Developing participant intellectual humility through technology delivered instruction – A proposed model

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A B S T R A C T

In this paper, we propose an intervention model as a pedagogical tool to develop intellectual humility through the lens of Karl Weick's (1995) sensemaking paradigm. We discuss the digital learning program Perspectives™ as an intervention method for instructional delivery. The purpose of our proposed model is to increase participant engagement and learning in becoming tolerant to viewpoint diversity and open inquiry, the hallmark of a liberal education. The model will serve as a key step in future research underpinning the promotion of cultural diversity, equity, and inclusion in the classroom. Beyond the theoretical contributions, this research also provides a methodological contribution by pairing the model with the use of a technology delivered instructional tool.

1. Introduction

Although remote learning had existed long before the start of the COVID-19 pandemic, the decision made by colleges and universities around the world to complete originally scheduled in-person and/or hybrid classes remotely due to the pandemic has led to an unprecedented challenge for instructors to keep students engaged in the virtual classroom. Whereas research has demonstrated benefits of student-learner engagement on academic achievement (e.g., Lei et al., 2018); sustaining student-learner engagement level using technology (e.g., Henrie et al., 2015; Mendini & Peter, 2019; Watson & Sutton, 2012) was often cited as a challenge to instructors especially during the pandemic when most classes were shifted to remote modality (e.g., Kay & Young, 2022) and the use of technology for student learning and engagement continues to be a challenge to instructors in the future of management education post pandemic (Cullen, 2022, pp. 172–183).

However, as classes transitioned to remote or hybrid modality, this suggested that there would be fewer opportunities for student-learners to interact with peers, which could mean more reluctance and less engagement in difficult conversations. In fact, students were found to feel more lonely and psychological distress reportedly to be prevalent in academia especially during the COVID-19 pandemic (e.g., Edwards et al., 2021). Indeed, it is alarming to observe a declining trend in student engagement from before the pandemic (e.g., Skinner & Pitzer, 2012) to during and post pandemic (e.g., Chu, 2022). Student-learner engagement was found to be a predictor of student learning in previous research of technology- mediated learning and technology delivered instructions (e.g., Henrie et al., 2015; Sitzman, 2011; Wekerle et al., 2022). As educators, we need to rethink what we can do and how we can help sustain student-learner engagement in the online or hybrid classes since these modalities will continue post pandemic as Cullen (2022, pp. 172–183) suggested to be a trend in future management education.

The purpose of this paper is twofold. First, we propose that intellectual humility should be fostered as a character-building exercise

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(Hartman, 2006) using Perspectives™, an online learning platform to improve student engagement by stimulating a classroom environment of open inquiry and critical thinking while respecting individual uniqueness and belonging (Lewis, 2000). Second, we develop a conceptual model based on Garris et al. (2002) Inputs-Process- Outputs in which intellectual humility can be fostered using Weick's (1995) sensemaking paradigm. In the following sections, we introduce our conceptual model and its derived propositions. First, we address intellectual humility and its importance to management education using an interdisciplinary perspective. Then, we proceed by discussing the importance of cultivating intellectual humility as a competency for management students. Next, we exemplify how intellectual humility may be developed through the intervention of a technology delivered instructional tool, namely, Perspectives. We conclude by discussing theoretical and practical implications of the proposed model to stimulate further research on intellectual humility in higher education.

We hope to make three contributions to extant literature by proposing a conceptual model of developing participant intellectual humility through the use of technology delivered instruction. First, this conceptual model provides an opportunity to integrate existing theories to generate a deeper and richer understanding of how they can facilitate student engagement in the classroom. Second, the proposed model provides an opportunity to stimulate emerging research on virtue/character building in higher education using technology delivered instruction. Finally, our proposed model offers an opportunity for higher education faculty and administrators to advance policies and practices aimed at strengthening our democratic institutions and improving epistemic truth in higher education as well as tolerance for workplace diversity and inclusion (Gebert et al., 2017).

2. Literature review

2.1. What is intellectual humility and why is it important in management education?

Intellectual humility is an individual difference and a multi-dimensional construct. Most definitions of intellectual humility cover at least one of the four domains including (1) a tendency to recognize one's own intellectual fallibility or limitations (e.g., Spiegel, 2012), (2) optimally calibrating one's intellectual limitations so that the goal is to achieve epistemic truth, rather than looking humble (Wright et al., 2021); (3) appreciation for others' intellectual strengths or regulating collective confidence (Kidd, 2016); and (4) a "low concern for one's own intellectual status and entitlements" (Roberts & Wood, 2007, p. 514). Table 1 presents the multi- dimensional framework of the intellectual humility construct adapted from Porter et al. (2021).

As shown in the Table, intellectual humility contains four dimensions broken down into an internal dimension vs. expressed dimension that is differentiated by an awareness of one's strengths and limitations as well as that of others. In contrast, the expressed dimension refers to the action taken by making sense to address personal limitations. For example, a person may be aware of personal beliefs that might be biased (internal dimension), but the person may not actively seek feedback to address this bias (expressed dimension) due to them being in denial yet being aware of such biases. People who lack an ability to interact with whom they disagree or don't want to interact with whom they disagree tend to fall in this category (e.g., Haidt, 2013). Next, intellectual humility is also conceptualized as containing the self vs. other dimension differentiated by an awareness of intellectual limitations and redressing of those limitations through a process of sensemaking. As an example, those who constantly practice their skillset and seek feedback from others as well as valuing other's opinions and feedback fall along these dimensions of self vs. others (e.g., Krumrei-Mancuso & Rouse, 2016; Zachry et al., 2018). Emerging research mapping intellectual humility within its nomological network showed intellectual humility as a facet of general humility (Davis & Hook, 2014). Other studies reported positive correlations with the Big Five personality traits including Openness to experience, Agreeableness, and Emotional stability (Meagher, 2022; Porter & Schumann, 2018); modesty and humility based on Ashton and Lee's (2009) HEXACO framework (Krumrei-Mancuso & Rouse, 2016; Porter & Schumann, 2018); self-efficacy and error in management orientation (Porter & Schumann, 2018; Seckler et al., 2021). Negative correlates of intellectual humility were reported to include one's need for cognitive closure to avert ambiguity and narcissism (Porter & Schumann, 2018) as well as political partisan or myside bias (Bowes et al., 2022) while uncorrelated with political identity or orientation (Bowes et al., 2022; Hendy, 2020).

