RIT | Applied Critical Thinking

The Annual Report for Applied Critical Thinking at RIT

For

2019-2020

Dr. Jennifer L. Schneider, CIH

Eugene H. Fram Chair in Applied Critical Thinking

2020

Contents

Executive Summary

In 2910-20, the maturation and integration of the Applied Critical Thinking initiative at the Rochester Institute of Technology (ACT@RIT) continued under the leadership of Dr. Jennifer L. Schneider. ACT@RIT is framed, functional, and ready to meet greater challenges. We have entered a new phase of ACT efforts on the national stage and are also poised to deepen our efforts to fulfill university goals.

We have increased on-campus participation 700% over the last 5 years. This year, we hosted 24 cosponsored Fram events, and an Institute-wide fall signature event that was very successful. The year-over-year participation increased 64.6% to al all-time high of nearly 2500 attendees despite the challenge of the COVID-19 Pandemic.

The measure of our success is not limited to event attendance but defined by our level of engagement and strategic refinement of university systems for student success. Notable accomplishments are measurable at all RIT campuses, including:

- Successful AITU summit of peer universities in August 2019
- Development of unique webinar event series with Alumni Relations and several colleges related to the pandemic (capitalizing on the RIT4Life model).
- Establishment of a unique Community of Practice Disasters that highlighted professors that contribute in this important area.
- Continued growth in faculty support including resources, rubrics and workshop offerings.
- Initiation of support and engagement of RIT international campus faculty.

Purpose and Guiding Aims

The purpose of this report is to summarize the ACT efforts and accomplishments for the 2019-20 academic year, list recommendations for future efforts, and define benchmarks for the ongoing evaluation of our progress.

Establishing the reputation of RIT as a national leader in Applied Critical Thinking relies upon a university-wide commitment coupled with a notable external contribution to the development of applied critical thinking. To ensure success, the university is (1) continuously improving a process grounded in performance measures and student achievement assessment, (2) continually seeking and sharing best practices and opportunities with internal and external partners, (3) integrating high-quality

ACT learning opportunities across the student experience, and (4) facilitating excellence in the development of Applied Critical Thinking in our students and our world.

Initiative Framing and Rationale

Our global society has high expectations. Decision makers must think critically to assess and strategize within complex, interconnected systems; continually adapt to rapidly evolving technological, aesthetic, and social environments; and manifest new ideas, both individually and collectively.

- In response, RIT created the **Applied Critical Thinking (ACT@RIT)** initiative to foster the application of critical thinking – *the exercising of effective thinking in any context*. **Application of critical thinking connects this performance chain of knowing-doing-creating**. The initiative is guided by several working definitions, including:
- **RIT University Education Goal and Essential Program Outcome: Critical Thinking** refers to those processes required to understand and evaluate complex claims of various sorts. It involves the evaluation of information, evidence, arguments, and theories, and the contexts in which these are encountered. It entails the questioning of different and competing perspectives, and challenging the (sometimes hidden) assumptions and inferences that determine what will count as evidence or argument. Critical thinking is learning to think in a disciplined and evaluative manner, to analyze and interpret the processes by which various claims are made and reliable conclusions are reached ([RIT Essential Outcomes](#)).
- **Critical Thinking Across the Curriculum: Critical thinking is…..** "the ability to identify, analyze, construct, and evaluate evidence and arguments in a deliberate and rigorous way" or "The growth of educated thinking". (C. Sheffield, Critical Thinking Across the Curriculum Report, 2014).
- **Fram Advisory Board:** "At RIT, ACT is an active form of engagement, drawing from our diverse domains and deep expertise to address the questions and challenges that we face. As the uncertainties and the magnitude of impacts increase in our complex world, we must now consider a wider range of possible outcomes. To do this well, we need to employ thinking that draws from multiple, diverse environments to more fully inform our evaluation and resultant strategies." (Fram Advisory Board. [Fram Award at Imagine](#)).

RIT systematically integrates critical thinking across the student experience to develop critical thinking in diverse settings. ACT@RIT is cultivated through learning expectations of *defining* the quality of information, *analyzing* and *developing* a point of view, *solving* of complex problems, and *creation*. These elements are embedded into our curriculum and practiced intentionally in ever-broadening and

diverse environments of experiential learning. RIT's renowned experiential learning program, the prolific use of projects and teams, community service programs, international experiences and programs, entrepreneurship and research opportunities, and participation in student groups in and out of the classroom are all valuable to the initiative. The ACT skills students develop transfer into every other area of life and are the impetus for growth, professionalism, and creative expression, empowering our alumni to realize their unique contribution to our world through whatever path they choose or create. The visual map of the effort is below:
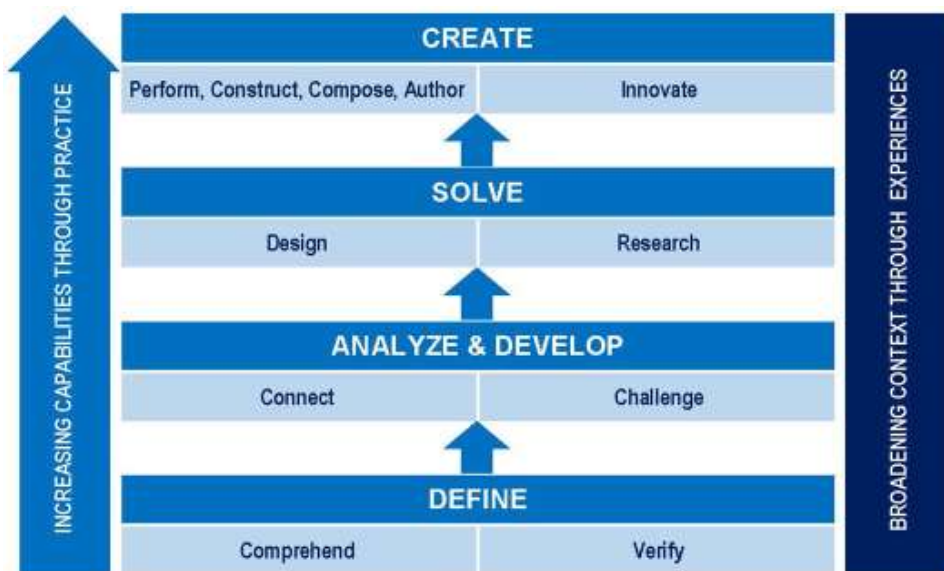
Figure 1: ACT Skill Development Map

2019-20 Management & Structure of the Initiative:

The ACT initiative is led and the report is compiled by the Eugene H. Fram Chair in Applied Critical Thinking (Fram Chair), Dr. Jennifer L. Schneider, CIH. In addition to her role as the Fram Chair, Dr. Schneider is also a professor in Civil Engineering Technology, Environmental Management and Safety within the College of Engineering Technology at RIT, and leads the cross-disciplinary Collaboratory for Resiliency & Recovery at RIT. She has expertise in HAZMAT, risk-based decision-making and global resilience. The internal Fram Advisory Board (FAB) of Rochester faculty and staff, the Fram alumni-driven External Advisory Board (FEAB), and the international campus (IFAB) all advise Dr. Schneider. Until January 2019, Dr. Schneider was supported by a part-time Fram Faculty Fellow, Dr. Adrienne Decker. In November 2019, Ms. Angela Brodie left RIT. Temporary administrative support

is provided by Linda Lagree, through Datrose, RIT's temporary staffing agency. Further information on the history of the Fram/ACT initiative can be found in Appendix 1.

