Imagine if the rising high school senior, the college senior considering graduate study, or the working professional seeking to grow their skill set asked “Why should I pick your institution?” and Georgia Tech was able to respond “Because we will help you flourish, thrive, and become a better ‘you’.”

Just imagine the future: At Georgia Tech, world-class educational experiences in fields of study are systematically designed using principles grounded in solid scientific research on human development and learning. A student’s Georgia Tech experiences are aimed to help them acquire deep knowledge in their subject woven together with the skills they need to adaptively apply that knowledge to overcome challenges in their career and life. Those skills are not only cognitive (e.g., problem solving, critical thinking) but also interpersonal (e.g., teamwork, leadership) and intrapersonal (e.g., the ability to reflect on the process of learning to help themselves learn more effectively).

To make this happen, Georgia Tech draws upon cutting-edge pedagogies, novel learning technologies, and optimized spaces (real and virtual). Moreover, along the different stages of a student’s learning, feedback is provided to help that student advance and to help faculty learn ways to improve the learning experiences. At every stage and for every experience, students are immersed in an environment that continuously pushes them to confront their limits. It is uncomfortable and makes them feel vulnerable, but that is alright, because Georgia Tech holds those vulnerabilities well and surrounds students with supportive practices that enable them to overcome any limitations. This is how learning is done at Georgia Tech. The best available science on learning and human development tells us that we all must learn in this way in order to grow and thrive and become more fully ourselves, to become the people we want to be.

Two key ideas underpin this vision of future educational experiences at Georgia Tech: the multidimensional character of learning experiences and the culture of whole-person development (Goel et al. 2016).

**Multidimensional Character of Learning Experiences**

Traditionally, most educational experiences in a university setting focus on supporting learning of content in a particular subject domain (physics, chemistry, engineering, etc.). A more modern view of such experiences (Pellegrino and Hilton 2013) recognizes that learning inherently has a multidimensional character (Figure 1):

- The cognitive dimension commonly includes competencies such as innovation, critical thinking, problem solving, information literacy, reasoning, and argumentation.
- The interpersonal dimension includes abilities such as communication, collaboration, responsibility, and conflict resolution.
- The intrapersonal dimension recognizes the importance of skills such as flexibility, initiative, appreciation for diversity, and metacognition (the ability to reflect on one’s own learning and to make adjustments accordingly).

Graduates who demonstrate abilities in three dimensions are sometimes called T-shaped thinkers and are the ones most in demand. The Commission uses the term whole-person education to describe an educational experience that provides all three types of skills.

In traditional STEM learning, the importance of cognitive competencies is widely recognized but rarely supported explicitly; STEM instructors often assume that students will pick up cognitive skills as they learn new subject content. It is rare that inter- and intrapersonal competencies are accounted for in learning at Georgia Tech.
Future educational experiences must be designed to account explicitly for all these learning dimensions; Georgia Tech graduates, and others, plateau or flame out in organizations not because of their cognitive limitations. While IQ and cognitive competencies are necessary, they are not sufficient. Positive psychological capital (i.e., the combination of hope, resilience, optimism, and efficacy) and emotional and social competencies are the differentiators and are fostered by nurturing inter- and intrapersonal skills.

The Culture of Whole-Person Development

Advances in the science of developmental psychology suggest that a strong culture of deliberate development (of both an institution and the individuals within the institution) requires three interlocking pillars (Figure 2): edge, home, and groove.

Educational institutions, like Georgia Tech, are in the people development business; however, the culture of such institutions typically contains serious flaws that are major impediments to deliberate development. As one example, the culture of Georgia Tech currently fails to provide a safe “home” where students can feel supported in revealing their weaknesses and in taking the risks needed for growth. Georgia Tech must examine how to make the culture changes to support the human flourishing that is necessary for both individuals and Georgia Tech as an institution to adaptively meet the twenty-first-century challenges that are increasingly technical, complex, volatile, uncertain, and ambiguous.

In the following sections we outline some recommendations for whole-person development, with the first two having a near term horizon.

Globalizing the Curriculum: Expanding the Lens of On-Campus Courses

In today’s environment, major issues facing individuals and nations are generally global in scope. By removing geographic boundaries and including an understanding of the beliefs and cultures of other societies, global issues can be handled more effectively. A university culture that embraces globalization not only prepares students for this new environment but it also enhances the whole-person skills of problem solving and critical thinking in diverse situations with multicultural collaboration and an understanding of global and ethical issues in an ever-changing world.

