- *Spain*

Lastly, students from Spain showed improvements in critical thinking ( $t(14) = 1.75, p = .004$ ), and managing information ( $t(13) = 1.77, p = .05$ ), simplifying information ( $t(13) = 1.35, p = .03$ ), and reframing alternative information ( $t(13) = 1.03, p = .02$ ) for self-nudging.

Such improvements are related to the fact that students attended the training, because the comparison with control group reveals that participants of the training program had higher levels of critical thinking and media literacy when compared to participants of the control group, i.e., second group of hypotheses. This appears for

each partner with no exceptions. Although not all the control groups had a sufficient number of participants to be compared with the pilot training group, the independent *t*-test revealed small (i.e.,  $p = .05$ ) to higher (i.e.,  $p = .001$ ) significant differences with improvements of critical thinking and self-nudging dimensions.

- *Greece*

Students from Greece reported a significant difference for the improvement in critical thinking ( $t(67) = 3.48, p = .001$ ), in managing information ( $t(67) = 1.78, p = .04$ ), and in using alternative strategies ( $t(67) = 2.18, p = .016$ ).

- *The Netherlands*

In The Netherlands students the differences of improvement were significant in critical thinking ( $t(40) = 1.14, p = .04$ ), in managing information ( $t(40) = 1.54, p = .05$ ), and in using alternative strategies ( $t(40) = 2.27, p = .014$ ).

- *Italy*

In Italian students, all the dimensions examined reported significant differences with the control group: critical thinking ( $t(98) = 2.91, p = .001$ ); managing information ( $t(95) = 2.28, p = .001$ ); simplifying information ( $t(94) = 1.95, p = .026$ ); reframing alternative ( $t(93) = 2.03, p = .002$ ); behaving critical explicitly ( $t(95) = 2.45, p = .001$ ); social influence ( $t(94) = 2.34, p = .011$ ); using alternative strategies ( $t(95) = 2.05, p = .002$ ); managing data ( $t(93) = 2.96, p = .003$ ); emotional affections ( $t(95) = 2.86, p = .002$ ).

- *Portugal*

Significant differences among the groups of Portugal students were found in critical thinking ( $t(139) = 1.64, p = .03$ ), managing information ( $t(127) = 1.49, p = .006$ ), behaving critical explicitly ( $t(127) = 1.86, p = .04$ ), social influence ( $t(127) = 1.11, p = .004$ ) and emotional affections ( $t(127) = 1.53, p = .05$ ).

- *Spain*

In Spanish students, all the dimensions examined reported significant differences with the control group: critical thinking ( $t(24) = 2.56, p = .009$ ); managing information ( $t(24) = 3.08, p = .003$ ); simplifying information ( $t(24) = 3.14, p = .002$ ); reframing alternative ( $t(24) = 3.27, p = .002$ ); behaving critical explicitly ( $t(24) = 3.29, p = .002$ ); social influence ( $t(24) = 2.54, p = .009$ ); using alternative strategies ( $t(23) = 3.23, p = .002$ ); managing data ( $t(23) = 3.28, p = .002$ ); emotional affections ( $t(23) = 2.79, p = .005$ ).

#### 4.3.2 Qualitative Assessment

Regarding the qualitative part of the assessment, four main aspects were investigated in the analysis, namely:

- 1) quality of the Educational Toolkit,
- 2) effectiveness of the Educational Toolkit,
- 3) contents of the Educational Toolkit,
- 4) integration of the Educational Toolkit within VET curricula.

- *Quality of the Educational Toolkit*

Participants' opinions on the kind of societal changes and technological transformation stressed the crucial role of having a critical thinking mindset and, consequent behaviour, in daily life. Among the views of the interviewees there is a certain degree of consensus over the positive experience with the Educational Toolkit, linked with a positive perception of it. Some participants reported their moral and pragmatic concerns with regards to the information-driven society, highlighting and stressing the importance of being aware of one's own irrational beliefs and cognitive biases, and the crucial importance of using reliable sources. Some participants (both students and trainers) emphasized the relevance of the opportunities offered by the use of the Educational Toolkit in the classroom, as the consequences of living in an information-driven society affect not only public environments - e.g. school, work, etc. -, but also the private sphere.