Fram Advisory Board

Most members from Fram Advisory Board chose to remain on the board for 2019-20 (Table 1). This board has representation from the colleges and degree granting units as well as Student Affairs. The duties of the board members are to guide Rochester-based ACT efforts and advocate for/be a conduit for ACT@RIT.

Table 1: 2019-20 Fram Advisory Board

- **Heath Boice-Pardee**
  Student Affairs
- **Corey Crane**
  College of Health Sciences & Technology
- **Mike Eastman**
  College of Engineering Technology (Associate Dean Representative)
- **Christine Keiner**
  College of Liberal Arts
- **David Long**
  College of Art & Design
- **Rachel Mazique**
  National Technical Institute for the Deaf
- **Sylvia Perez-Hardy**
  Golisano College of Computing & Information Sciences
- **Patricia Poteat**
  College of Engineering Technology
- **David Ross, College of Science**
  College of Science
- **Brian Thorn**
  Kate Gleason College of Engineering
- **John Ward**
  Saunders College of Business

Fram External Advisory Board (FEAB)

The Fram External Advisory Board is selected from RIT's notable alumni (Table 2). These board members bring an external point of view and guidance to the initiative. The current members serving 2- or 3-year renewable terms are:

Table 2: 2019-20 Fram External Advisory Board

- **Peter Bealo** (College of Art and Design [former College of Graphic Arts & Photography], Photographic Science, 1980)
  Consultant in Data Analysis, Public Education Policy, Marketing & Project Management

- **Joseph Boyd** (COS, College of Science, Chemistry, BS 2004)
  Senior Vice President, Financial Advisor, Brighton Securities

- **Jason Edwards** (Saunders College of Business, MBA 2003)
  Vice President of Category Leadership - Total US Grocery Pinnacle Foods Group LLC

- **Robert Jacoby** (Civil Engineering Technology, B.S./Environmental Management 1977)
  Consultant to the Energy Industry
  Former Global Manager at Royal Dutch Shell

- **Ellen Moser** (Computer Technology, B.T. Software Science 1981)
  Treasurer, Brentwood Library Foundation

- **Chris Petescia** (College of Art and Design, B.F.A. Graphic Design 2005)
  Owner, Kessel Run Ventures

- **William Standwill** (College of Art and Design, B.S. Graphic Communications 1988)
  Head of Commercial, Sherlock Biosciences

- **Krista Vardabash** (Saunders College of Business, MBA 2012)
  KV Strategies

- **Amanda J. Weissman** (College of Engineering, BS/Electrical Engineering; College of Science MS/Materials Science 2009)
  Senior Systems Engineer, Lockheed Martin

International Fram Advisory Board (IFAB)

The International Fram Advisory Board represents each of RIT's international campuses (Table 3). These board members bring an international point of view and guidance to the initiative. The current members serving 2- or 3-year renewable terms are:

Table 3: 2019-20 International Fram Advisory Board

- **Albina Balidemaj**
  Rochester Institute of Technology - Kosovo
- **Francis Brassard**
  Rochester Institute of Technology - Croatia
- **Jamaal Pitt**
  Rochester Institute of Technology – Dubai

General Education and Program Student Learning Outcomes

The teaching and assessment of ACT@RIT is managed through a comprehensive general education and program strategy founded on student learning and program goals. General education outcomes have been codified by the governing committee, and adopted accordingly. The abbreviated outcomes are listed in the professional practice column of the chart below because these inform the building of a competent, professional, and capable critical thinker. The full description of ACT student learning outcomes is noted in Appendix 2. RIT measures student critical thinking at several opportunities along the student experience as follows:

- University level Essential Program Outcomes assessed in designated general education courses
- Program learning outcomes
- Cooperative employer feedback
- National Survey of Student Engagement
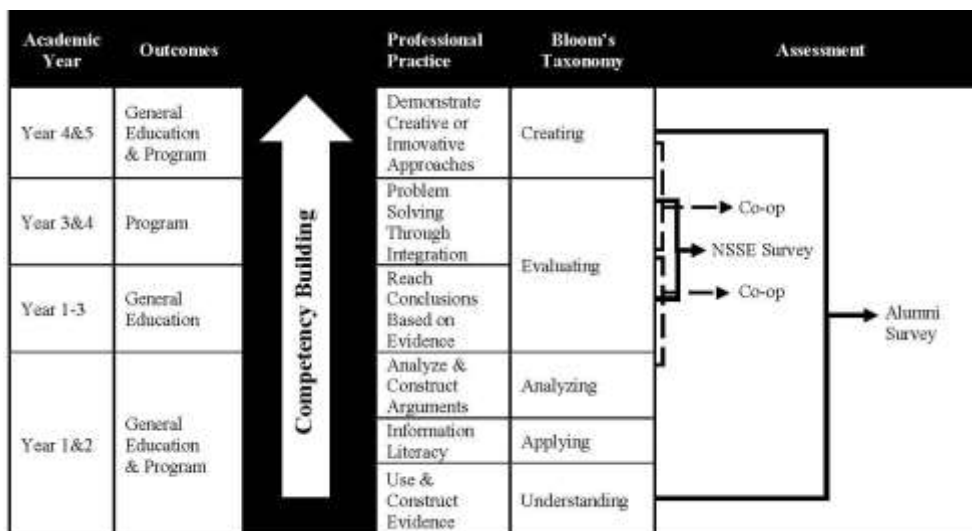- RIT's alumni survey broad in scope

Figure 2: ACT Outcomes Map

# Applied Critical Thinking Strategic Action Plan (2018-21)

The Applied Critical Thinking (ACT) Strategic Action Plan (SAP) for 2018-21 is meant to guide the ACT initiative and reflect ACT related goals of the Rochester Institute of Technology (RIT) Strategic Plan for 2025. Due to the emergence of the COVID-19 pandemic in early spring 2020, the initiative had to adjust plans and programming to meet the "new normal". Nevertheless, the gains were realized. The ACT effort directly supports university goals and the growth of the university programming, reputation, and is also crucial to the blending and growth of the unique capabilities of RIT. ACT plays a particular formative role in these university goals:

- **GOAL 1**: Enroll and support a diverse mix of increasingly creative, multi-talented students.
- **GOAL 4**: Continue to attract and retain world-class faculty committed to elevating RIT's collective excellence in scholarship, teaching and service.
- **GOAL 8**: Design and integrate unique curricular experiences at the intersection of RIT's programs in Technology, Art, and Design (TAD). Design new and revise existing programs in non-STEM disciplines that increase enrollment through this same distinctive integrated core.
- **GOAL 16:** Create a distinctive RIT brand and develop a supporting content marketing strategy that makes use of all relevant media.

