

HOW FUTURES LITERATE ARE YOU? EXPLORATORY RESEARCH ON HOW TO OPERATIONALIZE AND MEASURE FUTURES LITERACY

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Abstract

Futures Literacy (FL), developed by UNESCO (2014), is a capability that provides insight into how we approach unforeseeable challenges by using the future to innovate the present (Miller, 2015). When we only use the past to predict the future, detecting novelty is difficult. By knowing how we are using the future, we can integrate complexity and novelty in our choices and therefore make better decisions. Hanze University has adapted FL to higher education by developing intensive Futures Literacy Knowledge Laboratories (FLKLs) for Professional Masters. This paper focuses on the hypothesis that participants become more Futures Literate after participating in a Lab. Operationalizing underlying skills and measuring improvement during FLKLs is an important step towards an evidence-based approach. Therefore, this paper will focus on the development of a method of measurement that is aimed at measuring the effects of the FLKLs.

Keywords: Futures Literacy; Method of measurement.

Introduction

In a world where mankind's impact on the (social) environment is becoming more visible, we are confronted with major challenges such as climate change, migration, being able to guarantee food security, and other challenges. We may have an idea where we are heading, but does that reflect where we *want* to go? What can we do in the present to set course to a desired future?

Our vision of the future is often based on implicit assumptions since the future does not exist yet. These implicit assumptions influence our behaviour in the present: we prepare ourselves, mostly implicit, for the future that we expect. For example, we prepare a presentation, because we assume this makes us more convincing during the presentation. We follow a

healthy lifestyle, because we assume that it leads to a long and healthy life. Apparently, our behaviour in the present influences our future.

Despite the fact that everyone uses the future, we often do not know *how* we use the future. Knowing how we use the future is called Futures Literacy (FL). FL is a capability for thinking about our own assumptions and the assumptions of others about the future (Miller, 2015). We cannot prepare ourselves for something that is unknown, but what we can do is make our and others' assumptions about the future explicit and discuss the implications these assumptions have for the present.

UNESCO (2014) has developed a method that focuses on possible futures as a starting point for acting in the present, called Futures Literacy Knowledge Laboratories (FLKLs). FLKLs is a method that focuses on learning how we use the future with collective knowledge creation processes used as a tool. It is aimed at bringing together all available knowledge: the collective intelligence. Since everyone has different pieces of knowledge, it is important to integrate and clarify this knowledge into shared knowledge. This knowledge forms the basis for our predictions about the future and an image of the desired future. Because future scenarios are based on assumptions, these assumptions are exposed and challenged during the FLKL. By challenging assumptions (reframing), another possible perspective for the future is formed (Miller, 2018). By doing so, we go beyond predictable futures and this can lead to new creative ideas and solutions for the future (Hanze University, 2018).

Furthermore, Hanze University has developed Professional Master Programs to educate students who are innovative and can anticipate complicated problems. The ambition of the Professional Masters is to train students to become Futures Literate change agents, says board member of Hanze University Rob Verhofstad (ScienceGuide, 2017). Therefore, Hanze University has adapted FL to higher education by developing intensive FLKLs for these Professional Master Programs. The assumption is that FL is a set of skills, which can be learned and taught. Operationalizing underlying skills and measuring improvement during FLKLs is an important step towards an evidence-based approach. Therefore, we will focus on the development of a method of measurement that can measure the effects of the FLKL. In this study we will focus on the question: what is FL and how is it applied?

Futures Literacy. Miller, Poli, and Rossel (2013) describe FL as acquiring knowledge about know-what, know-how, know-when and know-why. We also acquire this knowledge from Literacy, i.e. language literacy. An example of Literacy is that the question "can you pass me the

salt?" can literally be interpreted as an information question, but through knowledge about language everyone knows immediately that it is a request. In a similar way, the knowledge we acquire with FL can lead to knowledge about *how* we use the future (Miller, Poli, & Rossel, 2013; Miller, 2015). An example is that we can see a future with all kinds of technological developments such as self-driving cars fuelled by solar energy, a virtual personal assistant, hyperloops, traveling to Mars, an artificial pregnancy in the lab, et cetera (know-what). An underlying assumption for technological developments could be "technology is progress". However, technology could also evoke a lot of resistance and lead to stagnation or even decay if technology violates humanity. Critically looking at these underlying assumptions about the future, leads to knowledge about how the future is used (know-how).

