Developing futures literacy in the classroom

Abstract
This study examines the impact of futures thinking classes on students’ futures literacy. Our qualitative and quantitative analyses indicate higher levels of futures literacy after the students took the futures thinking classes. We discuss the futures thinking classes, including the approach and pedagogical method used, and showcase some example activities. We conclude with advice for schools interested in implementing futures thinking classes to enhance their students’ futures literacy.

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Introduction

In this study, we examine the impact of futures thinking classes on the futures literacy of master students. Specifically, we examine how the approach of the Teach the Future Foundation (TFF) that incorporates education about the future, education of the future, and education for the future, influences students’ ability to ‘use-the-future.’ We follow Miller (2015) and described futures literacy as the capacity to design and implement processes that make use of anticipation, generally to try to understand and act in a complex emergent context.

We examine our research question at the Learning and Innovation program at Fontys University of Applied Science, in Tilburg (the Netherlands). We first assess through case-based qualitative analysis whether students’ understanding of the role that the future plays in their actions was enhanced after the futures thinking classes provided by TFF. We indeed find qualitative support for enhanced futures literacy. Following, these results are corroborated by our quantitative analysis in which we explicitly measure the students’ future consciousness using the scale developed by Ahvenharju, Minkkinen, and Lalot (2018). We conclude with advice for schools interested in implementing futures thinking classes to enhance futures literacy. This study is part of the series ‘Becoming a Future-Proof Teacher’ that provides insight into futures education at different educational programs (Bol and Staring 2018).

Why Futures Thinking at Fontys

The master’s program in Learning and Innovation (MLI) at Fontys aims to instruct and inspire professionals interested in innovating educational practices to improve the

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1 This approach is developed by [authors name disguised] of Teach the Future Europe. There are other approaches that can develop Futures Literacy.
learning of students, teachers, and educational organizations. In this program, the latest insights into the field of learning and innovation are brought together and linked to the students' own educational context. Students develop the knowledge and skills to initiate, supervise, and research innovative educational tools and techniques. The program’s content focuses on three professional roles: Teachers as researchers, teachers as designers, and teachers as leaders. Students are constantly reflecting on the development of their professional identity, observing changes and trends within and relating them to their own professional practice. Students also explore complex issues, or so-called “wicked problems,” relevant to their professional interests (Ramaley, 2014). Examples of these complex issues are: How to embrace trends related to digitalization in the curriculum of primary schools? Or how to prepare vocational students for increasing uncertainty in their career prospects? These complex issues require educational innovations as well as a broad understanding of the educational sector now and in the future (Bishop and Strong 2010). For that reason, MLI became interested in implementing futures thinking classes. Specifically, the objective of MLI was to implement futures thinking classes that enhance students’ futures literacy, which again enables students to discover innovative solutions for complex educational issues.

The Futures Thinking Classes

In the summer of 2018, MLI reached out to the TFF for support in introducing futures thinking classes in the program, with plans to offer the courses in the Fall of 2018 and Spring of 2019. As described above, MLI wanted a holistic approach to futures thinking to enhance students’ abilities to innovate education. It wanted students to ‘use-the-future’ to improve their approach to education. TTF has developed such an approach to futures thinking, one that incorporates all dimensions of future education; education
about the future, education of the future, and education for the future, as described by Bénéker (2018). Specifically, TTF believes that teaching about the future should be the class’s starting point and that the other dimensions (education for and of the future) should be layered in. By combining the different dimensions, each dimension becomes mutually reinforcing, creating a multiplier learning effect. It is this multiplier effect that results in futures literacy. In the following sections, we provide more details on the three dimensions that are combined in the TTF approach.

First, teaching about the future means exploring the various futures that may unfold. When teaching about the future, students are guided in their process of anticipating possible, probable, and preferred futures. Although teaching about the future is critical to developing true futures literacy, it has received relatively less attention from futures scholars (Bénéker 2018). Presumably, because it speculates upon occurrences that are perpetually unknown: the moment at which the future becomes concrete, it is no longer the future; it is the present. As a result, futures can only exist in anticipations (Miller 2018). Education about the future is the most abstract of the three dimensions and, therefore, the most challenging one to teach.