As proposed by several researchers (e.g., Meagher et al., 2019), intellectual humility is a prerequisite for learning because in order for learning to occur, one must first acknowledge that what they know is limited and as a result, actively pursue a topic that they either know a little or do not know. As a nascent field of inquiry, intellectual humility, measured as an individual disposition, has been shown in several studies to be positively related to learning in terms of curiosity and seeking out new information from others with whom they disagree (e.g., Leary et al., 2017; Porter & Schumann, 2018; Rodriguez et al., 2019). Although several studies have demonstrated that

Table 1
Intellectual Humility (IH) and its dimensions.

Self	Internal		Other
	Awareness of one's intellectual limitations	Awareness of value in others' intellect	
	"I accept that my beliefs and attitudes may be wrong" (Leary et al., 2017)	"I recognize the value in opinions that are different from my own" (Leary et al., 2017)	
	Redressing one's intellectual limitations	Openness to corrective feedback	
	"I actively seek feedback on my ideas, even if it is critical" (Porter & Schumann, 2018)	"I don't like it when someone points out an intellectual mistake that I made" (reversed scoring) (Porter & Schumann, 2018)	
	Expressed		

Source: Adapted from Porter et al. (2021).

intellectual humility can be taught to undergraduate students that subsequently led to a gainful change in their self-reported intellectual humility (e.g., Brant et al., 2020; Meagher et al., 2019); the potential effect of intellectual humility on classroom engagement and learning has not been addressed. In addition, to our knowledge, the question of how student- learner engagement can be sustained using technology delivered instruction in conjunction with developing intellectual humility has not been answered. We intend to fill this gap in the literature by proposing a new conceptual model in this study.

We believe that there are three reasons explaining the rise of intellectual humility within the past decade in organizational and psychological research. First, social media use (e.g., Facebook, Twitter, Reddit) has been found to increase polarization on social and political issues based on previous research (e.g., Van Bavel et al., 2021) as did rising income and educational inequality contributing to attitude polarization (e.g., Bosancianu, 2017). Intellectual humility has been proposed to be the solution to bridge the divisiveness and reduce attitude polarization in several empirical studies (e.g., Bowes et al., 2020; Porter & Schumann, 2018). In addition, those holding extreme ideological views were found to benefit more from intellectual humility relative to their moderate counterparts when it comes to reducing affective polarization and the attitude change remained stable for one month after intervention as shown in one recent study (Welker et al., 2022).

Second, within the past decade, there has been an increasing attention on promoting and advancing diversity, equity, and inclusion (DEI) in higher education across most of the world (e.g., Archer, 2007; Claeys-Kulik & Jorgensen, 2018; Hoffman & Mitchell, 2016). The focus on DEI has led to various organizational change initiatives ranging from promoting a diverse, equitable, and inclusive campus to the same within the classroom. However, in this paper, we differentiate between an integrative DEI strategy in the classroom in which viewpoint diversity is encouraged and intellectual humility is cultivated and a "woke" DEI strategy in the classroom or campuses in which DEI is promoted by focusing on critical race theory and restricting viewpoint diversity (e.g., Gebert et al., 2017; Waldman & Sparr, *in press*). "Woke" diversity strategies have been found to stifle innovation and exacerbate bias and inequity according to two recent studies (Foss & Klein, *in press*; Hellerstedt et al., *in press*). We propose that fostering student-learner intellectual humility is consistent with integrative DEI strategy because the latter promotes tolerance, defined as accepting the legitimacy of an action, idea, or person with which or whom one dislikes or disagrees (Gebert et al., 2017; Sugiyama, Ladge, & Bilimoria) and embraces both diversity and unity at the same time (Waldman & Sparr, *in press*) that is essential in bridging divisiveness and promoting constructive disagreement for innovation.

Third, the perception of a decline in academic freedom and the resultant rise of self- censorship among faculty and staff in higher education have been reported in recent studies (e.g., Karran et al., 2022; Whittington, 2019) conducted in the U.S., the U.K., and the European Union. In addition, research on undergraduate students in the U.S. mirrored the same level of declining freedom of expression found among faculty and staff. The majority of students surveyed said that they would want more opportunities to have constructive dialogues with their classmates with whom they have opposing views (e.g., Ryan et al., 2022). It is our belief that unless students are trained to develop their sensemaking skill and be intellectually humble, the likelihood of constructive discourse ending on a positive note will be low or even not possible. Sensemaking has been studied in organizational research for many decades both as a theorizing process and a knowledge/learning process (Maitlis & Christianson, 2014). In this study, we adopt the definition of sensemaking as "an ongoing retrospective development of plausible images that rationalize what people are doing" (Weick et al., 2005, p. 409). In this process, people respond to changes in their environment triggered by an interruption that violates their routine such as an unexpected occurrence, an introduction of a new idea or policy (Maitlis & Christianson, 2014; Weick, 1995; Weick et al., 2005). Sensemaking includes both the interpretation of a triggering event that subsequently serves as a catalyst for action and the action itself (Weick et al., 2005). As discussed previously, an action is the focus of the expressed dimension of intellectual humility and as such, it is the interpretation of the triggering event, not the evaluation of the choice people made that is essential in the sensemaking process to build intellectual humility.

In order for people to realize their intellectual limitations and redress those limitations, such triggers, or interruptions (e.g., an accumulation of errors during an auditing process) are needed to start the process of building intellectual humility, for example, bringing to the forefront the process of interpretation (e.g., asking 'Why did the auditors in charge of the auditing project not recognize their own personal limitations?' to frame the event as a question of meaning rather than evaluating the choice those people made by asking 'Why did they make such a decision not to ask for help when they were not up to the auditing task?' Seckler et al., 2021). This reframing process (shifting away from decisions to sensemaking) allows people to be humble. It gives people pause, and wonder about the possibility that given the circumstances, they could have made the same mistake (Weick et al., 2005), thereby formulating a response to view that triggering event as 'good people struggling to make sense of errors accumulated during an auditing process', rather than 'bad people making terrible decisions.'

As mentioned previously, sensemaking has enjoyed a long history of organizational research, evidenced by an established linkage between sensemaking and organizational learning (e.g., Christianson et al., 2009). However, studies examining the process of sensemaking in the context of higher education remain scarce. For example, Fitzgerald and Palincsar (2019) conducted a qualitative review and summarized best teaching practices in K-12 schools in which sensemaking was the core feature in curriculum across disciplines (e.g., science, mathematics, literature, history). Albert et al. (2021) conducted a large survey of college faculty in the U.S., Canada, and Europe identifying best instructional practices based on sensemaking paradigm across curricula. Nevertheless, to our knowledge, the linkage between sensemaking and character development (e.g., intellectual humility) was not addressed in prior research. This study is aimed to fill that gap by examining character development via the process of sensemaking within a technology-mediated classroom environment. In the paragraphs that follow, we explain the rise of intellectual humility in our research domain.