Graduating “good global citizens” is a primary component of Georgia Tech’s Strategic Plan (Georgia Tech 2010). To achieve this goal, the Georgia Tech Global Positioning Strategy intends to send 60 percent of all Georgia Tech undergraduates abroad by 2020 (Georgia Tech 2012). However, on-campus courses must contribute to this goal, too. By globalizing the curriculum at Georgia Tech, it would be possible for students to develop international understanding and intercultural skills through their disciplinary study on campus.

Such an initiative engages students in the study of dominant paradigms and invites them to challenge the assumptions associated with these paradigms and imagine new possibilities. Thus, in addition to preparing students to contribute to the real world, faculty who embed the pedagogy for global learning in their courses also contribute to Georgia Tech’s efforts to foster a culture of innovation through our curricular offerings.
The Commission recommends a near-term initiative to globalize the curriculum by providing a framework to help faculty incorporate international perspectives into their existing Georgia Tech courses. We propose to provide professional development pathways for faculty to learn how to link their on-campus instruction to Georgia Tech’s goals and initiatives for graduating global citizens.

This might include helping faculty integrate international, global, and intercultural perspectives into existing coursework and helping them learn how to leverage their own diverse experiences and/or those of the students in the class with the intended outcomes of the course experience. Another path would help faculty offer their courses in a coordinated virtual experience for students in Atlanta with students in a peer institution abroad. Faculty could draw from the model provided by a course on Global Issues and Leadership that involves Georgia Tech students from multiple disciplines and students in International Affairs and Public Policy at Sciences Po, Paris (Bankoff and Knoespel forthcoming). Such courses include virtual components and incorporate bi-university team projects.

One way to promote a culture of globalization and community among the faculty working on the internationalization of their courses is to sponsor a Global Curriculum Teaching Fellows (GCTF) initiative, where faculty would learn how to meet their course objectives in ways that help students think globally and would learn principles of course redesign that will guide them in making intentional choices that will help them achieve their course goals.

Furthermore, globalizing the curriculum at Georgia Tech offers the opportunity to highlight our diverse faculty and student population in a way we have never done before—rather than ask faculty to assimilate into the U.S. system of higher education, we would be asking them to partner with us to strengthen it. Currently, 46 percent of Georgia Tech academic faculty and 28 percent of research faculty at Georgia Tech were born outside of the United States. In the student population, 43 percent of graduate students and 14 percent of undergraduate students were born outside the United States.

Professional Development for Graduate Students

An aspirational goal of Georgia Tech would be to develop graduate students that go on to become excellent educators, researchers, leaders, and entrepreneurs—attributes that are highlighted in the Georgia Tech Mission Statement (Georgia Tech 2010). Georgia Tech graduate students currently receive rigorous disciplinary training that enhances their cognitive skills but may be lacking in the interpersonal and intrapersonal dimensions of whole-person education.

The Commission recommends developing programs that provide graduate students with comprehensive professional development instruction, training, and experiential learning opportunities that include future faculty development, project management, and digital networking. If successful, the projects associated with this recommendation will prepare students to excel in careers beyond Georgia Tech, where not just disciplinary skills but whole-person skills are crucial. In essence, Georgia Tech graduate students would have the skills needed to be movers and shakers in society.

The core competencies needed for master’s and Ph.D. students have been discussed in many venues. For example, the Project on the Master’s Degree, established by The Council of Graduate Schools in 2016, suggested a competencies taxonomy for master’s students: disciplinary and interdisciplinary knowledge; professional competencies; transferable skills such as communication, leadership, and working in teams; and research (Augustine 2017). The Council of Graduate Schools performed a study on professional development for STEM fields and suggested the following skills: communications, mentoring, leadership, research ethics, research, commercialization, and entrepreneurship, with a growing trend towards intercultural teamwork. Some skills that employers felt were deficient included science policy, risk management, time management, project management (Denecke 2017).

Competencies specific to future faculty at research universities include project management, writing proposals, networking with potential collaborators or funding sources, leadership, teaching, and being able to develop a research program. All Ph.D. students at Georgia Tech receive extensive training on how to conduct research but not necessarily on how to develop a research program.

