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SPECIALTY SECTION

This article was submitted to
STEM Education,
a section of the journal
Frontiers in Education

RECEIVED 01 April 2022

ACCEPTED 18 July 2022

PUBLISHED 06 September 2022

CITATION

Barelli E, Tasquier G, Caramaschi M,
Satanassi S, Fantini P, Branchetti L and
Levrini O (2022) Making sense of youth
futures narratives: Recognition of
emerging tensions in students'
imagination of the future.
Front. Educ. 7:911052.
doi: 10.3389/educ.2022.911052

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Making sense of youth futures narratives: Recognition of emerging tensions in students' imagination of the future

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In this era of great uncertainty, imagining the future may be challenging, especially for young people. In science education, the interest in future-oriented education is now emerging, research needs, however, to keep eyes on youngsters' future perceptions and on the development of a *future literacy*. In this article, starting from a sample of individual students' narratives about their future daily life in 2040, we aim to delineate which ways of grappling with the future can be observed in the essays and which methodological tools are suited to operationalize their identification and characterization. The analysis led to the definition of "polarization" and "complexification" attitudes that represent the ways in which the students' narratives are positioned with respect to a bunch of dichotomies: personal–societal, functional–aesthetics oriented, good–bad, natural–artificial, and certain–uncertain. Moreover, with this study, we provide a contribution to the methodological reflection that deals with the collection and analysis of data, when students' future perceptions need to be investigated. Discussing the limits of the current data collection tool, we introduce the design of a SenseMaker® questionnaire which contributed to feeding a collaboration with #OurFutures project, recently launched by the European Commission to collect future narratives all around Europe.

KEYWORDS

science education, *futures literacy*, secondary schools students, agency, sensemaking

Introduction

In this era of threatening societal challenges, the issue of how the youngsters perceive the future is becoming of paramount importance. Even before the COVID-19 pandemic, we were already in a period that sociologists called the "society of uncertainty and acceleration" (Rosa, 2013), in which communities were experiencing profound and accelerated changes that, as Rosa states, led to a situation of disorientation. As the Italian sociologist Carmen Leccardi argues (2009), the acceleration of social rhythms

has produced, in everyday life, a widespread cult of urgency capable of eroding the possibility of control by individuals, forced to measure themselves against an epochal trait of uncertainty and ungovernability of the future. The relationship with time has therefore profoundly transformed and is changing the way individuals construct their daily experiences. Indeed, this is also combined with the perspective raised by the South Korean-born Swiss-German philosopher Byung-Chul Han, who said that we are experiencing a society flatted on the present where “we are individuals afloat in an atomized society, where the loss of the symbolic structures inherent in ritual behavior has led to overdependence on the contingent to steer identity” (2019, p.11). About the importance of rituals, Han argues that “they represent for the time what the house is for the space” (2019, p.12), but the current accelerated and consuming society is progressively losing them. He continues saying that the absence of rituals also has wicked consequences on how humans relate to each other and with objects. Indeed, if rituals let humans be users and take care of their relationship with people and objects, in this accelerated society where we are losing these caring practices, the relationships of humans with others, and the objects become only in terms of consumers (Han, 2022).

Contemporary sociologists and philosophers are warning of a discrepancy in time, where the future has disappeared and the supremacy of the present, as well as the consumption of the contingency, is deeply affecting not only individuals’ daily life but also our relationships as humans (Gancitano and Colamedici, 2018). For example, as a society, we are facing a widespread phenomenon of polarization that touches, among others, the political, ideological, and behavioral dimensions. Even facilitated by the inherent mechanisms of social media interactions (Del Vicario et al., 2016), people are increasingly led to perceive “Us” in opposition to “Them”, this resulting in a threat to social cohesion and democracy (McCoy et al., 2018; Baldassarri and Page, 2021).

A fundamental contribution to the management of uncertainty of the future comes from the so-called *Futures Studies*. As Barbieri (1993) describes, since the late 1970’s, at a time of energy crisis, Futures Studies has outlined a new modality to address the problem of decision-making and facing the future. This discipline was not interested in predicting specific events, but in pointing out alternative ways to imagine the future. Specifically, the Futures Studies approach consists of a methodical examination of possible, probable, and preferable futures starting from a certain current condition, to open multiple possibilities toward the future.

Educational research has manifested a strong interest in understanding how to provide the young generation with

abilities for imagining their future, in a manner that supports different ways of acting in the present with an eye on the horizon. This interest has grown not only within academic institutions: no-profit organizations, like Teach the Future (TTF¹), have been established with the goal to introduce Futures Studies into education, preparing next generations with future-thinking skills and supporting educators in the process of teaching but also science education research tried to accommodate the Futures Studies approach to future thinking within STEM disciplines’ teaching and learning (Carter and Smith, 2003; Jones et al., 2012; Paige and Lloyd, 2016; Branchetti et al., 2018; Levrini et al., 2021a,b).

A recent Horizon2020 project called FEDORA (Future-oriented Science EDucation to enhance Responsibility and engagement in the society of Acceleration and uncertainty, Grant Agreement no. 872841) was established with the intention of conveying research efforts to foster youngsters’ ways of coping with images of the future through science education. Indeed, it was highlighted that a strong misalignment in the school system exists between the a-temporal or historically oriented teaching approaches and the need to support the young to construct visions of the future that empowers actions in the present.

The study presented in this article is situated within the FEDORA project and aims to explore students’ perceptions of the future. In particular, we aim to unpack two critical issues that previous studies in science education brought to light (Levrini et al., 2019, 2021a): (1) the “polarization attitude” toward socio-scientific issues (SSI) and complex themes; and (2) the “bubble effect.” The “polarization attitude” is manifested when students, also dealing with SSI, tend to reduce the dynamics between the individual and collective dimension to its extremes, either a mere personal/individual issue or a social-big issue. As per the “bubble effect,” the pandemic situation emphasized both the relevance of daily life and school rituals as ways to manage anxiety toward the future and the tendency to search for comfort zones through the activation of special personal and social routines and rituals that “close the systems” around the individual, rather than opening toward other societal actors (Levrini et al., 2021a). Moreover, we desire to give a contribution to the methodological reflection that deals with the collection and analysis of data with this study, when students’ future perceptions need to be investigated, in particular, we aim to understand which modality used to collect data can best suit avoid push the students, also indirectly, to emphasize a polarized situation.

¹ www.teachthefuture.org

Theoretical framework and background

This work builds upon three theoretical backgrounds: (1) the study referring to the definition and recognition of *future-scaffolding skills* (FSS) (Levrini et al., 2021b); (2) the study about the phenomenon of the Present-shock analyzed by the lenses of science education (Levrini et al., 2021a); and (3) the sociological constructions of the society of performance and the palliative society (Gancitano and Colamedici, 2018; Han, 2021).

The concept of FSS was coined and operationally defined within the Erasmus + project I SEE — Inclusive STEM Education to enhance the capacity to aspire and imagine future careers.² The project, inspired by the sociological construction of the society of uncertainty and acceleration (Leccardi, 2009; Rosa, 2013), touched upon the great difficulties encountered by young people in imagining their futures. As one of the main outcomes of the I SEE project, some operative markers were identified and defined to describe the change in students' perception of the future, as well as to recognize the development of FSS, which are extensively described in Branchetti et al. (2018), Levrini et al. (2019), Levrini et al. (2021b) and Tasquier et al. (2019). FSS is intended as skills to construct visions of the future that support possible ways of acting in the present with an eye on the horizon. They consist of structural skills, which represent the abilities to recognize temporal, logical, and causal relationships; build systemic views; and dynamical skills, which represent the abilities to navigate scenarios, relating local details to global views, past to present and future, and individual to collective actions (Levrini et al., 2019, 2021b; Tasquier et al., 2019).