2.2. Why is it important for business student-learners to develop intellectual humility?

There are at least three reasons why it is important to cultivate intellectual humility within and among student-learners. First, based on cross-temporal meta-analyses (e.g., Twenge et al., 2018; Twenge & Foster, 2010) U.S. college students have reported an increasing level of narcissism relative to previous generations. This increase in narcissism tends to lead to extreme views and reluctance to engage in controversial topics, as evidenced by a negative correlation between narcissism and intellectual humility (e.g., Porter & Schumann, 2018). It is important for student-learners to be modest and humble and avoid being arrogant or diffident, portraying extreme points of view. In a recent study, virtuous character building (e.g., humility) was viewed as an effective personal resource in coping with stressful life events and maintaining subjective well-being (Seijts et al., 2022). In another study, Canadian business students were found to uphold conservation values such as conformity and self-interests more strongly than did students in non-business majors and preferred to avoid conflicts, rather than resolving conflicts (Petersen & Ford, 2019). Taken altogether, the above research findings point to the need to cultivate intellectual humility within our business student learners for their future success.

Next, the Association to Advance Collegiate Schools of Business (AACSB) accreditation 2020 Business standards view college students as lifelong learners (www.aacsb.edu), rather than students, which is consistent with a growth mindset, amenable to developing intellectual humility as opposed to a fixed mindset inhibiting intellectual humility (Dweck, 2006, 2015). A growth mindset has also been suggested to be a focus of future management education (Foster, 2020). To our knowledge, research linking intellectual humility to Dweck's (2006) growth mindset conceptualization is lacking. However, sensemaking theory has been explored as a mechanism through which high- school teachers explained the concepts of growth vs. fixed mindset in teaching non-cognitive skills to high-school students in at least one study (Patrick & Joshi, 2019).

Lastly, as discussed earlier, intellectual humility is essential in promoting a culture of diversity, equity, and inclusion because of the increased diversity of the college student body. In addition, as the workforce becomes more diverse, there has been a call in the literature for a bottom-up approach to leadership development and personal development (Owens & Hekman, 2012). Specifically, leadership humility was viewed as a bottom-up approach to leader development, in which leaders who acknowledged their personal limitations and legitimized doubts, or uncertainty (Weick, 2001) were viewed by their subordinates as humble and effective leaders during times of crisis (Owens & Hekman, 2012).

Our world views are built, at least partly, upon the foundation of religions and/or spirituality, it is important to rely on cultural humility to regulate or moderate the extent to which religious beliefs are open to change to enable tolerance, if not learning from other cultures and/or ideologies. Cultural humility was found to reduce therapists' tendencies to engage in racial microaggression with their patients in therapy settings (e.g., Davis et al., 2016), and students scoring high on intellectual humility measured both quantitatively as a self-report Likert-type scale and qualitatively as a reflection essay were found to score high on cultural humility (Meagher et al.,
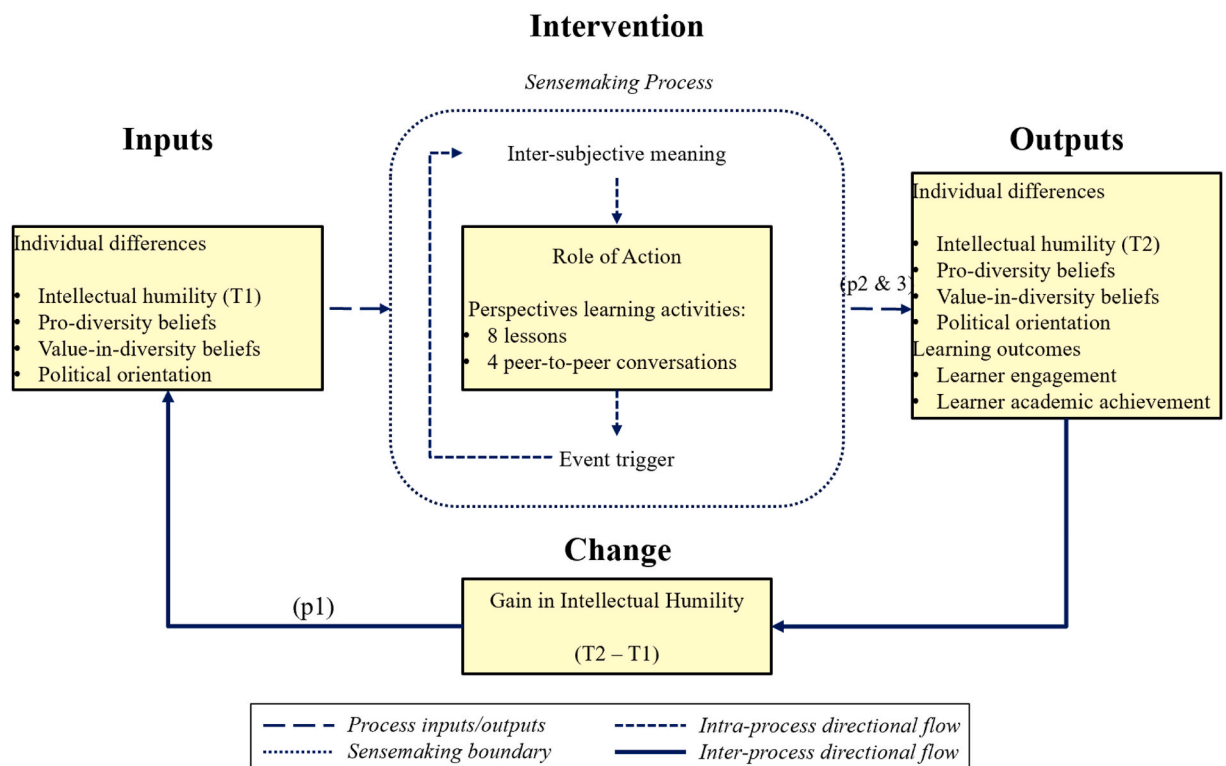
Fig. 1. Proposed conceptual model of fostering intellectual humility in business education.

2019). As a process, sensemaking may contribute to our understanding of intellectual humility's role in improving religious tolerance and affective polarization (Bowes et al., 2020; Hook et al., 2017).