Second, education for the future focuses on “21-st century skills.” Although this term is frequently used, there is little consensus of what these skills include, and consequently, we want to clarify this term. Adhering to the TTF approach, we focused on the skills shown in Figure 1. Specifically, we divide the futures skills into two categories: ‘sense-making’ and ‘strange-making.’ Sense-making is about logic and, therefore, includes critical thinking, systems thinking, and analytical thinking. Strange-making is about inspiration and, therefore, includes creative thinking, design thinking, and resourcefulness. In between situated are empathy and anticipation, because they are combinations of the first two categories. High levels of futures thinking require students to apply both ‘sense-
making’ and ‘strange-making’ as only the combination allows students to be aware of their anticipatory assumptions (Miller 2018). For definitions and further details, see Figure 1.

Lastly, education of the future examines how specifically the future of education can unfold. Currently, most emphasis is on using new technologies, such as blended learning, devices, and virtual reality but these are add-ons to the existing educational structure. It is, however, also essential to think about how education in the future can be structurally different, as it is a structurally different education that will allow us to cope with some of our most pressing problems like the destruction of nature and rising inequality (Wilenius 2017; Wilenius and Pouru 2020). For this reason, the TFF approach highlights combining the three dimensions in the futures thinking classes; Students develop the capability to use-the-future, and following are asked to apply their ability to imagine the non-future, the unexpected, the unthinkable approach to the education of the future. Thus, they are asked to apply sense making and strange making in the context of education about, for, and of the future.

To further explain the TTF approach, we discuss two examples in which we use teaching about the future as the building block on which we layer the other dimensions. Note that these are just some examples; there are many ways to implement the TTF approach.

**Combining the Three Dimensions: Two Examples**

In one of our initial futures thinking classes, we used the *Next Generation Survival Kit* developed by the Teach the Future Foundation. We first divided the class into groups of six to eight students and then provided each student with a ‘future dilemma.’ Examples

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2 The *Next Generation Survival Kit* and the *Futures of Education Set* (see next example) are both tools developed by the Teach the Future Foundation. Both can be downloaded for free at the Teach the Future library [www.library.teachthefuture.org](http://www.library.teachthefuture.org).
of such dilemmas are: Do we want a world with more artificial intelligence or more human creativity; Do we want a world that is very secure or very private; Do we aim for immortality or is dying part of life; and Do we want private goods or a sharing economy? These future dilemmas are the current uncertainties of our time and were therefore chosen for student discussion; reflection of these topics is valuable as it will influence the choices we make today.

We asked students to contemplate the alternatives of their given dilemma, choose the one they prefer, and explain their reasoning to the rest of the group. Even though students might feel both options are important, they must pick between the two. The group was allowed to provide input, but ultimately the student that was assigned the dilemma had to make the final decision. After each student made his/her selection, each group then elected which four of their members’ dilemma choices best described their ideal future. For example, the group could have picked security, artificial intelligence, immortality, and sharing economy to describe their future. The four selected dilemma choices are the critical elements of the ‘preferred’ future scenario they created next. Collectively, the students envisioned the life of an 18-year old person in 2040, living in the future scenario they created. We then asked the students to step into this person’s shoes and describe five important events in his/her future life. Mentally fast-forwarding to 2040 makes the fictional 18-year old come to life.