Other parallel studies in science education born within the I SEE project (Rasa and Laherto, 2022; Rasa et al., 2022) have pointed out the fact that development in science and technology can have great desirable and undesirable societal implications. This issue is at the core, for instance, of research in STSE – science, technology, society, environment (e.g., Bencze et al., 2020), SSI – socioscientific issues (e.g., Zeidler et al., 2005), and the various visions of scientific literacy (e.g., Sjöström et al., 2017). However, despite those fields exploring large holistic, value-centered approaches to evaluating technoscientific issues related to environmental aspects toward decision-making (e.g., Sadler et al., 2007; Tasquier et al., 2022), they omitted to explicitly address future thinking.

As Rasa et al. (2022) argue, technology is deeply connected to young people's fears and future views (Carter and Smith, 2003) and also to their hopes for sustainable futures (Cook, 2016). Indeed, the technological dimension deeply influences young' sense of future and agency and, thereby, it has important implications for future-oriented science education.

As a follow-up of the I SEE project, the study on the Present-shock (Levrini et al., 2021b) aimed to investigate students' perception of time induced by the pandemic and to create a new baseline to reflect on the role of science education in supporting the young as they navigate through fast-changing space-time structures. The study, elaborating on the sociological dichotomy between alienation from time and time re-appropriation (Rosa, 2010, 2013) from the perspective of science education (Levrini et al., 2015), coined and defined the construction of the Present-shock as that feeling, emphasized by the pandemic, of re-appropriating the meaning of daily rituals and perceiving a new sense of directionality. The survey about whether young students were really re-appropriating their time and how such reappropriation looked like unveiled an interesting phenomenon: school science tends to create “bubbles of rituals” that detach learning from societal concern.

The third and final backgrounds used for this part-study concern the sociological constructions of the society of performance and the palliative society (Gancitano and Colamedici, 2018; Han, 2021). Gancitano and Colamedici recently assert that we are living in a society where each person is forced to have a performer's public and inauthentic image, which they must build and enhance, and which could be either their salvation or their ruin. In this kind of society, working time and free time are no longer really separated, and this makes it impossible to have a true contemplative life, to make choices that are free. The entanglement between the working space and the free time forces the transformation of the sacred space related to the personal space into a public space. But, above all, into a merely and banally shared space. This does not represent a real sharing that should be characterized by the ability of entering together within a community that shares values and meaning, but it is rather the transformation of daily moments into moments of apparent value. This social, cultural, economic, and political system provokes two major reactions: performance anxiety and a sense of guilt. More recently, the Korean philosopher and sociologist, Byung-Chul Han, argued in his recent publication how today's society is terrified by suffering. The fear of pain appears to be so pervasive and widespread that people are forced to give up even personal freedom in order to avoid suffering. According to Han, the risk is closing ourselves in reassuring fake confidence that turns into a cage, because it is only through pain that we open ourselves to the world. The search for removing and denying the pain in front of an apparent sense of calm, self-realisation, and happiness, ensures people's capacity to perform and induces them to focus on a more private, introspective, and psychological relationship with the self instead of thinking at the collectivity and addressing any critical societal issues. Those two sociological constructions are in line with the phenomenon of the creation of isolated bubbles observed and analyzed in the Present-shock study.

² www.iseeproject.eu

Research questions and method of analysis

Framed within the studies outlined in the section above, the present study aims at answering the following Research Questions:

RQ1) What pattern can be observed in students' narratives about the imagination of the future?

RQ2) What methodological tools can be outlined to operationalize the identification and characterization of these patterns?

The data and the methodology through which we addressed these questions are outlined below.

Data and data sources

The data considered for the analysis were 223 individual essays. They were written by students, aged between 17 and 19 y.o., during the courses for university orientation organized by the Department of Physics and Astronomy of the University of Bologna from 2018 to 2021 within the PLS project (National Scientific Degrees Program, *Piano Lauree Scientifiche*). The topics of these courses were scientific, that is, *Climate Change*, *Simulations of Complex Systems*, *Artificial Intelligence*, *Seismic Risk*, and *Quantum Computing*. Consent forms were signed by all the students or their legal guardians, depending on the students' age. In writing the essays, the students followed the task of describing an ideal day in the future in twenty years. The tasks were refined throughout the years but the general structure could be summarized as follows:

“Imagine a winter day in 2040 and try to think about where you would like to live. Describe in a few lines (about half a page): (i) the place where you imagine you live; (ii) the kind of life you are leading; (iii) the types of problems that you, in your daily life, in your community of people and, in general, in your society are discussing and/or facing; (iv) the possibilities and new opportunities you can seize; (v) the technology, objects, the house, the city and the environment that surround you; (vi) the type of social life you lead.

Complete the following sentences: (i) A dream I have is. . . ; (ii) My ideal city includes. . . ; (iii) My ideal world includes. . . ; (iv) My main fears and concerns are. . .”

Analytical approach

Given the sample and the research issues, we opted here for a semi-qualitative methodology of data analysis rooted in

Grounded Theory (Glaser and Strauss, 1967). As part of this, a *thematic analysis* was carried out across all data sources (Braun and Clarke, 2006; Nowell et al., 2017). In particular, we assumed the approach of *reflexive thematic analysis* where a mixed inductive/deductive approach is used, combining both data-driven clusterings – coming from a bottom-up analytical process made on the essay – and theoretical hypothesis – merging and corroborating results coming from related research (Braun and Clarke, 2019).

From Grounded Theory, we derived the guiding principle for the immersion into data in all the stages of the analysis: the starting point was not a purely coding procedure but an iterative process in the search for *sensitizing concepts* (Glaser and Strauss, 1967; Charmaz, 2003). In this way, the researchers got attuned to the participants' perspectives, hence enabling themselves to capture and describe students' worldviews and narratives about the future, so as to guide further rounds of increasingly structured implementations. Coherently with the methodological framework of reference, the data were analyzed through an iterative process that included bottom-up debriefing phases designed to identify emergent themes and generate interpretative ideas.

To reach an acceptable level of internal validity, the analysis was conducted through a triangulation process that, in line with recommended practices (Anfara et al., 2002), included member check and peer debriefing with researchers in science education and some collaborators of the network. In particular, the group of analysis was composed of a core group of four scholars who dived into the analysis and a group of external scholars, among which the other authors of this contribution, who guaranteed the other levels of triangulation and checking. In the next paragraph, all the methodological phases are described and discussed.

Methodological phases

Essays organization and pre-processing

Data analysis started with a process of data organization and cleaning. A database has been constructed, into which all essays have been collected, anonymized, and pre-processed, in order to obtain a list of 223 word file documents. At the end of this step, they did not contain sensitive information that could allow tracing back to the authors and were ready to be analyzed. The documents were named in order to keep track only of the year and month when the essays were written, the gender of the authors (as declared by students themselves in the application form), and the PLS course they attended (a generic name is like Sxyz_year_month_course_StudentGender.docx and a real example could look like S004_2018_FEB_AI_M.docx). All essays (text only) are available in an official and public dataset.

