

# Learning Core Competencies in a Virtual World

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## Overview

Each person has a *lifeworld*, in which they learn, work, interact, and live. They need certain *competencies* to thrive in this lifeworld. But the human lifeworld differs across time and space. Today, digital networks may be changing the lifeworld of most of the world population. How does that change which competencies are needed? How does it change *how* these competencies can be learned?

We frame these questions by considering the presence or absence of physical *co-presence* in learning environments. We find that there are advantages and limitations to each when it comes to promoting *cognitive*, *interpersonal*, and *intrapersonal* competencies, which are each needed for *deep learning*. With physical co-presence, the promotion of these competencies depends on the teacher, curriculum design, and the social setting. In digital environments, there can be more control over the setting and the types of activities, so competencies may be easier to design for. In both cases, explicitly acknowledging the competencies as a desired outcome of the learning environment is a key step towards seeing them realized.

The world is increasingly networked. The lifeworld is increasingly characterized by digital co-presence. With these shifts in mind, new manifestations of existing competencies are needed—we call these networked competencies. Interpersonal abilities like clear communication and collaboration take on new meaning; cognitive competencies like information literacy and knowledge synthesis become more vital; and intrapersonal competencies like self-motivation, focus, and mindfulness come to the fore. We are extremely optimistic about the potential for deep learning in digital environments, but caution the designers of these environments that such outcomes do not “come for free” just because technology has been added to the mix. Instead, designers of all learning environments must take account of the *affordances* of their resources and design with the core competencies—cognitive, interpersonal, and intrapersonal—in mind.

## Welcome to the Lifeworld

It’s the end of 2012. The *lifeworld*—school, work, home, and play—is increasingly digitized. Information and individuals are increasingly interconnected. How can we survive and thrive as we create new digital lifestyles—lifestyles that, in turn, recreate us? As educators, we are particularly interested in the *core competencies* needed to be successful learners, creators, and innovators—individually and collectively. As we consider online learning, we must examine the desired outcomes of a learning process, and the possibilities and limitations for virtual learning environments to facilitate these competencies. Simultaneously, we must consider the ways that a

networked world redefines the form of these competencies. Can a holistic learning experience occur *in silico*? Let's find out.

### *Key Terms*

We begin from the premise that *learning* is an ongoing process that takes place as individuals interact with one another and with unfamiliar information or settings. Learning is by no means limited to activities within schools—the [LIFE Center reports](#) that at least 80% of learning happens in “informal” environments: outside of schools, at the workplace, or on the Web. Though these settings can vary in their social and linguistic norms and thus promote different expectations for behavior and communication, there remain a broad set of *core competencies* that enable learning and productive activity across each of the facets of the lifeworld.

These core competencies form a holistic picture of the learner. In a [recent report](#) on *Education for Life and Work*, the National Research Council (NRC) draws on research in the learning sciences, psychology and sociology to divide the competencies into three categories:

- **Interpersonal competencies**—collaboration; communication; leadership; conflict resolution.
- **Cognitive competencies**—critical thinking and reasoning; domain knowledge; creativity; strategies for learning and problem solving.
- **Intrapersonal competencies**—intellectual openness; work ethic; self-awareness and metacognition; a positive sense of the core self.

Although these competencies have been relevant for centuries, the NRC (and many others) characterize them as *21st-century competencies* to note their evolving meaning in the modern digitized world.<sup>2</sup> For example, one's *critical thinking ability* to weigh sources of evidence on a subject may change given unprecedented amounts of online information.

Underlying 21st-century competencies is *deeper learning*. The NRC defines *deeper learning* as “the process through which an individual becomes capable of taking what was learned in one situation and applying it to new situations.” In his exposition of the NRC report in class, Roy noted that deeper learning leads to both *content knowledge* in a domain, and to knowledge of *how, why* and *when* to apply this knowledge in order to solve problems. There is an ongoing,

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<sup>1</sup> The competencies are more commonly referred to as 21st century “skills” — e.g. the [Partnership for 21st Century Skills](#) and [Assessment and Teaching for 21st Century Skills](#). But the NRC report argues, “the research strongly suggests that most of them cannot be taught independent of a particular context or domain, and so calling them ‘skills’ is misleading. They might instead be called “competencies” that are developed while doing other tasks.” (EDF website). In our highly integrated society, deeper learning competencies are applied across a range of fields, often simultaneously.

mutually reinforcing cycle between the processes of deeper learning and the development of particular competencies.

A final framing device that is useful to keep in mind is the interrelationship between stated learning outcomes and the design of curricula, learning environments, and assessments. Cognitive competencies have traditionally been the explicit focus of learning opportunities and assessments; teachers want their students to learn a particular set of subjects or approaches, and test for mastery of these areas. In contrast, inter- and intrapersonal competencies are treated as enablers of cognitive competencies, but are rarely the explicit focus of activities or assessment. Expanding the focus here holds a vast amount of potential for learners' development of these competencies, because they are treated as valuable and learners are given the opportunity to practice them. Strategies for assessing intra- and interpersonal competencies are discussed briefly in this chapter, and in far more detail in [*the chapter that discusses the Nov 13 panel on digital assessment*].

With the core competencies, we have a benchmark against which to measure the success of various learning environments, activities, and assessments. Drawing on posts in the EDF discussion board, we explore the tradeoffs of digital and in-person learning environments in terms of each competency. The lens we use to highlight the difference between digital learning environments is *physical co-presence*.