In addition to acquiring this knowledge, FL also involves skills. Miller (2007) defines FL as the *capacity* to think about what the present has to offer in order to move towards a desired and possible future. This capacity can be strengthened by sketching scenarios about possible, probable, and desirable futures. In addition, Miller (2011) emphasizes that FL is the *capacity* to improvise and to be spontaneous, and the capacity to live with permanent ambiguity and novelty. This leads to being able to embrace complexity and think beyond the predictability of the future: a capacity that is important for change agents. Furthermore, FL is (1) understanding and being able to use anticipatory systems, (2) distinguish three types of futures used in the present (contingency futures, optimisation futures, and exploratory/novel futures) and (3) making sense of these futures (Miller, 2011). In the next sections these three components of FL will be discussed.

Anticipatory systems: Futures in the present. Firstly, it is important that we know that anticipatory systems can be used to think about the future (Miller, 2015). Anticipatory systems are used to form an image of the future. This image of the future influences our behaviour in the present. An example of an anticipatory systems is a *self-fulfilling prophecy*. Self-fulfilling prophecies are false predictions that become true, because we behave in a way that provokes the false expectations (Merton, 1948). An example: If you expect your boss to be unkind, this can lead to subtle behaviours that provoke unkind behaviour from your boss. If this unkind behaviour is subsequently ascribed to your boss' personality and you ignore your role in this situation, it confirms your expectation: Your boss is unkind. Although this is an unfavourable way of how the future can be used, it is an interesting example of FL, because it shows that behaviour in the present can evoke a course towards an expected future.

The previous example is usually an *unconscious* anticipation. FL is about the *conscious* human anticipation: by making anticipatory systems tangible, the future can be critically examined and therefore we can make sense of the present (Miller, 2011). The easiest way to map anticipatory systems is by asking people to describe the future (Miller, 2015). By doing so, underlying assumptions and variables can be exposed that we use to "predict" the future. These assumptions influence the choices we make in the present and are therefore important to make explicit (Miller, 2015). When we know why we are doing what we are doing, we know how this *could* influence the future leading to making better decisions today. Furthermore, critically examining these assumptions leads to alternative scenarios of the future which can help us with e.g. new action perspectives. Critical thinking is necessary to discover these assumptions (Inayatullah, 1998).

Three dimensions of the future. As mentioned in the previous section, we use anticipatory systems in the present to think about the future. Moreover, we can use different futures in the present. A Futures Literate person can understand and distinguish these three dimensions of the future, i.e. (1) contingency futures, (2) optimisation futures, and (3) exploratory / novel futures (Miller, 2011). Table 1 gives an overview of the various futures that are used and their definitions according to Miller (2011, 2012).

Firstly, the contingency and optimisation futures are the "predictable" futures based on probabilities we already can observe in the present (*closed future*; Miller, 2018). For example, based on our knowledge about global environmental problems, we expect that there will be no fossil fuels in the future. We do not know exactly when this will emerge, but we assume it will. Based on this assumption, we behave in the present in response to this expected future, e.g. developing sustainable innovations. Secondly, exploratory / novel futures take into account something that is unknown (*open futures*). During the FLKL this is investigated by using a *reframe* (Miller, 2018). Underlying assumptions are made visible and are challenged by exposing participants by a future consistent with their underlying assumption (e.g. in case of the assumption of absolute equality, a future perspective could be given where everyone has equal rights, equal resources, but are not allowed to be unique). This leads to the discovery of the deepest assumptions followed by a new perspective of the future. If we discover these futures, we can discover new thing in the present, ask ourselves new questions, and invent or innovate (Miller, 2018).