Preliminary reading and immersion into data

After MC skimmed 50 essays randomly picked up from the dataset, she suggested the reading of 5 essays – particularly rich (i.e., touching many dimensions requested by the task, fairly long, detailed, and well-articulated) – to the research group, composed of 9 independent readers. Three of these essays were by females and two by males who attended the PLS course on *simulations of complex systems* in 2021. The readers brainstormed a list of macro-areas (technology and science, nature, relationships, emotions, time, routines, and rituals) and a list of transversal perspectives (e.g., individual/collective, static/dynamic vision) that were not only touched by the students in the essays but also emerged as an important point in reading the literature, as stressed in the theoretical frameworks. These macro-themes and perspectives have been shared as initial lenses through which to focus the following phases of analysis.

First analytical phase

The first analytical phase was based on the hypothesis that polarization attitude could occur when the themes or the perspectives mentioned above were touched in an essay from a single, specific perspective, depicting, in fact, a polarized image of the future. For this reason, the aim was to explore better how the macro-themes were manifested into the data. We performed a qualitative analysis of 44 additional essays (stratified according to gender, years, and courses). From this stage, the analysis team was restricted to 4 researchers who

first worked independently and then discussed together to triangulate their results. In this phase, we annotated into an Excel file how the different sentences of the essay matched the macro-themes and transversal perspectives previously sketched (ref paragraph preliminary reading). The main result of this phase was an analytical grid structured in macro-themes, sub-themes, and perspectives, schematized in **Figure 1**. The combination of top-down and bottom-up approaches led to a rather complex structure of themes and sub-themes. The macro-themes extend our initial categories into: “Science and Technology,” “Nature,” “Relationships,” “Relationship Role,” “Emotional states,” “Emotional Factors,” “Time, Routines and Rituals,” “Values,” and “Otherness.” Most of them contain sub-themes: for example, we found “technology and/or science for personal use” and “science and technology as a job” as sub-themes of the first main theme. Also, a sub-theme of “Otherness” is the “subject’s attitude in judging against others.” The grid also presents transversal perspectives, such as individual, collective, agency, or devolution, which can be transversal features of many themes.

The essays analyzed through this tool seemed to show different structural patterns. For example, there were essays in which the coding was grouped into one or few themes and others were very spread. However, this categorization of essays into vertical and transversal ones resulted ineffective for our purposes because it could not directly capture our theoretical ideas of polarized and complexified attitudes.

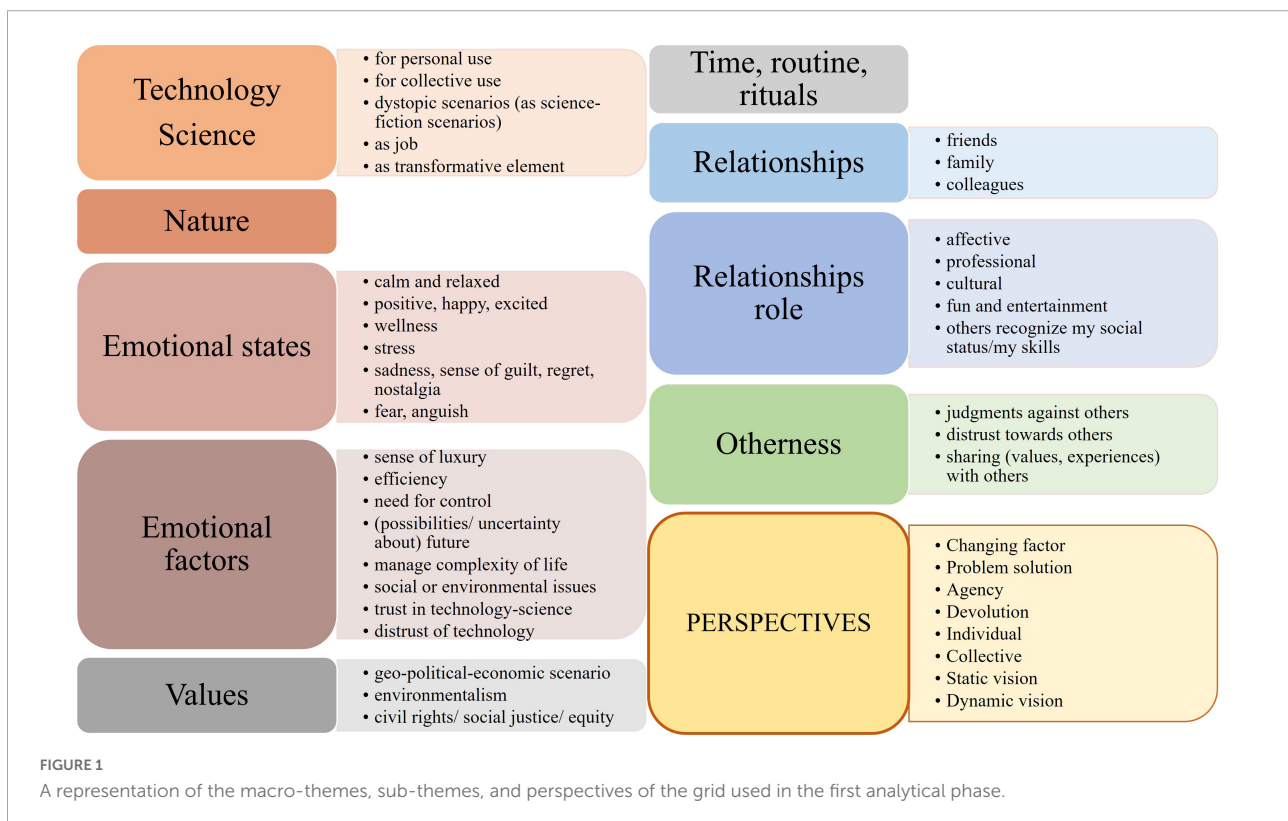


TABLE 1 Set of dichotomies (columns) as projected onto the macro-areas (rows).

		Dichotomies				
		Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Macro-areas	Science and technology	Personal use of S&T - Societal use of S&T	Humans rule on machines - Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
	Relationships	Self-centred circle of family and friends - Societally-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
	Emotions	Self-determined - Societally-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially induced emotions	Need for control - Refusal of control
	Time and space routines	Self-determined - Societally-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
	Occupation	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

Second analytical phase

At this stage, the analyzers felt they were sufficiently immersed in data, but still not capable to distinguish if an essay could be considered as an example of text containing a polarized attitude or complexified attitude. This was because some essays were markedly polarized over many themes, while other essays seemed to touch many themes but without giving a marked orientation for all of them. Here, the second analytical phase started, the results of which we will describe in the Data Analysis and Results section.