### *Using Physical Co-Presence to Characterize Learning Environments*

Learning is a social activity—we learn with others, or at the least, we learn by engaging with the knowledge of others embodied in written texts and visual representations. When we are *physically co-present* in the same space with others, we engage in a dynamic process that shifts every second in response to the context. Learners question, explore, and adjust their behavior and communication in response to those around them. We are particularly skilled at responding to non-verbal cues—humans can see subtle signs of confusion, boredom, or excitement in the tiny muscles of the face or in a slight twitch of the shoulders, and address these reactions accordingly. Communication also flows differently with physical co-presence. Questions and statements build on each other, and once stated, merge together into the ether of the past conversation and the psyches of the participants - each of whom have a unique take on how to integrate the new information into their previous frameworks for the world. Unlike a discussion forum or text-based chat, there is no easy way to revisit earlier comments.

Learners' activities are increasingly characterized by the *lack of physical co-presence*: interactions with peers, instructors, and resources are mediated by technology. Beyond the vast repositories of curated, static resources on the Web (Wikipedia serving as the best example, though of course it is less static than most), the most visible example of interactive digital learning environments are massive open online courses (MOOCs). Learners around the world are accessing structured content from elite universities, though these platforms currently feature

limited opportunities for learners to interact with each other or with the instructor. Other examples of digital learning environments include intelligent tutoring systems, the Khan Academy, StackOverflow, and the rapidly expanding educational game industry. (To see a small sampling of key products and players for schools, parents, and self-driven learners, you can explore a [roadmap of the educational technology landscape](#) curated by EdSurge).

Physical co-presence can be further split into multiple elements that give interactions meaning. In the class discussion, René Kizilcec makes the useful distinction between physical co-presence and *social co-presence*— we might interact in rich online environments without being physically near, and we might be standing right next to each other but lack any kind of social acknowledgement or exchange. Roy notes that digital media could perhaps allow us to reach new heights of social co-presence, in some ways "better than being there," thanks to unobtrusive methods of augmented reality. On the course discussion board, Dan Meyer reminds us that a lack of physical co-presence does not necessarily require machine-graded assessment. *Digital co-presence*—for example, video- or text-based chat, or collaboratively editing documents—brings together the real-time aspects of physical co-presence, with a slightly different set of social and linguistic conventions.

To explore the significance of physically co-present environments, Mitchell draws on Emile Durkheim's concept of *collective effervescence*—the energy you find in a room full of people. It's the enthusiasm and glee of a group chattering happily at a cocktail party, or the focus and creative engagement of a team trying to solve a problem at work. In the EDF classroom, Mitchell pushed us to experiment with collective effervescence by singing rounds of "Row, Row, Row Your Boat." After a reluctant beginning, the entire group got into the song, and we were united in a simple, affirming way that had not yet taken place in the course. How would this have felt if we were not physically co-present during the song? Let's do our own experiment!

1. Watch the first 20 seconds of the video—can you feel the energy in the room?
2. Join in the round yourself—do you feel connected with the group?
3. Find a group of friends and convince them to sing with you—how does this feel different than singing along with the video?

### *The Driving Question*

How does physical co-presence foster 21st-century competencies and deep learning? What are the limitations or strengths of a digital environment that lacks physical co-presence in terms of the development of these competencies?

On the class discussion board, the class weighed these questions and discussed advantages and disadvantages of each environment. Designers often analyze the *affordances* of a technology or environment: these affordances are the opportunities a particular setup makes possible. This highlights that there is rarely one perfect solution for a set of problems, and analyzing the

affordances of a technology helps designers understand what kinds of problems it can solve. We draw on salient points in the discussion board posts from the fifth week of class (23 Oct) in order to examine each of the competencies and explore the challenges and affordances within various environments.

### Interpersonal Competencies

The interpersonal competency domain includes teamwork and collaboration, leadership, communication, collaboration, responsibility, and conflict resolution (NRC report). These competencies are a form of social intelligence, involving attention and decoding. “These include the ability to read facial expressions, detect differences in tones and nuances in language, and responding to culturally appropriate manner” (Albert Lim). We need interpersonal skills to express and interpret ideas; they are fundamental to learning and progress in any field at any stage of development.

### *Advantages of co-presence and interpersonal competencies*

As Lucy Li brings up, interpersonal competencies are widely valued as essential skills for success, describing the Stanford Graduate School of Business’ most famous class as “Interpersonal Dynamics (aka Touchy Feely).” Many other EDF students value co-presence as a necessity for developing strong interpersonal competencies through non-tangible cues. Brian Perone thinks that “Interpersonal Dynamics” couldn’t be replicated online since “we don’t have the crutch of ‘real’ interpersonal interactions and the ability of a good teacher to ‘just know’ when a kid is getting something.” Hallie Fox adds, “Human cues, such as eye contact or body language, can be modeled, interpreted, and learned in co-presence.” Once non-verbal cues are understood, students can use them “as an informal feedback mechanism and allow you to reflect upon your actions and behaviors as a communicator/team member.” (Ritu Tandon).

Some believe that the underlying success and necessity for co-present learning of interpersonal competencies is due to biological conditioning. Johnny Winston argues that humans have evolved to develop these skills “almost exclusively” through physical co-present interactions; “physical co-presence gives the student the advantage of an evolutionary history that has fine-tuned the human brain to be adept at face-to-face social interactions. The advantages of these sorts of interactions are sometimes lost in online environments. Leadership skills in a face-to-face physical co-present setting are very different than leadership skills that apply to online interactions.” Given this evolutionary adaptation, leadership is learned, established, and maintained through co-presence. Frequent, confident communication is learned from interaction; Johnny concludes, “Essentially, leaders emerge by being confident and offering more verbal contributions to the conversation even though they may not be contributing to the group’s success at a higher level than the other group members.”