Table 1

Three dimensions of the future (Miller, 2011, 2012).

Three dimensions of the future	Definition
<i>Contingency futures</i>	People can prepare for possible futures. This has partly to do with predictions about the future based on chance and trends, but <i>when</i> and <i>if</i> the future takes place is unclear.
<i>Optimisation futures</i>	Optimisation futures means that things that happen in the future are caused by planning and thinking about the future. Optimisation futures can be used to shape the future based on anticipatory assumptions that lead to deduction of the future.
<i>Exploratory/novel futures</i>	Exploratory/novel futures take into account something that is unknown. These futures can be used to discover new things in the present. Contingency and optimisation of futures cannot take into account something that is unknown, but exploratory/novel futures can.

Sense-making capabilities. Finally, it is important for FL that we can integrate the different futures and their assumptions into making sense of these futures (Miller, 2011). Sense-making is about bringing together all knowledge (collective intelligence) and critically examining all this knowledge. It is important that the perspective of others is understood, because this leads to an integrated picture of *how* the future is used and which steps have to be taken in order to work towards a shared vision of the future.

This study. This study focuses on the hypothesis that participants of a FLKL become more Futures Literate after participating in a Lab. Previous literature made clear that a Futures Literate person has specific capacities / skills, e.g. the ability to improvise and be spontaneous. Furthermore, a Futures Literate person can also live with permanent ambiguity and novelty. Lastly, the literature shows that FL is also about the understanding of anticipatory systems, different dimensions of the future, and making sense of these futures. Operationalizing underlying skills and measuring improvements during FLKLs is an important step towards an evidence-based approach. We consider concepts underlying FL from a psychological perspective and explore psychological constructs that may be related to FL. In this way, the

translation can be made from a quite philosophical approach to a practical and measurable capacity. Therefore, this study will focus on the development of a method of measurement of these capacities.

Methodological approach

The method of measurement was developed in five phases. In the first phase, literature research was carried out to explore concepts that may underlie FL. In the second phase, these concepts were evaluated by an expert in conceptualization of FL and an expert in the field of Futures Studies to ensure content and conceptual validity. In the third phase, a small-scale observational study took place to explore whether the presumed concepts could be observed during a FLKL. Afterwards, instruments were selected to measure concepts that may underlie FL. Finally, a model was constructed using these concepts.

Results, discussion, and implications

Results

Crucial capacities for FL can be extracted from the definition of FL, i.e. (1) the ability to improvise and to be spontaneous and (2) the capacity to live with permanent ambiguity and novelty (Miller, 2007, 2011). In addition, the literature revealed that it is necessary to understand three components of the future in order to be able to use the future effectively: (1) anticipatory systems, (2) three dimensions of the future, and (3) sense-making capabilities (Miller, 2011). The aspects extracted from the definition, the three components of the future, and possible underlying psychological concepts will be discussed in the next sections.

Capacity to improvise and be spontaneous. The capacity to improvise and to be spontaneous is the first capacity that is part of FL. The capacity to improvise and to be spontaneous enables us to go beyond the predictable and embrace complexity (Miller, 2011). Gupta et al. (2010) describe improvising as the capacity of individuals to innovate. This definition is consistent with the psychological concept of *creativity*. The General Creativity Self-Efficacy Scale (GCSES) is an instrument for measuring the perceived ability of being creative and is a

good predictor for creative performance (Baghetto, Kaufman, & Baxter, 2006). This scale measures the self-reported competence to generate new and adaptive ideas, solutions and behaviours. In particular, the capacity to innovate is in line with the definition of improvising from Gupta et al. (2010), i.e. the capacity to innovate.

