Fixedness and Growth at Individual and Collective Levels in Knowledge Building Communities

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Abstract: Fast-moving changes to society as part of the digital age are posing new educational challenges that include developing students who are flexible, adaptive, and growth-oriented. Knowledge building communities (KBCs) are a growth-promoting pedagogy, suitable to address these challenges. Yet, developing students' identities as knowledge builders remains undertheorized. In this study, we rise above existing frameworks of fixedness and fluidity to elucidate how students and communities develop growth orientations. Using a grounded theoretical approach, we examined a KBC of graduate students, coding 324 relevant utterances that were expressed by the 18 students over the course of a semester. This resulted in a five-category model of fixedness and growth in KBCs that was then used to describe the overall development of the community as well as the transformation of one student. This study advances both theoretical and practical ideas about how to prepare students for life in the rapidly-changing world.

The need for growth orientations in today's society

Today's world is undergoing massive changes due to the rapid development of technologies, making information easily and extensively accessible on an unprecedented scale. The implications of these changes are affecting nearly every aspect of our society. For example, new skills required in today's "Gig Economy" do not consist of traditional employer-driven tasks, rather jobs where people must be self-directed as they work opportunistically based on demand, skill, and competition (Collins, 2017). Shifting from the safety and comfort of a lifelong career—where people can become entrenched with fixed proficiencies—to a dynamic and frequently changing career requires people to constantly grow as they overcome new hurdles (OECD, 2018).

The theory and pedagogy of learning communities addresses these contemporary educational challenges by being based on principles such as continuous knowledge improvement, exploration of authentic problems, and advancing collective knowledge (Scardamalia & Bereiter, 2014; Zhang, Hong, Scardamalia, Teo, & Morley, 2011). Understanding these principles, however, is not a trivial matter for its participants. It oftentimes requires students to undo the fixed learning practices they enculturated in traditional schools, as well as work through advanced stages of personal growth so they can engage productively in the ever-deepening knowledge building process.

In recent years, scholarship on learning communities, and particularly knowledge building communities (KBCs), has begun to address questions related to students' identities, dispositions, and mindsets (Hod, Zhang, Yuan, & Zhou, 2018; Kici & Scardamalia, 2018; Ma, Resendes, Scardamalia, & Dobbie, 2019). Yet, the personal challenges associated with engaging in the continually advancing endeavor of knowledge building remain undertheorized. In this research, we draw on two relevant bodies of knowledge that have not specifically examined their frameworks in the context of the growth-promoting culture of learning communities, but are still highly relevant to these forms of social organization. Specifically, Dweck's (2006) work on "mindsets" is based on the contention that one's belief regarding intelligence as being either static (fixed) or malleable (growth) influences the way they cope with challenges, setbacks, and even their love of learning (Dweck, Chiu, & Hong, 1995). A second theoretical framework is based on the work of Carl Rogers. Rogers was an influential psychologist who led the humanistic movement of the mid-20th century, upending decades of therapeutic perspectives by suggesting that personal growth does not entail moving from one fixed position to another, but from a fixed position to one that was continually changing (Rogers, 1961/1995). He provided detailed descriptions of different facets of becoming "open to experience" that have inspired research on person-centeredness that continues today (Cooper, O'Hara, Schmid, & Bohart, 2013; Rogers, 1969).

This study tries to answer the question, "How do people and communities develop the growth orientations necessary to function in a dynamic and frequently changing world?". We draw on the theory of mindsets and person-centered perspectives to conceptualize growth as the movement between fixed and static states with those that are adaptive, fluid, open, and flexible. We explore this continuum in the context of a graduate-level KBC, examining data at individual and collective levels.

Fixedness and growth frameworks

Fixed and growth mindsets

Based on several decades of research mainly around people's implicit beliefs about intelligence and its relation to motivation, Carol Dweck (2006) offered a theory of mindsets that is relevant to process-oriented learning (Boaler, 2016). Advancement of society toward a more independent way of living and working requires that the institution of schooling adjusts in significant ways, seeking to cultivate self-sufficient, lifelong learners consistent with the ideas underlying mindset research (OECD, 2018; Collins, 2017; National Research Council, 2012).