This activity asks students to explore a potential future and, thus, can be labeled as education about the future. It helps students develop awareness about the uncertainties of our time; it makes them realize that the future is still open, what will happen depends on the choices that we make today. It also shows that everyone sees the world differently and, because of this, will make different choices. Everyone should, therefore, create their own vision for and opinions about the future, not just blindly copy others.
In the following step of the activity, we integrate education for the future. Specifically, the students are asked to consider which ten skills this 18-year old person would need to be successful in their ‘preferred’ world scenario. Of this list of 10 skills, the students need to indicate which skills they are already teaching in their classes and which skills they envision themselves teaching in the future. Finally, each group presents their future scenario and their set of skills to the class. The activity lets students experience different futures and provides them with an overview of the skills that will be important in the future and how the priority between these skills will depend on what the future will look like. This creates a sense of urgency for the students to assess what they are currently teaching and the need for change in the curriculum to better prepare their own students for the future.

Importantly, this activity does not only provide insight into the needed skills for the future; the students also train their own futures skills. Specifically, a) critical thinking skills, as students analyze alternative paths to the future, b) system thinking skills, by seeing how the different dilemmas all influence each other, c) anticipation, by designing a world that is not yet a reality, and d) empathy, by imagining someone's world in the future while listening to and accepting each other’s perspectives.

The next activity we discuss is the “Futures of Education Set: What is Your Preferred Future?” also designed by the Teach the Future Foundation. This activity embraces both education about the future and education of the future from the beginning. We did this by instructing our students to think about the future of education. Specifically, we divided the students into four groups. Each group was provided with two unique keywords that described a future scenario they needed to design (e.g., learning in elementary school and market-driven). Each group was also provided with five example
situations that matched their keywords to get their creativity flowing. The examples were based on current trends and developments specific to their topics. Students were given magazines, scissors, glue, markers, and a blank canvas to let their imagined future come alive. They were challenged to come up with concrete examples of situations, tools, or methods used in the future world that they were envisioning. This activity provides students not only guidance on how to think about the future but also the time to reflect on the future of education, something that often does not get prioritized in their busy day-to-day lives.

Following this, the students were asked to prepare a presentation about their future of education. Each group was directed to one corner of the room. With tape, dividing lines were created to create four visibly distinct areas to separate the groups from one another physically. In their ‘box,’ each group presented their envisioned future and promoted their future world. Once all four futures were presented, students were asked to step into the area that represented the future of education that they believed to be the most realistic. This could be their own future of education or the future presented by one of the other groups. Next, the students were asked to step into the area of that scenario that represented the future of education that they most preferred. For some students, this meant they had to change areas, while for others, the most preferred future was also the most likely to happen.

This activity highlights that everyone sees the future differently, not just in what they think will happen in the future but also in what they hope will happen. It shows that positive and negative arguments can be made for all futures, and how some arguments that are positive for one individual actually can be perceived negatively by others. Although this activity does not explicitly discuss education for the future; students are again using their own future skills as the exercise requires imagination, drawing relations, and anticipation.
Pedagogical Approach

In futures thinking classes, you can expect some initial pushback from some students, as they are likely operating outside of their comfort zone. It is far removed from the traditional ‘push’ education where what needs to be learned is known by the instructor and students merely need to be able to “re-produce” the information back to the instructor. Instead, these activities are ‘pull’ education, which starts from the discovery of not knowing something, initiating the search for hypotheses, experiments, and evidence that eventually lead to understanding (Miller, 2018). Therefore, to get to true ‘pull’ education, it is important for the teacher to see oneself as a facilitator, not a lecturer. Futures literacy is created by building awareness about the future and teaching the ability "to walk on two legs" by engaging with futures for planning and preparation, but also being open to novelty (Miller, 2018). This can never be achieved if students simply repeat after an instructor.

To reduce anxiety about the fact that there is no ‘one right answer,’ not even preferred answers, the facilitator might need to help the students by providing examples and facilitating students’ brainstorming. This is why, for example, we provided the students with the keywords and the five examples in the second activity described above. It is also why we always include enough time for students to discuss their ideas amongst themselves throughout the process. We have found that the comfort of the examples and the brainstorm sessions lead students to open up and create more out-of-the-box ideas. We caution, however, against providing too many examples from professional futurists. We found that, for example, showing scenarios created by professionals shifted the focus from creative, imaginative ideas to a focus on “doing it the right way.”

