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Becoming Self-Aware—How Do Self-Awareness and Transformative Learning Fit in the Sustainability Competency Discourse?

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An ever-growing number of scholars are developing and applying competency frameworks in the context of sustainability education. Despite the strong interest, most of the research has ignored the varying meanings of competency, which can be interpreted as a performed ability, but also as personality development. UNESCO (the United Nations Educational, Scientific, and Cultural Organization) recently suggested self-awareness to be a central sustainability competency. However, the sustainability competency discourse is lacking a thorough analysis of how and if personality development related dispositions can be considered as competencies, how can they be taught in higher education, and how can the potentially transformative experiences resulting from such teaching be considered. This article aims at a deep understanding of the concept of self-awareness and its interpretations. We have reviewed the roots and analyzed the current interpretations of self-awareness in sustainability competency research and explored how the competency frameworks connect to transformative learning. In addition, we give tangible examples from art based and creative practices of design education, in which we have examined how self-awareness is defined and how it connects to transformative learning. The interpretations of self-awareness addressed two perspectives: awareness of oneself and awareness of one's relation to others and a wider society. Based on our research, becoming self-aware is a process that nourishes transformative learning. We additionally understand self-awareness as a process of internal growth instead of only a performable ability. This needs to be considered when developing the sustainability competency frameworks and their applications in education.

Keywords: self-awareness, sustainability competency, transformative learning, sustainability education, design education, higher education

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INTRODUCTION

The challenges of sustainability require transformations that are not only technical and political, but also personal (O'Brien, 2018; Ives et al., 2020). In higher education, the personal sphere, or self-awareness, is regarded as essential in relation to sustainability (UNESCO, 2017; Brundiers et al., 2021). The personal sphere is also vitally important in sustainability education because severe

sustainability related topics raise anxiety among young people (Ojala, 2013; Brundiers and Wiek, 2017). Scholars have approached and conceptualized these and other educational goals by framing the learning as transformative (Sterling, 2011) and by approaching the educational challenge as a question of competency building (Wiek et al., 2011; Brundiers et al., 2021).

The competency building approach has proved powerful for conceptualizing the goals of sustainability education in higher education institutions. The competency framework suggested by Wiek et al. (2011, 2016) has been widely used in research on sustainability education (Redman and Wiek, 2021). In their framework Wiek et al. (2011, 2016) suggest that students should have the ability for systems thinking, anticipatory thinking, strategic thinking, values thinking, interpersonal collaboration, and integrated problem-solving.

This framework has been further developed by many other scholars (see Redman and Wiek, 2021). As a result, a later addition to the sustainability competencies has been self-awareness competency, proposed by UNESCO in the publication *Education for Sustainable Development Goals* (UNESCO, 2017), and discussed by Brundiers et al. (2021). This addition brought the personal sphere explicitly into the framework. However, it is often unclear what is meant by self-awareness in the context of sustainability education. Most of the articles discussing self-awareness only mention the concept as part of UNESCO's key competencies for sustainability. Brundiers et al. (2021) recognize self-awareness and intrapersonal factors as essential for sustainability education but remain doubtful about whether these factors should be called competencies. On the other hand, in a recent document published by the European Commission, self-awareness related factors are directly connected to competency-based education (Bianchi et al., 2022). To clarify the connection between self-awareness and competencies a deeper understanding of what is meant by self-awareness is necessary (see Redman and Wiek, 2021). In addition, clarification of what is meant by competencies is needed.

The theory of transformative learning might also be helpful when aiming to clarify what self-awareness is in the context of sustainability in higher education. Many scholars have proposed transformative learning as a key element of sustainability education despite the sometimes-superficial application of the theory in sustainability education research (Aboytes and Barth, 2020). UNESCO (2017, p. 10) definition of self-awareness as "*the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires*" attaches the meaning of the concept to awareness of a person's position in the world, the strengthening of a person's agency and a person's metacognitive capabilities to deal with emotions. There are similarities between these abilities and the fundamental idea of transformative learning as a process of becoming aware of previously unquestioned assumptions, or frames of reference, and thus transforming them to become more open and reflective (e.g., Mezirow, 1990). Becoming aware of one's own assumptions and the position in the world also lays the foundation for social action (Wolff and Ehrström, 2020). Stuckey et al. (2013) have suggested that "*deeper self-awareness*" would be a potential result of a transformative learning process. However, in the context of sustainability education research, no thorough analysis seems to exist on the connection between self-awareness and transformative learning.

In addition to theoretical analysis, there is a need to understand what self-awareness is in teaching, and what learning settings and conditions might support students' self-awareness. Moreover, it is crucial to understand what becoming self-aware requires from students and what emotional reactions transformative learning experiences might cause. Pedagogies that consider the holistic and relational orientation of transformative learning through cognitive, non-cognitive, embodied, and social learning experiences, are already practiced in design education (Grocott, 2022). Design at its core is a reflective practice (Schön, 1983), and a change-oriented and future-directed discipline, in which creative practices are applied to facilitate sustainable change (Irwin, 2015; Ceschin and Gaziulusoy, 2019; Light et al., 2019). In the context of this paper, design education focuses on the social dimensions of design, and frames the role of design in the engagement of communities in active, situated, and participatory transformation (see DiSalvo et al., 2017; Grocott, 2022). Therefore, the field might provide fruitful examples for sustainability education on how transformation (of self and society), self-awareness, and emotions could be considered in teaching. Accordingly, to respond to the need for research on self-awareness and transformative sustainability learning, design education serves as an example.