The core of mindset theory is based on one's belief regarding intelligence as being a static or fixed entity versus being malleable or having the potential for incremental growth. According to the entity theory, people make assumptions regarding their intelligence as a fixed trait. According to the incremental theory, people make the assumption that intelligence is a malleable trait that can be developed with effort. People on the fixed side of the continuum (fixed mindset) tend to perceive success, abilities, and talents as proving they are intelligent, and therefore are more likely to pass up opportunities to push their limits because failures come with the risk of jeopardizing their attributed beliefs. Therefore, they often try to avoid dealing with challenges and setbacks (Dweck, 2006). Failures come with a high risk of reinforcing a belief of being incapable. People on the growth side of the continuum believe their intelligence or traits can be stretched or improved with effort, making them more likely to embrace challenges as opportunities for growth (Dweck, 2006). People with growth mindsets attribute their failure to poor strategies or effort which they can constantly improve. These people see failure as an opportunity to progress and develop skills (Dweck et al., 1995). A degree of fixed and growth mindset exists in all people and may vary between situations. Likewise, growth mindsets can be cultivated (Brock & Hundley, 2016; Dweck, 2006). The ability of the brain to change is evident in neuroscientific research that provide findings to what is called brain plasticity (Boaler, 2016).

One exciting area of research that looks deeply into mindset interventions can be found in the work of Jo Boaler (2016). Boaler argues that children have natural inclinations towards mathematics which are often replaced by negative feelings based on their school experiences. Children's beliefs about their abilities are molded by teaching methods and testing, leading students to believe that mathematics is a gift they may or may not possess. To cultivate a growth mindset in students, Boaler recognized that it is not enough to change the way teachers talk or provide feedback to them. The shift, rather, hinges on teaching methods. To nourish a mathematical mindset, mathematics must be taught as a broad landscape in which students can wander around, explore, ask questions and think about relationships. Boaler claims that the reason students often fail math is not because it is too difficult, but because they need to build their own understanding of mathematical concepts. Understanding math as a set of ideas and relationships and the students' role as explorers, thinkers, sense-makers, and idea generators is the essence of fostering growth mathematical mindsets (Boaler, 2016).

Boaler's work is an important contribution to mindset research because it acknowledges the importance of designing learning environments where students can face and overcome challenges. Fostering growth mindsets appears to require much more than short interventions as a great deal of mindset research has taken (see Paunesku et al., 2015). Building on this progress, research should continue to explore mindsets in learning environments where students must sustain engagement in complex inquiry.

Person-centered conceptions of fixedness and fluidity

Although the theory of mindsets has been very influential across the world, there are other theoretical approaches that have addressed fixedness and fluidity. Specifically, the person-centered approach is highly relevant to the issue at hand. Even though it has been most widely applied within counseling and psychotherapeutic settings, its relevant to educational contexts is clear (Rogers, 1969). In Rogers' (1969) *Freedom to Learn*, he suggested that education must put trust in its students, allowing them the freedom to explore problems that are authentic to their interests and personal growth trajectories. However, he noted that the responsibility put on the shoulders of students could be threatening, and he extensively detailed how people in such contexts (provided with the appropriate conditions of unconditional positive regard, empathic listening, and congruence) slowly worked through these challenges, making this highly relevant to the development of students' identities when they have responsibility in continually changing endeavors (Rogers, 1957).

According to Rogers' theory of growth, for a person to be able to shift from fixity to fluidity, she needs to experience herself as being fully received. This includes acceptance of feelings such as anger, fear, insecurity and of any mode of expression such as silence, tears, and words, all of which are part of her being at that moment (Rogers, 1961/1995). Unconditional acceptance allows a person to shed any masks concealing her true feelings and thoughts without the fear of being judged. This allows the student to deal with hard feelings or difficulties associated with the learning process.

The continuum between fixed and fluid is arbitrarily divided by Rogers into seven stages. The first stage is of full fixity, where no problems are perceived and there is no desire to change. Moving along this continuum,

participants gradually accept self-responsibility to face problems, recognize personal rigidness, and express feelings while accepting them as being owned in the present. At the seventh stage, the person reaches a point where personal constructs become tentative and constantly validated, allowing for spontaneous growth to occur as a person is open to experience and fully functional (Rogers, 1961/1995).