While co-presence alone can foster interpersonal competency, such as reading cues on the soccer field or in a board meeting, some believe that a teacher is necessary. For deeper learning to

occur, the teacher must cultivate a culture of collaboration, questioning, and respect to engage student learning. This requires individualization to pick up cues and “just know” how each student is progressing. In an idealized series of interactions, “one can imagine a teacher, informal learning facilitator, or more likely, a parent, taking the time to discuss this goal, giving students mental heuristics for working towards it, and checking in with them regularly or encouraging them to check in with each other to see if they have incorporated this awareness into their lives.” (Emily Schneider)

### *Challenges for Interpersonal Competencies*

Simon summarizes the challenges: “It would be reasonable to assume that online learning environments would be difficult places in which to foster...interpersonal competencies...So much of what we think of under this rubric seems to depend in one way or another on the idea of ‘physical co-presence’ (a.k.a. being in the same room), and there are clearly some specific difficulties presented for traditional online paradigms by a recognition of these qualities as falling within the purview of a programme of education.” How, in an online world, can you work in teams, collaborate, communicate, resolve conflicts, and build leadership skills without “seeing” your peers?

Lucy predicts, “I believe the current format for offering MOOCs will severely limit the ability of students to develop competent interpersonal skills. In physical interactions, participants are taking cues not only from the words that are being exchanged but also from body language, tone, facial expressions, etc. If we believe education should play a role in developing properly socialized citizens, I believe MOOCs will never be an adequate replacement for the physical classrooms. You can read about body cues or tonal changes in human interactions but if students don't have the chance to practice and observe what they are being taught, I don't think they will ever fully assimilate the information and put into practice.” Ritu explains, “Non-verbal cues do not exist in an online environment, whereas I am able to reflect on the non-verbal cues of my peers during our in-person activities, which contribute to my development as a team member and communicator.” Julia Cambre worries that in an online environment, students will “play it safe” rather than take more creative risks than they might working collaboratively in person.

### *Can Students Develop Interpersonal Skills Online?*

Given these challenges, “there is still plenty of scope for them to operate in the realm of (digitally) mediated interaction,” Simon says. Johnny agrees, “Physical co-presence is ideal for the development of this competency but that is not to say that virtual co-presence (e.g. working on a project through Google Docs and an instant messaging application) cannot build interpersonal competency as well.” The future may also bring more need for taking interpersonal skills online. Simon points out, “Not only is it possible to develop, practice, and demonstrate qualities such as collaboration, leadership and even conflict resolution in a community in which most or all communication takes a predominantly written form, but indeed the specific forms these skills take in such an environment are probably of increasingly relevance in contemporary

and near-future careers and lives. It is not only in the sphere of education that more and more human interaction is moving to digitally (and often textually) mediated paradigms.”

Online platforms may also be adding further wrinkles to the development of interpersonal competency. Hallie Fox suggests, “Given the demands of our globally-networked age, perhaps interpersonal communication skills via email, online platforms, etc. will be more important than face to face conversations. Maybe we need to consider how to develop ‘networked interpersonal’ skills as well.” “Both skill-sets are important. Increasingly, it is becoming as important to be able to lead and collaborate online as it is to do so in a brick-and-mortar environment. Thus, interpersonal competency is tightly linked to co-presence; however, both virtual and physically co-present interpersonal competencies are important in today's world,” Johnny opines. Working in Kenya with mobile phone learning, Ben Williams learned that “there are definitely ways to facilitate learning through technology, while encouraging interpersonal co-presence. One example is a mobile learning company that is teaching entrepreneurship through mobile phones (e.g., they have established a curriculum—which includes quizzes—that they deliver through SMS to mobile phones). [This has led to] a hybrid co-presence.” Albert Lim sums it up, “The online space adds the dimensions of skills in navigating social media and getting ideas across, and knowing how to do it appropriately without starting flame wars! One needs to gain experience and knowledge of both offline and online social contexts, in order to develop the various dimensions of one's interpersonal skills.”

### Cognitive Competencies

According to the NRC report, cognitive competencies break down broadly as Cognitive Processes & Strategies, Knowledge, and Creativity. These broad categories include familiar goals such as critical thinking, information literacy, reasoning, and innovation. On the discussion board, several students examined these cognitive competencies in light of learning environments with and without physical co-presence. In these environments, what opportunities do learners get to practice these competencies, and how can educators evaluate and provide feedback on these competencies? Stanford EDF participants more often cited lack of physical co-presence as a challenge than an advantage in the development and assessment of cognitive competencies and deeper, authentic, transferable, conceptual skills.

### *Challenges for Cognitive Competencies: A Focus on Assessment*

Engin Bumbacher draws on recent research in the learning sciences, specifically embodied and situated cognition, to analyze whether learning environments without co-presence can foster deep and transferable learning. He finds it essential that the learner actively participates and that lessons “situate the content/concept/skill/etc. to be learned in different contexts, such that enough experiences are generated to enable ‘deep learning’ to occur.” Can skills or competencies learned online transfer to other contexts?