Our aim with this article is to give a profound understanding of the concept of self-awareness and its interpretations. The article begins with a theoretical framework, in which we review the two key concepts, competency (and competence) and transformative learning, as well as introduce the nature of design education and practices. This is followed by an examination and analysis of the self-awareness concept from the following viewpoints: (1) how the idea of self-awareness has been developed in sustainability competency research, (2) how the self-awareness concept has been defined in recent studies discussing self-awareness or the associated "intrapersonal competency" concept in the context of sustainability competencies, (3) what practices are used for teaching self-awareness in the context of design education, and (4) how our findings relate to the transformative learning theory. The concluding section discusses the implications of the findings to sustainability competency and sustainability education research and practice.

THEORETICAL FRAMEWORK

Competence and competency are common concepts in contemporary educational policy and research. However, the interpretations of these concepts vary, and they are often also difficult to distinguish between them. The concepts are sometimes combined with a transformative approach and may

include self-awareness. When discussing sustainability, the meaning of these concepts is crucial.

The Ambiguity of the Competence/Competency Concept

Since the beginning of the twenty-first century, educational goals have been defined widely in the form of *competencies*. In educational policy, the concept has been used both to fill the gap between education and work (Allais, 2014), and to create visions of how to respond to major future challenges (OECD, 2019; Bianchi et al., 2022). The concept covers two kinds of educational aims (Schaffar, 2021). On the one hand, it includes the idea of a learner who can respond to unpredictable situations, and on the other hand, it is used to ensure that graduates are competent (have sufficient skills and knowledge) to move on to their future profession (Illeris, 2013; Schaffar, 2021).

The latter idea of what competent graduates are has met with criticism for marketizing higher education, and viewing education purely instrumentally (Allais, 2014; Grice and Franck, 2017). Murtonen et al. (2017) criticize the theoretical foundations of competence-based education for being based on behavioral learning theories. Biesta (2016) argues that definitions of competence turn to the past instead of searching for wisdom that helps the learners to make judgments in a non-predictable future. Similarly, according to Lozano et al. (2012), this competence approach fails to consider the need for social transformation and students' capability to be agents of social change.

The discussion on sustainability competencies faces the same general challenges of the competence/y concept. In addition, according to Sterling et al. (2017) this discourse is characterized by substantial terminological plurality: concepts like competence, competency, capability, attribute, and ability are used as synonyms and to address differing meanings. Sometimes competence and competency are found even within one article, with the word "competencies" (the plural form of competency) being used with competence, which is an uncountable noun. Moreover, it is often left unclarified whether competence/y is linked to students' performance or if it is interpreted in a wider sense, including also developing students' personal values and empowering students to act in accordance with their values (e.g., Shephard et al., 2019).

Mäkinen and Annala (2010) suggest a difference between the competence and competency concepts. According to them, competence refers to outcomes of learning, i.e., knowledge and skills that are needed from a professional of a certain field, whereas competency is about personal traits, focusing on the development of the potential of an individual instead of performance or outcome. Similarly, Schaffar (using the term *competence*) (2021) identifies two interpretations of the competence concept, one having roots in sociology and another in psychology. The interpretation arising from sociological theory emphasizes competence as qualification. Relating to this interpretation, Schaffar (2019) argues that the role of educational institutions is to define competence requirements and measure students' achievements and eventually grant qualifications. The psychological meaning of the concept refers to being competent in a wider sense, and to being capable of acting in future unpredictable situations (Illeris, 2013; Schaffar, 2019; Schaffar, 2021). Illeris (2013) suggests that "being competent" also includes the aspect of development of personality and a person's "*capacities, dispositions and potentials*" (Illeris, 2013, p. 115). Then, according to Illeris (2013, p. 115) being competent is not only about what a person can do in practice, but also "*what a person has the preconditions to be able to do, and how far these preconditions have been developed.*" Accordingly, whereas measurement of a student's competence is central to the first interpretation, being competent in a broader sense evades the idea of measurement (Illeris, 2013).

This article interprets competencies in this broader sense and uses the competency concept to refer to the development of knowledge and skills, but also to the slow processes of developing personal dispositions, values, and individual's potentials. However, this difference is yet to be shown in sustainability education research and Shephard et al. (2019) call for acknowledging that there are two separate goals for education: those that can be performed and those that are more aspirational in character (e.g., willingness to act for sustainability).

According to Illeris (2013), development of competencies in the sense of personality development can facilitate transformative learning. Yet, what could it mean if competencies relate to transformative learning? Is it feasible to combine an economic-political educational concept like competency with a philosophical-psychological educational concept like transformative learning?

Transformative Learning

Jack Mezirow developed the transformative learning theory with a purpose of teaching for change in adult learning contexts. According to Mezirow (1990) and Mezirow (1991), transformative learning is a reflective assessment in which individuals learn to critically reason about postulated meaning and values. In this process, the individuals move through cognitive structures in which they identify and judge earlier assumptions. Mezirow calls the habits or rules for interpretation "meaning schemes." These schemes are transformed through reflection, which also includes validity testing. "Meaning perspectives," on the other hand, imply general sets of habitual prospects or codes controlling what individuals think, how they act and how and what they learn, and involve criteria for making value judgments (Mezirow, 1990). These perspectives are often based on the process of socialization, and date back to childhood. Also meaning perspectives may be altered through reflection. Transformation happens when the individual considers the old meaning schemes or perspectives to be invalid and replaces them with new ones. To learn and make meaning is thus also about unlearning (see, e.g., Macdonald, 2002). While meaning schemes and perspectives delimit what a person learns, meaning perspectives also involve feelings about oneself (Mezirow, 1990). In a critical learning process involving reflection, people think about if what they have learnt earlier is relevant under present circumstances. Therefore, reflection gives coherence and order to activities, and involves critique. The reflections may occur at three levels, aiming at content, process, or premises (Mezirow,

1991; Taylor, 2009). Content reflection includes issues like perceptions, thoughts, emotions, and acts, while reflections on processes focus on how one performs the functions of perceptions (Taylor, 2009). Reflection on premises is the base and may even include questioning of fundamentals like worldviews. Such a fundamental inquiry may be a strongly emotional process, according to Taylor.