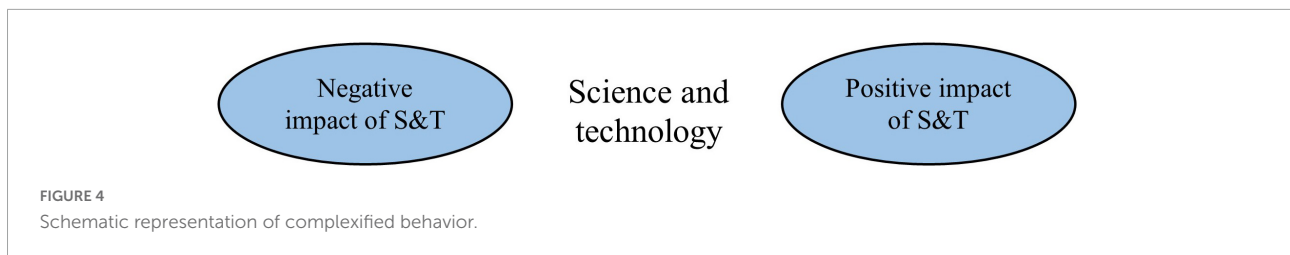
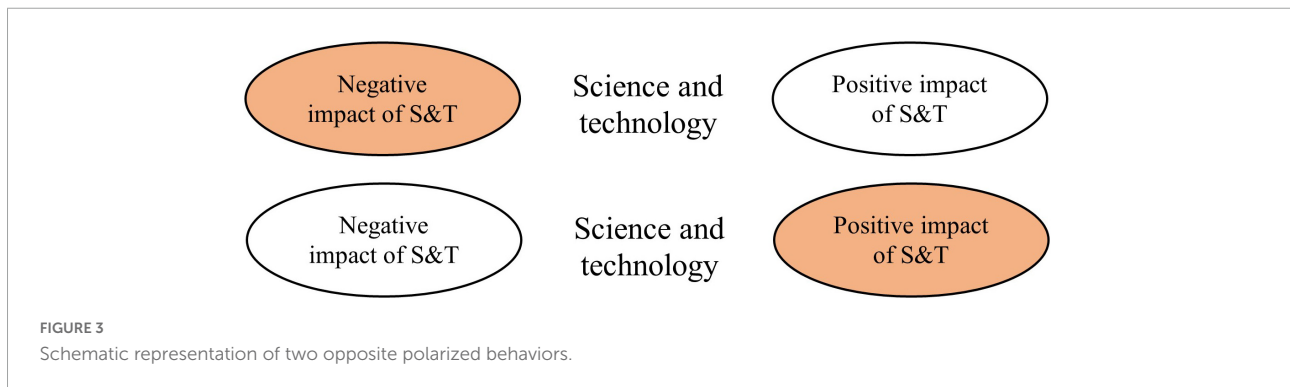
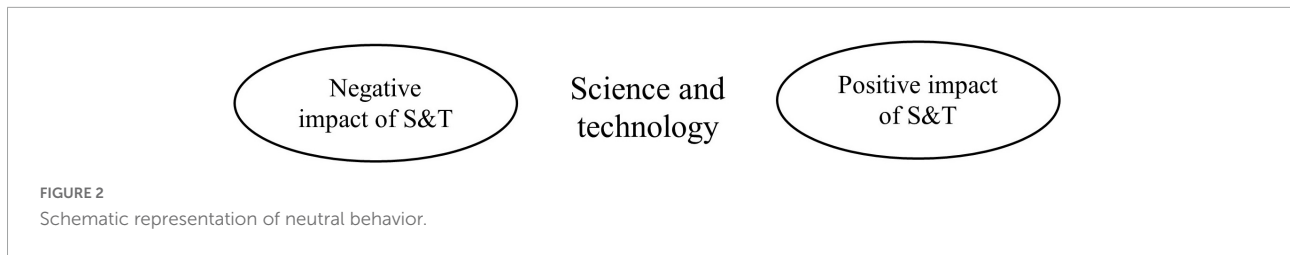
Instead of looking for themes and their sub-themes to construct a grid as we did in the first analytical phase, we went directly in search of the polarized or complexified attitudes not only over the different *themes* but also over a set of *dichotomies* that represented alternative ways of looking at a particular issue. The dichotomies were listed through an iterative process of data analysis that progressively enlarged the empirical base up to the reach of saturation. They are formulated as couples of poles, i.e., opposite, very generic adjectives that do not contain any reference to the specific themes. The five dichotomies have been identified are personal–societal, functional–aesthetics oriented, good–bad, natural–artificial, and certain–uncertain.

However, to analyze the essays, these general dichotomies were not enough. Indeed, we needed something closer to what the students actually mentioned in their essays, but at the same time, we wanted to avoid the risk of a too precise mapping that made us lose the possibility of observing the polarized or complexified attitudes of the students, as we did

in the first analytical phase. To do that, we reconsidered the previously identified themes and reformulated some of them arriving at the following set of macro-areas: vision of science and technology, relationships, emotions, time and space routines, and occupation. Then, we realized that all the dichotomies could be projected onto each macro-area to obtain specific dichotomies that were closer to the data and ready to be used to look at the students' essays. For example, the personal–societal dichotomy, when projected onto the science and technology theme, became a dichotomy that contrasted a personal use of science and technology and a societal one; when projected onto the theme of relationship, the personal–societal became a counterposition between a restricted circle of people around oneself versus societally oriented relationships. The complete list of the specific dichotomies obtained from the projection of the general ones onto the macro-areas is reported in [Table 1](#).

Once we obtained the area-specific dichotomies, we were ready to see how the students' essays embodied them. From previous readings and analyses, we expected, for each specific dichotomy, to find three possible behaviors, schematically represented in [Figures 2–4](#):

- **Case 1 - Neutral:** The students do not mention explicitly any pole of the dichotomy or touch them in an inconsistent way ([Figure 2](#)).
- **Case 2 - Polarized:** The students position their description on one pole of the dichotomy, ignoring or explicitly rejecting the other ([Figure 3](#)).



- **Case 3 - Complexified:** The students “keep the dichotomy alive” including in their description a tension between the two poles without a collapse on only one of them (Figure 4).

To analyze the essays, we used a table identical to Table 1 for each student, in which we added a column to take note of whether the student wrote about a macro-area or not. If a polarization was observed over a certain dichotomy (case 2), we colored the cell in orange; if otherwise a complexification was observed, we marked it in blue (case 3); the cell was left white in case of neutral behaviors (case 1). In a separate file, we reported a general synthesis of the essay and the specific sentences that made us recognize the dichotomy and the related polarized or complexified behavior.

From the resulting tables, we could observe several patterns. There were essays markedly polarized (orange) or complexified (blue) over several macro-areas and several dichotomies; others that projected the same general dichotomy on all macro-areas and others that mixed complexified with polarized behaviors. To give back a picture of the multiplicity of students' attitudes with respect to the macro-areas and the dichotomies, we chose 4 essays to be analyzed in detail. We report them in the Annex, while we discuss our interpretation in the Findings section.

Findings

To construct the narrative of polarization and complexification, we chose four profiles that well represent the variety of students' essays. Of the 12 essays analyzed with the grid in Table 1, we selected four that represent the two types of behavior observed in the data, i.e., polarization and complexification. Two case studies will be analyzed in detail, with precise references to the students' words, one as an example of polarization and the other as complexification. After this detailed presentation, two further cases will be presented as other possible manifestations of the phenomena. This will allow us and the readers to enrich the empirical basis on which defining the polarization and complexification behaviors.

Lucy: A case of polarization

The first essay considered was written by S113 (in the following we will name her Lucy), who attended the course on Quantum Computing in February 2019. Below, all findings emerged from the analysis of Lucy's essay will be described and visible in Figure 5.

S113_2019_FEB_QC_F	Macro-area mentioned (1) or absent (0)	Dichotomies					
		Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain	
Macro-areas	Science and technology	1	Personal use of S&T - Societal use of S&T	Humans rule on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
	Relationships	1	Self-centred circle of family and friends - Societally-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
	Emotions	1	Self-determined - Societally-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially induced emotions	Need for control - Refusal of control
	Time and space routines	1	Self-determined - Societally-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
	Occupation	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

FIGURE 5 Polarized and complexified dichotomies found in S113 essay's analysis.

In the essay, all the macro-areas are touched by the student and are intertwined throughout the whole story.