2.3. How can intellectual humility be developed?

In this paper, we propose using Perspectives as a training intervention to foster and develop intellectual humility. Perspectives is a computerized interactive learning platform, available to the public free of charge at www.constructivedialogue.org. Perspectives is an example of technology delivered instruction (TDI), defined as the use of digital technology to deliver instructional materials, widely used in human resource development (Cascio, 2014). Perspectives enable participants to learn the content in digitized format at their own pace to build intellectual humility over time. Developed using evidence-based psychology designed to reduce polarized viewpoints and foster mutual understanding across multiple viewpoints, Perspectives has been widely used by more than 550 college educators, 70 public and private organizations across 20 countries as of March 2023 since being launched in November of 2017 (Welker, 2023). Its software has gone through several versions with the current version 2.0 including 8 modules or lessons with each lesson lasting approximately 30 min. In addition, there are 4 optional lessons for practicing the techniques learned in the previous lesson with a partner each lasting 45 min. After completing eight Perspectives lessons, learners are provided with a summed score across lessons showing their intellectual humility progress.

According to the Inputs-Process-Outcomes Game Model from Garris et al. (2002), learners' *competencies* serve as the input, which influences learning outcomes; the outcome in the model, through a process of interaction between learners and the training intervention, for example, a technology delivered instruction such as Perspectives as well as the instructor (Garris et al., 2002). Fig. 1 shows the conceptual model of developing intellectual humility in a business course. According to the model, students' intellectual humility at the beginning of the semester serves as an input variable that will be strengthened during the process of the semester interacting with their peers and completing the lessons in Perspectives through the sensemaking process of enactment, selection, and retention (Maitlis & Christianson, 2014; Weick et al., 2005). As a result, post-training intellectual humility is expected to be at a higher level at the end of the semester. The proposed conceptual model includes three control variables of pro-diversity beliefs, value-in diversity beliefs, and political orientation. According to a study conducted by Hendy et al. (2017), political orientation among a sample of U.S. college students was found to remain stable over a 15-week course in which students were required to debate controversial topics as part of a business ethics course. Next, pro-diversity beliefs were found to be an important component of inclusive leadership (Randel et al., 2018) in which leader humility is a central characteristic. However, the real gain in teamwork outcome was only realized when team leaders displayed value-in diversity beliefs as reported in a recent study (Leroy et al., 2022). Therefore, in our model, we propose to include all three individual differences as control variables to investigate the extent to which intellectual humility would be gained by the training intervention after controlling for the above three individual differences. As presented earlier, Perspectives is an example of technology delivered instruction (TDI), which enables participants to learn the content in digitized format at their own pace to build intellectual humility over time. This feature lends Perspectives to be an active, rather than passive learning tool. Active learning has been documented to contribute significantly to teaching effectiveness based on a large-scale meta-analysis of TDI (Sitzmann, 2011) as well as in a recent study conducted during the pandemic (e.g., Wekerle et al., 2022). Students engaged in both active and passive learning activities in class in which technology was adopted, however, only active learning activities were found to predict learning outcomes (e.g., Wekerle et al., 2022). The peer-to-peer conversation activities are designed to help learners apply the concepts discussed in the previous self-study lesson in dialogues with their peers.

Sensemaking is about identifying, interpreting, and acting on the information that is available to us. Thus, this process involves three steps: (1) identifying a triggering event, (2) interpreting the event or constructing its inter-subjective meaning and (3) acting on the available information. Sensemaking occurs when there is a triggering event, one that disrupts our normal routine, as discussed in the preceding paragraphs. Within an organization's context, being audited by the government for tax compliance may be a triggering event because it may be the least expected by members of the organization, especially those working in the accounting department. The subjective and experienced ambiguity or uncertainty caused by an external audit as well as its associated emotion vary among individuals and can impact individual and organizational identity (Corley & Gioia, 2004). An external audit carried out by the government may signal a crisis triggering sensemaking among individual auditors working for the organization because these auditors may feel that their identity and/or competency is under threat. Previous studies have documented the important role of sensemaking in fostering learning (i.e., learning from error) within and among individuals, groups, and organizations (e.g., Christianson et al., 2009; Seckler et al., 2021). However, sensemaking during an organizational unexpected event (e.g., being audited by the government for tax compliance) may be viewed as a risky action that might lead to a better understanding of their competency and intellectual humility (e.g., why did we as internal auditors in charge of tax compliance, not recognize our own intellectual limitations and seek guidance from our managers to improve our reporting standards?') versus safe inaction (e.g., we did not do anything wrong, so doing nothing is best) that might perpetuate the confusion or identity threat (Weick, 1995).

Using Perspectives as a learning platform, students benefit from Weick's (1995) sensemaking in engaging with others in social discourse, rather than simply relying on their own interpretation of information and facts (Weick et al., 2005). Social discourse may serve to promote viewpoint diversity, an essence of Perspectives, which can enhance resourceful sensemaking as reported in at least one study (Wright et al., 2000). Sensemaking has been conceptualized as an intra-individual process and inter-individual or inter-group process (Maitlis & Christianson, 2014). When viewed as an intra-individual process, the second step in sensemaking process involves students advocating for a particular view of those auditors and their organizations (e.g., unethical, lacking competence, corrupt, evading tax laws, skirting regulatory reporting standards vs. competent in adopting sophisticated strategies to avoid taxes vs. withholding judgment until more information or facts become available) and influence other students during class discussion

or peer-to-peer conversations to persuade others in class to agree with their view(s). On the other hand, the second step in sensemaking process, when viewed as an inter-individual or inter-group process involves students discuss in groups about their advocated view(s) of the auditors and the organization for which those auditors work and mutually build their understanding of the issue together.

Perspectives as a TDI enable sensemaking to occur via both processes. Since student-learners have an opportunity to have a series of discussion (four in total as shown in Table 2) with their partners/peers throughout the duration of learning with Perspectives, we propose that student-learners are able to overcome the feeling of discomfort or cognitive dissonance when recognizing that what they have perceived during the interpretation step of sensemaking (e.g., the Internal Revenue Service (IRS) in the U.S. was found to have audited fewer big corporations in 2020 compared to 2012 according to TRAC (trac.syr.edu), a non-partisan, non-profit data research center at Syracuse University; in terms of audit equity by race, the IRS admitted to have audited Black taxpayers three times more frequently than non-Black taxpayers based on 2014 tax returns and tax audit data according to a recent study (Elzayn et al., 2023) does not match their pre-conceived expectations (e.g., the government only audited companies and/or individual taxpayers if they are suspected of tax fraud) when the process of sensemaking is enacted at the individual level. In addition, consistent with Aristotelian and Confucian virtue building, practice is required to find the golden mean or the middle ground between the two extremes by engaging in perspective taking as perspectives being essential for building a virtuous character. Viewed under this lens, sensemaking lends itself to meaningful classroom discourse in the quest for epistemic truth or knowledge, the foundation of a liberal education.