KBCs as a growth-promoting pedagogy

Scardamalia & Bereiter (2014) introduced KBCs as a theoretical and pedagogical framework in the early 1990's as part of the sociocultural turn in the learning sciences and computer-supported collaborative learning communities (Koschmann, 1999). The thinking underlying KBCs was heavily influenced by the ideas of authenticity and enculturation, with the recognition that "too often the practices of contemporary schooling deny students the chance to engage the relevant domain culture, because that culture is not in evidence" (Brown, Collins, & Duguid, 1989, p. 34). Following this logic, KBCs are designed to approximate the culture of authentic knowledge building organizations within classroom contexts (Scardamalia & Bereiter, 2014). Scardamalia and Bereiter made large advances by designing the Knowledge Forum, a digital learning environment that supports the knowledge building process by enabling students to add notes with new contributions to the communities' knowledge base (Scardamalia, 2004). The uniqueness of KBCs is that the collective goals of the community to advance knowledge are at the forefront, with individual learning seen as a by-product of engaging in this process (Scardamalia & Bereiter, 2014). Therefore, to participate successfully students not only learn knowledge building skills, but they take part in a social effort to advance knowledge based on emergent goals rather than fixed ones (Zhang et al., 2011). This involves taking collective cognitive responsibility, such as by being aware of others' contributions, complimenting others' ideas by building-on, and engaging in distributed knowledge work (Zhang, Scardamalia, Reeve, & Messina, 2009).

The principles underlying KBCs strongly resonate with characteristics of growth mindset. These include continuous knowledge improvement, exploration of authentic problems, and advancing collective knowledge (Zhang et al., 2011). Putting these principles into practice requires the ability to see the knowledge building process and the knowledge itself as endless. Having a growth mindset in a KBC means you can constantly contribute new ideas, set goals, and take part in sustained knowledge advancement as part of the community and personal growth processes without being afraid of being judged or jeopardizing your attributed intelligence. Similar to the way Boaler's (2016) mathematical classrooms are well suited to foster students' growth mindsets, KBCs offer a general pedagogical model that are applicable in a wide range of disciplines.

In recent years, Hod and Ben-Zvi (2018) have introduced humanistic activities into KBCs to address the communities' knowledge building practices alongside participants' personal growth. These KBC's are designed based on Rogers' *person-centered approach* to foster a growth promoting climate by giving unconditional positive regarding others, listening empathically, and being congruent in relationships (Rogers, 1961/1995). In addition to the idea-advancement focus of KBCs, the humanistic activities offer opportunities for students to reflect on their identities as knowledge builders as an integral part of the process (Hod & Ben-Zvi, 2018). This innovation on KBCs is important in the context of promoting growth orientations because, in addition to giving students the opportunity to face authentic challenges and setbacks, it provides students with the opportunity to reflect on their own practices and make intentional changes to them.

To sum, the notions of fixedness and fluidity is a very promising and relevant line of research that can have a broad impact on the design of learning environments that aim to prepare students for a rapidly changing world. Research on mindsets has suggested that teachers need more professional development to implement these ideas successfully, and that short targeted interventions may not be enough to yield the desired results. Person centered approaches suggest broader views on the personal properties that are relevant to a person's change and growth. KBCs offer a pedagogy that provides students with opportunities to engage in authentic knowledge advancing activities and reflect on wide dimensions of their participation in the learning process. This opens important questions for empirical investigation: (a) *What categories of fixedness and growth are expressed in KBCs? (b) How can KBCs be characterized along a continuum of fixed- and growth-orientations and how can transformations be traced over time? and (c) In what ways do students transform from having fixed- to growth-orientations within the full context of their knowledge building efforts?*

Methods

To answer our research questions, we investigated a graduate course that was designed as a KBC with the addition of humanistic activities. Specifically, the course, "Challenges and Approaches to Technology-Enhanced Learning and Teaching" (CATELT) had the triple aim of, first, introducing the participants to knowledge about human learning; second, having the students experience the myriad challenges and approaches of technology-enhanced collaborative learning; and third, for students to consider and reflect on themselves as learners (Hod & Ben-Zvi,

2018). Our data corpus was drawn from a full semester of CATELT, which included 18 students and two co-moderators (the formal instructor who was a member of the Faculty of Education, and a teacher's assistant).

CATELT was structured as a blended course, where weekly 210 minute face-to-face meetings alternated with ongoing activities for the remainder of the week in a wiki environment. Activities were generally designed to promote knowledge advancement through collaborative experiences (idea-centered) or focus on people's experiences and identities as learners (person-centered).