Engin explains, “Research suggests that in order for the transferability of skills, or broader ‘deep learning’ to occur—in line with the philosophy of Constructivism and Situated Cognition—people’s ideas get formed and transformed when expressed through different media, when actualized in particular contexts, when worked out by individual minds’ (Ackermann, “Constructing Knowledge and Transforming the World,” 2004). Furthermore, I support the claim that ‘knowledge is not information; it is experience to be constructed through interaction with the world’ (Ackermann, 2004).”

Further, learning critical thinking, for instance, may rely on more than the explicit lesson content. Engin argues that “non-verbal cues play an important role,” and so “learning environments which require physical co-presence offer many more opportunities and the flexibility to develop this range of experience required. . . . A teacher is better able to guide students through experiences which would enable them to foster critical thinking.”

Three other participants ask what assessment of cognitive competencies looks like without co-presence. Shuchi Grover finds this question vital, because “as educators if we care at all about knowing whether our teaching worked and if the curriculum achieve the desired learning objectives for the learner, we must care about assessment” and also because this “is not an issue for the future, it is something MOOC designers are having to confront *today*.” Shuchi bases her views on the assessment of cognitive competencies in MOOC-like environments on the following belief. “For assessment to be meaningful, it needs to be authentic and contextual. This makes assessment of reasoning skills and conceptual ideas (as opposed to rote knowledge of facts and factoids) particularly challenging. Few would refute that these types of competencies cannot often be tested meaningfully through answers that have to be bubbled in or any type of assessment that can be done at scale. One of the chief concerns (and criticisms) of standardized testing, in fact, is that testing of knowledge through multiple choice questions goes against the grain of teaching for understanding, (and transfer), or what we have been referring to as ‘*deeper learning*’.”

Shuchi goes on to raise the following questions: “How then can meaningful assessment be achieved in an online environment that operates at the scale of a MOOC? Clearly, not every subject can be graded as easily as Math where there is a right/wrong answer (although grading even Math assignments can be challenging if the teacher wishes to give a student meaningful personalized feedback), or CS programs where automated program analysis tools can be coded. How will essays/writing be assessed? Or any kind of science or liberal arts-related question where a long form answer is the only way to assess a learner's understanding? Can we leave assessment to be crowdsourced (via peer assessment)? Can we comfortably rely on peers from around the world (with capabilities largely unknown to the teacher), to grade students' work, assess for conceptual understanding and give meaningful feedback to help the learner along? Or are we happy to rely on algorithms for automated grading (assuming there will be such tools for grading in the not-so-distant future)?”

In his response to Shuchi, Roy points to some exciting developments in the realm of automatic grading systems, specifically, the Hewlett Foundation competitions (described [here](#) and [here](#)), where they had different groups try to match the success of human coders of both long-form and short-form essays in K-12.

However, Shuchi emphasizes that "the point of assessment is not just to give a grade but to provide meaningful feedback to the learner." Julia Cambre concurs: "Yes, these crowdsourced grading systems are very new and will continue to improve, but it's difficult for a student taking an online course to get a solid answer to 'Do I really understand this material? Do I really deserve this grade?' when it's not clear whether their grader was qualified to evaluate them."

Julia also doubts that these assessment systems can support creativity. "At present, I think that creativity is undermined for students in MOOC-style online instruction. In today's MOOCs, ambiguity in assignment guidelines seems to cause confusion among participants. As Brian Perone mentioned, this means that the assignments and assessment rubrics coming from the instructor are spelled out in excruciating detail. When faced with such guidelines, it seems that students would tend towards more cookie-cutter submissions rather than a creative interpretation of the assignment. Perhaps out of fear that their creative assignment will be marked down for failing to conform to the rubric, students will play it safe rather than taking risks in their coursework. In contrast, students who have the benefit of a co-present learning environment can ask their instructor for permission ahead of time to submit something that's 'out of the box,' or can easily clarify misunderstandings in evaluation."

An anonymous participant argues that growth in cognitive capacities should be rewarded but cannot be assessed in a massive course. Anonymous offers a hypothetical scenario: two students, "Roy" and "Mitchell," enter a Coursera course with very different backgrounds, and they put in different levels of effort that are inaccurately and unfairly assessed due to the lack of physical co-presence.

"Both Mitchell and Roy had opportunities to gain new cognitive competencies, but they put themselves in a situation in which only Roy's competencies were challenged. Mitchell was able to ace the evaluative components of the course while Roy struggled on assessments of cognitive understanding. The instructor(s) did not have a chance to review the papers of either because 2,800 students had submitted the essay assignment. Evaluation failed to capture Roy's growth or Mitchell's lack of growth, both of which might have been easily evident to the instructor(s) based on the nature of their in-class discussion remarks if the class were held in a co-present format. Instead, Mitchell skated through unchallenged and Roy's cognitive competency gains went unnoticed in the assessment phase."

Anonymous argues that therefore "physical and social co-presence can be extremely valuable in appropriate assessment of cognitive competencies and that MOOCs and some other formats risk losing differentiation of cognitive competency gain."

### *Advantages for Cognitive Competencies*

Instead of focusing on problems stemming from a lack of physical co-presence, Hsaolin Hsieh vividly describes the challenges of the physical classroom and suggests that technology can help. "In traditional in-class teaching and learning, students/learners outnumber their teacher/instructor. For example, one teacher will have to teach anything up to 20 or more students at the same time. If the teacher is lucky, he or she will have to deal with 5 different kinds of learning trajectories and needs; yet, if unfortunate, there could be as many different learning patterns as there are students that need to be catered for as best as possible. Under such conditions, it is inevitable that the needs of certain students will be compromised or marginalized due to realities of classroom management, such as time limits, the need to offer the best benefit for the majority, and the design of curriculum." Thus, the physical "classroom setting makes it very difficult to offer individual students the kind of activities they need for maximal cognitive development."