Sensemaking is an iterative process (lending itself perfectly to virtue or character building as noted in the previous paragraph) including enactment, selection, and retention, during which we interpret the meaning of the triggering event to formulate an *action* that is grounded in identity construction at the individual level. The role of action as the third step in the sensemaking process is important because we can learn about an issue (i.e., a triggering event) by taking action and observing what results from that action. In addition, we can test our preliminary understanding of the issue generated through our sensemaking efforts in the previous steps of the sensemaking process. We also shape the environment for subsequent sensemaking on the basis of actions taken by individuals, groups, and organizations. It is the mutual influence of actions – environment that defines enactment (Maitlis & Christianson, 2014). Enactment is what makes sensemaking different from interpretation, which is the second step in the sensemaking process, in that enactment often leads to new structures, constraints, and opportunities that might be non-existent before such an enactment (Weick, 1995).

Sensemaking also refers to giving meaning to the abstract using one's intuition or hunches and to test that hunch using the iterative process described above (Weick et al., 2005). The first lesson in the Perspectives process Dialogue, called "Explore the inner working of the mind". In this lesson, student-learners are first introduced to the concept of self-righteousness or believing in what we know as right even though it is wrong. This irrationality is due to our overreliance on hunches and emotions, rather than logic or reasoning. An example used in the lesson is that most people would hesitate to buy a used car when they knew that it was previously owned by a serial killer even though the car was of good quality at a very good price. The action or decision not to buy the car is rooted from *the wrong feeling* attached to buying the car because its previous owner was a serial killer. One objective of the Perspectives dialogue is to let student-learners know the importance of when to discount our intuition, when to trust it, and use it in combination with logic and reasons to build new knowledge. Because emotions are a part of the sensemaking process (Maitlis & Christianson, 2014) an intense emotion such as the wrong feeling vs. right feeling in the car buying example is expected in the process of virtuous character building such as intellectual humility. Our discussion thus so far, is consistent with the expected result of improving intellectual humility after completing the lessons in Perspectives. Therefore, the following proposition emerges:

Proposition 1. *Intellectual humility will be higher at the end of the semester because of the training intervention during which sensemaking occurs than what is recorded at the beginning of the semester.*

In this paper, we posit that the Perspectives learning platform will improve student- learner engagement in the classroom in terms of their behavioral, emotional, and cognitive indicators. Behavioral indicators of classroom engagement include class participation, attendance, and preparation (e.g., reading, doing homework). Emotional indicators of classroom engagement include positive attitudes toward the class, expressing interest, enjoyment, and excitement in the topic discussed in class, feeling safe and/or positive with peers and/or instructors. Cognitive indicators of classroom engagement include beliefs about the importance and/or value of intellectual humility, cognitive/strategy planning, and implementation to study the topic content, and self-regulation (Henrie et al., 2015; Lei et al., 2018).

Perspectives lessons and activities are designed to engage student-learners on an emotional basis. As an example, in lesson 4,

Table 2
Perspectives learning platform schedule to cultivate intellectual humility.

Lesson	Topic covered	Activity	Allotted Time
1	Explore the inner working of the mind	Self-study	30 min
2	Uncover the roots of our ideological differences	Peer-to-peer conversation #1	60 min
3	Cultivate intellectual humility	Self-study	30 min
4	Welcome diverse perspective	Peer-to-peer conversation #2	60 min
5	Explore other worldviews	Self-study	30 min
6	Challenge the culture of contempt	Peer-to-peer conversation #3	60 min
7	Managing emotions in difficult conversations	Self-study	30 min
8	Master difficult conversations	Peer-to-peer conversation #4	60 min
Total			6 hours

students are introduced to the importance and value of talking to people with whom they disagree to grow their portfolio of diverse perspectives. Hartman (2006) suggested that helping students think critically about their values and realize those values in practice are two important components of character development. Thinking critically about one's values and recognizing that others may hold the same values but to a different degree tends to create an emotional reaction among student-learners. This may enable student-learners to re-frame past-present circumstances into understandable situations. The typical emotional outburst among students when hearing other students sharing a different view on various contentious topics (e.g., electric vehicle subsidy in response to climate change, taxation, health care reform, prescription drug marketing, student loan forgiveness) from their own is "You are crazy to believe that".

Although emotions are understood to be part of the sensemaking process caused by labeling (Maitlis & Christianson, 2014; Weick et al., 2005), such an action might lead to negative learning outcomes if the label is considered offensive. A desired emotional reaction from successfully completing Perspectives is to embrace the explorer mindset and encourage perspective-taking by refraining from being upset and expressing wonder to elicit more information from the other dissenting views by expressing an interest in learning more about the others holding dissenting views such as '*help me understand why you acted that way or let me help you understand my perspective on this issue in the hope that you will act differently or understand where I am coming from'*; '*tell me more about it. I may learn something from you'* (Perspectives, lessons 4 and 6). This perspective taking approach has been shown to be successful in brokering identities in diversity training (Sugiyama, Ladge, & Bilimoria). Based on Weick's (1995) sensemaking paradigm, the sensemaking process is "driven by plausibility rather than accuracy" (p. 17). This is consistent with Perspectives' dualities approach of "both/and" thinking (Smith & Lewis, 2022) and moral pluralism (Graham et al., 2013; Whittington, 2019) in which multiple solutions to a problem are plausible, rather than searching for a correct one. One characteristic of leadership humility identified by Owens and Hekman (2012) includes modeling teachability, or leaders as "models of learning" (p. 798). Based on the definition of intellectual humility discussed earlier, modeling teachability can be viewed as an outcome of being aware of and valuing others' feedback and seeking others' feedback to address one's own limitations. Models of learning can be further enhanced by recognizing that there are different ways that might be equally valid to solve a problem or accomplish something (Owens & Hekman, 2012). Based on the above discussion, it is reasonable to expect that sensemaking process enables the cultivation of intellectual humility, which promotes a culture of diversity, equity, and inclusion. Emerging empirical evidence showed that perceived feeling of belonging among students included in the sample from the U.S. and Canada improved and sustained for one month after completing the lessons in Perspective version 2.0 (Welker et al., 2022).