This plan follows the initial ACT SAP for 2015-18; the SAP is a guidance document that is reflected by the annual plans of work for the Fram Chair office. This plan centers on impacting the student experience, and therefore, student engagement is THE key part of our efforts.

Highlights of Accomplishments in 2019-2020

Accomplishments include 24 events with nearly 2500 participants with the same operational budget first allocated in 2011. In a new model, we seek to support a wide range of ACT that increases both our impact and our reputation across the campus as a partner. This included the hosting of the September 2019 Fram Signature Lecture, "POWERFUL STUFF: At Entrepreneurial Mindset Build Upon Critical Thinking" with Doug Melton of the Keen Foundation. Doug Melton, Ph.D., a national speaker on engineering education, encouraged hundreds of students, faculty, and staff at Rochester Institute of Technology to
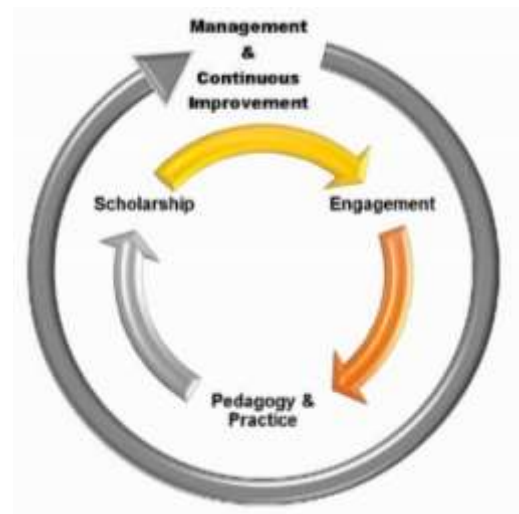
have an entrepreneurial mindset. This was part of three days of Signature events beginning September 17, 2019, including multiple student-centered opportunities and a culminating signature lecture. A total of 628 students attended these events.

Other events included the following:

- RIT Alum David Piantanida, State Oversight Liaison, Enforcement Coordinator, and ELMS Champion Trainer ECAD, Denver Region 8, United States Environmental Protection Agency presented "Environmental Policy, Science, Energy, Crisis Communication and Working for the Public Sector" on October 3, 2019. (80 students attended)

- "Thought at Work", a 3-day student run, student focused design conference was held on October 18-20. (382 students attended)

- "ARTiculating Deaf Experiences conference co-sponsored with NTID was held on November 6, 2019. (Approx. 200 students attended)

- Dr. Wenda Bauchspies, Co-director of Michigan State University's Center for Gender in Global Context, is an interdisciplinary and international social scientist whose expertise lies in the integration of gender, social justice and culture with agricultural research, science education and technological adaptation. The event was held on November 7, 2019. (302 students attended)

- "How Thinking" workshop lead by Dr. Schneider, held during RIT's Graduate Education Week. The workshop was held on November 20, 2019. (15 students attended)

- Co-sponsored with the COS, Dr. David Bader, a Distinguished Professor in the Department of Computer Science and Director of the Institute for Data Science at New Jersey Institute of Technology gave a talk titled "Solving Global Grand Challenges with High Performance Data Analytics". The event was held on February 5, 2020. (Approx. 50 students attended)

- Co-sponsored with the COS, 6th Distinguished Speaker, Dr. Julie Posselt presented "Graduate Student Meal Health: What Faculty, Friends and Family Can Do". The event was held on February 28, 2020. (Approx. 50 students attended)

- Co-sponsored with Alumni Relations, as part of the Critical Thinking Living & Leading through Pandemic Series, three very successful disaster webinars were held in May and June 2020:
  - May 19, 2020: Critical Systems. (97 attended)
  - June 1, 2020: Social Vulnerabilities and Covid-19 (53 attended)
  - June 19, 2020: Medical Innovations in Time of Crisis (41 attended)

- Co-sponsored & Gray Matters' events in AY 2019-20. (566 students attended)

Postponed Events Due to the Pandemic:

- Teachers on Teaching: The goal of these workshops is to support and increase faculty-driven pedagogy in Applied Critical Thinking. Dr. Marcos Esterman was scheduled for an event on March but this was postponed due to the pandemic shut down on March 13.

- Speaker Series: Unfortunately, two major speaker events we scheduled for March 2020 were postponed due to the pandemic:

  – March 20, 2020 - Fram Speaker Series: Driving Success with Business - Stacey Lake (BS '05 marketing, MBA '07), corporate communications manager at Bergmann; Anthony Barone (EMBA '10) enterprise architect at Excellus Blue Cross Blue Shield; Alexandra Myers (BS '17, new media marketing and management information systems) OSCR360 account manager, L-Tron; and Zachary Sweet (BS '17, management information systems) project coordinator, Wegmans Food Markets.

  – March 26, 2020 - Fram Speaker Series: Global Issues Forum – Ever wonder how ready our communities and our infrastructures are for global changes that are already upon us? We have the experts coming to RIT. Dr. John Hummel of Argonne National Lab and Ms. Suzanne Frew (RIT Alum) of the Frew Group will be here March 25 & 26 to share and discuss the critical thinking that is part of assessing and building our resilience to meet these challenges locally and globally.

Other accomplishments included growing the Community of Practice with the addition of twenty new members, creation of the Community of Practice—Disaster Science in response to COVID-19 (12 new members), and the RIT4LIFE series related to the pandemic.

As the Fram Chair, Dr. Schneider is a contributor to other RIT initiatives, for example, Predictive Analytics (student retention & resilience) and RIT Alumni Relations efforts including RIT4Life, etc.

Management & Continuous Improvement (Process):

- Continued to integrate and advance the initiative, in accordance with the Strategic Action Plan.
- Invitation to join the gen ed review board and initiated the review of Problem-Solving related courses within the professional program side of the transcript.

Creating Engagement:

- Communication Plan: With the reorganizing of the Fram office to distributed support and the pandemic, the social media activity of Fram decreased for several months, but then increased again as university planning allowed. Nine issues of the Fram Focus were published. These

highlight upcoming Fram events, co-sponsored events, Community of Practice recognition for excellence in Applied Critical Thinking, and feature relevant news and scholarly articles selected by Eugene H. Fram.

- The Office of the Fram Chair was featured in 4 articles in RIT's University News and also featured in one podcast during this academic year.

Critical Thinking Course Highlights

- **Year One/365 course:** Dr. Schneider continued her association with Year One or 365 by serving on their advisory board as they have offered this newly enhanced course and student experience.