"Adaptive learning, on the other hand, can assist the development of cognitive competencies in an individualized, learner-centered manner." Hsaolin believes that "by adopting interactive computer technologies, adaptive learning is able to offer tailored trajectories corresponding to the student or learner's feedback. Not only is it possible for the needs of individual students to be accommodated, but the motivation of students may be enhanced by such a tailored approach."

### Intrapersonal Competencies

Intrapersonal competencies include the ways that you encounter ideas and other people: intellectual openness, flexibility, and appreciation for diversity. They also include your approach to challenges: work ethic, grit, initiative and perseverance. Finally, they include the support of a positive core self: being happy, confident, and physically healthy.

Metacognition and robust strategies for learning are a central intrapersonal competency - being aware of the state of your knowledge and your emotions, the ways that these states interact with the work or learning you are engaged with, and making strategic adjustments accordingly. On the discussion board, metacognition also emerged as a necessary condition for the *development* of intrapersonal competencies. As described by Tanner Veal, "Intrapersonal competencies require taking time for reflection and self-evaluation in order to practice them. Values like intellectual openness, conscientiousness, and positive self-efficacy can be demonstrated and discussed in either a co-present classroom or an online classroom, but in order to implement them in one's own life, a person would have to take account of his or her existing attitudes and habits and assess whether or not they are in line with these goals" Likewise, Jason Oscar Randolph describes the value of self-reflection and metacognition: "Many of my most successful students

have been able to communicate with themselves about how they are feeling at any given time. To have a kid that's 12 years old, that in the midst of the school year or in the midst of a project, that can ask herself, how am I feeling in this moment? Why am I feeling this way? How are these feelings affecting what it is that I'm doing? How is what I'm doing affecting how I am feeling? These are seemingly simple questions but there are a great many people that have been extremely successful in academia that also do not know how to ask or answer these questions for themselves." On the same note, Daniel Greene raises the playful and provocative questions: "What would a Zen MOOC look like? Or a MOOC that encourages a practice of sitting with an open-ended question for a while before jumping to an answer?"

Traditionally, intrapersonal competencies typically get attention when there are issues that arise, but not as a matter of course. As Emily Schneider states, "there is limited dialogue in schools—or society generally—about being aware of your emotional state. Emotional regulation for young students is certainly emphasized, but this is more a matter of suppression than acknowledgment." Betsy Williams mentions Hallie Fox's comment in class about "teachers trying to fit in inter- and intrapersonal education for kids with disrupted home lives" and underscores the locus of responsibility that is usually assigned to these types of competencies: "I wonder where in the lifeworld the development of intrapersonal skills has been assigned across societies over time: home? school? work? church? play?"

Several students point out that the development of intrapersonal competencies depends on dialogue as much as reflection. Tanner suggests the implementation of "rituals of reflection" within a co-present setting, because the appearance of everyone around you doing it could encourage you to take it seriously." Jason notes, "A person can find a great deal of success in a wide array of practices if he can explore his own feelings in a structured and self-supportive way."

Finally, some students flag the normative nature of intrapersonal competencies and the risk of assessing learners based on competencies that are at odds with the student's home culture, not clearly communicated, or misaligned with other desirable outcomes. Kareem Edouard points out: "What may be considered idleness to some may be a sign of patience. I may want quality where others value quantity. To assess work ethic, especially for a child, could have deep psychological and development impacts if evaluated and more importantly framed incorrectly." To this point, Daniel Greene adds: "Measuring grit in a context where the learner doesn't value the ultimate goal seems almost sinister. And there are always going to be people who get the things done differently [...] We don't want employers to abuse statistical predictions of 'grit' that might systematically undervalue people who are just as qualified in terms of the ultimate goal."

### *Intrapersonal Competencies in the Classroom*

To support intrapersonal competencies in a physically co-present environment, the instructor must play an active interventionary role. But there is a large amount that be learned through

observation. As Betsy points out, “In person, a skilled assessor may be able to infer the presence of many of these valuable traits—or at least notice stark absences—through observation.” Tanner states, “Because of the richness of evidence that can be gleaned from being co-present with people—from their facial expressions to the words they mutter under their breath—traditional classrooms might be best for accomplishing this kind of assessment.”

The curriculum can also be designed with this goal in mind, as can assessment strategies. These assessment strategies often rely on technology of some sort, though this is not a necessary condition.

As an example, Molly Bullock envisions a middle school math classroom: “Students are working in small groups to determine the amount of frosting needed to cover a Halloween cookie and a way to tell which shapes will need the most or least frosting. The teams are expected to derive an emergent understanding of surface area through group work and discussion. This is a great opportunity to practice initiative, self-direction, and perseverance. During this task, the teacher plays the role of facilitator rather than the one delivering knowledge (Frykholm 2004).”

Assessment is supported by technology and goes into a portfolio where it can be revisited by the students, parents and teacher. Molly describes: “The teacher has an app or a checklist that has the students pre-organized by group. She can click on a student and a rubric pops up for describing student behavior across that exemplifies work ethic and conscientiousness at a variety of levels. After the lesson, the students are prompted to evaluate themselves along the same dimensions. This is repeated during several different activities throughout the year.”