Capacity to live with permanent ambiguity and novelty. The capacity to live with permanent ambiguity and novelty is important to think beyond the predictability of futures and leads to being able to embrace complexity of futures (Miller, 2011). People who do not like ambiguity are people with a high *personal need for structure*. Furthermore, people with a high personal need for structure have a strong need for certainty. The Personal Need for Structure (PNS) scale is a reliable scale for measuring the capacity to live with ambiguity and uncertainty (Thompson et al., 2001).

Effectively using the future. Despite the fact that everyone uses the future, we often do not know *how* we use the future. Components that must be understood to effectively use the future are anticipatory systems, the three dimensions of the future and sense-making capabilities (Miller, 2011). For each component, it is explored which psychological construct underlies the component and how this can be measured.

Anticipatory systems. The literature stresses that it is important to have critical skills for understanding anticipatory systems (Inaytullah, 1998). These skills are important to discover and evaluate underlying assumptions about the future. *Critical thinking* is a concept that establishes the capacity for this. Critical thinking is an important cognitive process that involves analysing and evaluating arguments without bias of experience and underlying knowledge. Critical thinking is something you learn in order to avoid heuristics and biases in thinking (West, Toplak, & Stanovich, 2008). Moreover, it is a process of recognizing and examining assumptions underlying thoughts and actions (Brookfield, 1987). The latter is in line with what is discussed during the FLKL: it involves uncovering underlying assumptions about the future followed by critically examining these assumptions.

There are various instruments to measure critical thinking such as the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1980) and the Halpern Critical Thinking Assessment (Halpern, 2010), but a disadvantage of these instruments is that they are very extensive (assessments of at least 40 minutes) and costly. A precondition for the development of the method of measurement is that this method will not take more than ten minutes. Therefore, these instruments cannot be used. Ideally, items should be developed to measure the capacity

to discover and examining underlying assumptions. Attention will be paid to this in future research. In addition, suggestions were made by an expert in Futures Studies to measure assumptions through *Integral Futures* and *Baseline Analysis*. It will still be examined whether these are suitable methods for processing in a questionnaire, but has not yet been included in the current draft of the method of measurement.

The three dimensions of the future. As discussed earlier, there are three dimensions of the future: (1) contingency, (2) optimisation, and (3) exploratory/novel futures. Understanding and distinguishing these three dimensions is a component of FL. Capacities that seem to be needed to use these three dimensions of the future are: self-efficacy, open-mindedness, and creativity.

Self-efficacy. Firstly, self-efficacy seems an important capacity for explorative / novel futures. Self-efficacy is about our expectations of being able to influence our surroundings or behaviour. Moreover, self-efficacy enables us to choose challenging situations, to explore our environment or to create new environments (Bandura, 1977). In addition, according to Schwarzer and Jerusalem (1995), we are better able to handle unpredictable and complex situations with a high self-efficacy. Therefore, high self-efficacy enables us to explore new environments and deal with complexity of futures. A questionnaire that measures self-efficacy is the Generalized Self-Efficacy Scale (GSES) (Schwarzer & Jerusalem, 1995). It assesses one's belief in his or her ability to cope with new or difficult situations and to overcome obstacles and setbacks that are often accompanied by these difficult situations.

Open-mindedness. In addition to self-efficacy, open-mindedness seems to be an important capacity for FL. If a future becomes reality, we should be able to respond to this novelty. We expect that open minds make it possible to deal with this novelty. The observation of a FLKL confirms this idea, since participants show an active listening attitude and give others the opportunity and space for different opinions. A psychological concept that covers open minds is the personality trait *openness* that is part of the Big-Five framework (Goldberg, 1992). The Big-Five framework is a model of personality traits with five bipolar factors that represent personality (Extraversion vs. Introversion, Agreeableness vs. Antagonism, Conscientiousness vs. Lack of Direction, Neuroticism vs. Emotional Stability, and Openness vs. Closeness to Experience). There are very extensive and reliable personality questionnaires such as the NEO with 240 items (Costa & McCrae's, 1992), which takes about 45 minutes to fill in. For our method of measurement it is necessary that the instrument does not exceed ten minutes. Since