- **RIT edX** (part of RITx Soft Skills Professional Certificate): In an effort to grow enrollments in the six courses that we were offering as part of the Soft Skills Professional Certificate, we split them up and repackaged them into two new Professional Certificate programs. The RITx Critical Thinking & Problem-Solving offering is now part of the Leadership Essentials Professional Certificate. Please note that the more recent verified enrollments may be far higher due to an initiative which we collaborated with edX to make education more accessible through COVID by distributing coupons (free verification) to specific audiences in need. We won't know for sure until later this year when the next revenue report comes from edX.
    - **Critical Thinking & Problem Solving**
      As part of the Soft Skills Professional Certificate
      Total Enrollments (to date as of August 31, 2020): 91,749
      Verified Enrollments (to date): 1,425
      Passing Learners (to date): 889

    - **Critical Thinking & Problem Solving:**
      As part of the Leadership Essentials Professional Certificate
      Total Enrollments (to date as of August 31, 2020): 74,600
      Verified Enrollments (to date) 2,486
      Passing Learners (to date): 1,550

The graphic below illustrates the geographic distribution of learners in this course.
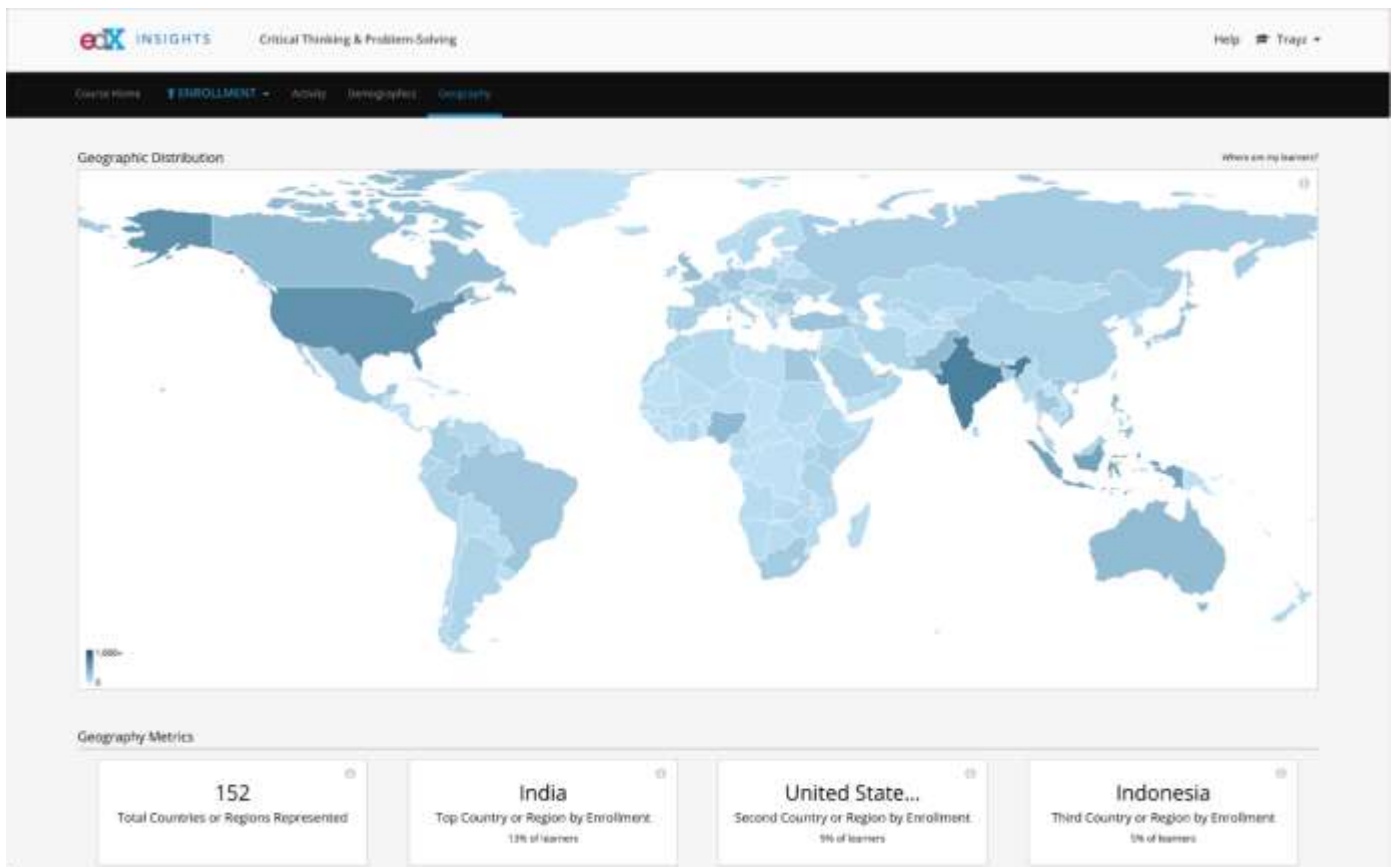
Figure 3: Learner Distribution

2020 Fram Award at Imagine

Unfortunately, the Fram Awards were cancelled when RIT's Imagine Festival was also cancelled due to the pandemic.

Pedagogy & Practice

- Community of Practice & Exemplars: Our current Community of Practice membership now includes forth-six RIT faculty and staff members in both the ongoing CoP and the newly created disaster CoP, broadly representing the university. Please note that three of these individuals have since retired or left RIT.

- Assessment: There are approximately 600 general education courses with ACT components and

many program-level courses that support ACT@ RIT, by continuing to build our assessment strategy for ACT through these courses. Examples include:

- Longitudinal Study: The assessment processes for ACT continued to be an area of growth. In Fall 2019, all problem-solving curse related outcomes were collected for later analysis. The longitudinal study of student self-assessment of CT continued. This data will be used to inform and forward a broader longitudinal study examining the growth of student ability to apply critical thinking across their RIT student experience.

- Student Learning Outcomes & Rubrics: Dr. Schneider reviewed RIT's assessment of one of the Critical Thinking learning outcomes (summary attached) at each RIT location. Assessment results for each outcome are now available online. She served on the General Education Assessment Advisory Board and made recommendations related to faculty engagement and recognition. Additionally, the council recommended a move to a new assessment schedule in which all four critical thinking outcomes will be covered in the same year. Review of the critical thinking outcomes (general education as well as the potential for program level) is ongoing. The process and rubrics were shared at the AITU meeting August 2019.

- International Faculty Teaching Survey: The international faculty survey formed the basis of specific campus planning to support development of ACT faculty capacity. Opening events in fall 2020 were planned for each campus but had to be reconfigured due to the pandemic.

External Engagement Efforts

RIT continued to engage externally in many efforts, and have begun making strides in creating external partnerships and building its reputation over the past year. These efforts include:

- **AITU Summit**: *Advancing Student Thinking for 21st Century Success*.

  As institutions known for design and innovation, AITU universities are particularly equipped to transform the approaches used to prepare students to critically think to solve complex problems, innovate and lead.

  Summit goals were to scope the 21st century critical thinking skillset for graduates of AITU schools, create individual institutional action plans to expand or enhance structures to develop student critical thinking for problem-solving, innovation and leadership, determine next steps for sustaining and expanding this community of practice and to frame a strategy to broadly

communicate the value of these AITU university efforts. This invitation-only summit was successfully held in Chicago in August 2019, and the summary white paper is in Appendix 3.

Supporting Corollary RIT Initiatives:

- **Predictive Analytics:** Dr. Schneider has participated in the university committee addressing student retention and resilience to improve persistence and on time graduate rates (OTG). There is much cross over between student success and student ability to critically think about their own self efficacy. Since RIT has built a successful program in critical thinking for professional and citizenship success, and that same frame can be translated to assist students in understanding the use of critical thinking for their personal lives and overall challenges. This effort dovetails with the processes and analytics that are part of ACT@ RIT.