Finally, we cannot emphasize enough the importance of unlocking imagination and stimulating out-of-the-box thinking. The focus needs to be on exploration and discovery. This can be accomplished by getting creative yourself; by using not only words but also
visuals, plays, songs, games, or whatever helps to make these future scenarios come to life. Our advice: *engage* and show, don’t just tell.

**Teach the Future Approach**

In summary, we propose that in order to truly enhance the futures literacy of students, it is important to take a holistic, integrative approach to futures thinking. The teaching should be broad, cover the three dimensions of future-oriented education (*of*, *for*, and *about*), but importantly, these dimensions need to be taught in an integrative fashion. The exploration *about* the future is used as a starting point, and through this lens, the education *of* the future is explored, and during this process, the skills *for* the future are discussed and trained. This layering approach allows the discussion of education *of* the future to be more in-depth and the education *for* the future to be more effective as analyses *about* the futures require so many different future skills. The integrative approach results in a multiplier effect that generates true change in students’ thinking.

**The Impact on Futures literacy**

As discussed above, the objective of adding the futures thinking classes to the master’s degree program was to increase the futures literacy of these experienced teachers. We assessed the success of the futures classes along this dimension in two ways. First, we performed a qualitative analysis of the student’s behavior and skill development. We used informal observations of the students in the futures thinking classes, and more importantly, asked for their reflections on their futures literacy in a group interview. We also analyzed several students’ work portfolios, including their self-assessments. Following, we gathered quantitative data, which will be described in more detail below.
In both our qualitative and quantitative analyses, we are guided by the work of Lalot, Ahvenharju, Minkkinen, and Wensing (2019) on the concept of future consciousness to capture futures literacy. Ahvenharju et al. (2018) have developed a scale that measures individuals’ future consciousness through five dimensions: time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others. This concrete measure allows us to assess and measure the students’ futures literacy before and after the futures thinking classes. We argue that the future consciousness scale is a good proxy for futures literacy as future consciousness captures the first steps of the action learning process that participants of the Futures Literacy Laboratories displayed as they became more futures literate (see Miller 2018). We reason that students with higher levels of future consciousness understand how the future plays a central role in what they perceive and pay attention to in the present. Moreover, they realize that they can anticipate in different ways and thereby imagine different futures. They start to understand that envisioning various futures changes what they could see and do in the present; they are able to ‘use-the-future.’ Thus, we argue that higher levels of assessed and measured future consciousness indicate higher levels of futures literacy.

Qualitative Results

Observations

We first examined whether the students showed improved futures skills (see Figure 1). From this analysis, it was clear that most MLI students felt quite comfortable with ‘sense-making skills’ from the start, while the ‘strange-making skills’ were new to most. As a result, the most interesting observations were not related to complex thinking or interrelation: students displayed high skill levels as we expected. The more interesting skill improvements occurred when students had to apply creative thinking and imagination
(strange-making) to the situations they were confronted with. As described above, questions like ‘which skills would an 18-year person need to survive in a ‘preferred’ world scenario in 2040?’ triggered students to think out loud, to associate, to assume, to predict, and to solve.

**Group Interview**

We also explicitly asked the students about their futures literacy through semi-structured interviews. All students gave positive answers and indicated that they felt that both their sense-making and strange-making skills had improved. Following, to assess whether the impact of the futures thinking classes went beyond skill development and resulted in a better understanding of the role that the future plays in their actions, we linked students’ answers to the five dimensions of future consciousness (Ahvenharju et al., 2018).