Data collection and analysis

Throughout the semester, we collected (a) audio and video recordings of every face-to-face meeting; (b) online artifacts created on the wiki by the students; and (c) data from open interviews at opportune times, either during breaks, or when something interesting occurred as related to our research questions and we wanted to know more about it. To answer the first research question, we used a grounded theoretical approach as proposed by Strauss (1987) and operationalized into four stages by Charmaz (2008). In the first stage, we carefully reviewed the entire data corpus, recording expressions that indicated a possible fixed- or growth-orientation. We added descriptions and interpretations of all noted data in the second stage of the data analysis process. We then looked for high level categories within the data and between existing related theories (particularly Dweck and Rogers), including examining the level at which different expressions were found to be at (i.e., a continuum between fixed and growth). This stage corresponded to Charmaz's description of theoretical sampling. Lastly, we continued the refinement process until all the data fit into a coherent framework in what is called theoretical saturation. We carried out a test of inter-rater reliability after the codes and definitions were complete.

To characterize the community's fixed-growth orientation over time, all expressions were time-coded based on three periods within the course corresponding to weeks 1-4, 5-8, and 9-13, respectively. This resulted in a calculated value for each fixed-growth categories (found as part of the first research question) during each of the three time periods tested (T1, T2, T3). We calculated the weighted arithmetic mean per time period for each category. We then used a chi-squared test of independence to test whether there was a significant relationship between the time periods and the community's fixed-growth orientation, as well as a Cramer's V measure to test the strength of the relationship.

To explore students' transformations in the full context of their knowledge building efforts, we studied the case of one student who made observable changes to their fixed-growth orientations throughout the semester. We examined the situational ways that this student expressed her fixed and growth orientations throughout the semester at a fine-grained level of detail. We applied the framework from the first research question as a basis to tell the contextualized, narrative story of this student (Creswell, 2012). To make sure the interpretations were valid and reliable, we involved two additional researchers, one who was familiar with the environment and the other as an outsider, to interpret the data until we reached a consensus. Together, these processes served to triangulate the findings, both as it is based on multiple sources and with multiple interpreters (Schoenfeld, 2007).

Findings

In total, we found five different categories of fixedness and growth, each at three corresponding levels (Table 1). Generally, the first level—fixedness—included expressions that insinuated resistance or avoidance towards change. The second level—steps towards growth—included expressions that showed recognition of the need and desire to change. The third level—growth—included acting on and actively exploring change. Cohen's Kappa coefficients for the agreement between two raters was .72 for the categories and .88 for the levels.

Table 1. Categories and levels of fixed- and growth-orientations

Category	Level 1	Level 2	Level 3
Feelings	F1-Not sharing or being honest about emotions, uncertainties, or tentativeness. Showing emotional distance from community activities.	F2-Owning and/or sharing feelings, recognizing vulnerabilities.	F3-Exploring, expanding on, complex emotions. Discussing development of emotions and ways of coping openly. Actively acting to deal with restricting emotions
Mindset	M1-Afraid to jeopardize one's intelligence or being judged	M2-Recognizing one's own fear of taking on challenges	M3-Actively taking on challenges and facing obstacles, seeing them as opportunities to grow. Contributing or participating without fear of being judged or jeopardize one's intelligence

Personal Responsibility	P1-Not taking responsibility; blaming others for problems.	P2-Recognizing that a person can author and shape their experience	P2-Taking actions based on internal desires or a sense of personal responsibility
Self Constructs	S1-Seeing self as fixed. Not recognizing self constructs or seeing them as unchangeable	S2-Recognizing self as changeable	S3-Active reality testing of self through social construction
Attitude Towards Change	A1-Not willing to change	A2-Recognition of desired change	A3-Acting to create personal change

To characterize the learning community along a fixed-growth continuum, we created a three-ring hexagonal representation based on the calculated fixed-growth orientation (Figure 1). This visualization is useful to communicate the status of a community at any one moment and to trace its growth over time.

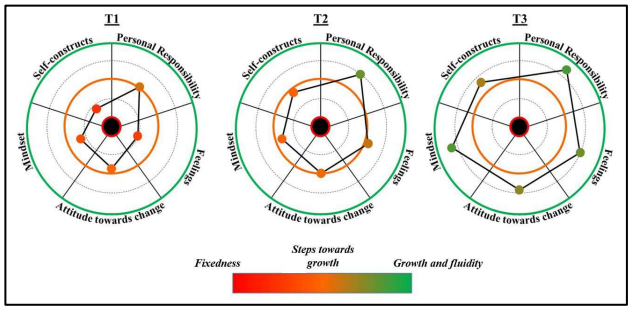

Figure 1. Five categories of fixed-growth orientations across three time periods.