- **Alumni Relations and RIT4Life:** Alumni Relations continues to build programming for alumni that is relevant to their goals and creates a relationship to the university. The Fram e

- **E**xternal Advisory Board presents a natural opportunity for selected alumni to give back their time and expertise to the university, by guiding the initiative and acting as ambassadors for the effort and RIT. This relationship was leveraged in our original (but postponed) planning for Spring 2020, and our resurrected webinar plans in summer 2020. Alumni are a terrific, engaging resource for our students and our faculty.

Integration with RIT's major goals

The importance of ACT in RIT's long-term strategy is evident. Development of leaders within and at the intersection of technology, art and design requires fostering complex visionary thinking that is grounded in ACT skills. Applied Critical thinking has a role to play in the integrative learning path with RIT.

Challenges to ACT Integration

The ACT at RIT initiative faces challenges that must be overcome collaboratively. RIT must continue to foster engagement of our own RIT community by establishing both top-down and bottom-up support, and build connections at both the general education and program level. This may be best accomplished through the fundamental problem structure and problem-solving curricula that is an integral part of our academic programs. Achieving notoriety is of paramount importance. It is a simple truth that there are many priorities and distractions on a college campus that make it difficult to emerge from the crowd of opportunities, particularly without a clear connection to the disciplines that attracted students to RIT. The educational community, as well as popular media and literature, paints a somewhat negative picture of college students' ability to think and focus beyond self. This view is not lost on our students and does not make it easy to build a rapport and inspire interest in engaging in critical thinking activities. Further, learning and practicing critical thinking is difficult, takes time, and is resource-intensive for faculty, students, and classes, requiring a significant commitment on the part of all, including the university itself. In RIT's case, the next steps will require commitment. To be truly integrated, it must be an expected *and* obvious part of each student experience, so that the students see and understand their role in developing their own capabilities.

ACT Recommendation

Our efforts in ACT now give us the opportunity to make a significant impact both inside and outside of RIT. The processes, engagement and curricular structures, and best practices are now in place to allow our effort to mature and evolve. The Fram Chair is ultimately responsible for the leadership of the ACT initiative by creating community engagement and integration across the student experience. Our immediate goal is to increase faculty, staff, and student capacity to practice ACT by significantly enriching (or expanding) the student impact despite the challenges of COVID-19.

The opportunity to leverage our ACT@RIT initiative to advance RIT on many fronts is apparent. The academic year 2020-21 will be focused on support of faculty teaching and learning of critical thinking, particularly as we develop and refine modalities of teaching, focusing on:

- Increasing engagement and connections between traditional and unique educational experiences to

develop student ACT skills, including ACT as the key lynchpin and pivot point to support the growth of the broad mindset, leveraging interdisciplinary efforts, and particularly, individual resilience (critical thinking for self) as well as society.

- Integration of the Fram/ACT effort, throughout the student experience of the campus community as we learn to live and lead through the pandemic and its impacts.

- Growth of the ACT skillset with our graduate students, beginning with our graduate teaching assistants as our next generation of teachers, researchers and leaders.

Conclusion

The applied critical thinking initiative has the required components in place to achieve our goals of creating an environment that cultivates advanced critical thinking skills for RIT students and alumni and establishes national prominence and recognition for RIT.

Fram/ACT will continue to cultivate an integrative and future-minded presence at RIT and beyond. Living through this pandemic, it is apparent that this initiative is more important than ever to develop and support effective citizen-leaders that can successfully face the challenges of our evolving world and create a compelling future

Appendix 1: History

The Eugene H. Fram Chair in Applied Critical Thinking was funded in 2011 by an anonymous RIT alumnus to honor Professor Eugene H. Fram. Gene Fram is a Professor Emeritus of Marketing who retired from RIT in 2008 after 51 years of teaching at Saunders College of Business. He is known for his expertise in the study of retail malls and shopping, Internet retailing, nonprofit and corporate governance, and advertising. Professor Fram received his Ed.D. in Higher Education from the State University of New York at Buffalo, his MS degree in retailing from the University of Pittsburgh, and served as the J. Warren McClure Research Professor of Marketing at RIT. Gene is the recipient of the 1997 Eisenhart Award for Outstanding Teaching and the RIT Presidential Medallion in 2008.

Dr. Clarence Sheffield served as the inaugural Fram Chair from 2012 to 2015, and laid the foundation for the effort, including establishing the first faculty advisory board, writing of the *Critical Thinking Across the Curriculum* report, adoption of general education student learning outcomes for critical thinking, engaging faculty and students through small group events and hosting of five speakers.

The effort was reorganized in 2015-16 with the appointment of Dr. Schneider, with the goal of impacting the student experience through faculty engagement and transparent communication.   Since that time, major accomplishments have included the seating of three advisory boards comprised of Rochester faculty and staff, international campus faculty, and an external alumni advisory board; creation of two successive action plans that dovetail with university strategy; ongoing measurement and continuous improvement of student critical thinking through data gathering and analysis; implementation of a communication plan including the Fram Focus Newsletter, website, and social media; support of learning initiatives for faculty and students both on campus and through distance learning; and the establishment of the Fram Awards at RIT Imagine. In 2015-16, Dr. Schneider was also supported part-time by Dr. Evelyn Brister of COLA, Philosophy, who created a new course in 'Responsible Knowing'.   Dr. Schneider initiated and continues the practice of disseminating an ACT annual report that summarizes efforts and accomplishments. This initiative expanded in 2016-17 with increasing engagement and integration of the effort on the Rochester campus. External and internal engagement accomplishments include establishment of the Fram External Advisory Board, a social media presence on Facebook and Twitter, a new student-directed introductory video, and a partnership with University News as part of an expanding external

outreach effort. The internal curricular efforts include three applied critical thinking experimental courses, an updated information literacy rubric and implementation of an argumentation rubric. Significant campus engagement resulted from fourteen events, Fram signature and collaborative programming, and the beginnings of a faculty/ staff community of practice. In addition to the regular applied critical thinking programming at RIT, more than 600 participants actively engaged in specific Fram opportunities over the course of the academic year.

2017- 2018 saw substantial increase of social media presence on both Facebook and Twitter, proposal of an Association of Independent Technological Universities (AITU) Applied Critical Thinking summit with peer university administrators for 2019, publishing of papers related to the implementation and evaluation of applied critical thinking at RIT, and a critical thinking-centric proposal to Misk-Gates Foundation. Internal efforts include establishment of the International Fram advisory board (IFAB) that includes members from our international campus locations, the very first Provost's Learning Innovations Grants (PLIG) awards, and creation of rubrics for ACT-related analysis and evaluation of creativity and innovation student learning outcomes. Thirteen Fram events and collaborative programming created significant campus engagement. The year-over-year participation increased 4%, more than 850 participants actively engaged in specific Fram opportunities.