The pace of the narrative is marked by a very precise temporal rhythm that follows the pace of the day with a precise description of daily rituals. The protagonist of the story is the student's "personal and health assistant," named Bobby, that helps its owner in all the routine aspects and mediates her needs for control in the routine, as well as the emotional aspects. The role of the assistant is related to the personal life of its owner and it only improves it.

The emphasis on the personal dimension of the future imagined by the student (as opposed to the societal perspective) and on the optimistic and positive attitude toward it sketches the two prevalent and coherent dichotomies that we recognized in Lucy's essay.

Concerning the personal–societal dichotomy, as already mentioned, the presence of Bobby – named the *personal* assistant – reflects a vision of technology as something devoted to responding to individual needs. Indeed, this is confirmed by the absence through the essay of any implication of technology on society at large. Moreover, the assistant also gives back a picture of the relationship between humans and technology, where machines are always conceived as something at the service of humans, functional for the exploitation of everyday actions, and guarantors of personal support and well-being.

Bobby is her "guardian angel" that "refreshes her memory of what she needs to do at work," cooks the lunch for her, and welcomes her home "with a blanket and a cup of tea." The personal emphasis is also well-evident not only in the use of technology but also in the self-determination of daily rituals, careers, and emotions, which excludes any reference to society at large and to the surrounding community. The openness beyond individual issues is only present when Lucy mentions her relationships with her inner circle of friends and colleagues, where she finds contexts to discuss relevant societal issues ("I really missed him a lot, but above all I missed talking to him: you can go from politics to bloopers in a very short time, and never lose significance. In particular, we start talking about the current political situation in Italy, our country of origin, which is more fragile than ever in this period").

About the good–bad dichotomy, the essay is strictly centered on the "good" pole across all macro-areas. Technology is never problematized but is a herald of positive implications only ("In the driveway I find Bobby [...] I thank him and as I throw myself on the bed I think he has been the best investment in recent years"). Job is experienced with a deep sense of accomplishment and satisfaction of continuous successes. Relationships are experienced by her in an extreme harmony and throughout daily routine, she reports only positive emotions ("I get up smiling and thinking that finally a new day has arrived arm in arm

S220_2021 FEB_SC_M	Macro-area mentioned (1) or absent (0)	Dichotomies					
		Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain	
Macro-areas	Science and technology	1	Personal use of S&T - Societal use of S&T	Humans rule on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
	Relationships	1	Self-centred circle of family and friends - Societally-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to- face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
	Emotions	0	Self-determined - Societally- determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially induced emotions	Need for control - Refusal of control
	Time and space routines	1	Self-determined - Societally- determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
	Occupation	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

FIGURE 6 Polarized and complexified dichotomies found in S220 essay's analysis.

with new opportunities and possibilities,” “I fall asleep, finally, thinking that tomorrow is a beautiful new day”). This optimistic view of life seems to be triggered by a satisfied need for control over the uncertainties and contingencies of life to which the personal assistant responds.

David: A case of complexification

The second essay considered was written by S220 (in the following we will name him David), who attended the course on Simulations of Complex Systems in February 2021. The macro-areas and dichotomies found in David's essay are visible in Figure 6.

Almost all the macro-areas are touched by David, only the emotional level is not addressed. Stylistically, the essay does not have a structure of the daily routine's narration but rather follows – also graphically through the division of paragraphs – the list of issues suggested by the task (see above paragraph “Data and data sources”). However, the time and space dimensions are an important part of the student's picture of the future even if his description overcomes an idea of time as bounded by routine constraints and time boxes, which is very typical of other essays. Hence, we recognize in David

an example of the possibility of overcoming the certainty–uncertainty dichotomy in relation to time. In particular, for this macro-area, this is represented by the complexification of the opposition between a strict stay within a very fixed and determined routine (fixed pole) and the vagueness and blurry perception of time in the future (vague pole). Indeed, David recognizes the intrinsic difficulty of imagining the future due to many variables that can occur [“It is difficult to say how my day will be organized since I do not know the schedules of what my work will be, certainly, there is that most of the time I will have lunch in the company of friends/colleagues (if the work will occupy both the morning and the afternoon) and probably often have dinner in the company of someone.”]. Also in the technological macro-area, David imagines a future in which humans are able to live in an extraterrestrial space thanks to scientific advancements and discoveries and people's trust in it. Rather than something certain, static, and pre-determined, he describes these changes as an open scenario that he problematizes over many perspectives (e.g., ethical and juridical, technical, scientific, and technological research).

Remaining on the technological macro-area, he also overcomes the natural–artificial and the functional–aesthetics dichotomies. Specifically, the presence of technology throughout the whole essay is mitigated by the importance given to the natural pace of life and vice versa (“I imagine

the house is of medium size, just over 100 m² at most, and precisely in the province and therefore in a situation of all things considered tranquility, but home automation is certainly present in my idea of a future home.”). Moreover, the value and power of science and technology are neither limited to the functional solutions of everyday issues (functional pole) nor the contemplation of useless instruments (aesthetical pole) but are perceived as something valuable for pursuing both the pleasure of knowing and concrete outputs of research (“The opportunities that I most easily imagine will be presented to me are international research projects, however, if you really need to think big, you could also imagine having the opportunity to study some physical phenomena in space”).

Another form of complexification can be recognized when David describes his relationships in the future scenario. Indeed, he imagines a rich spectrum of people around him that does not include only people similar to him, with his same interests and values, but also diverse people that he could encounter during his life (“I imagine a very active social life, I don’t take it for granted that I will have a partner but I don’t even exclude it, in my circle of close friends I don’t only see people with the same interests as me but also those who are my current friends.”). In this way, we interpret his vision as an example

of complexification, because both the poles of personal-social dichotomy are considered in his view.

In summary, the open, balanced, and complex vision permeates the whole essay. This is exemplified by the presence of affirmative sentences, then mitigated by others like “but it could go in another way.”, “but I do not exclude I would. . .”, “but I don’t know. . .”, and “but I don’t take it for granted”. However, this inhabitation of the dichotomy does not make the essay sound problematic nor struggled from an emotional point of view: the student seems to experience well the openness described.

Enlarging the span of cases of polarization and complexification behaviors

After having analyzed two case studies in detail, we want to show two further examples to show how polarization and complexification attitudes can be displayed differently in the various essays. In **Table 2**, we give a graphical overview of the four selected cases.

TABLE 2 Overview of the selected cases of polarization and complexification.

Macro-area	S113_2019 FEB_OC_F	Macro-area mentioned (1) or absent (0)	Dichotomies				
			Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Science and technology	1	1	Personal use of S&T - Societal use of S&T	Humans role on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
Relationships	1	1	Self-centred circle of family and friends - Socially-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
Emotions	1	1	Self-determined - Socially-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially-induced emotions	Need for control - Refusal of control
Time and space routines	1	1	Self-determined - Socially-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - Routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
Occupation	1	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

Lucy. Example of polarization over all the macro-areas with a prevalence of the dichotomies of personal-social and good-bad (female)

Macro-area	S111_2018 FEB_AI_M	Macro-area mentioned (1) or absent (0)	Dichotomies				
			Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Science and technology	1	1	Personal use of S&T - Societal use of S&T	Humans role on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
Relationships	0	1	Self-centred circle of family and friends - Socially-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
Emotions	1	1	Self-determined - Socially-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially-induced emotions	Need for control - Refusal of control
Time and space routines	1	1	Self-determined - Socially-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - Routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
Occupation	1	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

Max. Case of polarization across macro-areas with a spread distribution over dichotomies (male)