personality is not the main goal in itself, a shorter instrument also suffices. In this case, the TIPI (Ten-Item Personality Inventory) or BFI (Big-Five instrument) are interesting questionnaires to look at. The TIPI takes about one minute to fill in, but has a moderate test-retest reliability for Openness to Experience ($\alpha = .62$) as opposed to BFI ($\alpha = .80$). The BFI has 44 items and takes five minutes to fill in. It is a reliable questionnaire with good internal consistency, construct and external validity and applicable in different age groups for both the Dutch (Denissen et al., 2008) and the British BFI (John & Strivastava, 1999). For the first draft, the TIPI is included in the method of measurement in order to explore which personality traits are influenced by the FLKL. Since the participants are more or less placed in a somewhat uncomfortable situation, i.e. the uncertainty of the future, we expect that other personality traits, such as emotional stability, could also be influenced by the FLKL. This could lead to more anxiety and negative emotions (aspects of emotional instability). Therefore the complete TIPI is included in the method of measurement.

Creativity. Finally, creativity is an important capacity for using exploratory / novel futures, because we have to be able to think out of the box to discover new futures. FL goes beyond contingency and optimisation of futures, which are based on chances and predictions. New futures are futures that we cannot know. To discover these futures we must be capable of thinking beyond our own frameworks and creativity can contribute to thinking beyond our predictable frameworks. In order to measure creativity, the earlier mentioned General Creativity Self-Efficacy Scale can be used. It is an instrument that is a good predictor for creativity and measures someone's self-reported competence to generate new and adaptive ideas, solutions and behaviours. Hence, creativity is important in two aspects of FL. Firstly, creativity can contribute to think beyond our predictable framework. Secondly, creativity leads to embracing the complexity of futures (Miller, 2011).

How futures are used. In addition to the necessary capacities for using the three dimensions of the future, there are items included in the method of measurement on *how* participants use the dimensions of the future. These have already been used in a questionnaire developed by Riel Miller. As we mentioned earlier, contingency and optimisation futures are the “predictable” futures (closed futures) based on probabilities we already can observe in the present, and by planning and thinking about the future (Miller, 2018). Closed futures are measured with the following items: (1) with enough facts, we can predict the future, (2) with enough thinking we can prepare for the future, (3) with enough vision, we can choose between

possible futures. Since exploratory / novel futures (open futures) take something into account that is unknowable to us, the following item is included: the future is unpredictable and unknowable to us. However, there will be more questions developed to measure how these futures are used. It is clear that these items will not be adequate to measure exactly how the future is used, but it gives some insight in these dimensions. Further research will be realized to explore these future dimensions more extensively. Finally, to measure the impact of the FLKL on the perception of the predictability of the future the following item is added: how easy is it to picture the future?

Sense-making capabilities. Sense-making capabilities are about bringing together all available knowledge (the collective intelligence) and critically examining all this knowledge (Miller, 2011). After bringing together and critically examining all this knowledge, the group is given meaning to this collective intelligence. The first step to make sense of this knowledge is that we can empathize with others' knowledge and vision of the future. A concept that fits in this capacity is *empathy*. Empathy is an individual response to an observed reaction of the other (Davis, 1983).

Empathy can be measured with the Interpersonal Reactivity Index (IRI) (Davis, 1983) which measures individual differences in empathy. This index measures different dispositions with respect to empathy: (1) perspective taking (the tendency to take different perspectives), (2) fantasy (the tendency to identify with fictional characters), (3) empathy (the tendency to feel warmth, sympathy and worry for others), and (4) personal anxiety (the tendency to feel uncomfortable and to be concerned when others experience negative feelings) (Davis, 1983). For FL, the disposition "perspective taking" seems to be important, because a participant has to be able to empathize with other visions of the future. For that reason it is decided to include only the dimension perspective taking. In addition to the English questionnaire, a reliable translated version has also been found in Dutch (De Corte et al., 2007).