There are currently pockets of training programs at Georgia Tech that address many of these competencies. The Graduate Studies Office has a suite of online resources and in-person programs for career and professional development, including career exploration and job search guidance as well as a communications certificate program. This office partners with the Student Government Association and Center for Teaching and Learning (CTL) to run the Career, Research, and Innovation Development Conference (CRIDC), which provides sessions on career exploration in consulting, industry, start-ups, government and nonprofit organizations, and academia. CTL
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offers a set of graduate-level courses on teaching and learning and supports students in developing their own teaching philosophies, culminating in a Tech to Teaching Certificate. Some individual schools within Georgia Tech have professional development or future faculty training programs that are specific to their disciplines, such as Biomedical Engineering, Chemistry, and the Scheller College of Business.

A near-term recommendation is to expand and coordinate existing professional skills and future faculty training programs across campus. A working group should address the question of what can and should be done campus-wide from the Graduate Studies Office, college-wide, or at the department level. The goal is to have professional and future faculty training programs that are effective, efficient, relevant, and sustainable.

In addition to determining how to fill in the current gaps with new content, a novel idea would be a deliberate approach at building a program that is more modular so that it can be tailored and reused across academic units. A specific skill module would include resources such as videos, readings, and case studies, plus activities suitable for group interactions. Skills could be identified at various levels of abstraction (to borrow the “layered abstraction” architectural structure from computer science): basic skills modules such as listening and empathy are at the lowest level, an intermediate level that builds upon and utilizes this lowest level of skill modules includes interpersonal communications and mentorship. The metaskill level includes modules on leadership and entrepreneurial skills.

This “levels of abstraction” approach might allow for development modules to be reusable and composable across disciplines and populations. Figure 3 shows a sample of the layered framework, where the dashed lines show the connections between the particular lower-level skill modules and the upper-level modules that rely on them. This particular selection of topics shown is meant only to display the layered skills framework; the specific skills at each level would need to be determined.

Departmental units could replace any of the modules with their own customized versions, and they could custom-compose the set of modules that make an upper-level unit. This framework and the developed modules could be reused across populations, as well. In particular, the graduate student modules could be a pilot program for a similar whole-person development program for faculty (see the CNE Report Supplement Building a Culture to be Deliberately Innovative in Education (Georgia Tech 2018a). To achieve widespread participation, professional development programs would need a shift in culture that can be achieved with proper student and faculty incentives. Most current students do not take advantage of the existing programs, partly because they are not aware of the programs or do not realize the value that they would gain from such training. Also, some Ph.D. advisors discourage activities that would distract students from their research.

Figure 3. A “levels of abstraction” framework for a program of professional development that is built with reusable and composable modules.
Students may be incentivized if more programs integrate training of skills such as leadership, networking, teamwork, and project management into graduate curricula by developing professional skills courses or allowing programs to count minors or certificates that address these skills in their degree requirements. Advisors could be incentivized if these development programs were offered for cohorts of faculty in order to them to see the benefits in their own work.

Mentorship of graduate students is arguably the most important part of a university research program, yet the most common way of assessing it is based on research production—the number of papers produced. Higher paper production might be achieved by narrowly focusing students on the research at hand, which would be a disincentive for the whole-person education that the Commission endorses. Thus, a more fundamental recommendation is to develop more comprehensive ways of evaluating faculty mentorship of graduate students for promotion, tenure, and annual reviews.

Developing a Curriculum and Culture of Whole-Person Development

Higher education institutions with a research and education mission are in the business of developing ideas (research) and people (graduates). Most universities, Georgia Tech included, deliberately invest in research while relying on education to take care of itself, meaning that faculty learn how to teach by being assigned to teach courses, and students learn (or don’t learn) in those courses. The culture surrounding teaching and learning is haphazard rather than deliberate.

A curriculum that promotes whole-person education requires development in the three dimensions depicted in Figure 1—cognitive, interpersonal, and intrapersonal skills—each of which students approach through the lens of edge, home, and groove (Figure 2). Various schools and units at the Institute already have many successful programs that provide fertile opportunities for whole-person education. Laboratory courses, studio and design courses, problem-based learning, and flipped classes all have elements that force students to develop skills that are cognitive, interpersonal, or intrapersonal.

Other experiences outside of the traditional classroom or laboratory broaden the experiences into specific contexts, including co-op, research and project teams, Vertically Integrated Projects (VIP) Program, and entrepreneurial programs such as CREATE-X as well as study abroad. Overarching themes in the Grand Challenges program and Serve-Learn-Sustain give ethical and societal contexts for whole-person education. See the CNE Report Supplement Learning by Doing for more details on these types of programs (Georgia Tech 2018c).