The results of the test of independence to examine the relation between fixed-growth orientation and time period was significant, $X^2(4, N = 324) = 58.54$, $p < .001$. The Cramer's V showed a moderate .301 relationship. These results confirmed that the orientations shifted from fixed to growth throughout the three stages.

A case study of a student's transformation

Fixedness

Nur (pseudonym), a 27-year old female course participant, began the semester looking very calm and excited towards a new beginning. In her first personal online diary entry she wrote about feeling eager to learn and to get to know her new friends. Despite Nur's appearance of being carefree and open, data revealed that she was afraid of being judged by others and had difficulty dealing with challenges. Showing her fear of judgement, Nur was very quiet during most group reflection sessions until the last few sessions of the semester. She explained her silence during group reflection sessions in her week three personal diary, writing "I didn't want to share my thoughts in class to avoid people from forming opinions of me as a learner that is unsure of her actions" [M1].

During the knowledge building activities of the face-to-face meetings, Nur would mostly listen to others and participate only when she had a well-formed notion of what she wanted to say. While taking part in a small group discussion during the third week, she remarked to the researcher that "everyone is so smart and they are already saying what needs to be said, so I am not adding anything. I prefer not to talk" [F1, S1, A1].

Steps towards growth

During the second face-to-face group reflection session, the discussion veered to the topic of working under pressure. Several students reflected about the many obligations that they had in their lives and the fact that they felt there was never enough time for them to fulfill them all. Although Nur was silent during this discussion, she appropriated the ideas in her second online diary entry:

Nur: I always tend to talk about pressure when I have a task I need to finish, but listening from the side, and the moderator said that pressure/or talking about not having enough time could be just an excuse to avoid obligations, I felt it shook me and thought this was touching something that characterizes me, something that for the first time is reflected in my face so clearly [S2].

Nur's general silence during face-to-face meetings were inconsistent with her online practices, where she was open and expressive about some of her concerns and difficulties. She addressed this inconsistency in her week 3 diary, suggesting that she had a desire to be known by the community in writing, "those who would like to learn more about me can enter my personal diary and learn about me as a learner" [F2].

The fifth face-to-face person-centered activity asked students to choose a card and describe how the image and word on it reflected their feelings and/or identity. Nur chose a card of a little girl standing across a polar bear separated by a glass window (Figure 2). Although Nur did not describe her reactions to the full group, she wrote about it extensively in her online diary:

Nur: At first glance I was worried about the girl's feelings. Wow how scary! Maybe she is crying! Maybe she is scared! Looking more closely I thought, maybe this close encounter with the bear is making the girl feel better about herself, maybe she doesn't feel fear against the great challenge in front of her… This made me think! Why did I choose such a negative view at first sight with all the positivity in my mind?... I imagined that I was the little girl facing a big challenge, standing and watching in full control, and with time, the girl in me will grow bigger and the challenge will become smaller…. [P2, A2]

Figure 2. Points-of-You © coaching card. (Translated title is "perspective")

Growth and fluidity

Over the next several weeks, Nur continued to consider her practices and identity vis-a-vis these ideas. Suggesting that they were growing in importance to her, before the tenth face-to-face meeting she held several private discussions with one of her peers about finally talking publicly during a group reflection session. During the actual session, she seemed restless—moving in her chair, looking around as if she wanted to talk, but not finding an opening to do so. When the discussion meeting was about to end, she finally mustered the courage to put herself forward, later writing that "I felt I was about to miss my opportunity to be heard" (Week 10 diary) [P3, S3, A3].

Guided by the moderator, Nur talked about wanting to be a leader of educational change in her home community. She talked about not being able to be a leader due to her perception that others were better than her. Nur turned to specific members of the community and described to them how they affected her [F3, M3, A3]. For example, she turned to Naomi and said the following, who got up and gave her a hug in response:

Nur: I hear you in the reflection session how you are able to see people. Your thinking is outside the box. Your diary doesn't allow me to be calm. It challenges me a lot. I also want to write this way, I want the ability to interpret things and see them from other vantage points [F3].

During the next face-to-face group reflection session, after receiving several compliments in her online diary that included wholly positive feedback about her importance in the community, Nur continued to express her thoughts and feelings with the community.

Nur: I thought that the group told me good things but maybe some people are not saying anything. Maybe there are negative things. I can accept negative criticism. I think negative feedback can be given, but must be given sensitively. I invite everyone to give me negative feedback also [F3, M3, A3].