Macro-area	S220_2001 FEB_SC_M	Macro-area mentioned (1) or absent (0)	Dichotomies				
			Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Science and technology	1	1	Personal use of S&T - Societal use of S&T	Humans role on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
Relationships	1	1	Self-centred circle of family and friends - Socially-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
Emotions	0	1	Self-determined - Socially-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially-induced emotions	Need for control - Refusal of control
Time and space routines	1	1	Self-determined - Socially-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - Routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
Occupation	1	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

David. Case of complexification with a predominant articulation over the macro-area of technology (male)

Macro-area	S152_2000 FEB_OC_F	Macro-area mentioned (1) or absent (0)	Dichotomies				
			Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Science and technology	1	1	Personal use of S&T - Societal use of S&T	Humans role on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
Relationships	0	1	Self-centred circle of family and friends - Socially-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
Emotions	1	1	Self-determined - Socially-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially-induced emotions	Need for control - Refusal of control
Time and space routines	1	1	Self-determined - Socially-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - Routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
Occupation	1	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

Alice. Case of complexification: emphasis on emotions; coherent over the dichotomies when overcome. Example of a robust complexification over many macro-areas but still presenting polarization in the technological macro-area (female)

S011_2018 FEB_AI_M		Macro-area mentioned (1) or absent (0)	Dichotomies				
			Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Macro-areas	Science and technology	1	Personal use of S&T - Societal use of S&T	Humans rule on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
	Relationships	0	Self-centred circle of family and friends - Societally-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to-face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
	Emotions	1	Self-determined - Societally-determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially induced emotions	Need for control - Refusal of control
	Time and space routines	1	Self-determined - Societally-determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
	Occupation	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

FIGURE 7 Polarized and complexified dichotomies found in S011 essay's analysis.

Max: Another case of polarization

S011 shows another example of a polarization attitude. He attended the course on Artificial Intelligence in February 2018, and we will refer to him as Max. This can be grasped at first sight by looking at the Figure 7, in which only orange cells are marked. Similarly to Lucy (case study 1), even in this case, the text is very rich, touching almost all the macro-areas, only the relationship dimension is not touched by the student. However, the structure of polarization is very different from that displayed by Lucy. In that case study, the polarization is mainly displayed vertically in the grid, reflecting the fact that the text is guided by two central dichotomies (personal–societal and good–bad) that are projected over all the macro-areas. On the opposite, this vertical structure of the table is not so present in Max's essay that shows a distribution of polarizations across all the macro-areas touched, with a predominance of that related to emotions, in which four dichotomies are touched. Even if not so marked as in the case of Lucy, Max also shows a prevalent dichotomy (functional–aesthetics oriented) with a polarization on the functional extreme.

Alice: Another case of complexification

Like David, even S152 is a case of a quite rich and extended essay in its description, indeed almost all the macro-areas, but relationships, have been touched. S152 attended the course on Quantum Computing in February 2020, and we will refer to her as Alice. Looking at Figure 8 globally, we can see that it is a case of complexification, even spreader with respect to David, even if there are two aspects of polarization that are present in the technological macro-area, where instead David showcases a deeper level of complexification. Here, Alice manifests a negative aspect of technology that touches the personal dimension.

In this case study, the emotional macro-area, completely absent in David, is the most expanded. Indeed, four out of five dichotomies are overcome by showing a complexified attitude. In the emotional macro-area, the only “neutral” dichotomy is that related to the personal–societal one. A possible interpretation is that indeed the personal–societal is the only dichotomy that the student does not overcome in any area and, on the opposite, exhibits a polarization about this in the technological macro-area.

S152_2020 FEB_QC_F		Macro-area mentioned (1) or absent (0)	Dichotomies				
			Personal-Societal	Functional-Aesthetics oriented	Good-Bad	Natural-Artificial	Certain-Uncertain
Macro-areas	Science and technology	1	Personal use of S&T - Societal use of S&T	Humans rule on machines -Machines rule on humans	Negative - Positive impact of S&T	Nature as the priority - Technology as the priority	Certain - Uncertain of S&T scenarios
	Relationships	0	Self-centred circle of family and friends - Societally-oriented relationships	Useful for wellbeing - Generative of delight	Extreme harmony - Difficulty of cultivating relationship	Authentic face-to- face relationships - Relationships mediated by technology	Fixed and established - Undefined or in continuous transformation
	Emotions	1	Self-determined - Societally- determined emotions	Determined by a functional-oriented life - Determined by aesthetics-oriented life	Pessimism - Optimism	Visceral - Artificially induced emotions	Need for control - Refusal of control
	Time and space routines	1	Self-determined - Societally- determined routines	Determined by the search of performance - Determined by the search of delight	Routine increases the quality of life - routines are oppressive	Routine immersed in nature - Routine dominated by technology	Fixed routines - Vague or absent routines
	Occupation	1	Individual career - Career with social impact	Performance - Aspiration	Good role in someone's life - Bad or absent role in someone's life	In contact with nature - Totally immersed in technology	Already decided career - Unimagined career

FIGURE 8 Polarized and complexified dichotomies found in S152 essay's analysis.

We can also say that passing across the different macro-areas, in each of them, there is at least one dichotomy that has been complexified.

Looking at the picture per column, this complex behavior appears even stronger, since there are three dichotomies that seem to be strongly overcome (due to the showcase of their complexification in more than one macro-area), those are the functional-aesthetics oriented, the natural-artificial, and the certain-uncertain.

Discussion

We started our study by asking ourselves what we could see in the students' narratives when they were asked to imagine the future twenty years later. As we explained in the methodological section, the process that led to finally seeing something in the data was not straightforward. Students' essays were rich and articulated, and the lenses with which we looked at the data had to be progressively refined. However, the data analysis allowed us to answer the research questions we stated at the beginning, leading to an identification of both the phenomena that can be observed in students' narratives about the imagination

of the future and of the methodological tools to reach a characterization of these phenomena.

In this article, we characterize these phenomena as polarization and complexification attitudes through the analysis of how the students' narratives are positioned with respect to a bunch of dichotomies that can be manifested across several thematic macro-areas covered by the text. Through the detailed analysis of four case studies, we recognized polarization patterns when the students, across several macro-areas, exhibited a flattening of the description of their future that covered only one pole of the dichotomy. On the opposite, complexification patterns are recognized when the students, instead of focusing on a pole of a dichotomy, develop a richer argumentation that moves across the two dichotomous poles keeping both "alive" and considering both of them as important to reach a sensible description of the future. We named the second phenomenon "complexification" since the multiplicity of perspectives that embeds recalls an issue that is crucial for the science of complex systems; indeed, the perspective of complexity allows us to overcome sharp distinctions between local and global phenomena or between the individual agents and the societal system. As science educators, we believe that embedding in science teaching perspectives on the science of complexity could help the students recognize the complexity

of reality and go beyond dichotomous thinking that seems pervasive at many levels.

The complexification patterns can be individuated as a second issue which is also crucial for the science of complexity, i.e., the concept of equilibrium and sustainability (Barelli, 2022a,b). Being able to stay in the tension between opposite poles recalls the states of dynamical equilibrium that are observed in many complex systems. This particular type of equilibrium is very distant from the thermodynamic notion and includes a cyclical movement across states. As population dynamics models show, ecological sustainability is achieved not because a system perseveres in an immutable state but, on the contrary, because there is an overall evolution of the system obtained as the oscillation around different “poles.” Hence, we emphasize that, again, the perspective of complexity could be a heritage of concepts to allow the students to move from fixed and static pictures of the future – hence unrealistic – to more dynamic ones that create spaces to envision authentically sustainable narratives.