Many educational researchers have been interested in transformative learning, developed the approach further and tried out transformative learning methods in practice (Wolff, 2022). The theory has been criticized for focusing too much on individual transformation and neglecting social reality, as well as emotional, imaginative, and ideological perspectives (Mezirow, 2009). For the last 20 years, the initial epistemological features of transformative learning (by esp. Mezirow) have been criticized from particularly postmodern and poststructuralist perspectives, but these initiatives have also failed to see transformative learning in all its complexity (Alhadeff-Jones, 2012). Transformative learning takes time, and cannot be forced (Taylor, 2009). It demands considerable planning and must be implemented without naïve expectations (Alhadeff-Jones, 2012), since the outcome is simultaneously predictable and unpredictable. It requires a wide variety of theories to understand how transformation takes place in complex relationships, interactions, and mutual interdependencies.

Transformative learning has caught increased attention in sustainability education research (e.g., Stuckey et al., 2013; Bell, 2016; Lange, 2019), but it has often been discussed at a shallow level (Aboytes and Barth, 2020). Mezirow did not create transformative learning for a reconstruction of the world (Sterling, 2011), but with a thorough theoretical focus. Transformative learning is an option in sustainability education (Boström et al., 2018), since it develops awareness of extensive power structures and strengthens agency to change society (Lange, 2019). Lange (2019) emphasizes a transformation process advancing from an individual viewpoint to a mutual planetary concern. In sustainability education, she distinguishes between three levels of transformation. First, the "micro-level change" or the learners' joint critical reflection. Second, the "meso-level change" is a more challenging change beyond the individual, including the human role in the entire world. From a sustainability view, this is the most important level. Thirdly, "macro-level change" requires political, economic, technologic, and ideological changes.

Lange (2019) argues that sustainability needs a transformative learning approach, which implies a change from outcomes, measurements, managerialism, and colonization. This is a deep transformation leading to alternative ways of thinking and acting and requires higher education to play a significant role in the fostering of awareness, learning and action.

Self-Awareness and Transformative Learning

Mezirow (1991) was influenced by Jürgen Habermas and his three domains of knowledge: the technical, the practical, and the emancipatory. From the notion of emancipatory knowledge, Mezirow (1981) developed the idea of emancipatory learning, and he related it to self-awareness and to self-reflective learning. The self-awareness concept has its roots in Carl Jung's psychology. Jung (1958) means that what generally is called self-knowledge is very limited, and it depends largely on social aspects. This prejudiced self-knowledge is immune to critique, but humans can obtain a deeper self-knowledge through exploration of their own "souls." According to Jung (1958), human psyches hide unknown potentialities, which can lead individuals to either catastrophe or construction, depending on how the individuals encounter them. If the individuals meet these powers with the right attitude, the attitudes can guide toward good ends. However, individuals easily avoid changes, and therefore, changing humankind is a slow process, according to Jung. However, by insight into one's own actions, and with access to one's own unconsciousness, an individual can influence the unconsciousness of others (Jung, 1958).

There are obvious similarities between Jung's self-knowledge concept and Mezirow's transformative learning theory and its basic critical self-reflection concept. However, Mezirow (1991) sees a difference between the Jungian view and his own. Boyd and Myers (1988) suggest a transformative approach in line with a Jungian theory of a self-made up of components like an ego with hidden instincts, which can be reached through meditation, dreams, and intruding thoughts. Mezirow (1991) calls this an alternative approach to transformative learning.

When Mezirow (1991) explains how the subjective self is built up through socialization, and how much the individuals take for granted in this process, there are similarities with Jung's notion of self-knowledge. The individuals need to understand who they are in relation to this knowledge. Mezirow also sees similarities between his ideas and Jung's in the individual's prelinguistic capacity to go against socially imposed expectations. However, many authors mix the concepts of critical self-reflection and self-awareness and use them as synonyms (e.g., Nagata, 2006; Bezard and Shaw, 2017), even if the concepts are distinct, not at least because of their vastly different theoretical base.

Self-Awareness and Design Education

In the design literature, self-awareness is closely related to professional development, the process of *becoming* a designer, but more broadly to how one *is* and *becomes with* others and the world (e.g., Akama, 2012; Hummels and Levy, 2013; Light and Akama, 2014). Awareness of one's personal sphere and positionality, as well as awareness of one's relation to others is emphasized with the idea that one is being affected by others and affects others at the same time (Light et al., 2019).

In contemporary design education, there is a growing interest in addressing social and sustainability transformation through creative approaches (see Irwin, 2015; Light et al., 2019; Dolejšová et al., 2021). Contemporary design education aims to cultivate future visionaries, experts and actors with skills to navigate uncertainty, in unfamiliar cultural contexts and in relation to sensitive social issues (e.g., Grocott and McEntee, 2019). These aims link to the competency discussion above and students' capabilities to act in a world that is changing and is unpredictable. By learning to facilitate multidisciplinary collaboration, and

participatory and experiential design interventions, in which it is important to acknowledge multiple value systems and relationships (Hummels and Levy, 2013; Pereira et al., 2019), design students are trained to act as agents of change. Most importantly, by applying their professional skills students and designers also support and foster the agency of others (Manzini, 2015).