In more detail, participants evaluated the Educational Toolkit as qualitatively good and relevant. However, there were some specific concerns coming from trainers on how to translate the teaching strategies in practical activities in their classes. Accordingly, some teachers reported how they had to adjust the training's exercises and practices according to their students' needs and level of school advancement. By means of example, since

the Educational Toolkit's exercise were developed by a group of trainers from different partner organisations, it was easier for teachers and trainers to use the strategies developed by their own organisation, rather than employing those from other partners. Despite this, the trainers used similar practices or re-adapted the already existing ones, which indicates that this issue has not compromised the quality of the pilot action.

- *Effectiveness of the Educational Toolkit*

Participants gave relatively high and positive judgments on the use of the Educational Toolkit. Moreover, they showed a shared view of training activities realised by the teachers and trainers and addressing the students. Particularly, students and teachers indicated how the skills developed were not limited to the classroom activities as they a) proposed a general definition of critical thinking and b) students reported how they applied some of the techniques in their daily life, out of their classrooms.

First of all, teachers and trainers of all the partner organisations agreed on the importance and the linguistic meaning of having a critical thinking mindset and good levels of media literacy. They defined it as “the set of skills of an individual which allow them to deal with the information driven society without incurring in flawed and erroneous choices” leading to “avoiding getting lost”. Such a result, although it partially echoes the definition of the academic literature, is particularly crucial for evaluating the effectiveness of the training, as trainers have been able to foster the students’ capacity to offer a personal perspective on the content of the training. Secondly, this results in the long-term application of the techniques developed outside the classroom. Accordingly, students reported how they have applied this way of thinking and behaving in their daily life (e.g., when debating with peers or looking for information).

- *Contents of the Educational Toolkit*

Teachers reported that debating in the classroom and raising awareness of cognitive biases and prejudice is very interesting and stimulating. Indeed, the debating activity has been the one most frequently used by teachers to sharpen students’ critical thinking skills and media literacy. Some teachers and trainers, for example, created two groups with the task of confronting around a specific topic where two different positions can be sustained. During these activities, students made arguments concerning possible irrational beliefs, cognitive biases and the use of reliable sources. As such, the debates were more based on the students’ ability of debunking arguments of others rather than on the use of good rhetorical way of presenting arguments. Despite these positive results, students as well as teachers and trainers reported some ways in understanding the notion of self-nudging, asking for a clearer description of the training technique and the related exercises.

- *Integration of the Educational Toolkit within VET curricula*

One of the most interesting aspects reported by teachers, trainers and students was the fact that all agree on the importance of integrating the NERDVET training into VET curricula. They actually reported how useful it was for them to have the possibility to debate and think about the different ways through which they could make incorrect choices and assumptions due their own irrational beliefs, biases or when trusting unreliable sources. For most of them, it was quite surprising to understand how easy it can be to make poor decisions. Accordingly, they suggested that VET programs should entail at least 1-2 hours per week to develop and continue their “critical thinking” training. This is both for improving students’ skills and also to make them feel engaged and active, as well as fostering their sense of participation in civic life.

## 5. Conclusions

### 5.1 Commentary on the results of the pilot action

Having thoroughly presented in the previous chapters of the present report all the actions performed in the organisation, implementation and monitoring of the pilot action, its outcomes can be summarised as follows:

- *Quantitatively*, the achieved results meet and, in some cases, exceed the targets foreseen by the NERDVET project proposal in terms of students, teacher/trainers and role models reached.
- *Qualitatively*, the piloting experience allowed to extensively test the training techniques, exercises, practices and video tutorials proposed in the Educational Toolkit in a real classroom environment. The gathered feedback was articulated and overall positive, with crucial remarks for adaptations or improvement to be used in the subsequent phases of the project.
- *Methodologically*, the pilot action provided insightful inputs on how to implement the Educational Toolkit, highlighting good practices to operationalise its integration in VET curricula and to be transferred to other peers or educational institutions.