In addition to the IRI, a number of specific items have been added to investigate how participants describe the perspective of others. We expect that participants will describe the perspective of others by looking at their own perspective. The FLKL should teach participants that different perspectives are possible concerning the future. We expect that after the FLKL participants will describe the perspective of others as more different than their own perspective.

Discussion

In the previous sections, we connected relevant concepts with FL. In Figure 1 we have drawn a model of how we conceptualize the relationship between these concepts and the aspects of FL. In this section we will discuss this model.

Firstly, the literature stresses that anticipatory systems can be used to think about the future. Additionally, we can use three different futures in the present (Miller, 2011). On the one hand, we can use futures based on predictions (contingency futures) and based on planning (optimisation futures). These are more or less predictable futures (*closed futures*; Miller, 2018). On the other hand, exploratory / novel futures go beyond the predictability of futures and can be used to discover new things in the present (*open futures*). This activates new perspectives of the future (Miller, 2011, 2013, 2015, 2018).

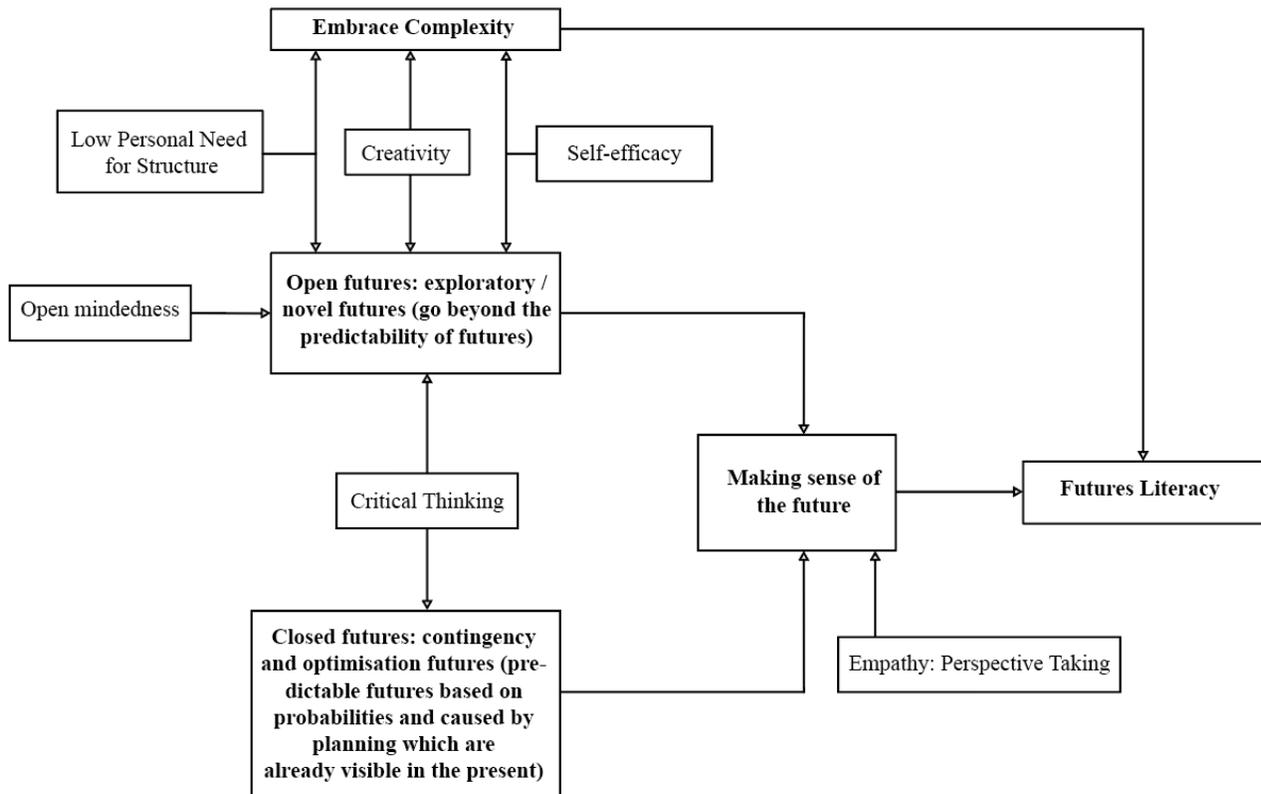


Figure 1

Model of FL and psychological concepts influencing aspects of FL.