Art-based and creative practices, which have been highlighted in sustainability science (Bentz et al., 2021, 2022) and transformative learning literature (Cranton, 2016), are well known in design education. These practices are often associated with change-making efforts that are grounded in mutual learning, cultivating the participants to challenge and change their own views, as well as their ability to become sensitive to new perspectives (Light and Akama, 2014; Mattelmäki et al., 2014; Vink et al., 2017). In this context, we do not refer to visual arts approaches or a traditional culture of object design, but to generative tools and sensorial materials, as well as sense-making methods that invite people to experiential, embodied and empathic learning encounters (see Dolejšová et al., 2021; Grocott, 2022). According to Lisa Grocott (2022), in which she connects design and transformative learning, the making and exploring together prompt the learner to be reflective. Such embodied encounters are deeply connected to a quest to make meaningful change (Grocott, 2022). Furthermore, creative practices mobilize knowing that goes beyond the analytical and rational mind and promote a transcendence of the here and now through imagining. Thus, in addition to becoming aware of the current situation, the aim is to foster participants' ability to envision alternative solutions and desirable futures, which can be rehearsed by using various forms of speculative drama, performance or scenario building methods (Halse et al., 2010; Brandt et al., 2012; Dolejšová et al., 2021). In the context of transformative change, these practices of "acting from the future" create an embodied and sensorial memory of what being in that envisioned, changed future situation could feel and look like (Grocott, 2022). In addition, these practices elicit and make visible the invisible social patterns and obstacles, "stucks," that affect people's ability to co-create and encourage a transition toward the desired future (Dutra Gonçalves and Hayashi, 2021).

Such processes of challenging and transcending the perceived and experienced reality by imagining involve reviewing and rethinking personal and collective, deeply held assumptions and mental models in social systems (Vink et al., 2017). This is associated with Mezirow and Jung's ideas about the ability to go against and beyond socially set expectations. In this context, Vink et al. (2017) highlight, in line with the pragmatists Schön and Dewey, that cognitive processes are intertwined with embodied actions (see Wetter-Edman et al., 2018). Vink et al. (2017, p. S2170) hence propose that creative practices have potential in altering people's existing ways of interpreting the world as well as provoking their reflexivity, and eventually enabling change in social systems. In practice, this means that the way design practices can contribute for example to Lange's three levels of transformation (mentioned earlier) is by providing an opportunity for encounters in which a wide range of stakeholders, such as leaders, policy makers, employees, citizens, or marginal groups, can work together. They can jointly explore how deep, individual and cultural beliefs, values and mental models create "cognitive scripts" that shape their actions (Grocott, 2022, p. 45) and support them to imagine and rehearse new ways of being and becoming (see also Meadows, 2008 and transcending paradigms).

METHODS

Having reviewed the theoretical backgrounds of the competence/competency concept, transformative learning theory and transformative education practices from the perspective of design education we now move on to explore the self-awareness concept. For self-awareness to be a useful concept for sustainability education theory and practice, it is essential to create an understanding of what kind of educational goal supporting students' self-awareness is. This study follows an exploratory approach. We have searched various perspectives to find meaningful ways to understand self-awareness and its connection to transformative learning. We selected this approach because our initial article searches showed that the concept was often left without definition or defined with either no or very few references.

Self-awareness was first introduced as a sustainability competency in the UNESCO publication *Education for Sustainable Development Goals* (UNESCO, 2017). To better understand the background of this new competency, we traced how self-awareness and the personal sphere have been discussed in the sustainability competency research before 2017. As a result, we reviewed four highly relevant and frequently cited articles on sustainability competencies and learning outcomes.

We then analyzed how self-awareness competency has been interpreted after the publishing of the UNESCO report in 2017. The use of the concept as part of sustainability competencies is rather recent, and many of the articles give only shallow definitions of the concept. Therefore, the analysis started by a so-called snowball sampling to identify the more relevant articles in relation to the research purpose (Wohlin, 2016). The article by Brundiers et al. (2021), which introduces intrapersonal competency as a synonym to self-awareness, led to two more articles (Frank and Stanszus, 2019; Giangrande et al., 2019) that discussed the meaning of self-awareness and intrapersonal competency. Another important starting point for our search was the systematic review of sustainability competencies by Redman and Wiek (2021). The snowball sampling to identify key articles contributing to the interpretation of self-awareness and intrapersonal competency resulted in a selection of six articles that we analyzed in detail. In addition, we conducted a search in SCOPUS with the phrase "'*higher education' AND self-awareness AND competenc* AND sustainabl**" within the time range from 2017 to 2022. This search resulted in 164 articles. Out of these 164 articles we selected for further reading eleven articles that mention higher education, competencies and sustainability in the abstract. Out of these eleven articles four discussed self-awareness on a level that was useful for building understanding on self-awareness as a sustainability competency. One of these articles was from 2020 two from 2021, and one from 2022. As a result

of snowball sampling and database search, we ended up with ten research articles, which we analyzed to find out how the authors defined the self-awareness or intrapersonal competency concepts (see **Table 1**). Moreover, we also discussed our findings against the UNESCO publication *Education for Sustainable Development Goals* (UNESCO, 2017) to understand the similarities between scientific and political discussion on sustainability competencies.

Based on jointly agreed criteria, one researcher was responsible for the practical article search. The same researcher also inserted the interpretations of self-awareness from the selected ten articles into an Excel table. This table formed the basis of the analysis. During the article selection and analysis process the authors met several times to decide on how to select the articles and discuss initial findings comparing the diverse interpretations of self-awareness. Therefore, all authors contributed to the understanding of the self-awareness concept. This iterative process assured that all the authors agreed on the results.

SELF-AWARENESS AS COMPETENCY?

This section explores how the above discussed notions of transformative learning and self-awareness are present in sustainability competency discourse. We first review briefly how self-awareness and the personal sphere were included in the competency research before UNESCO (2017) recognized self-awareness as a competency. Thereafter, we continue by analyzing the meanings and interpretations given to self-awareness competency.

Development of Sustainability Competencies

Many scholars have suggested a variety of sustainability competencies since the early 2000s. The conceptual competency framework developed by Wiek et al. (2011) was a turning point in the sustainability competency discourse. After its publication, research focus shifted from sustainability learning goals (e.g., Sipos et al., 2008) and competency frameworks (De Haan, 2006; Barth et al., 2007; Rieckmann, 2012) to developing and analyzing the Wiek et al.'s (2016) conceptual competency framework (e.g., Wiek et al., 2016; Wilhelm et al., 2019; Brundiers et al., 2021) and to applying it in teaching and assessment (e.g., Lozano et al., 2017; Redman et al., 2021).