Betsy points out: “Higher education is an implicit test of intrapersonal competence: when a student enrolls in a state college with 50% graduation rates, the student's mastery of metacognition, self-assessment, self-direction, initiative, grit, responsibility, adaptability, self worth, and other intrapersonal competencies may make the difference between leaving campus with a degree or just leaving with debt. University of Pennsylvania's [Angela Duckworth](#) studies grit in particular, and her research finds that people who have earned Associate's Degrees have more grit on average than (four-year) college graduates; holders of doctorates are on a par, grit-wise, with the two-year graduates.”

The structure of courses and activities can also support the development of interpersonal competencies. Envisioning a college classroom, Betsy also describes: “having early deadlines tied to assignments with self-assessment and peer-assessment, professors can both scaffold some of these deeper learning abilities and get an early measure of possible problems. Other structured assignments that help students organize their ideas, plan how they will complete their projects, and recognize growth in their abilities can also serve as formative assessments. More prosaically, taking attendance in class meetings can provide a measure of self-discipline and responsibility.”

### *Intrapersonal Competencies in Digital Environments*

Several students proposed digital tools and environmental elements that can be used to support the active development of intrapersonal competencies. Emily refers us to “[a number of widgets](#) available that enforce awareness among computer users by regularly popping up to ask: ‘Have you taken a deep breath recently?’ ‘Have you gotten up from your desk?’ or simply require the user to stop working for 2 mins. A regular set of reminders of this sort—‘How do you feel?’ ‘Which of your goals are you working towards?’ etc.—could be very useful for supporting self-regulation.” Similarly, Betsy suggests, “The website could have timers or digital cheerleaders that count down time until the next break and applaud the student for staying on task (say, writing or working problems through a web interface) for a given period of time. [750words](#) and [SuperBetter](#) are great examples of ways technology helps people develop accountability for goals they wish to pursue. 750words helps people meet a goal of writing 750 words each day (of whatever they want—journal, work, a novel, poetry...). It counts the words as they go, it strictly enforces the end of the day, and it awards whimsical badges for things like the length of streaks, typing speed, and entry length. SuperBetter lets people choose from a set of intrapersonal goals, signing up for streams of challenges to complete to further these goals. Here, technology is used to provide anonymous reinforcement of progress, coupled with expert-designed curriculum.”

A digital environment can also be designed to support higher levels of confidence or connection. Emily cites “a vast and growing body of work on the subtle cues that learners internalise from their environment about their identity in relation to the learning task, their role in the classroom, and their possible mental growth....there are a related set of constraints, but slightly greater control over the cues in the environment - for example, all of the language on a website or video can be carefully chosen. Social-psychological interventions (e.g. Geoff Cohen's value-affirmations work or Carol Dweck's mindset interventions) can be deployed en masse. Moreover, in an asynchronous environment the rules for contribution are somewhat different - a broader number of students could feel comfortable participating, and may, for example, react differently to a comment with limited visual cues about the gender or other attributes of their interlocutor.” Betsy adds, “In a MOOC, students can anonymously share in forums reflections on their work habits and their goals, and receive feedback. In most in-person classes, such reflections are often sealed for the student's eyes only, or perhaps the student's and instructor's, but it could be valuable to discuss them with others who may have faced similar challenges.”

### *Strategies for Assessing Intrapersonal Competencies*

Molly describes a purely analytics-based assessment of strategies for learning, conscientiousness, and work ethic: “Simple measures include whether the student watches the videos (and re-watches when getting in-video quiz questions incorrect), engages in forum discussions and/or study group conversations about content, complete assignments, etc. More complex measures include whether the student seeks help outside the MOOC environment, whether they choose to engage at a basic level (just watching videos) or taking on the most challenging types of engagement (such as final examination or sharing assignment results for feedback).”

Dan Meyer takes issue with a purely analytics-based approach. He argues, “These platforms measure the time of day and the amount of time a student spends looking at a webpage. They measure hint tokens. What can they tell us about what a student *does* on that webpage though? What can they tell us about what a student knows and doesn't know when she gets a problem wrong?” Instead, Dan proposes using technology to enable human-graded assessments. He envisions a technology-enabled assessment for open-mindedness: “A student takes a survey before the assessment that asks for her opinion on any number of inflammatory issues. [...] The machine then pairs that student with a non-co-present student who's taking the assessment at the same time who holds the opposing view. They are linked to each other in a chat. They need to explain their own views and attempt to convince each other while maintaining an open stance towards an idea with which they disagree. The non-co-presence is a blessing here. You engage someone with whom you have no meaningful history [...] A human reads the transcript later and uses a rubric to determine the open-mindedness of each participant.”

Roy also weighs in on the importance of moving beyond analytics to develop a nuanced picture of the learner. Referring to measurements of “grit” as ongoing engagement, he states: “I think 'grit' as you've discussed it can be inferred with some reliability online but it will be important to use ethnography as a complementary methodology, as there are SO many reasons why someone may have paused/ceased/slowed down in their work in a course—only some of which indicate issues with their grit to be addressed or helped along.” Betsy agrees: “Especially when studying higher education, researchers often project their own reasoning or the logics they are familiar with onto subjects' actions. Moving into the online space, with a new population of students interacting in new ways, inferences about behavior are even less likely to be accurate—which makes the ethnography you're talking about that much more important.”

### Conclusion

Stanford EDF buys into the importance of deep learning and the cognitive, interpersonal, and intrapersonal competencies essential to it. We have explored the tensions of how people can learn them in person and online, and we want anyone offering online education to ask themselves: What am I trying to teach, beyond the mere content? How can my students develop these competencies, and how can I notice and acknowledge their progress?