### 5.2 Commentary on the assessment of the pilot action

In summary, the aim of the piloting's assessment system was to

- 1) find evidence of the effectiveness of the training developed via the partner collaboration of the NERDVET project and tested during the pilot action
- 2) gather knowledge on the usefulness and impact of the Educational Toolkit
- 3) identify possible academic and practical implications.

As previously mentioned, for the quantitative component of the assessment, students of the pilot group reported small to largely significant differences for most of the investigated dimensions, with post-training dimensions having significant higher levels than those of the pre-training. Such improvements can be read as a consequence of the pilot action, as the comparison between control and pilot groups for the post-training dimensions revealed significant differences too. That is, provided that the experimental and control groups of each partner have completed the same questionnaire and at the same time, the control groups showed significant lower levels in the dimensions considered when compared to the pilot group. This also indicates an improvement in the students of the pilot group, which appears as a positive effect of the training.

Quantitative results echo in the qualitative part of the assessment, with indications about what worked well and why. Particularly, teachers, trainers and students who participated in the interviews showed a certain level of satisfaction with the activities of the training. Intriguingly, these results are in line with those of the pre and post comparison and the "control vs pilot group" analysis, according to which most of the students demonstrated higher levels of critical thinking and self-nudging dimensions of behaving critically and the management of complex information.

Students expressed in different terms the quality and relevance of the training: for the most part, they reported how they were implementing training activities in their daily life after the training. This means that, indirectly, the students were not only focused on the activities at school, but also that teachers and trainers have been able to foster their capacity to behave critically even in private situations. Lastly, teachers and trainers found the training activity itself interesting and relevant, also in the possibility that the Educational Toolkit gives to support students in their critical thinking beyond the testing that was carried out within the NERDVET project.

### 5.3 Implications of the pilot action

The pilot action of the NERDVET project was conceived in order to allow the partner VET providers to test the Educational Toolkit on the field, with the ultimate aim of assessing its effectiveness, exploitability, and performance overall. Such a hands-on experience provided the needed conditions for the project partners to

form a detailed vision on, on the one hand, what works well in the Educational Toolkit; on the other, on what should be reviewed, improved, adapted. In other words, the pilot action will have important implications for the upcoming phases of the NERDVET project (namely, Work Package 4 – Validation and Upscaling), which will lead to the validation and further validation of the Educational Toolkit.

Still, as it has been argued throughout this report, the participants' opinions gathered both by means of the standard piloting monitoring, as well through the formal assessment system, are clear and uniform in reporting positive judgements on the NERDVET training experience. All the project partners are indeed already looking to systematise the use of the Educational Toolkit in the upcoming training years, applying it to more classes of students, subjects and contexts.

As a matter of fact, expressing it in different ways, all actors (teachers/trainers, students, supporting and project staff) directly involved in the piloting have stated that the NERDVET model, embodied in the Educational Toolkit, should be systemically integrated in the curricula of their training centres and, furthermore, be taken up by any other interested VET or traditional education provider. More than that, offering such a training should not be left to the individual drive of teachers/trainers or VET providers, but the necessary political framework should be provided through a top-down process, to which the NERDVET bottom-up initiative aspires to contribute.

The positive experience made with the pilot action has only strengthened the belief in the NERDVET project partners that it is of paramount importance to continue their work to raise awareness on the need to integrate training on critical thinking and media literacy in training programmes, pushing for a mobilisation of policy makers and stakeholders at local, national and EU level.



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## ANNEXES

### I. Templates used for the quantitative assessment

Questionnaire for the quantitative assessment of the piloting phase

2022

Authors

Francesco Tommasi, Università di Verona

Andrea Ceschi, Università di Verona

Riccardo Sartori, Università di Verona

Dear participant, welcome

By completing this questionnaire, it will be possible to investigate some specific individual aspects regarding critical thinking skills and media literacy. This questionnaire is part of the NERDVET project, an Erasmus KA3 involving seven partners from six European countries which aims at proposing an educational toolkit for the enhancement of critical thinking and media literacy in the context of initial vocational education and training. For more information on this research, please consult the NERDVET website at [www.nerdvet.eu](http://www.nerdvet.eu).