The ways in which students perceive themselves as agents of their narrative are very different between essays exhibiting polarization and those that manifest complexified patterns. Indeed, even the actions described by the students seem to reflect the overall phenomena. In cases of polarization, the actions envisioned by the students are certain, already determined, well-established and with a precise outcome that has been already predicted. In cases of complexifications, we see that some actions are still imagined but they take the form of a cone of possible things to be done if some circumstances could happen. This echoes the certain–uncertain dichotomy: the complexification patterns show an overcoming of this Manichean distinction and accept the existence of a spectrum of possibilities, which do not exist in the polarized cases.

Conclusion and further steps

The analysis carried out in this study somewhat confirmed the societal phenomena highlighted by recent sociological and philosophical studies concerning the perception of time and the related consequences, like the need to rebuild rituals and the increasing difficulties in humans’ relationships (e.g., Rosa, 2013; Han, 2019). Moreover, the analysis went in the direction to see the form of manifestation of what philosophers are recently calling the society of performance and the palliative society (Gancitano and Colamedici, 2018; Han, 2021). Indeed, the need to create “bubbles of rituals”, where the time seems to live in a parallel world and where the emotions are kept low, defines a space time of isolation that expresses in some way a rooted feeling of the young generation to be separated from the crude reality. However, the analysis also shows that there are still interesting ways in which the young overcome the polarized

effects and are able to imagine more complex futures, which are not stuck in bubbles.

Furthermore, the analysis also shows the predominant role that technology occupies in the future imagination and how this is a support and accompaniment to actions. This is in line with the findings of the Standard Eurobarometer (European Commission, 2021): Europeans expect that technology (together with science and innovation) will contribute to many important issues in the near future (e.g., health, jobs, education, environment, energy supply, security) and that this contribution will be bigger than those given by humans’ actions.

Despite framing within the overall general picture, the original contribution of this analysis consisted in focusing on two specific phenomena that have been rarely explored within the research field of science education, the polarization, and the bubble effects, as well as finding an operative way to recognize them into students’ narratives of their futures. Another contribution of this article was to understand whether the phenomena are induced by the type of narration required or if they are attributable to students’ attitudes.

Indeed, in the whole article, we have been very careful in saying that the phenomena we observed were typical of the students’ narratives, without assuming that polarized or complexified was the students’ visions of the future. For the type of data we collected, this would have gone beyond our purposes. From this study, we began a follow-up investigation in order to check whether the students had some form of polarized or complexified views of the future, or if these phenomena were emerging patterns triggered by the tool of data collection. To do that, we got inspired by SenseMaker® questionnaires,³ developed by Dave Snowden. These questionnaires are based on the ideas of complexity, sensemaking, and narratives (Snowden and Boone, 2007). They collect the first-hand narratives from respondents and combine these with quantitative data and pattern visualization. These quantitative data are created by the respondents who self-define the narratives they have provided, answering questions that require positioning the narratives in a space of possible choices. This process of “self-scoring” is made possible because all the quantitative questions are built on the so-called “signifiers,” i.e., concepts that anchor the plotting of respondents’ micro-narratives in space (Van der Merwe et al., 2019). A questionnaire has already been designed and submitted in synergy with #OurFutures, a project launched by the European Commission and aimed to use SenseMaker® to collect future stories all around Europe. In further studies, we will check if the students’ sensemaking of their narratives will confirm our interpretation in terms of polarization or complexified attitudes, or if new phenomena will emerge.

This study is in line with what the EU context is urgently calling for. Education, and moreover science education,

³ <https://sensemaker.cognitive-edge.com/>

can give a fundamental contribution to enabling learners to develop competencies and acquire knowledge, skills, and attitudes needed to take action toward a sustainable transition of our society. Indeed, as it is stated in the recent Green Competence Framework (Bianchi et al., 2022), “through *futures literacy*,” learners can anticipate, prepare, and invent as changes occur. *Futures literacy* encourages learners to (i) use their imagination when thinking about the future, ii) tap into their intuitions and creativity, and (iii) assess the possible steps needed to achieve their preferred future.

Data availability statement

The data supporting the conclusions of this article is contained in the open access dataset, available at the following URL: <http://amsacta.unibo.it/6964/>.

Ethics statement

All the data analyzed for this manuscript were collected after consent forms were signed by all the students or their legal guardians, depending on the students' age. The module for consent form and the whole process of data collection and analysis have been reviewed and approved by the Ethical Commission of the University of Bologna within the FEDORA project.

Author contributions

OL coordinated the whole group and contributed to the setting of the study and the revision of the manuscript. GT coordinated the processes of data analysis and writing of the manuscript. EB and GT co-shared the responsibility of the writing and they have been put as the first authors of the manuscript in alphabetic order. MC coordinated the process of preparation of the manuscript and submission phases and took the main responsibility of the construction of the dataset. SS, PF, and LB contributed to the collective discussion for the evolution of the ideas argued in the manuscript. EB, GT, and MC represented the core group of scholars who mainly worked on the analysis. To reach an acceptable level of internal validity, the analysis was conducted through a triangulation process that, in line with recommended practices, included peer debriefing with researchers in science education and some collaborators of the network. In particular, the group of analysis was composed of a core group of three scholars (MC, GT, and EB) who dived into the analysis and a group of external scholars, among which the other authors (SS, PF, LB, and

OL) of this contribution, who guaranteed the quality of the results *via* other levels of triangulation and checking. All authors contributed to the article and approved the submitted version.

Funding

This research was conducted within the FEDORA (Future-oriented Science EDucation to enhance Responsibility and engagement in the society of Acceleration and uncertainty) project that has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement no. 872841.

Acknowledgments

The data discussed in this article were collected by the Bologna research team coordinated by OL and have been analyzed and processed by the authors of this article. The results were discussed with FEDORA partners working within WP3 and contributed to the design of deliverable 3.1 of the FEDORA project. The discussion of these results contributed to the refinement of a SenseMaker® questionnaire produced by the HorizonEU project #Our Futures (https://knowledge4policy.ec.europa.eu/projects-activities/ourfutures-images-future-europe_en). We would like to especially thank Erica Bol for this opportunity.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Annex

Lucy's essay (S113_2019_FEB_QC_F)

The sun shines and crosses my bedroom window, I see its light with my eyes still half closed, but then I look at the clock: it is already 6.00. I jump up smiling and thinking that finally, a new day has arrived arm in arm with new opportunities and opportunities, even if the more time passes, the more difficult I find it to leave my Ultimate Bed.

To wake up, nothing is better than a little exercise, a shower, and a cappuccino, without forgetting the subject! Luckily I have Bobby, my Guardian Angel, more commonly referred to as "personal helper and health care worker," who is refreshing my memory right now with what I have to say in a few hours at work. I go down the stairs and arrive at the garage, where I find my beautiful Mustang, which I soon discover has some problems with the battery, probably due to the radio being on all night. but it does not matter (!), It is an excellent opportunity to take a good walk. or run, since now it is done!

Finally, I arrive at work (at the hair, but I arrive), I hold a magnificent conference together with a couple of my colleagues, who, satisfied at least as much as I am at the end of it, decide to invite me and our whole department for a dinner this evening, and I see absolutely no reason why I should refuse, far from it! I accept smiling, and I walk home with my head in the clouds. I arrive in about 20-min, just in time for lunch (which fortunately Bobby has already taken care of) and for an episode of my favorite TV series. After that, I put on some music and start getting on with work, aware that the next few days I will spend at my parents' house without doing anything from a work point of view since I have not seen them for a while.