Concerning the dimension of time perspective, students mentioned that they felt better, prepared after the classes and less surprised when they would actively think about future scenarios. It allowed them the opportunity to choose a better direction in the process of educational innovation. The second dimension that appeared in the students’ answers was openness to alternatives. Students felt more confident to think differently. This can be seen as the effect of a so-called disruptive learning environment, where different opinions come together. Ultimately, more knowledge is gained with a more complete picture of the specific issue that was discussed (De Wolf et al., 2018). Students reflected on the futures thinking classes with the notion that every image looks different for everyone. It taught them to take the time to understand each other in a better way. Some told us about an increased concern for others, the fourth dimension of futures consciousness. The final category of responses from the students is related to the dimension of systems perception, which is strongly linked to sense-making and complex thinking. Students learned to see a bigger picture by analyzing possible trends and developments.
We also asked students if they experienced futures thinking as something easy or difficult. Most students gave mixed answers. On the one hand, they found futures thinking easy because they felt ‘everything is possible, there’s no right or wrong.’ On the other hand, students noticed they got stuck in their own thinking patterns, and it was difficult to break such habits. One student indicated: “At the beginning of the year, I had difficulty staying open-minded. Futures thinking exercises helped me open myself up to other possibilities. Even if they seem impossible now”.

**Portfolio-Analysis**

Based on the analysis of the students’ work portfolios, we found they did not only improve their own futures literacy through the futures thinking classes, but they also used their futures literacy to improve the future of education within their own professional setting. For example, several students have used the Next Generation Survival Kit as an introduction in their team meetings to show why change is important. The class, therefore, had a ripple effect as the lessons learned reverberated from the students to their colleagues. At the same time, the application of the futures thinking activity highlighted the importance of futures literacy and helped the students gain the support of their colleagues for their MLI innovation projects. As indicated by this testimony of one student: “The futures thinking classes were an important starting point during the design of the study day for my innovation project at our school. During the classes, I experienced how powerful it is to think outside the box. This is what I wanted my colleagues to experience. Therefore, future-oriented thinking was an important part of the last study day.” Another student who teaches at a primary school convinced her team to start with future education as a main topic for their internal seminars: “During the seminar on future education, which I designed and carried out with a colleague, I spoke with the team about what could be in the future and
what we should, therefore, offer as a school. As a basis, I used the futures thinking classes from Teach the Future.”

Some MLI students also used the Next Generation Survival Kit with their own students, creating another ripple effect. Some students even introduced futures thinking as a module in their curriculum. Thus, the futures thinking classes made the MLI students realize the importance of developing futures literacy, not only for their own development but also for the development of their students. As one student indicated: “The futures thinking classes have given me insights into classes about the future. My ideas about future education have changed, and I notice I have developed myself when it comes to future awareness. The classes had an iterative impact on my viewpoint on educational concepts, but especially on how I view education in general”.

In summary, our qualitative analysis indicates improvement in MLI’s students’ futures literacy and also provides evidence of the ripple effect that the increased futures literacy created for their own schools and students (Bol et al., 2018).

Quantitative Results

To quantitatively test whether the students’ futures literacy has increased after the futures thinking classes, we use the scale developed by Lalot et al. (2019) to measure future consciousness. We collected the information through two surveys. Specifically, we did a pre-futures thinking classes survey when the students entered the program at the beginning of the 2018 fall semester. We did a post-futures thinking classes survey after the final class session of the 2019 spring semester. We administered the survey through the website created by Lalot et al. (2019).3 Eighteen students completed the pre-survey, and fourteen students completed the post-survey, resulting in fourteen pre-and-post matches.

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3 For more information on the scale see https://futuresconsciousness.utu.fi
Descriptive Statistics

Each of the five dimensions of the future consciousness scale (time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others) are measured by three to five questions. Each dimension’s score is the simple average of the questions pertaining to that dimension, and the future consciousness score is the simple average of the five dimensions. As shown in Table 1, the students’ average future consciousness score is higher in the post-test, after the classes, than in the pre-test, before the classes. This pattern also holds true for the individual dimensions.

As for the student participants, the average age is around 35, and there is an about equal mix of males and females. MLI focuses on continued education, and thus, not surprisingly, they have, on average, around 17 years of work experience. The group also presents a nice mix of students currently teaching in primary school, secondary school, vocational education, and even Master of Applied Science programs.