In the following sections, we will ask you some questions about your status and your perception of your critical thinking skills. The answers are anonymous and cannot be traced back to either the email or the name and surname you used to register. The request of your name is necessary to verify the completion of the questionnaire. The databases of names and results are disconnected, so it is not possible to trace the answers given starting from the identifier. The questionnaire may take less than five minutes. We recommend answering the questions quickly, to fill in the answer that first comes to your mind and to read the meaning of the answer categories very carefully. For this research we are interested in your own opinion, there are no right or wrong answers. You can interrupt the compilation every time and delete your answers. Moreover, you can interrupt and continue the survey at the other moment. We would like to emphasize again that your answers will be treated confidentially. No name is attached to the responses, so the questionnaires are anonymous. Furthermore, the answers cannot be viewed by other people in your organization. We thank you for your contribution to the research. If you are ready continue by pressing the Next button.

Note that all personal information we retain will be subject to the Regulation (EU) 2016/679 (General Data Protection Regulation) in the current version of the OJ L 119, 04.05.2016; cor. OJ L 127, 23.5.2018. To view the full text of the privacy statement, click <https://gdpr-info.eu/>.

Please, report here your information:

Gender	
Age	
Nationality	
Email	

Please, indicate your agreement to the following statements from 1 to 7 (chose only one option)

1	2	3	4	5	6	7
Totally disagree	Disagree	Partially disagree	I don't know	Partially agree	Agree	Totally agree

1	It bothers me when people rely on weak arguments to defend good opinions.	1	2	3	4	5	6	7
2	Before giving an answer, I always focus on the question first.	1	2	3	4	5	6	7
3	I value my ability to think with great clarity.	1	2	3	4	5	6	7
4	If there are four views in favor of, and one view against an argument, I would tend to side with the four favorable opinions.	1	2	3	4	5	6	7
5	Other individuals appreciate my intellectual inquisitiveness and research-oriented personality.	1	2	3	4	5	6	7
6	I act as if I were rational, while in fact I am not.	1	2	3	4	5	6	7
7	I find it easy to organize my thoughts.	1	2	3	4	5	6	7
8	Everyone, including myself, generally engages in debates and arguments out of self-interest.	1	2	3	4	5	6	7
9	When confronted with a big and important decision, I first try to collect as much information as I can.	1	2	3	4	5	6	7
10	Being open-minded means not knowing what is right and what is wrong.	1	2	3	4	5	6	7
11	It is important for me to understand what other people think on various subjects.	1	2	3	4	5	6	7
12	All my beliefs must have a solid and tangible basis.	1	2	3	4	5	6	7
13	People generally say that I am too hasty when taking decisions.	1	2	3	4	5	6	7
14	It is impossible for me to be impartial when discussing my own opinions.	1	2	3	4	5	6	7
15	I admire my own ability to present creative choices and solutions.	1	2	3	4	5	6	7
16	It is important to try to understand the thoughts/opinions of foreigners.	1	2	3	4	5	6	7
17	My curiosity is one of my greatest strengths.	1	2	3	4	5	6	7
18	I always seek information that supports my views, while avoiding those that contradict my views.	1	2	3	4	5	6	7
19	I really enjoy trying to understand how everything works.	1	2	3	4	5	6	7