After 3 h without interruption, I turn off the music and my computer, turn on the phone, and find too many notifications for my taste, but there is one that catches my attention: my dearest friend, practically a brother, has decided to make a stopover here in Dublin so that I can say goodbye before leaving for Sudan for work. I call him and, strangely, he answers right away. He has always hated being on the phone, so I make it short and invite him for an aperitif before going to dinner with my colleagues.

Just half an hour later we are in my favorite bar. I really missed him a lot, but above all, I missed talking to him: you can go from politics to ducks in a very short time, and never lose meaning. In particular, we start talking about the current political situation in Italy, our country of origin, which is more fragile than ever in this period. it was probably lucky to find work so early here in Dublin, even if every day I hear the lack of my old friends and my family. But you have to make choices in your life, and I have chosen my future. and it is not that I never see them: I often go down to Bologna during the holidays to have the opportunity to greet everyone, as I will do this weekend, on the other hand.

Unfortunately, time passes very quickly, and he and I both have to go down different paths again, but it is worth it, at least I hope. I greet him and quickly catch up with my colleagues: it is a pleasant evening and we are able to compare and present our ideas regarding different topics, including Bobby, who I find to be appreciated by a large number of people, all that he is bringing with it the ExitBrexit, thanks to which the United Kingdom could return to be part of the European Union definitively and completely, and the new techniques on mind reading, in which I still do not fully believe.

A few hours and a glass of wine later I walk home, and the more meters I walk, the more I realize how much I need to get my beautiful red metallic car back, but I will think about it later: for now, I need to go home and get me a good sleep.

On the driveway, I find Bobby who was waiting for me with a blanket and a tea that has now turned cold. I thank him and as I throw myself on the bed I think he has been the best investment in recent years. I fall asleep, finally, thinking that tomorrow is a wonderful new day and that I will finally be able to talk and spend time with someone who really knows me, also because those few minutes spent with my "almost brother" had managed to make me feel crazy.

See you soon, my beloved and complicated Italy.

Max's essay (S011_2018_FEB_AI_M)

I wake up tired, the night before I was in the small hours; a few months ago I reached forty but my relationship with the bed has not changed one iota, I'd kill for an extra hour under the covers. At breakfast, I take an extra pill than usual, in addition to the usual one that increases my concentration I decide to also ingest a stimulant: an important day today, and I cannot let the morning sloth inside me affect my performance. As I get dressed I turn on the neural chip I installed somewhere in my skull, I'm too busy to remind myself of such trifles - not that I like passing all my private information to a company that makes the biggest bid, but the modern world has happily said goodbye to your privacy with Facebook and Google decades ago - I have other things running through my head: today I and the other 23 members of my quality check team have to run the latest batch of important AI tests that will revolutionize yet another turn the modern world. I let myself be overwhelmed as the wave of information runs through my neural connections: I like the feeling of having everything under control. Among other things, I am pleased to note that the value of the New Lira has risen again. With a thought, I discover that that night I received 17 unanswered calls, and I am delighted to have turned off the chip a few hours earlier; nowadays almost the entire population leaves their own on. It is not possible to live in modern society without it, but sometimes I regret the good old analog era. . . it is amazing how a few years' difference can affect so much. I like to think that people like me have seen the sunset of the analog, the advent of the digital, and the beginning of the neural. Leaving the house I find a capsule that, like

every day, is waiting for me to accompany me to work. Ironically, after all these years we still go to work; probably a life locked up in your own home would not be much progress. The last time I drove a car was at the age of thirty-four, when the first AI for transport control was implemented nationwide: a couple of years earlier the new industrial revolution had begun, and now much of daily life revolves around artificial intelligences. It almost looks like an Asimov book, it is not bad.

David's essay (S220_2021_FEB_SC_M)

In 2040, I imagine I will live more or less where I live now or in the province of Bologna but I do not exclude that I will often be forced to travel for work. I imagine the house is of medium size, just over 100m² at most, and precisely in the province and therefore in a situation of all things considered tranquility, but home automation is certainly present in my idea of a future home.

My expectation is to have a lifestyle that is not completely sedentary, in fact, I hope to be able to carve out some time to devote to physical activity and also above all to have time for social relationships, which I particularly have a heart.

It is difficult to say how my day will be organized since I do not know the schedules of what my work will be, certainly there is that most of the time I will have lunch in the company of friends/colleagues (if the work will occupy both the morning and the afternoon) and probably often dined in the company of someone. What will mark my time will therefore probably be work.

Surely the environmental issue will still be a very important issue, given the objectives of the Artemis space program, I also like to imagine that the issue linked to the regulation of space will be central, both as regards what belongs to whom, and the laws in force in extraterrestrial space, in end it is highly probable, since I would like to do my job with it, that physical debate will be my daily bread.

The opportunities that I can most easily imagine will be presented to me are international research projects, however, if you really need to think big, you could also imagine having the opportunity to study some physical phenomena in space (again thanks to the Artemis program) but I still see this very difficult, I believe that it takes more than 20 years for it to become almost normal.

I imagine a very active social life, I do not take for granted that I will have a partner but I do not exclude it either, in my circle of closest friends I not only see people with the same interests as me but also those who are my current friends.

Alice's essay (S152_2020_FEB_QC_F)

When the evening falls in the cold of Baltimore, the memories of my maturity surface. It will perhaps be that dry and pungent air, already breathed in different places and times that leads me to reflect on the times of a life in which the present escapes and fades, mingling with a past that I still feel close to.

In the forties of the 2000's, I was in New York, the city that in my youth had fueled my candid fantasy of making concrete the great aspirations that I had long hidden behind a humility that was anything but sincere. New York would have made it possible, I thought, since nothing is unfeasible where the explosive encounter between the microcosms of our planet takes place.

On the threshold of my forties, however, I had to realize that I had overestimated the centrality of the influence of a place, however, promising it might appear, on my ability to cultivate a brilliant present full of opportunities. It must be said I was there following the purchase of some completely automated suburban supermarkets: the only human intervention was in fact maintenance, at most two times a year. After all, the profits from the business made me largely independent and free to manage my time, mostly spent in the exasperated exercise of an empty eclecticism, in the hope of finding something I was really made for.

So I was always looking for what that land could offer me: the opportunities to undertake new careers in the most disparate fields were not lacking, however, I felt a sense of discouragement in the absence of real external stimuli: far from the richness of diversity between people, between their attitudes and the uniqueness of places, which were not necessarily artificial, metallic and cold constructions of glass and concrete.

I did not know whether to trace the cause of this condition of alienation back to the first twenty years of the century, when the first symptoms were already beginning to make their way into my habits: even then I began to consider with some seriousness the implications to which an excessive and unhealthy I use those devices, which were already revolutionizing our relationship with knowledge and emotions, and of which, in spite of myself, we were already addicted.

They were handheld computers, similar to tablets, which with the passing of the years had become thinner and thinner: until they could be wrapped around themselves, until they were incorporated into our muscular system and nervous system: enhancing their physical performance and capabilities cognitive. In this regard, a question that hammered my mind concerned the man himself: I wondered what he actually had left of him. What wealth had actually been left to him by what was thought to be called "progress"? What had become of his independence?

In my own way, I carried on my ethical battle, despite the professional contradiction at the base (I had to support myself), trying to preserve the roots of my identity as a human being while remaining open to the positivity of the advancement of science and technology.