The most frequently cited competency frameworks published before the UNESCO framework (2017) include a reference to the personal sphere of an individual and non-cognitive components of learning. For example, De Haan (2006) emphasizes non-cognitive components in his *Gestaltungskompetenz* (shaping competency) for secondary education: it includes competencies for self-motivation and the motivation of others, for distant reflection on individual and cultural models, and for promoting capacity for empathy, compassion and solidarity. In higher education, Barth et al. (2007) highlight the role and interplay of both cognitive and non-cognitive components of learning and argue for the reflection of values to be an important part of education. Similarly, one of the competencies suggested by Wiek et al. (2011, 2016), values thinking, refers to sustainability as a value-laden concept requiring ethics and acknowledging the complexity of the many viewpoints on how social-ecological systems should be developed.

The competency framework of Wiek et al. (2011) makes a distinction between academic and sustainability key competencies, for example by pointing out that critical thinking should be fostered in all academic programs as a key outcome. Rieckmann (2012) for his part, sees critical thinking as a central sustainability key competency. He thoroughly discusses individual reflection and the role of experience in advancing competencies and argues that competencies develop through action in varying contexts and situations. He defines the term competency as a precondition for self-organized action, differentiating it from the performance of that action and, thus, establishing an implicit connection to the two interpretations of competency (Mäkinen and Annala, 2010).

Apart from critical thinking and individual reflection, which echo the need for viewing the world in a novel way (generally seen as important in sustainability competency literature), explicit connections to transformative learning remain rare. However, Sipos et al. (2008) make a direct connection in their "head, hands and heart" model, which they designed to promote transformative learning. This model emphasizes a critical reflection process and the empowering of students to make them change perspectives. In addition to empowerment, Sipos et al. (2008) suggest "creative" and "fun" as transformative pedagogies of their heart domain.

To sum up, most of the sustainability competency frameworks suggested before the publication of the UNESCO learning objectives (2017) address the development of learners' personal sphere or personal change, but the discussion remains vague (Wilhelm et al., 2019). Similarly, the connections between competency frameworks and transformative learning are weak or even missing (see also Giangrande et al., 2019; Aboytes and Barth, 2020). However, since scholars have recently suggested self-awareness and intrapersonal competencies should be added to the sustainability competency frameworks (Redman and Wiek, 2021), there is a clear need to understand the role of the personal sphere as a part of sustainability competencies. Giangrande et al. (2019) even suggest that intrapersonal competency could be a way to strengthen transformative learning. The following section discusses and analyzes how the scholars have defined self-awareness and intrapersonal competencies, and whether these competencies connect to transformative learning in the way Giangrande et al. (2019) suggest.

Interpretations of Self-Awareness and Intrapersonal Competency in Sustainability Competency Research

To understand how self-awareness is interpreted as a competency we analyzed ten articles in which the concept is discussed after the publication of the UNESCO report *Education for Sustainable Development Goals* (UNESCO, 2017). Our analysis revealed that the authors described self-awareness and intrapersonal concepts with similar meanings. Whereas some authors used

TABLE 1 | Interpretations given to self-awareness and intrapersonal competency and explicit connections between self-awareness and transformative learning (X = the theme was identified in the article/explicit connection between self-awareness/intrapersonal competency and transformative learning).

References	Concept used	Identified themes					Explicit connection to transformative learning
		Awareness of one's emotions, desires, thoughts, values, assumptions and behaviors	Emotional resilience	Awareness of one's positionality	Awareness of one's relation to others and compassion	Reflection supporting motivation and willingness to act	
Giangrande et al. (2019)	Intrapersonal competency	x	x		x		x
Frank and Stanszus (2019)	Self-reflexivity/self-awareness	x				x	
Miguel et al. (2020)	Self-awareness		x	x		x	
Valley et al. (2020)	Awareness of self	x	x	x			
Brundiers et al. (2021)	Self-awareness, intrapersonal competency	x		x	x		x
Frank (2021)	Self-awareness	x					
Fuertes-Camacho et al. (2021)	Self-awareness	x		x		x	
Redman and Wiek (2021)	Intrapersonal competence		x				
Warrier et al. (2021)	Self-awareness		x				
Muff et al. (2022)	Self-awareness				x		

intrapersonal competency and self-awareness as summarizing concepts, Giangrande et al. (2019) used self-awareness as a sub-competency of intrapersonal and Frank (2021) as a sub-competency of personal competency. In addition, even though the meaning of the concepts varied, we identified the following recurring five themes, which emerged in at several of the analyzed articles (see **Table 1**):

1. awareness of one's emotions, desires, thoughts, values, assumptions, and behaviors,
2. emotional resilience,
3. awareness of one's positionality,
4. awareness of one's relation to others and compassion,
5. reflection supporting motivation and willingness to act.

The next section includes discussion on the five identified themes in more detail.

Awareness of one's emotions, desires, thoughts, values, assumptions, and behaviors was the most pronounced interpretation given to self-awareness and intrapersonal competency (Frank and Stanszus, 2019; Valley et al., 2020; Brundiers et al., 2021; Frank, 2021; Fuertes-Camacho et al., 2021). Becoming self-aware was not limited to intellectual processes but seemed to be connected with non-cognitive processes. For example, Frank (2021, p. 1238) defines self-awareness as "*awareness of habits, mental models and inner states and processes [.] and psychological coping mechanisms*" and Giangrande et al. (2019, p. 16) as an ability to "*become aware of states of being beyond your rational mind.*"

Awareness of one's emotions relates further to emotional resilience. Miguel et al. (2020, p. 6) linked emotional resilience to the concept of self-awareness as an ability to deal with *"personal feelings and desires,"* and Valley et al. (2020) as self-care. According to Warrier et al. (2021) self-awareness, as an ability to understand challenging emotions is focal in times of uncertainty. Giangrande et al. (2019) addressed emotional resilience most comprehensively by including several abilities related to stress management and emotional resilience in their proposal of intrapersonal competencies. Redman and Wiek (2021) in their part, limited the interpretation of intrapersonal competency to be only about emotional resilience and self-care. In line with many others, Frank and Stanszus (2019) and Frank (2021) highlighted the importance of self-care and emotional resilience but did not connect these abilities directly to the concept of self-awareness.