To formally test whether the futures teaching classes positively affected the students’ literacy measured through the future consciousness scale, we conducted the dependent sample t-test (i.e., paired sample t-test). This is a statistical procedure used to determine whether the mean difference between two sets of observations is zero or not. In a paired sample t-test, each subject or entity is measured twice, resulting in pairs of observations. Our results provide empirical evidence consistent with the hypothesis that futures thinking classes improve futures literacy. Both one-sided and two-sided p-values are smaller than 0.001 (t = -4.55, Pr (T < t) = 0.0003 and Pr (|T| > |t|) = 0.0005). Thus, there is a significant increase in the futures consciousness after the futures thinking classes.

Conclusion and Food for Thought
This study examines whether the futures literacy of the students at the MLI at Fontys increased after the futures thinking classes designed by the TTF were implemented. Futures thinking was introduced to support students in finding educational innovations for complex issues, or wicked problems, within their own professional practice. The TTF approach is holistic and embraces education of the future, education for the future, and education about the future. Notably, the TTF approach promotes that teaching about the future should be the starting point and that teaching of the future and for the future should be integrated into the lessons about the future because it is in light of the exploration about the future that analyzing education of the future and training the skills for the future is most impactful. Specifically, we predict that teaching the three dimensions in combination while using teaching about the future as the backbone will lead to high levels of futures literacy. We have examined this prediction both through qualitative and quantitative analysis, and both confirm our prediction about increased futures literacy after futures thinking classes. Our qualitative research also shows that the futures thinking classes had a positive impact on the innovation process of students in relationship to the wicked problems within their own professional practice. Although the number of students that were examined in this study is limited, we believe that our findings are valuable for educational professionals in the field of futures education.

We end this article with some advice for other educational institutions interested in integrating futures thinking classes in their curriculum. Although there obviously is no one right way, we would like to share some insights that helped us increase the impact of the futures thinking classes and, consequently, helped us create a stronger improvement in futures literary amongst the students.

*Exploration of Futures*
As discussed above, the starting point of the futures thinking classes is engaging in thinking about the future. Here it is important that students are stimulated to use their own creativity and curiosity to imagine what the futures will look like. Guiding their thinking too much will stifle their thought process and, thereby, diminish their understanding. To truly be innovative, students’ thinking should in no way be limited. Instead, they should be motivated to think as broadly as possible. This discovery process also highlights the plurality of the futures; it is futures thinking, not future thinking. Educators must ensure that students do not talk about the future as if there is one-fixed future. Rather, they should be exploring multiple futures and reflect on the changing nature of the world and their role in shaping the future. Such exploration should create a feeling of empowerment. The future is not here yet, and there are many futures possible. We want students to see that they control their present by the actions they take and, consequently, they can influence their future. In this discussion, ensure that students not only think about their near futures but also guide them to think about long-term scenarios. This will highlight students’ role in shaping their own future as well as the futures of generations to come. Students grow more mindful in their designs for future generations by proposing solutions to current problems that are more sustainable in the long run.

Trends and Developments

The changing nature of the world is not an easy concept for students, not even for experienced educational professionals at a master’s degree level. It can be challenging for students to accept that “change is the only constant.” Students have been taught that relations are linear and predictable; hence, accepting the high levels of complexity and interrelatedness in the world they live in can be difficult. One wants to strike a balance, where students recognize the interrelatedness and complexity of the systems that surround them but without feeling overwhelmed. One way of finding that balance is by putting things
in a time perspective. Moving from past to present to future makes students aware of time. This awareness can reduce anxiety about change, as it provides an understanding that change is not something new, but that it has always occurred. The reduced anxiety can create feelings of empowerment, which will improve students’ outlook for the futures.