As mentioned earlier, FL is about making people aware of their anticipatory systems (Miller, 2011). This is achieved by discovering underlying assumptions of the future. We argue that *critical thinking* is an important capacity for both *open* and *closed futures*. We need critical thinking to discover and evaluate underlying assumptions of the future. By critically examining our underlying assumptions, we gain a deeper understanding of *how* we use the future. Knowing our assumptions and openly questioning them, allows us to approach the present with more creativity and imagination (Miller, 2018).

In addition to critical thinking, we think that *open-mindedness* is an important capacity for *open futures*. Open-mindedness makes it possible to discover new things in the present (Miller, 2015). Furthermore, we argue that a *low personal need for structure, creativity, and self-efficacy* are capacities needed for *open futures* and *embracing complexity*. Firstly, the literature already stresses that the capacity to improvise (creativity) and the capacity to live with permanent ambiguity and novelty (a low personal need for structure), enables us to go beyond the predictability of futures and to embrace complexity (Miller, 2011, 2015). Therefore, a *low personal need for structure and creativity* are both connected to *embrace complexity* and *open futures*. The last psychological concept connected to both *embrace complexity* and *open futures* is *self-efficacy*. Self-efficacy enables us to choose challenging situations, to explore the environment, or to create new environments (Bandura, 1977). In addition, we can deal better with unpredictable situations and complex situations with a high self-efficacy (Schwarzer & Jerusalem, 1995). Therefore, we argue that self-efficacy is an important underlying psychological construct for exploring new environments (open futures) and embracing complexity.

Finally, it is important for FL to integrate the different futures and making sense of all this knowledge of these futures. We expect that an underlying psychological concept is *empathy*, in particular the facet *perspective taking*, to be able to make sense of all these different futures that emerge during a FLKL. The expectation is that before the FLKL the perspective of others will be described by looking at the participants' own perspective. The FLKL teaches participants that there are more possible perspectives of the future. For that reason we argue that empathy is changed by the FLKL and will lead to making sense of the future.

However, a number of limitations of the method of measurement can be discussed. Firstly, no adequate instrument is found to measure critical thinking. For future research, *Integral Futures* and *Baseline Analysis* will be explored and items will be developed to measure critical

thinking in the context of FL. Secondly, limited items are used to measure *how* participants use the future. These items have already been used in earlier survey work and have been explored further. In addition, future research is needed to further explore underlying concepts and ways to measure FL.

Implications

This study is the first study that takes into account psychological constructs underlying FL. This contributes to a bigger understanding of FL and insights in what is possibly changed by a FLKL. This can help to distinguish different methods that are using the future, e.g. scenario planning (Ringland, 1998). Furthermore, this study succeeded to make the translation from a quite philosophical and abstract approach to a practical and measurable skill. This will help future practitioners to measure the effects of a FLKL.

Conclusions

The purpose of this theoretical study was to construct a method of measurement for FL, considering the hypothesis that participants of a FLKL become more Futures Literate after participating in a Lab. We expect that there are psychological constructs underlying FL that are influenced by the FLKL and are measurable. Key constructs that may underlie FL are: critical thinking, self-efficacy, open-mindedness, creativity, a low personal need for structure, and empathy. In future research we will measure these constructs by means of a pre- and post-test and we will explore if these constructs are changed after the FLKL. Furthermore, we will test the model we have constructed of FL and the expected psychological concepts influencing aspects of FL.

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