A theme across the posts is that to be successful in a digital environment, the features need to be designed right, but there is a lot of potential to do so—it can be designed into the environment regardless of the instructor, or whether there's an instructor at all. Some people idealize a traditional co-presence model and assuming that teachers know how to teach these competencies in the classroom, when in fact, many teachers struggle with to meet these goals. To support these competencies in a physically co-present environment, it relies on the teacher, as well as the design of the curriculum. Intrapersonal competencies in particular seem to have a lot of potential

online, perhaps because they have been less of a focus in traditional classrooms so there is more opportunity to differentiate between online and traditional approaches. Betsy Williams' post provides a nice summary: "There are a multiplicity of ways to foster and measure noncognitive abilities online, just as in person. The big problem is that they are usually neglected in traditional education and will only exist (be taught and measured) in online education to the extent that they are acknowledged and built in." In week 8 we had further discussion of how assessment can work in online education. It is encouraging to know that there are people thinking about how to measure many of these essential competencies. We need to push so that once these measures are developed, they actually get put into use where appropriate.

### *Physical Co-presence?*

Interactive, physically co-present environments play a critical role in student's development of core competencies. There is little wonder why universities have historically invested in building adjoining classrooms, offices, and courtyards, rather than simply building larger libraries and study halls. While brick-and-mortar schools offer established platforms for physical co-presence, their relationship with student's work and personal life is changing. Students will seek increasingly personal ways of engaging with their teachers, peers, and course material. The challenge for educators in both digital and physical classrooms is to create dynamic environments that integrate digital learning with the students' broader lifeworld.

### *Digital Co-presence?*

In the production of this paper, we too practiced and became immersed in, what could be, the future of collaborative online learning. This chapter was written in the digital co-presence of six separate authors through a video chat meeting in Google Hangout (see screenshot), interspersed writing on a shared Google Doc with an attached chat bar, and an ongoing group email thread. An initial physically co-present meeting led to general ideas that evolved and found clarity through our digital communications. Yet we found our conversation no less strained, our ideas no less asynchronous, and the process both convenient and enjoyable! This process of online collaboration was dependent on our use of interpersonal, intrapersonal, and cognitive competencies, and their "digital-personal" manifestations.

### *New Applications of the Core Competencies*

For education's digital future, we need to consider the category of "networked competencies." We don't actually propose that this is a new, conceptually unique group, but rather use it as an umbrella term that draws from cognitive, interpersonal, and intrapersonal competencies to encompass competencies that today's learners especially need in a rapidly digitizing lifeworld. They are new manifestations of the existing competencies that will be necessary to survive in the 21st century and may need radical reinterpretation for a digital context.

Self-expression and communication, for example, are more complex in an online world where the goal of expressing a coherent idea clearly is challenged by the need to express it quickly and

compellingly, so you have a chance of competing for your viewer’s attention. Kids may already be very adept (‘digital natives’) at these skills. They spend an inordinate amount of social time online so they are constantly practicing negotiating social roles and understanding digital communication (*NY Times* [article](#)). However, they need to learn how to “code-switch” between digital and in-person environments, both honing their mindfulness and selective focus to be fully engaged in the environment they have chosen and understanding the social, tone, and style cues and potential misunderstandings inherent in online or face-to-face learning. Our conversation is relevant not just to online course designers but to those designing traditional instruction, because online activity is changing students’ interpersonal experiences and abilities.

On the forum, participants came up with fantastic suggestions for “networked interpersonal skills” (Hallie Fox), explored in more detail in the interpersonal section above. In particular, Ben Williams has observed a “hybrid co-presence” in Kenya that may be in education’s digital future globally.

On the side of cognitive skills, critical thinking and information literacy are also transformed by learners’ online experiences. The task of navigating the preponderance of information available and interpreting the reliability of evidence from multiple sources has become harder by orders of magnitude, taking the entire web into account instead of just published sources and academic resources. We must design learning environments that are learner-directed and use technological platforms as an asset for motivating perhaps traditionally unmotivated learners.

Perhaps the most genuinely new skill under this umbrella competency is related to self-direction and mindfulness. The ability to choose “where” one is mentally and avoid the “[always elsewhere](#)” syndrome is a challenge perhaps unknown to former generations of students and educators. How, given the widespread use of technology and digital addiction, [can educators teach mindfulness](#)? In an emerging digitized classroom where students are constantly multitasking and encouraged to do so, how do we direct attention inward?

### *Final Thoughts*

The core competencies are learned in digital and non-digital environment but there are limits to the ways that they can be taught and learned in both of these spaces. Given the networked state of our existence, it’s essential to push on the limits of the technologies and figure out how to a) design better activities, assessments, and platforms and b) complement digital technologies with other strategies. Simultaneously, we must acknowledge that the demands for some of these competencies have changed.