Perspectives lessons are also designed to engage participants on a cognitive and behavioral basis. In terms of cognitive engagement, participants are introduced to selected classical texts to learn important concepts related to humility. For example, the English philosopher John Stuart Mill's famous quote "*conflicting doctrines, instead of being one true and the other false, share the truth between them; and the nonconforming opinion is needed to supply the remainder of the truth, of which the received doctrine embodies only a part*" (Mill, 1859, as cited in Perspectives) is used to illustrate the importance of listening to both sides of an argument, and that the truth is usually a combination of both sides. This shapes the environment for sensemaking, as the actions shape and re-shape situations to restore order. Another indicator of cognitive engagement is evidenced in the quiz given to participants at the end of each lesson to measure comprehension. Various visual aids including pictures and graphics are included in Perspectives to supplement the text, which aids participant comprehension. According to at least one study, younger learners were found to prefer visual images to texts compared to older learners (Twenge et al., 2018). With respect to behavioral indicators of engagement, Perspectives lessons are designed to give learners who spend the time needed to learn the content an advantage over those who go through the lessons by simply clicking the button(s) on their computer screen. Several studies have documented a positive correlation between the time spent playing a business simulation game and simulation performance (e.g., Hendy, 2021; Kilburn & Kilburn, 2012). Based on the above discussion, the following proposition is presented:

Proposition 2. *Perspectives technology intervention will be positively associated with student-learner engagement (including behavioral, emotional, and cognitive engagement).*

As shown in Table 1, Perspectives views intellectual humility as a competency that can be taught and developed, rather than an enduring trait that we are born with. In addition, the life-hacks features available at the end of each lesson allow students to practice the concepts learned in each lesson to foster humility. As noted elsewhere (e.g., Sitzmann, 2011), this feature promotes a sense of intrinsic satisfaction among student learners and help them become humble, rather than pretending to be humble over time. A large-scale meta- analysis has shown that *content knowledge* was more effectively delivered via TDI compared to the traditional in-person workshop or classroom based (e.g., Sitzmann, 2011). Perspectives lessons are designed to capture both declarative and procedural knowledge of intellectual humility. Kraiger et al. (1993) defined declarative knowledge as the memorization of facts and concept definition (e.g., humility vs. diffidence vs. arrogance) and procedural knowledge as the application process of the concept(s) recalled in the declarative knowledge component (e.g., peer-to-peer conversations/scenarios to build humility and reduce arrogance). Perspectives lends itself to be applicable to classroom instruction (both online and hybrid modalities) as shown in previous studies (e. g., Hendy, 2020; Mabrey et al., 2021) in addition to workforce training and development such as a part of an employee upskilling program to help offset the replacement and augmentation effect of artificial intelligence (AI) on future jobs (Tschang & Almirall, 2021).

Research showing the benefits of sensemaking has documented the linkage between sensemaking and strategic change such that sensemaking by leaders and managers were found to influence the organization's vision, mission, and culture during transitional period such as a corporate spin-off (e.g., Corley & Gioia, 2004; Jay, 2013). Extrapolating this finding to individual student learners and instructors, it is reasonable to expect that when student-learners are successful at sensemaking to reduce cognitive dissonance, and improve their mental health, an internal change can be said to occur. Because sensemaking as a process is grounded in identity

construction (Weick, 1995), individual student-learners may experience multiple identities throughout the sensemaking process to help them enact the environment and be comfortable with their new identity construction (a.k.a. retention). Likewise, when instructors are successful at influencing the sensemaking of student learners in their class, a strategic change such as academic achievement at the class level will follow. Indeed, sensemaking was found to be positively related to organizational learning in prior research (e.g., Christianson et al., 2009). Therefore, the following proposition emerged:

Proposition 3. *Perspectives technology intervention will be positively associated with student-learner academic achievement* (*declarative and procedural knowledge*).

3. Method

3.1. Theoretical contributions

We adopted Weick's (1989) approach to theory construction in developing our proposed conceptual model. Specifically, Weick (1989) proposed three steps including problem statements, thought trials, and selection criteria in theory building. First, our theorizing process started with an interesting fact, which is a continuing decline in student engagement in the classroom before the pandemic (Skinner & Pitzer, 2012), during the pandemic, and post pandemic (Chu, 2022). This interesting fact served as the foundation on which we specified our problem statement, which is why student engagement continues to decline over the past years. Next, through an iterative process of percolating on student engagement using *if-then* statements, we arrived at a solution to improve student engagement, which is fostering intellectual humility via Weick's (1995) sensemaking process to explain why it can improve student engagement in the classroom, which ultimately improve student learning. The third step in Weick's (1989) theory building refers to identifying a set of selection criteria to be applied to the solution identified in the thought trials. We feel that our proposed model, testable using qualitative, quantitative, and/or mixed methods in terms of its three propositions, comes with a diverse set of criteria for other researchers to continue refining the model with a view to making it a better model. As Weick's (1989) argued "the greater the number of diverse criteria applied to a conjecture, the higher the probability that those conjectures which are selected will result in good theory" (Weick, 1989, p. 523).

Our approach to theorizing can also be viewed as following a conceptual induction method (Carlile & Christensen, 2005; Meredith, 1993). Alternatively, our approach fits the description of pragmatic empirical theorizing (Shepherd & Suddaby, 2017). We felt that this approach was appropriate in our case because the conceptual model that we proposed is not entirely new. Specifically, we took an existing and validated learning model termed Input-Process-Output (Garris et al., 2002) and layered it with another existing theory, namely sensemaking (Weick, 1995) to theorize how an important competency such as intellectual humility can be fostered and developed by using TDI, an interactive online platform called Perspectives. In addition, our conceptual model should be viewed as descriptive, rather than normative theory building at this point because of the descriptive and correlational nature of our propositions (Carlile & Christensen, 2005).

We followed Corley and Gioia's (2011) call for taking a pre-science orientation in theorizing because we hope that our proposed model enhances "the receptivity of the audiences" by "influencing the intellectual framing and dialogue about what we need to know" (Corley & Gioia, 2011, p. 13). Viewed under this lens, the theoretical contribution of our proposed model is in its utility, rather than originality because the theories underlying the model are not new as mentioned previously. We hope that that the value of our proposed conceptual model will *not* be viewed as a final product, but rather, as a process of consistent and rigorous testing and application of the model's propositions. As Carlile and Christensen (2005) noted, unexpected results or findings from the proposed theory or anomalies provide researchers an opportunity to revisit the foundation of the theory to improve it, rather than having it "tested but unimproved" (p. 4).