Miguel et al. (2020), Valley et al. (2020), Brundiers et al. (2021), and Fuertes-Camacho et al. (2021) proposed awareness of one's positionality, or role in local and global community as a part of self-awareness competency. Valley et al. (2020) include additionally an aspect of cultural and social awareness, which in their context relates to also understanding one's privileges and how social and cultural background affects how one acts in relation to others.

Awareness of one's relation to others and compassion was also relevant on a more personal level, as an ability to feel connection to others (Giangrande et al., 2019) and to find compassion toward oneself and others (Giangrande et al., 2019; Brundiers et al., 2021). Similarly, Muff et al. (2022) highlight self-awareness as an ability to connect with the surrounding world. Also, Valley et al. (2020) recognize one's relationship to others and interaction as essential but differentiate between "awareness of self" and "awareness of others."

Reflection supporting motivation and willingness to act is linked to the action orientation of sustainability education and sustainability competencies (e.g., Rieckmann, 2012, 2018). According to Miguel et al. (2020) self-awareness is about constant evaluation and promotion of one's actions. Frank and Stanszus (2019, p. 9) link self-awareness to affective-motivational processes and propose deep reflection of one's "*inner states and processes*" as a way to make conscious decisions concerning the actions one is willing to take.

Some authors also used other concepts than self-awareness and intrapersonal competency to describe the competencies related to the personal sphere. For example, Frank's (2021) proposal of personal competencies for sustainable consumption resonates with the identified themes. Besides self-awareness, he suggests five other personal competencies: emotional resilience, self-care, the ability to cultivate ethical virtues and the ability to access and cultivate sustainability mindsets.

When comparing the five themes we identified with the initial definition of self-awareness in the UNESCO publication *Learning Outcomes for Sustainable development Goals* (UNESCO, 2017), similarities with three themes are evident. For example, the publication suggests that self-awareness is about being able to "*deal with one's feeling and desires*" (UNESCO, 2017, p. 10), which resonates with emotional resilience suggested in several of the articles we analyzed. In addition, awareness of one's positionality is explicitly present in UNESCO's definition of self-awareness. The publication also connects self-awareness to motivational processes as it suggests that self-awareness is an ability to "*continually evaluate and further motivate one's actions*" (UNESCO, 2017, p. 10). Moreover, the two themes that UNESCO publication does not connect with self-awareness competency, are included in other UNESCO competencies: relating and being sensitive to others is a part of the definition given for collaboration competency and awareness of how one thinks, feels, behaves and what one values is suggested to be a component of critical thinking competency. To conclude, individual definitions of self-awareness are divergent but simultaneously, significant similarities can be recognized in research and in policymaking.

Connections Between Self-Awareness/Intrapersonal Competency and Transformative Learning

Of the ten analyzed articles, only Giangrande et al. (2019) and Brundiers et al. (2021) connect self-awareness or intrapersonal competency and transformative learning explicitly. They suggest that intrapersonal competency may facilitate transformative learning. Beyond these direct connections to self-awareness and intrapersonal competency Valley et al. (2020) highlight the importance of transformative pedagogies and Fuertes-Camacho et al. (2021) see transformative learning as essential to increase reflective practice. However, none of these articles discuss the transformative aspect of self-awareness/intrapersonal competency at a deeper level. We took a closer look at the interpretations of self-awareness/intrapersonal competency

discussed in these ten articles and reflected on them in relation to our review on transformative learning to understand how self-awareness is connected to transformative learning.

Reflection is the most emphasized connection between the interpretations of self-awareness and transformative learning. According to the interpretations, contemplative or reflective practices (Brundiers et al., 2021; Fuertes-Camacho et al., 2021) or self-observation (Frank and Stanszus, 2019) might support the process of becoming self-aware. Similarly, Mezirow (1991) and Taylor (2009) consider that reflection (of content, process, and premises) is necessary for transformation. Moreover, self-awareness, as interpreted in the articles, covers both cognitive and non-cognitive processes, following the approaches of Stuckey et al. (2013) and Cranton (2016), who suggest that processes leading to transformative learning are not only cognitive but also non-cognitive.

In addition, self-awareness as awareness of one's own emotions, desires, thoughts, values, assumptions, and behaviors echoes strongly with Mezirow's (1990; 1991) understanding of transfromative learning. On the other hand, when compared to Lange's (2019) micro, meso and macro levels of transformation, this interpretation of self-awareness could require reflections similar to what Lange calls the micro-level change; self-awareness should not be limited to recognizing one's own thoughts, emotions and values but also include reflection on the personal paradigms that shape them.

For Giangrande et al. (2019), the ability to deepen the connection between the human and non-human world is one dimension of intrapersonal competency. This idea of how one is in the world in relation to others, and how one is aware of one's positionality (Valley et al., 2020; Brundiers et al., 2021) is also in line with Lange's (2019) meso-level change. According to Giangrande et al. (2019), intrapersonal competency also is a means of shifting consciousness, which can be connected to macro-level change (Lange, 2019) from the perspective of aiming toward shift in "*shared beliefs and worldviews*" (O'Brien, 2018, p. 156). The shifting of consciousness relates to what Taylor (2009) called reflection of premises, which might lead to change in worldviews.