During the 12th face-to-face meeting, the moderator invited the community to raise issues about the collaborative knowledge building process with a focus on things that did not work well for the community. Even though there were several open issues and challenges in the community, the group remained silent in talking about them. Suddenly, Nur spoke up:

Nur: This week I had a problem in my group...We talked for half an hour… There was no reaction to what I wrote [online]. I disconnected from the phone conversation before it was over. I felt terrible like I haven't for a long time. That my voice wasn't heard. It's like a person who has his mouth taped shut… I sent a Whatspp message… explained how I felt… The next conversation I felt I was heard [F3, M3, P3].

Finding the courage to talk openly during the reflection session was a pivotal moment for Nur. By removing her mask and talking about her feelings honestly, she clearly expressed advanced stages of fluidity and openness that were very important for the community. Namely, she broke down some of the barriers that the community was not able to overcome, opening a large discussion about how the group was building knowledge together and undoubtedly helping make the entire community knowledge building process more intentional.

Discussion and conclusions

This study aimed to examine how the design of KBCs can foster individual and collective growth-orientations. The five categories that we found broaden current notions related to personal dispositions when facing obstacles or challenges. The idea of growth mindset, for example, posits that people's beliefs about whether intelligence is fixed or malleable corresponds with their ability to effectively persist in the face of challenges. Our findings braoden this view, suggesting that there is a complex intertwining of ideas, beliefs, attitudes, and emotions that are responsible for people's actions and potential to develop. Such a finding is sensible, particularly as no one theoretical framework (e.g., mindset) claims to account for the full range of human behavior.

The second part of our study organized the 324 fixed-growth expressions collected during the semester based on time periods, categories, and values. On the whole, our findings showed community growth at a statistically significant level. This was represented in a community-level visualization that showed the co-dependency of the categories, i.e., how they generally changed together. This is important to get a sense of the way communities develop (or stagnate and descend) over time, relative to the ongoing activities of the community. Indeed, we expect that the growth of a learning community is tied to the ongoing events, the emotional breakthroughs, the development of interpersonal relationships, and the level of cohesion and trust. While future research would be needed to examine all of these relationships, the ability to examine the ongoing process of community-transformation from fixedness and fluidity is one of the main contributions of this research.

Lastly, the analysis of Nur provided us with results that meaningfully portray fixedness and fluidity in KBCs. At first, Nur perceived herself as not being fully received by others as well as by herself. This appeared to be associated with rigid constructs in her communication and knowledge building practices. Her fear of sharing her authentic ideas and feelings led her to blockages that are described in the first level of our model. Having the opportunity to authentically write diary entries as well as hear other students' stories appeared to scaffold Nur's transformation out of a place of fixedness. A noticeable sign of change was seen when Nur became aware of a construct she perceived as a fact and now realized was an idea that could be changed. Her recognition about her fear of being judged with her holding back and not expressing herself fully set in motion a number of small changes in Nur's practices and identity that led her on the path towards fluidity. Studying Nur illustrates the complex process that is often required to overcome personal difficulties. Clearly, these are orientations for participants in successful knowledge building communities to have, as groups need to learn how to work together and solve problems as they emerge. Having participants who are open to experience and are able to adjust to new circumstances is a mark of a healthy knowledge building organization.

Limitations and next steps

The limitations of this research mainly have to do with the challenge of accurately capturing abstract, contextually-laden material (that we don't always have access to) about the participants. There is a degree of interpretation inherent in this process, which is inevitable given that the fact that people do not always fit into neat categories. Therefore, even with inter-rater reliability, at best we can get an overall impression or description of fixedness and fluidity, but can never fully accurately capture specific people's orientations on such a continuum. Additionally, we based our interpretations on data that were expressed by the students—namely, that which they chose to share, either in writing or verbally, with the community (or at times with the researcher when probed). While we made efforts to triangulate our results by looking for multiple pieces of evidence to confirm a particular portrait such as with Nur, we cannot be sure that there were not facets of her functioning on the fixedness-growth continuum that were not reported and therefore skewed the results. This is why we chose a case study approach to examine individuals instead of trying to quantify the result of each of them.

Conclusion

It is possible to call KBCs a growth promoting pedagogy because they encourage continual growth and ever deepening discourse. The results of this research suggest that the movement of students' identities as knowledge builders from fixedness to fluidity may be both a result of participating in KBCs as well as highly consequential in improving the collective knowledge building process.

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