3.2. Future research directions

As mentioned previously, our proposed model can be tested using a variety of different methods. For example, it can be tested using an experimental or quasi-experimental pre-test and post-test research design with a control group. Whereas the control group of students do not receive Perspectives as a TDI intervention, the experimental group of students will receive instructions throughout the semester using Perspectives. It would be best to have the same instructor for both groups of students to reduce the potential instructor or facilitator effect as discussed previously in the paper elsewhere (Gebert et al., 2017; Patrick & Joshi, 2019). Intellectual humility can be measured using a combination of self-report measures and the numeric score at the end of eight lessons in Perspectives. Since intellectual humility is assessed in Perspectives as an objective measure (i.e., numeric score) across lessons, it reflects the natural progression of learners over time in cultivating their humility, which lends itself better for organizations to track individual progress. This advantage of Perspectives overcomes a limitation inherent in extant research that relies on a one-time snapshot of intellectual humility self-reported data that can be contaminated with self-deception, a dimension of socially desirable responding (Haggard et al., 2018).

However, researchers might not want to discard self-report as a source of intellectual humility data based on the low agreement between self and other-report because self-enhancement operationalized as overclaiming was not predicted by honesty-humility, a positive correlate of intellectual humility in a recent study (Goecke et al., 2020) despite evidence of socially desirable responding in self-reported intellectual humility data in previous studies (e.g., Meagher et al., 2015). For example, Meagher (2022) reported weak correlations between self and informant ratings of intellectual humility (average correlation coefficient of .19 across 3 different

intellectual humility scales with the minimum of 0.09 and maximum of 0.32) suggesting added value in utilizing both self-report and other-report data of intellectual humility. Nevertheless, it is appropriate to use self-report data for certain dimensions of intellectual humility where it is not easily observable and most associated with cognitive biases, such as redressing one's intellectual limitations while relying on other/informant reports to assess other intellectual humility dimensions such as awareness of one's intellect and awareness of value in others' intellect.

It is important to note the possible bias caused by participants overstating their intellectual humility due to social desirability as reported in prior research (Meagher et al., 2015). Another reason for the potential inflation of intellectual humility gain might be due to the Hawthorne effect. It is possible for participants to react in accordance with their instructor's expectation when they know they are being observed in the classroom in discussing their Perspectives experience and/or peer-to-peer conversations. On the other hand, it is possible that some students might dislike the instructor/facilitator that they deliberately respond in a way to lower their Perspectives scores to sabotage the instructor's effort in developing participant intellectual humility.[1] These biases can be addressed by using a combination of measures of intellectual humility as discussed above. A unique feature within Perspectives is the additional four peer-to-peer conversations that can be used to measure peer perception of their partner's intellectual humility over the course of the 15-week semester to offset any potential biases with self-reported data.

3.3. Contextual considerations

Future researchers might want to examine potential moderators of the gain in intellectual humility using Perspectives through the sensemaking mechanism as proposed. At the societal and/or cultural level, one moderator might be the national/cultural/political system. For example, the student behavioral engagement-academic achievement linkage was found to be stronger for students in the U. S. and European countries compared to those from Asian countries while the opposite was found for the cognitive and emotional engagement – academic achievement linkage in a meta-analysis (Lei et al., 2018). It is possible to expect that intellectual humility as a virtue to vary across cultures with Eastern cultures (e.g., China, Korea, Japan) valuing it more so than Western cultures because being or looking humble might be viewed as being or looking "weak" in Western cultures. At the individual level, it might be worthwhile for future researchers to look into the student learner's level of openness to experience, cognitive ability, or complexity as potential moderators of the gain in intellectual humility. Another moderator might be the classroom context itself including student perception of psychological safety within the classroom.

4. Discussion

Our conceptual model builds on the work of Garris et al. (2002) by embedding Weick's (1995) sensemaking theory. First, we expand the input-process-output model by focusing on what 'process' entails, moving away from a 'black box' approach by detailing an intervention mechanism supported by Weick's (1995) sensemaking paradigm. This integration of two existing theories contributes to extant literature by generating a deeper and richer understanding of how these theories can facilitate student engagement in the classroom, and subsequently student learning. Next, we provide the inner-working components that transform inter-subjective meaning through the role of student learners as active participants engaging in various activities designed to build intellectual humility. Our proposed model hopefully provides an opportunity to stimulate research on virtue building in higher education using technology delivered instruction. Finally, we illustrate how expected outcomes and interruptions lead participants to reframe the baseline expectations towards a sensemaking process of enactment, selection, and retention arising from social and collective construction in a feedback loop that leads to emergent individual differences such as a higher level of intellectual humility.

As noted, intellectual humility is a prerequisite for learning (Meagher et al., 2019), our proposed model offers an opportunity for higher education faculty and administrators to advance Perspectives as a technology delivered instruction to improve constructive dialogues in higher education as well as strengthen our democratic institutions as well as tolerance for workplace diversity and inclusion (Gebert et al., 2017; Waldman & Sparr, *in press*). A recent review of intellectual humility highlighted that most existing measures of intellectual ability view this construct as a stable personality trait whereas in this paper, we view intellectual humility as a state construct or competency that is amenable to change over time. This view of intellectual humility as a competency is also consistent with recent calls from scholars for future research using experimental or training intervention to change participant level of intellectual humility (Davis et al., 2022; Zachry et al., 2018).

Perspectives promotes moral pluralism (Graham et al., 2013; Whittington, 2019), rather than moral universalism or ethnocentrism, which allows for multiple solutions to a problem, stimulating innovation, rather than promoting one solution as the best or correct based on ethnocentrism. In addition, Perspectives is based on a growth mindset of learning and motivation (Dweck, 2006), rather than a fixed mindset, with supporting evidence from neuroscience (e.g., brain plasticity). According to Carol Dweck, who proposed the concepts of growth vs. fixed mindset of intelligence in her work on motivation, those who have a growth mindset tend to look at their mistakes as learning opportunities, consistent with intellectual humility, whereas those who have a fixed mindset tend to look at their mistakes as something that should be avoided in the future (Dweck, 2006). Research supporting Dweck's (2006) growth mindset through the lens of sensemaking has begun to emerge. Patrick and Joshi (2019) conducted in-depth interviews with teachers in 3 high-schools in the U.S. and revealed that teachers' prior beliefs and

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[1] We would like to thank an anonymous reviewer for these suggestions.

understanding about growth vs. fixed mindset (either from their training or independent from their official training) influenced how they engaged with students in explaining those two concepts. They cautioned that whereas growth mindset could be misinterpreted as relentless positivity without paying attention to the "false growth mindset" (Dweck, 2015), fixed mindset could be construed as a cultural trait associated with low-income, poor-performing immigrant students (Patrick & Joshi, 2019). As presented earlier, Perspectives has been used successfully in a variety of settings including higher education, K-12 education, and private and public sectors to foster learners' openness to opposing views (Welker, 2023). Initial evidence supporting the validity of Perspectives learning platform in fostering intellectual humility has begun to emerge. For example, a positive correlation of Perspectives scores and cognitive diversity operationalized as viewpoint diversity using a small sample of undergraduate business students (N = 35) in a business ethics course (Hendy, 2020). Another large-scale study using a quasi-experimental design showed the gain in intellectual humility from completing Perspectives to be small to medium effect sizes (Welker et al., 2022).