It seems obvious that a deep level self-awareness includes a transformative potential. In the context of sustainability competencies self-awareness includes not only awareness of oneself, but also the aspect of positionality (Miguel et al., 2020; Valley et al., 2020; Brundiers et al., 2021; Fuertes-Camacho et al., 2021) and that of supporting one's agency (Frank and Stanszus, 2019; Miguel et al., 2020; Fuertes-Camacho et al., 2021). Thus, the process of becoming self-aware might result in "*new ways of being and acting in the world*" (Grocott, 2022, p. 4). In the next section we present design education practices in which the connection between transformative learning and self-awareness competency is already well established.

Design Education Employing Transformative Learning and Self-Awareness

The following examples are mostly based on studio-based learning, through which students gain first-hand experience of what it means to be self-aware and how their own emotions, assumptions, mental models, and values affect their (design) decisions and interactions with their environment. In line with our identified themes on self-awareness above, actors within design education understand self-awareness through relationality, which develops from the need to understand oneself to better understand others (Akama, 2012; du Plessis, 2015; Grocott et al., 2019). Such a relational stance becomes particularly apparent in Hummels and Levy's (2013) phenomenology-inspired approach, in which they emphasize that design students should adopt a relational way of being and becoming, which means that designers cannot distance themselves to an objective position, but they must understand themselves as parts of many perspectives, agencies and roles in the world. The key message of this approach is that designers themselves should be and embody the change they seek (Hummels et al., 2019), including the willingness and openness to explore their own values and practices, that underlie and influence the collaboration with various stakeholders in various development processes (Hummels and Frens, 2011; Hummels and Levy, 2013).

Perhaps the clearest examples of how self-awareness based on transformative learning theory integrate into design education is the "Transforming Mindsets Studio" experiment (Grocott and McEntee, 2019; Grocott et al., 2019) and a course called "Fundamentals of design for social innovation" (du Plessis, 2015; du Plessis and Rettig, 2021). Looking at the three levels of change proposed by Lange (2019) (see "Transformative learning" earlier in this article), both the examples focus mostly on the micro-level change, but touch the meso- and macro-level aims with the emphasis on educating a generation of designers who can understand human experience more deeply (Grocott and McEntee, 2019) and "*shift their own humanity toward life-affirming habits*" (du Plessis, 2015, p. 2).

du Plessis (2015) reports on how various reflective journaling, visualization activities and improvisational group exercises—focusing on the mind, body, feelings, and intuition—create a space in which students gain awareness of their personal sphere, and therefore can shift perspectives and prototype new ways of engaging with the world. Central in her holistic approach is teaching the students to deal with the challenging side of transformation too, which includes surfacing barriers to change such as oppression or trauma. According to du Plessis, when the students gain personal experiences of the difficulty of going through the transformation process, they have confidence later in work to remain present during potential conflicts and repair relational ruptures (du Plessis, 2015; du Plessis and Rettig, 2021). Her approach demonstrates what developing emotional resilience could be in practice and highlights how focusing on students' intrapersonal development improves their interpersonal and intercultural capacities (Grocott and McEntee, 2019).

In the same manner, the *Transforming Mindset Studio* emphasizes that to foster productive cross-disciplinary collaboration, design students need to know how to learn from others, trust their instincts, take risks, exhibit social resilience, and reflect on actions (Grocott et al., 2019). Grocott and her colleagues give the students space and tools to face and become aware of their limiting beliefs, explore, and tune

behavior patterns, and propose preferred (personal) futures via, for example, prospective writing and embodied and performative exercises conducted in playful, judgment-free and non-analytical spirit (Grocott and McEntee, 2019). In line with the "head, hands and heart" model (Sipos et al., 2008), the elements of play and performativity have a significant role in creating a safe space, in which students can take the psychological and social risk of being vulnerable. Such conditions, based on Grocott et al. (2019), enable the students to deepen their self-awareness and ability to recognize and challenge restrictive mental models.

What makes the *Transforming Mindset Studio* a rare example in the design research literature is that it reports both the exercises that enable favorable conditions for transformative learning, but also what participation in such a process requires from the students. Thus, it can be seen as pioneering work that delves deeper into the benefits but also the challenges of integrating self-awareness in design education. According to Grocott et al. (2019), one of the key findings was related to the students' difficulties in transferring, applying, and maintaining the learning outcomes outside the safe and supporting studio environment. In the post-course interviews, the students reported that to deepen their learning, it would have been beneficial also to lead and teach others the same exercises they had experienced during the course (Grocott and McEntee, 2019).

DISCUSSION: TOWARD A MORE COMPREHENSIVE FRAMEWORK

In this article, we have studied the self-awareness concept from a variety of viewpoints. In the context of sustainability competencies, we analyzed ten articles with definitions of the self-awareness concept. The interpretations showed five common themes addressing two key perspectives: awareness of oneself and awareness of one's relation to others and a wider society. The study also identified a connection between transformative learning and self-awareness. This connection was evident in the examples we provided from design education practices, showing that self-awareness is closely linked to transformation. In the following, we discuss the implications that self-awareness competency and its connectedness to transformative learning have on (a) the development of sustainability competency frameworks, (b) the learning processes of becoming self-aware, (c) the interpretations of the competency concept and eventually, (d) the educational goals related to sustainability.

The development of self-awareness competency can be seen as a continuum of the discussion on the learning goals of sustainability education and especially the affective dimension of learning. Our investigations revealed that the personal sphere has been identified as an integral part of sustainability competencies from an early stage. Currently, it seems evident that acknowledging the personal sphere as an educational goal (e.g., self-awareness, intrapersonal, and personal competency) has received wide acceptance (Redman and Wiek, 2021). Therefore, it is essential to further develop self-awareness as a concept by building on the wide understanding created during the last decades.