In 2018-19, the maturation and integration of the Applied Critical Thinking initiative at the Rochester Institute of Technology (ACT@RIT) continued under the leadership of Dr. Jennifer L. Schneider. Applied Critical Thinking at RIT is framed, functional, and ready to meet greater challenges. We have entered a new phase of ACT efforts on the national stage and are also poised to deepen our efforts to fulfill university goals. We have increased on-campus participation 700% over the last 5 years. This year, we hosted 12 college-focused Fram events, and an institute -wide spring lecture and fall signature event set that were very successful. The year-over-year participation increased 61% to an all-time high of 1400 attendees despite the ongoing challenge of capturing interest on our busy campus.

Engagement is more than event attendance, but strategic refinement of university systems for student success. Notable accomplishments are measurable at all RIT campuses, including: implementation of

the suite of rubrics for ACT-related student learning outcomes, and initiation of data informed ACT process evaluation; completion of a first-year student perception survey for Rochester that forms a baseline for longitudinal student assessment; establishment of a relationship for future RIT4LIFE opportunities; continued successful university- level offerings including the graduate 'Worldmaking' salon and a critical thinking course through RIT edX; growth in faculty support including resources, rubrics, teaching circle and workshop offerings; initiation of participation and feedback survey for RIT international campuses; and successful planning for the first of its kind Association of Independent Technological Universities (AITU) Applied Critical Thinking Summit, attracting participation for our peer institutions for a summit in August 2019.

Appendix 2: Learning Outcomes

Critical Thinking refers to those processes required to understand and evaluate complex claims of various sorts. It involves the evaluation of information, evidence, arguments, and theories, and the contexts in which these are encountered. It entails the questioning of different and competing perspectives, and challenging the (sometimes hidden) assumptions and inferences that determine what will count as evidence or argument. Critical thinking is learning to think in a disciplined and evaluative manner, to analyze and interpret the processes by which various claims are made and reliable conclusions are reached. (Source: RIT current Educational Goals Definition)

	Academic Programs	Co-op Employer Evaluation 2016-18	NSSE 2015	
Measure and Results	100% of programs identified at least one program goal/student learning outcome	**Critical Thinking:** **Information Literacy:** *Accesses and synthesizes information from appropriate sources* 4.4 out of 5.0 **Met** (n=624) **Creative/Innovative** Synthesizes existing ideas, images, or expertise in original ways 4.3/5.0	NSSE 4b. *Applying facts, theories, or methods to practical problems or new solutions* Senior **Approaching** RIT 3.0, AITU Peer 3.1 NSSE 4c. *Analyzing an idea, experience, or line of reasoning in depth by examining its parts* Senior Met RIT 2.9, AITU Peer 2.9 NSSE 4d: *Evaluating a point of view, decision, or information source* Senior **Met** RIT 2.6, AITU Peer 2.6 NSSE 4e. *Forming a new idea or understanding from various pieces of information* Senior **Met** RIT 2.8, AITU Peer 2.7	
University Level Benchmark	100% of programs will identify at least one program goal/student learning outcome aligned to Critical Thinking	Employers will rate RIT students 4.0 or higher Scale 1(poor) – 5 (excellent)	RIT Seniors will report a mean that is higher than or on par with their AITU Peers (n= 800 RIT seniors, ~1800 AITU)	
Preliminary Action Items	Develop faculty team to determine criteria, core assignment(s) and set benchmark	Review/analyze co-op student evaluation responses to qualitative questions re: Critical Thinking	Ongoing review of NSSE data for trends	

General Education Student Learning Outcomes
Proposed Assessment Schedule 2020-2026*

Framework	General Education Student Learning Outcome	2020.21 Assessment		2021.22 Assessment		2022.23 Assessment		2023.24 Assessment		2024.25 Assessment		2025.26 Assessment	
		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Communication	Express oneself effectively in common college-level written forms using standard American English				X							X	
	Revise and improve written products			X									X
	Express oneself effectively in presentation, either in spoken standard American English or sign language			X								X	
	Demonstrate comprehension of information and ideas accessed through reading				X								X
Critical Thinking	Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information							X					
	Analyze or construct arguments considering their premises, assumptions, contexts, and conclusions, and anticipating counterarguments								X				
	Reach sound conclusions based on logical analysis of evidence							X					
	Demonstrate creative or innovative approaches to assignments or projects								X				
Social	Analyze similarities and differences in human social experiences and evaluate the consequences					X							
Global	Examine connections among the world's populations		X**			X							
Ethical	Identify contemporary ethical questions and relevant positions						X						
Artistic	Interpret and evaluate artistic expression considering the cultural context in which it was created						X						
Scientific Principles	Demonstrate knowledge of basic principles and concepts of one of the natural sciences		X**							X			
Natural Inquiry of Science	Apply methods of scientific inquiry and problem solving to contemporary issues and scientific questions		X**							X			
Mathematical	Comprehend and evaluate mathematical or statistical information	X									X		
Mathematical	Perform college-level mathematical operations or apply statistical techniques	X									X		

* Schedule may be revised based on achievement of the General Education Student Learning Outcomes
** Spring 2020 outcome assessment postponed

Revised 2020 Office of Educational Effectiveness Assessment / Academic Affairs

Appendix 3: AITU 2019 Summit White Paper:

Advancing Student Thinking for 21st Century Success

Executive Summary: The inaugural AITU Summit was very successful. Direct outcomes included (1) benchmarking of critical thinking processes and challenges, (2) teaching and assessment strategy across the universities, and (3) development and sharing of best practices. Longer term opportunities included (1) continuation of the summit with topics of interest, (2) increased collaboration, particularly in data and assessment, and (3) elevating our collective communication of the added value of an AITU university.

Introduction:

1. Summit History & Description:
   A dozen AITU institution representatives attended a summit on August 7 & 8, 2019 in Chicago at the Hyatt Regency O Hare. The summit was planned by a team of AITU institutional leaders, including Dr. Jennifer Schneider, Fram Chair (RIT, chair), Joanne Pratt (Olin), Matt Lovell (Rose-Hulman), Dan Shargel (LTU), and Art Heinricher (WPI). The event was held over an evening and a day, and focused on institutional strategy and best practices for teaching and assessment of critical thinking for problem- solving, innovation and leadership.

See Appendix A for Summit Flyer and registrant list.

2. Defining Critical Thinking for AITU
   The attending AITU institutes all shared unique but broadly similar visions of the application of critical thinking. Approximately half of participating institutions directly identify it as a core learning skill, though it may be labelled and defined differently. The other half of AITU institutions integrate within a skill supporting another institutional priority, for example, innovation or problem-solving.

Comparison of approaches:

A representative from each participating university presented a 3-5 minute "lightning talk" focused on critical thinking at their institution. Participants provided an overview of university strategies for managing the teaching and assessment of critical thinking, highlighted a featured element or process that the institution does well, and identified challenges or areas for improvement. Given the broad parameters of the assignment and the variety of presenter roles and vantage points from the fifteen institutions, each presenter focused on slightly different strategies and curricular components. Despite varying perspectives, common themes emerged across most or all AITU institutions. These themes are worth noting if AITU is to work collectively towards a shared vision for critical thinking.