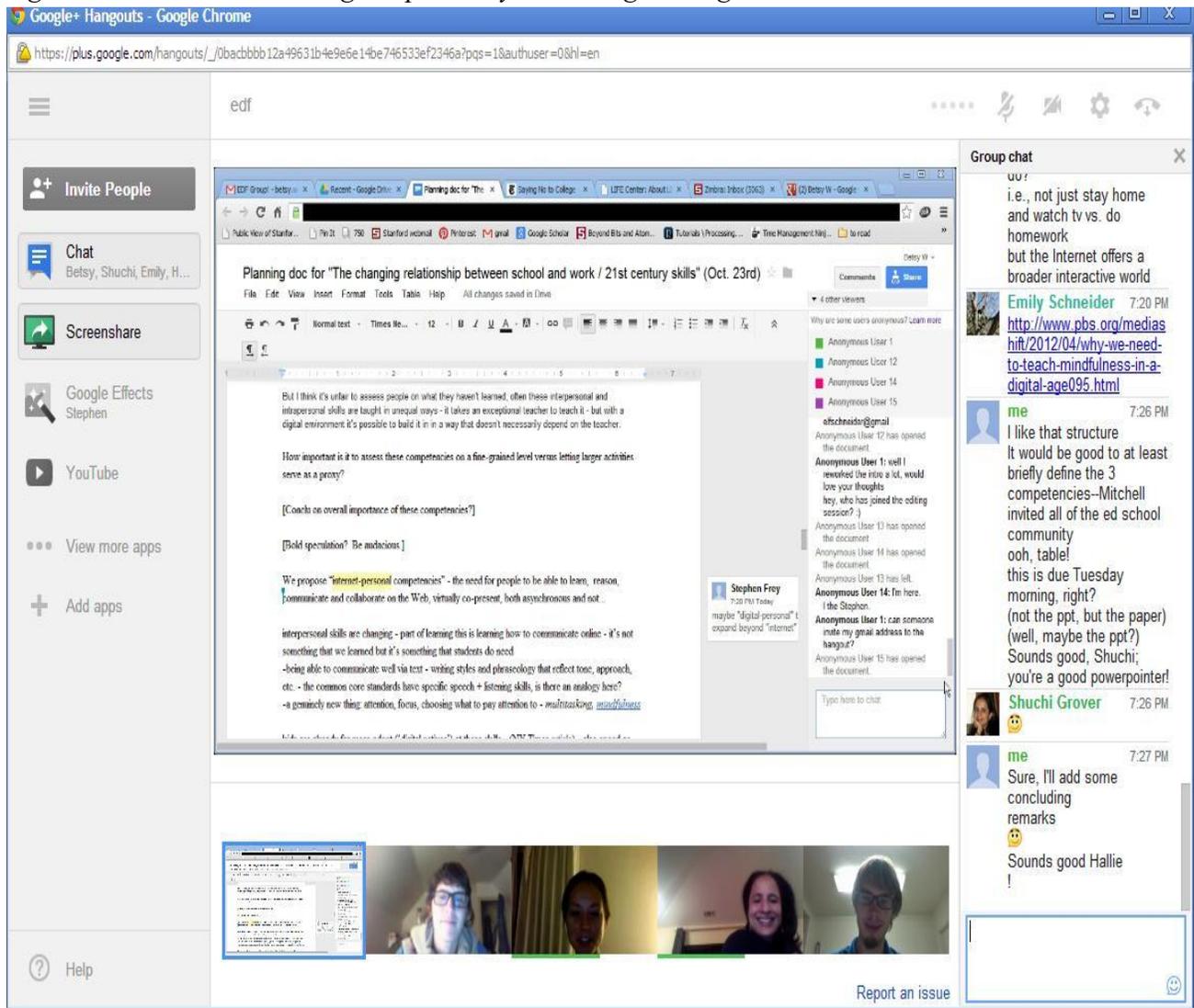
*Figure 1. Summary Table*

	<b>Digital Learning</b>	<b>Physical Learning Environments</b>
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	<b>Environments</b>	
<b>Interpersonal</b>	<p><u>Advantages</u> In a globally-networked age, digital communication will become more prevalent in careers and lives.</p> <p>Digital communication can bring geographically distant individuals into the same “room.”</p> <p><u>Disadvantages</u> Without the benefit of tone and social cues to aid communication, class members may have trouble understanding each other.</p>	<p><u>Advantages</u> Teachers can intuitively “just know” when a student gets it.</p> <p>“Evolutionary history has fine-tuned the human brain to receive the majority of its social information through non-verbal cues.”</p> <p>Collective Effervescence: the motivation, energy and excitement of the crowd.</p> <p><u>Disadvantages</u> Social hierarchies in classrooms may get reinforced, and stereotypes may affect how people treat each other.</p>
<b>Cognitive</b>	<p><u>Advantages:</u> Curricular content can be personalized to individual student learning style and progress.</p> <p><u>Disadvantages:</u> Assessment of student work occurs out of context.</p> <p>Potential absence of meaningful personal feedback from teachers.</p> <p>Students may “play it safe” to conform to impersonal rubric, rather than arranging to “go out of the box.”</p>	<p><u>Advantages</u> Teachers can demonstrate <i>how</i> to think and discuss while learning.</p> <p><u>Disadvantages:</u> Teachers must divide their efforts to satisfy multiple learning styles.</p>

<p><b>Intrapersonal</b></p>	<p><u>Advantages</u>          Digital reminder services can aid personal development (“Have you met your goals today?”).           Students can anonymously discuss personal challenges in life or schoolwork.   <u>Disadvantages:</u>          Online classes may require more “grit” and self-guidance to complete.           A coherent sense of self may be lost without distinguishing between virtual and “real” life situations.           Explicit assessment of intrapersonal competencies are likely to be inaccurate.</p>	<p><u>Advantages</u>          Group accountability can help students stay on track.           Supportive communities can strengthen emotional maturity, and encourage personal reflection.   <u>(Dis)advantage:</u>          Opportunity to “absorb” attributes from peers (i.e. living in a dorm of “hard workers” or “partiers”).</p>
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Figure 2. EDF Team Working Co-presently in a Google Hangout



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