Interestingly, there seems to be an attempt to introduce self-awareness competency as a solution to the criticism met by the competency framework suggested by Wiek et al. (2011); (Anderson, 2013; Lambrechts et al., 2018; Giangrande et al., 2019). For example, Anderson (2013, p. 3) criticizes the framework for being "*heavy on the mechanics of problem-solving and light on the judgment and wisdom needed to know which problems deserve attention*" and suggests that development of personal values should be included in the framework. Similarly, Biesta (2016) has argued that by focusing on developing competencies, education fails to contribute to the most important: development of wisdom and ability to judge. Self-awareness competency could also be seen a response to the calls to see the importance of ethical competencies in sustainability education (see Grice and Franck, 2017).

Through design education, we sought to understand more systematically the commonalities and similarities between creative design practices and transformative learning. The aim was also to use practical examples from design education to highlight how self-awareness could be addressed in teaching and incorporated into course exercises. Especially the non-cognitive, creative, and embodied methods combined with imaginative and playful approaches, but also safe and non-judgmental learning environments, are obviously significant components in the teaching and learning processes that facilitate self-awareness. Therefore, the processes leading to self-awareness are both cognitive and non-cognitive, as in the later development of the transformative learning theory (e.g., Stuckey et al., 2013; Cranton, 2016). Transformative learning theory was also recently applied explicitly in design education (Grocott, 2022), highlighting the need for sustainability education to learn from other disciplines and existing good practices.

Our explorations led us to the conclusion that becoming self-aware should be seen as a process that most likely requires, or nourishes, transformative learning. The transformative nature of becoming self-aware was mentioned by Giangrande et al. (2019) and Brundiers et al. (2021), but it was not thoroughly discussed in any of the articles we analyzed. In addition, references to transformative learning theory were mostly missing. If we understand becoming self-aware as a transformative learning process it means that self-awareness is not only awareness of one's own thoughts, emotions, and values but also of the personal paradigms or biases that shape them. However, the articles that discussed self-awareness and intrapersonal competencies did not address how challenging the process of becoming self-aware can be. For the self-awareness concept to be useful in developing sustainability education, it is essential to pay attention to the learning settings; they must provide sufficient support for the students to deal with the emotions that arise from potentially transformative learning processes.

Our explorations on self-awareness draw a picture of a learning process that is very different from the instrumental interpretation of competencies. Redefining the competency framework by adding self-awareness into it shifts the framework toward an interpretation of competencies that is connected to

the development of personality (Illeris, 2013) and development of values (Anderson, 2013) and views competency as an ability to judge (Anderson, 2013; Schaffar, 2021). This follows the interpretation of competency proposed by Illeris (2013), in which he includes development of personality and even transformative learning. However, due to the more prevalent interpretation of the competence/y concept so tightly connected to performance, our exploration of self-awareness leads to a wider discussion on how useful the competency concept is for communicating self-awareness as an educational goal (see also Shephard et al., 2019; Schaffar, 2021).

Furthermore, in line with Schaffar (2021), we question the usefulness of the competency concept in higher education because of its varying meanings and references to differing educational goals. If self-awareness is brought to education as a competency, there is a risk that is becomes translated into a learning outcome that we expect our students to achieve instead of a personal development process which higher education can support but which cannot be forced.

To summarize, in this study we identified that the process of becoming self-aware might lead to a personal paradigm shift. This means that the self-awareness concept is closely connected to transformative learning. This has many implications. **Firstly**, we call for acknowledging the current ambiguity in the use of the self-awareness concept and suggest more careful and accurate referencing when providing definitions for the concept in sustainability education research. **Secondly**, although transformative learning has been recognized as important in sustainability education, transformative learning theory is currently discussed superficially in sustainability competency research. However, according to our findings, self-awareness as a competency nourishes transformation and would need a deep understanding of transformative learning theory when applied in higher education. **Thirdly**, when designing learning settings to promote self-awareness in education, teachers should be able to address the potentially transformative process of becoming self-aware. As we have learned through our explorations, learning that supports self-awareness ought to include both cognitive and non-cognitive processes and the teaching should employ practices that touch upon students' awareness of their personal paradigms, such as contemplative, embodied and social approaches. Moreover, transformative education needs careful planning and open-ended outcomes. This poses requirements for teachers' training and other support structures in higher education institutions. **Finally**, and perhaps most importantly, critical questions remain on the usage of the competency concept in higher education since it currently fails to differentiate between performable abilities and personality development. Conceptual development is needed to ensure that the concepts employed are helpful in translating the diverse educational goals into practice. The personal sphere and strengthening of agency are essential in societal transformation, and, actors in higher education should also be urged to address ways of knowing and learning other than cognitive ways, and explicitly acknowledge non-instrumental educational goals, such as self-awareness.

To conclude, this article focuses on the concept of self-awareness and its connectedness to transformative learning. The approach was exploratory and did not aim to provide a full picture of the concept. The analysis of the implications for teaching practice focused on one particular field, design education. However, this was fruitful, as the field values reflective practices and approaches self-awareness as awareness of oneself in relation to the world instead of focusing merely on the individual. Future research ought to include a more thorough review on the interpretations of self-awareness, intrapersonal competency, and personal competency in sustainability education research, deeper investigations on the applicability of transformative learning theory to sustainability competency research, and more experimental studies on teaching practices that support students' self-awareness.

AUTHOR CONTRIBUTIONS

NJ had the leading role in writing about competencies and self-awareness in sustainability education. MK played a significant role in writing about development of sustainability competencies. MK, NJ, and L-AW took care of the overall coherence and structuring of the text. KH had the main responsibility for writing about design education, which TM commented on and complemented. L-AW wrote about transformative learning and the roots of self-awareness. MF contributed to the section on competencies. All authors contributed to the transdisciplinary process of co-creating, writing, and editing the manuscript.

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