20	Developing an open view about a problem at hand should always be a first priority.	1	2	3	4	5	6	7
21	My opinion of controversial subjects is generally shaped by the last speaker.	1	2	3	4	5	6	7
22	Regardless of the circumstances, I am always interested in learning more about a subject.	1	2	3	4	5	6	7
23	The best way to solve a problem is to ask for the answer from someone else.	1	2	3	4	5	6	7
24	I am described as having an orderly and systematic approach towards complex problems.	1	2	3	4	5	6	7
25	Having an open mind towards different world views is less important than what people actually think.	1	2	3	4	5	6	7
26	Others express their opinions, but I am not interested in listening to them.	1	2	3	4	5	6	7
27	I am good at developing orderly plans for resolving complex problems.	1	2	3	4	5	6	7

1	I organize my work place in such a way that I have everything I need (or at hand)	1	2	3	4	5	6	7
2	When I study or work, I intentionally place distracting things out of sight/	1	2	3	4	5	6	7
3	I am used to keep my tools for working and studying in the same place where they are supposed to be /	1	2	3	4	5	6	7
4	I create rules of thumb to manage complex activities	1	2	3	4	5	6	7
5	I translate complex information into a plain language when I have to deal with complex decisions	1	2	3	4	5	6	7
6	I map the information to aid me in my work or study tasks	1	2	3	4	5	6	7
7	I actively try to take different perspectives to an important decision I have to make	1	2	3	4	5	6	7
8	I try to think about multiple options to solve a problem	1	2	3	4	5	6	7
9	When I have a problem, I think about the consequences before acting	1	2	3	4	5	6	7
10	When I do have an on-going project, I monitor my progress to stimulate my motivation	1	2	3	4	5	6	7
11	I keep track of my progress to keep me coherent with my plans	1	2	3	4	5	6	7

12	I do constantly update those tools which help me to keep track of my progress (i.e., CV, personal diary, notes)	1	2	3	4	5	6	7
13	I do ask my colleagues/co-workers for feedback on my activities	1	2	3	4	5	6	7
14	When I have to deal with new activities, I let me inspire by expert colleagues/co-workers	1	2	3	4	5	6	7
15	In co-working tasks, I look for collaborations with expert colleagues/co-workers	1	2	3	4	5	6	7
16	I try to adopt a routine to support me in reaching my goals	1	2	3	4	5	6	7
17	I avoid those habits and routines which do harm my plans	1	2	3	4	5	6	7
18	I am not open to changing my habits and my lifestyle even though they could harm my plans	1	2	3	4	5	6	7
19	When I have to make a decision at work, I group arguments in favour and against.	1	2	3	4	5	6	7
20	I use a checklist of the steps I have to undertake to solve long activities	1	2	3	4	5	6	7
21	I list all the activities that I do before acting in a complex situation	1	2	3	4	5	6	7
22	I set small daily rewards for myself to stimulate me in reaching my work goals	1	2	3	4	5	6	7
23	I tend to not give myself a reward if I do not reach my goals	1	2	3	4	5	6	7
24	I give myself a reward if I do reach one of my goals	1	2	3	4	5	6	7
25	I use reminders and prompts to remind me of scheduled work tasks	1	2	3	4	5	6	7
26	I commit myself to reaching my goals by setting deadlines.	1	2	3	4	5	6	7
27	I use a well-planned agenda to remind me all the daily activities.	1	2	3	4	5	6	7

*Note. The short version does not include the items 1, 4, 5, 10, 12, 14, 15, 18, 20, 21, 24, 25 and 27 for the CRT and items 22, 23 and 24 for the Self-Nudging scale.*

## II. Template of the semi-structured interview for the qualitative part of the assessment

For teachers/trainers:

1. (About the training) How did it go?
2. How were the students? Did they feel engaged?
3. Which was/were the most challenging aspects of the toolkit?
4. Which was/were the best activities of the toolkit?
5. Which was/were the best feedback/outputs that you received?
6. Did the training work?
7. What would you suggest?

For students:

1. (About the training) How did it go?
2. Did you feel engaged? Did you enjoy the activities?
3. Which was/were the most challenging aspects of the toolkit?
4. Which was/were the best activities of the toolkit?
5. Have you applied the toolkit strategies out of the school? If yes, can you describe it?
6. Did the training work?
7. How do you define critical thinking and media literacy?
8. What would you suggest?