The deliberate approach to whole-person education is to provide guidance and training for students in these skills, not just put them into situations where these skills are useful. For example, it is common practice in both K-12 education and higher education to put students on teams and hope that the teams function collaboratively. A program at Georgia Tech for training in effective team dynamics is embedded into numerous courses and has been achieving success over the last few years. The CNE Flashpoint effort, described in the CNE Report Supplement Formative Leadership (Flashpoint): One Georgia-Tech-born Approach to Deliberately Innovative Education (Georgia Tech 2018b), greatly enhanced the effectiveness of the team dynamics program.

Any plan to establish a curriculum for whole-person development that is widespread would need a cultural change at the Institute. For example, Georgia Tech could provide and require comprehensive teaching training on evidence-based practices, backward course design, effective group work, metacognition and reflection, diversity-inclusive teaching practice, and deliberate development of interpersonal and intrapersonal skills of students in their coursework. In addition, formal and informal spaces can be created on campus where students and faculty meet, discuss ideas, work on projects, build networks, grow, and develop. It would be important to advertise and market to students not only the cognitive aspect of the courses but also the inter- and intrapersonal skills developed by the courses. Core courses should be appealing, innovative, and have ideas that stick with students beyond the final exam.

Metacognition embedded throughout the curriculum develops students who can self-monitor their academic progress, who can reflect on how technical and content learning in a field partner with development of interpersonal and intrapersonal skills. The Commission recommends that Georgia Tech implement a curriculum, outlined in the following subsection, to help students become self-aware and deliberate in their approaches to their education and their career and to give attention to ideas and areas where they are passionate and can have great impact.
What Does that Whole-Person Education Curriculum Entail?

Students arrive at Georgia Tech, or any institution of higher education, with a view of the world and their place in it that is formed by their life experiences to date. We need to create and promote spaces on campus where Georgia Tech citizens can explore various ideas and figure out which ones are authentic. The Commission’s proposed whole-person curriculum, modeled on the Formative Leadership Development training at the Center for Startup Engineering (CSE) at Georgia Tech, includes development such as the following:

1) Students are taught to notice and become aware of how they interact and behave in their environment, when they engage and when they step away. Bringing students’ attention to how they and others behave draws attention to what matters to the student and to others.

2) Using the ability to notice things about themselves and others, students determine situations or ideas they are passionate about versus indifferent to and attempt to find areas where their non-indifference is so important to them that they will commit all of their resources to those situations or ideas.

3) Students then analyze how they and others navigate the situations that they find they cannot ignore or fail to engage in, and they look for the underlying causes of or their hidden commitments about those situations or surrounding those ideas.

3) From these commitments and behaviors, students practice identifying a direction or idea for which they perceive a wider authentic demand.

4) Students identify their big idea to inform, transform, or form a new deliberate academic and career direction to develop intellectual curiosity, foster effective career exploration, and position themselves to make decisions aligned with their true interests.

5) Students consider how to introduce their big idea in a way that does not activate resistance behaviors by their support network or other constituents.

In this process, students develop the listening, observational, and interpersonal skills to unveil the hidden commitments and assumptions about themselves and others which could prevent an authentic idea from moving forward. They learn to listen, reflect, and respond to ideas with sensitivity. The result is that students and all members of the Georgia Tech community will improve at identifying, developing, and delivering new ideas. Ideas with authentic demand have the potential for Georgia Tech and its students, faculty, administrators, and alumni to add value in the world.

The final piece for whole-person education is to document evidence that students are developing successfully along the dimensions of cognitive, interpersonal, and intrapersonal. Students are formally mentored in how to privately document and publicly curate a portfolio of their knowledge, skills, and abilities along the three dimensions of cognitive, interpersonal, and intrapersonal. The public curation allows seamless presentation of ideas to potential employers and graduate and professional programs. The portfolio documents can be physical or electronic, preferably leveraging Georgia Tech’s technical presence and showcasing the student’s technical skills.

Currently, the College of Computing is collaborating with the Georgia Tech Library to develop plans for e-portfolios. In addition, the Wallace H. Coulter Department of Biomedical Engineering (BME) is partnering with the KERN Foundation to launch a multiyear, multimillion-dollar project, starting this year, to develop and implement portfolios for engineering education. The portfolios will encourage students to learn and apply design thinking skills to design their undergraduate educational experiences and to promote their whole-person development.