1. Mission Statement: The majority of universities include some aspect of critical thinking in their Mission Statement, with "creativity/creative," "innovation," and "problem solving" or "problem based" as the most prevalent. The words "critical thinking" or "critical thinkers" are not used in any Mission Statement.

2. Lack of Shared Definition: A university level shared definition of critical thinking was rare, and, as a concept, was mentioned as challenge to construct and implement considering the variety of disciplines represented at the participating institutions. In discussions throughout the summit, many stated that the notion of a critical thinking definition as unique to each discipline was a commonly held belief.

3. Signature Curriculum and Student Experiences: Experiential learning (e.g., Co-op, internship) was often a signature component of the curriculum but was approached and fulfilled differently. Most institutions required some degree of problem-based or project-based learning, often in the form of First Year Experience or Capstone Project.

4. Assessment Strategies: Perhaps the greatest variation was found in the strategies used to assess critical thinking. All institutions reported a concerted effort the measure the critical thinking skills of their students, however, approaches varied greatly as did the level of the assessment approach (e.g. department level vs. university). University level assessment was challenging for many reasons, but central to this challenge was a lack of a shared and agreed upon definition of critical thinking.

5. Challenges: A variety of challenges were presented throughout the summit, however, critical thinking across the disciplines and faculty engagement in the assessment of critical thinking were the most commonly shared challenges.

See Appendix B for comparison table.

Focus area workshops:

Two workshops were run concurrently with approximately half of the attendees participating in each. These workshops entitled "Advancing Critical Thinking" and "Best Practices for the Teaching and Learning for the 21st Century Skill of Critical Thinking" focused on developing tools for institutional assessment and classroom pedagogies for Critical Thinking.

1. Institutional Strategy Workshop
   In the Advancing Critical Thinking workshop, participants worked to develop strategies for institutionalizing the assessment of critical thinking skills. The goal of the session was, ultimately, to develop an action plan specific to each participant's Institution to advance the assessment of student critical thinking skills. This session supported an environment where assessment leaders could share best practices, use the expertise in the room to sharpen ideas, and help one another avoid pitfalls.

   The team focused on the development of seven areas of a holistic assessment plan: (1) Shared (Institute specific) Critical Thinking Definition, (2) CT Student Learning Outcomes, (3) CT Assessment Tools/Rubrics, (4) Faculty Training, (5) Curricular and Co-Curricular Mapping, (6) Alignment with Institute Processes, and (7) Sharing of Best Practices. Each participant was able to

identify Institute strengths and share best practices. Each participant also identified areas to take the next step in advancing CT assessment on their respective campuses.

2. Pedagogy Workshop:
   In the pedagogy for Critical Thinking workshop, participants initially worked in small groups to create a visual product that captured characteristics, skills, examples and definitions of Critical Thinking. These were shared and discussed with the entire group to acknowledge the diverse ideas and interpretations around Critical Thinking. Before proceeding to exchange ideas on how we develop and assess Critical Thinking in the classroom setting, participants filled out worksheets that helped them to identify the activities and deliverables that support the development of Critical Thinking in their courses. They also identified which of those activities they use to assess student performance in their class. Several ideas for developing Critical Thinking were shared and expanded within the group. For example, one participant shared that in a class on Failure Analysis students read reviews of products on vendor websites and make an abstraction of the underlying reason for the poor reviews of particular products. In a Product Design course, Critical Thinking is developed through creating and marketing a product, which requires informed decision making throughout the process. To leverage students' intrinsic motivation to become better critical thinkers, one participant utilizes the Pink Time (https://www.pinktime.org/) approach, where classes are cancelled for a short period of time (a week or two), and students determine how they want to develop their Critical Thinking skills then do the activities that support this development and report back to their classmates. Other activities that were discussed help students develop media literacy, identify confirmation biases, defend different viewpoints of an issue and develop prototypes. Participants in this workshop took away several diverse ideas for incorporating more Critical Thinking into their courses.

Emerging themes of the work

Our discussions revealed seven themes that emerged:

Theme #1: There is no uniform definition of critical thinking. This term seems to mean different things to different stakeholders (i.e., people/universities) with a broad range of definitions. Within this broad range of definitions exists different Bloom's verbs or levels of critical thinking as well as a spectrum of thinking between critical thinking, in theory, and critical thinking in practice.

Theme #2: All universities have codified critical thinking in some way (e.g., PO, LO, mission statement, etc.) and believe they are teaching it and assessing it. Not a single participant felt this construct was unimportant and should not be a focal area. While all participants believed they were teaching and assessing critical thinking, the lack of uniformity in methodology made the participants wonder how effective each effort actually was and whether assessment efforts were productive and illustrative.

Theme #3: Critical thinking is not embedded at a specific level within the organizations, and could be manifested at the university, program, department, and course level. This then impacts and influences its integration (e.g., at the course level an engineering capstone may view critical thinking differently

than a humanities course). The inconsistent placement of critical thinking makes assessment across curricula a challenge.

Theme #4: Critical thinking appears to be hard to isolate as an independent construct and seems to need to be attached to some other concept (critical thinking as it relates to _____fill in the blank). How each university attempts to isolate and assess critical thinking as a construct varies widely. The lack of independence in the construct makes independent assessment a real challenge, yet attendees agreed that critical thinking is a core skill needed for success across any discipline or general education curricula.

Theme #5: Faculty are charged with implementing critical thinking. It seemed loosely agreed to that faculty may not all have the same degree of understanding as to how critical thinking integrates with the curriculum, how to assess it, and/or some faculty may not recognize or teach critical thinking as an independent construct. This seems to suggest the need for a more action-oriented critical thinking teaching frameworks that faculty can implement within their classroom.

Theme #6: Applied Critical Thinking dovetails very well with other current initiatives that AITU institutions are engaged in, particularly KEEN networks. Critical thinking also supports our collective efforts to prepare students for our evolving world, where employment environments are constantly evolving. Continue to share the google folder with participants to act as a repository.

Theme #7: Collaboration like this is a powerful opportunity as each university works to increase our impact. By sharing best practices and strategies in critical thinking we have already improved our capacities and created relationships for future needs. This is particularly important as we look to become more effective, yet efficient in our operations and our teaching. Sharing of expertise, best practices and data and assessment capacity leverages our collective strengths.

Recommendations:

Our recommendations for provost and leadership consideration are to:

1. Continue to build upon the gains and relationships begun at the summit around critical thinking

2. Support annual short summits around a topic of interest to the universities to increase capacity and collaboration

3. Develop a network to share assessment, data, and expertise for particular projects

4. Leverage partner university experience to inform our collective success strategies as we encounter similar challenges and opportunities

5. Use our collective voice to communicate how we add value to the greater community

AITU ASSOCIATION OF INDEPENDENT TECHNOLOGICAL UNIVERSITIES

Advancing Student Thinking for 21st Century Success

August 7 & 8, 2019 at the Hyatt Regency O' Hare, Chicago

As institutions known for design and innovation, AITU universities are particularly equipped to transform the approaches used to prepare students to critically think to solve complex problems, innovate and lead. This invitation- only summit is a call to use our collective capabilities to move the needle within individual institutions and for the AITU, in general. Participants will launch a 'scope, design, develop,' process to innovate our methodologies for imbuing 21st century critical thinking skills by benchmarking related outcomes and assessment practices, creating action plans to enhance our impact, and framing a strategy to communicate the value of our contributions to the teaching and learning of critical thinking in the future.