Considering the totality of evidence presented, we recommend Perspectives as a learning and/or teaching pedagogy as well as an employee development tool to build intellectual humility, promote open inquiry, and critical thinking on campus and in the workplace. It is important for us as educators to align our action and words so that we truly embrace a campus climate of diversity, equity, and inclusion, rather than misalignment between what we say we support and our action of what we actually do support as evidenced in Hoffman and Mitchell (2016).

4.1. Challenges in developing intellectual humility through technology delivered instruction

Notwithstanding the potential benefits of Perspectives, it is noteworthy to mention a few challenges or difficulties of Perspectives as an on-line learning and training intervention tool.

First, as noted in a recent study (Albert et al., 2021), fewer than half of the surveyed faculty reported using TDIs in their teaching across disciplines. Although there is no monetary cost to adopt Perspectives, there is an extra cost in terms of time and effort from the perspective of the faculty to adopt the Perspectives software in their classrooms. It is our hope that with the continued increasing rate of on-line course delivery to meet student learner demand, more faculty will see the need to adopt TDIs to improve student engagement and academic achievement in the classroom (Lei et al., 2018). Second, after the decision to adopt Perspectives has been made, to fully take advantage of this software, a group climate of psychological safety must be created by the instructors and perceived by student-learners for them to feel safe and comfortable to freely speak their mind. This can be best achieved by having the guidance and mindset of a facilitator as opposed to the mindset of an instructor. In other words, facilitators help guide the difficult conversations, rather than telling student-learners what they should do or think during those conversations. In addition, faculty should adopt the perspective taking approach to broker identities as successfully demonstrated in corporate diversity training programs (Sugiyama, Ladge, & Bilimoria).

Third, the faculty/facilitator should join the peer-to-peer conversations from time to time to prevent student learners from gaming the system (e.g., not engaging in conversation as expected or completing activities at random). Therefore, a hybrid format in which learners engage in self- study virtually at their own time, but practice with a partner in a face-to-face setting might be best to maximize the benefit of fostering intellectual humility. Last, the faculty/facilitator must practice humility themselves, i.e., believing in the growth mindset, to avoid letting their own biases influence the process of cultivating and fostering intellectual humility among student learners (Patrick & Joshi, 2019). In addition, by practicing intellectual humility, the faculty/facilitator can show they support their students in their journey of character development, therefore increasing student learning cognitive and emotional engagement (Lu et al., 2022).

4.2. Practical implications

In our conceptual model, we suggest that intellectual humility is enacted through a sensemaking process that includes behaviors to facilitate a respect for individual uniqueness (we may agree to disagree at the end of completing lessons in Perspectives dialogue) and value for diverse perspectives. Encouraging participants to contribute with diverse perspectives may be time consuming because it requires a lengthier peer-to-peer discussion process. It is critical that the instructor serve the role as facilitator who mentors student-learners to facilitate an inclusive classroom experience. This crucial role raises the question of the instructors' ability to teach, coach, and facilitate. Thus, their effective humble leadership should be sought during the hiring and selection process. Similarly, training college instructors and integrating ethics into their training programs could improve the effectiveness of inter-individual or inter-group sessions because the success of Perspectives depends on the success of instructors' sensemaking process (Fitzgerald & Palincsar, 2019). College and university administrators can also directly support faculty towards creating inclusive classroom experiences and climate. As discussed in the literature (e.g., Randell et al., 2018; Zhou et al., 2022), simply putting student-learners of different demographic groups in a classroom and promoting diverse individuals to leadership positions does not necessarily lead to positive outcomes. However, when diversity is viewed and valued in terms of a virtuous character for which faculty assist student-learners cultivate and foster, the emerging evidence shows that many positive outcomes will follow including subjective well-being and successful coping with stressful life events (Seijts et al., 2022).

Although individuals holding extreme ideological views were found to gain more in intellectual humility relative to their moderate counterparts, and their attitude change remained stable for one month after having had Perspectives lessons as shown in one study (Welker et al., 2022), it is important to note that sensemaking accomplishments may be lessened for participants with a strong collective identity such as, immersed in a mindset that leans towards the extreme (e.g., individuals identified as extremely religious or extremely antitheist); whereby, the individual may struggle with separation from engrained group beliefs or norms, whether

experienced or not – in efforts to counter the experience of having an identity threat (Maitlis & Christianson, 2014). In such cases, participants with engrained collective identity may not benefit as much from Perspectives Dialogue in terms of improving intellectual humility as other student learners all else equal. However, the fact that these individuals experience the inter-subjective meaning constructed using language and/or narratives during the peer-to-peer conversations or classroom discussions is an exercise in sensemaking in and of itself. Therefore, we think that it benefits everyone even when we agree to disagree at the end of the Perspectives dialogue.

5. Conclusion

In this paper, we propose a conceptual model to develop an important competency for business students, namely, intellectual humility. Using Weickian sensemaking paradigm within organizational and psychological research, we explicate the utility of the model and the adoption of Perspectives - a technology delivered instruction - as an intervention to improve sensemaking, and subsequently building a virtuous character based on intellectual humility. Our research offers to create a strategic change within individual student learners in terms of reducing affective polarization, improving the sense of belonging within groups, foster constructive dialogues across groups, and promote an inclusive classroom climate. It is our hope that the model serves as a starting point to stimulate future studies that are aimed at testing and improving the model based on our propositions.

Author statement

The first author was responsible for the conceptualization of the study, general review, and proofreading of the study. The second author was responsible for the literature review, methodology, and discussion sections of the study. The third author was responsible for the practical implications and general review of the study. We would like to thank the Editor and the two anonymous reviewers for their helpful comments and guidance throughout the review process.

Declaration of competing interest

The authors of this publication declare there is no conflict of interest. No financial incentives are acquired or solicited by the authors from promoting the Perspectives learning technology.

Data availability

No data was used for the research described in the article.

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