Importantly, instructors should highlight that futures thinking is not forecasting how patterns will continue in the future; we focus on foresight where we think about how radical change will disrupt patterns and how new trends will emerge that move the world in different directions. Being open-minded and not following set patterns is a critical element of thinking about the futures.

Integration in the Curriculum

Futures thinking skills, as with all skills, need to be trained regularly. As a result, it is better to integrate futures thinking in the curriculum rather than simply adding it to the curriculum. Finally, for students not to experience futures thinking as a useless exercise, it is advisable to think about where students would likely apply their newly gained futures literacy. For example, MLI teachers enabled their own students to find educational innovations for complex issues. Thus, consider first why it is important to develop students' futures literacy and then provide them with an opportunity to apply their insights and skills to a subject that matters to them.
References


Futures skills are the skills that allow one to understand that change leads to the future; this is represented by the inner circle, change, leading to the outer circle, future. Futures skills are divided into sense-making and strange-making skills:

- Sense-making is about logic. It includes complexity which includes critical thinking, systemic thinking, and analytical thinking, and interrelation, which requires the ability to actively connect different fields, persons, topics, and even time dimensions.
- Strange-making is about inspiration. It includes creativity and imagination, which are driven by qualities like inventiveness, resourcefulness, and design thinking.

Proficiency in futures skills means that both dimensions need to be employed at the same time; both sense-making and strange-making must happen, which only can truly occur when an individual can be empathetic and anticipate. That is, individuals will need empathetic thinking, being able to envision different dimensions, and anticipation, take action in the current in order to be prepared for the possible future.
**TABLE 1**
Descriptive Statistics

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<th>Variables</th>
<th>Pre-Futures Thinking Classes</th>
<th>Post-Futures Thinking Classes</th>
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<td></td>
<td>N</td>
<td>Avg.</td>
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<tr>
<td>Futures consciousness</td>
<td>18</td>
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</tr>
<tr>
<td>Time perspective</td>
<td>18</td>
<td>3.8</td>
</tr>
<tr>
<td>Agency beliefs</td>
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<td>3.7</td>
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<td>Openness to alternatives</td>
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</tr>
<tr>
<td>Systems perception</td>
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</tr>
<tr>
<td>Concern for others</td>
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</tr>
<tr>
<td>Age</td>
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*Futures Consciousness* refers to the human capacity to understand, anticipate, prepare for, and embrace the future, measured as the average of time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others.

*Time perspective* refers to an individual’s awareness of the way how events and their consequences follow each other as sequences over time, measured as the average of 3 survey questions, each with an anchored 5-point scale, ranging from (1) not at all like me to (5) very much like me.

*Agency beliefs* refers to the extent to which an individual feels able to shape the course of future events both at a personal and societal level, measured as the average of 5 survey questions, each with an anchored 5-point scale, ranging from (1) not at all like me to (5) very much like me.

*Openness to alternatives* refers to the ability to critically question established truths and see the possibilities that emerging changes may bring about, measured as the average of 4 survey questions, each with an anchored 5-point scale, ranging from (1) not at all like me to (5) very much like me.

*Systems perception* refers to the ability to see the interconnectedness between human and natural systems as well as the complex consequences of the decisions we make, measured as the average of 3 survey questions, each with an anchored 5-point scale, ranging from (1) not at all like me to (5) very much like me.

*Concern for others* refers to being concerned about and committing ourselves to bettering not only our own future, but the future of others, of society, and even the future of generations yet unborn, measured as the average of 5 survey questions, each with an anchored 5-point scale, ranging from (1) not at all like me to (5) very much like me.

*Age Category* refers to students’ age category where 0 indicates age is between 0-9, 1 indicates age is between 10-19, 2 indicates age is between 20 -29, etc.

*Gender* refers to students’ gender where 0 indicates male, and 1 indicates female.

*Work experience* refers to students’ years of work experience.

*Current employer* refers to the type of educational institution where the students currently teach where 1 indicates primary school, 2 indicates secondary school, 3 indicates vocational education, and 4 indicates Master of Applied Science program.