Summit Goals:

- Scope the 21st century critical thinking skillset for graduates of AITU schools
- Create individual institutional action plans to expand or enhance structures to develop student critical thinking for problem-solving, innovation and leadership.
- Determine next steps for sustaining and expanding this community of practice
- Frame a strategy to broadly communicate the value of these AITU university efforts

Attendees: Targeting at least one to two implementation leaders from each AITU institution, representing faculty, academic affairs or assessment offices.

Summit participants will represent their universities in the:

- Sharing of best practices for the teaching, learning and assessment for related student learning outcomes in problem-solving, innovation and leadership
- Designing of action plans for individual institutional improvement
- Writing of a communication to inform the broader AITU community
- Drafting of an AITU strategy to create value for consideration by each institution

Agenda:

Day 1 Evening (all): (2 hours)

Welcome with evening reception and dinner

- Facilitated discussion to frame the problem of 'Building student thinking for 21st century success'
- Lightening presentations on each institution's related approach (10 mins each) and discussion

Day 2:

Continental Breakfast (all)

Concurrent Morning sessions (2.5 hours, pick one):

- Assessment strategies for critical thinking applied to problem-solving, innovation and leadership
- Best practices for the teaching and learning for the 21st century skill of critical thinking

Light Lunch (all)

Whole group discussions with facilitation (each 45 mins):

- Strategy for continued collaboration as a consortium
- Creating and communicating the value of our efforts and accomplishments

Adjourn 3 pm

AITU Registration List

Name	University	Title	Email
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Appendix 3B: AITU Critical Thinking Summary

Institution	Mission includes Critical Thinking (CT)?	Institutional Outcomes Includes CT?	Shared Definition of CT?	Signature CT Curriculum:	Signature CT Student Experiences:	Key CT Assessment Strategies:	CT Challenges:
Carnegie Mellon	• Problem solving	woven in but not explicitly labeled as CT	No	Critical thinking embedded throughout the curriculum, with discipline-based CT highlighted in the majors	Intro course in Philosophy; Online tool for argument diagramming used across courses	contextualized assignments assessed via rubric	• Cross disciplinary applicability • Creating robust engagement
Case Western Reserve University	• Creative • Inquiry • Learning that is active, creative and continuous.	Yes	Yes: https://sages.case.edu/2015/01/20/learning-outcomes/ *"... Critical thinkers are able to look at ideas and decisions from multiple perspectives, and consider open-mindedly the assumptions, implications, and practical consequences of alternative systems of thought. .."*	SAGES Student Learning Outcomes, Seminars, Senior Capstone	FY Engineering (Six two week modules, students formulate and test hypotheses, students reflect on assumptions)	SAGES writing portfolio consisting of essays and reflection reviewed annually	• Communication skills • Faculty engagement • Wide variation in courses by department
Embry-Riddle Aeronautical University	• Innovation • Problem-based discovery	Yes	*Yes: Students will synthesize and apply knowledge in order to define and solve problems within*	Critical Thinking Across the Curriculum	Students have a Capstone in many programs that assess CT.	Critical thinking LO's are evaluated via embedded LMS academic assessment (rubric)	• Assessment across teaching modalities • Shared pedagogy on

				professional and personal environments.			embedding CT activities
Illinois Institute of Technology	• Creation • Innovation	Not Directly	No	IPRO (Inter-professional Projects Program) Multi-disciplinary studies committee	Practicum, internships, multi and interdisciplinary instruction and instructor supervised research / projects	Professional development courses; curriculum has specific courses in design school and optional gen ed	Link to problem solving and creation capacities.
Lawrence Technological University	• Innovative and agile leaders • Theory and practice	Yes, formally assessed within the general education core curriculum.	No	Entrepreneurially-minded learning embedded throughout the engineering curriculum (IDEAS: Interdisciplinary Design & Entrepreneurial Application Sequence Project-based design experience FY-SR Capstone) KEEN framework (namely, the 3 C's - Curiosity, Connections, and Creating Value) details many shared attributes with those describing desirable critical thinking skills.	Sophomore Engineering Design Studio - Critical thinking through innovation in an Interdisciplinary, team-based, sophomore-level engineering design course where students engage with real customers, identify an opportunity for design themselves within a design theme, and develop and build a working prototype that creates value for the customer.	Longitudinal mixed methods assessment study in progress to determine efficacy of program in instilling entrepreneurial mindset in engineering undergraduates utilizing surveys, student interviews, and case study-based direct assessment instrument.	Can we teach and assess mindset? Or can we simply provide students the opportunities that allow for ambiguous, real-world, problem solving that reinforce habits of thought?
Milwaukee School of Engineering	Innovation (value)	Yes	No	MSOE Mindset emphasizes CT	Create Institute	Common learning outcome and program embedded assessment.	• Heavy teaching loads • Faculty onboarding

NYU Tandon School of Engineering	Innovation	Not called out as such, but included	No	First Year General Engineering. Vertically Integrated Projects (VIP). Cornerstone to Capstone	Professional Skills Workshops. Global Leaders Honors Program. VIP. Capstone.	Measured outcomes in VIP, Capstone	Clear Definition and Assessment
Olin College of Engineering	• Creative	Yes	*Students engage in analyzing, evaluating, synthesizing, and applying diverse information and experiences to support decision-making, attitude formation, action, and expression.*	Critical Thinking embedded throughout the curriculum	Projects in courses from first semester first year through senior Capstone	Course-level assessment	• Institutional assessment • Merging curricular and co-curricular
RIT	• Creativity • Innovation • Curiosity	Yes	*Effective thinking in any context, (supported by Gen Ed & Program efforts): Critical Thinking refers to those processes required to understand and evaluate complex claims of various sorts.*	Embedded in and mapped to programs and general education	Co-op/experiential learning, Capstone for most majors	Course-level assessment of general education	Cross disciplinary shared definition
Rose Hulman Institute of Technology	Solving problems	Yes	Critical Thinkers-develop evidence-based conclusions	Students develop and demonstrate CT in their general education requirements and in their capstone experiences of	Capstone experiences	CASO RosEvaluation	Assessment

			through a process of informed evaluation and judgement.	their technical discipline areas			
Stevens Institute of Technology	Solution of challenging problems	Not Directly	No	IDEAS: innovation, Design, Entrepreneurship at Stevens	Tech & Entrepreneurship experiences, especially capstone	Project Driven	Not Provided
WPI	Problem and Inquiry projects imbedded from first year to graduation	Yes	Identify, analyze, and solve problems creatively through sustained critical investigation	Projects define graduation requirements Great Problems Seminars	Major Project, Interactive Project	Capstone and other projects	• Faculty Development • Assessment