The Annual Report for RIT Applied Critical Thinking

for

2015-2016

by Dr. Jennifer L. Schneider, CIH
Eugene H. Fram Chair in Applied Critical Thinking

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Executive Summary

The Applied Critical Thinking initiative at RIT began transformational change in 2015-16, beginning with a new chair, Dr. Jennifer Schneider. A significant foundation was created through the creation and implementation of the new strategic action plan, including engagement and pedagogy, assessment and scholarship. Some notable highlights are the Fram Focus newsletter, the Fram Award for Excellence at Imagine, new curricular programing, a new argumentation learning outcome assessment rubric, and multiple critical thinking events. Of particular note, approximately 500 attendees engaged in the various Fram events and learning opportunities over the course of the academic year.

Introduction

This report outlines the annual accomplishments and activities related to the Applied Critical Thinking (ACT) initiative at the Rochester Institute of Technology (RIT). This effort is lead 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 & Safety within the College of Applied Science & Technology at RIT. She specializes in HAZMAT, Risk Based Decision-making and Global Resilience. In 2015-16, Dr. Evelyn Brister was the Fram Faculty Fellow, and worked with Dr. Schneider to support the further development of the Fram Initiative. In addition to her fellow position, Dr. Brister is a philosophy professor and scholar at RIT, specializing in philosophy of science and environmental philosophy.

Purpose

The purpose of this report is to provide a summary of the efforts and accomplishments related to ACT for this year, and to provide recommendations for future efforts and benchmarks for ongoing evaluation of our progress.

History

The Eugene H. Fram Chair in Applied Critical Thinking was funded in 2011 by an anonymous RIT alumnus who donated $3 million to honor Professor Fram. Eugene 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 list of speakers and their topics is noted below in Table 1.

Table 1.

2012-2015 Fram Lectures	
N. Katherine Hayles, Duke University	”The Technogenetic Spiral: Implications and Interventions”
Dr. Richard Arum, New York University	“Critical Thinking, College and Careers: Lessons from a Study of Recent College Graduates”
Dr. Genevieve Bell, Intel, Corp.	“MAKING LIFE: A prehistory of robots & why it still matters today”
Dr. Richard Arum, New York University	“Critical Thinking, College Experiences and Transitions to Adulthood: Lessons from Aspiring Adults Adrift”
Dr. Frank Zenker, Lund University	“Debiasing Techniques, their Reliability and Implications for Critical Thinking Instruction”

2015-16 Management & Structure of the initiative

The growth and longevity of the Fram ACT effort depends upon the engagement of the whole community. Therefore, to support this engagement, the Eugene H. Fram Chair for 2015-18 is Dr. Jennifer Schneider, a professor of risk engineering of the College of Applied Science & Technology. Dr. Evelyn Brister, associate professor of philosophy, was appointed the Fram Fellow for 2015-6. Supporting and advising their efforts is a Fram Advisory Board.

Fram Advisory Board (FAB)

In October 2015, a new Fram advisory Board (FAB) was seated (Table 2). This board has representation from all colleges and student affairs at RIT. The duties of the board members are to:

- Guide ACT efforts at RIT
- Advocate for/be a conduit for ACT within the colleges at RIT

Table 2.

2015-2018 Fram Advisory Board			
Jerry Argetsinger National Technical Institute for the Deaf	gsanla@rit.edu	1849 LBJ Hall	5-6035
Callie Babbitt Golisano Institute of Sustainability	cwggis@rit.edu	2173 Sustainability Hall	5-6277
Heath Boice-Pardee Student Affairs	h.boice@rit.edu	2410 Student Alumni Union	5-2268
Roger Dube College of Science	rrdpci@rit.edu	2104 Carlson	5-5836
Clark Hochgraf College of Applied Science & Technology	cghiee@rit.edu	2136 Engineering Tech. Hall	5-3167
Barbara Lohse College of Health Sciences and Technology	balihst@rit.edu	A622 Slaughter Hall	5-4208
David Long College of Imaging Arts & Sciences	dllppr@rit.edu	2250 Gannett Hall	5-5724
Les Moore Saunders College of Business	lmoore@saunders.rit.edu	1146 Brown Hall	5-6966
Sylvia Perez-Hardy Golisano College of Computing & Information Sciences	sphics@rit.edu	2311 Golisano Hall	5-7941
Collette Shaw Student Affairs	cmsldc@rit.edu	2462 SAU	5-2114
Brian Thorn Kate Gleason College of Engineering	bkteie.rit.edu	1596 J. Gleason Hall	5-6166
Larry Torcello College of Liberal Arts	lgtghs@rit.edu	1303 Liberal Arts Hall	5-2327

The FAB advised the Fram chair and guided the creation of the ACT strategic action plan for ACT. The FAB was also active in supporting the communication and engagement of the colleges and in the Fram events. Dr. Brister created a new course in responsible knowing, presented her scholarly work and represented RIT's efforts at multiple conferences, and led a faculty targeted event, 'The Next Big Thing'. Further description of her scholarly efforts is included in Appendix 1 and in the accomplishments section of the report.

For 2016-17, the advisory board members have agreed to continue. Dr. Argetsinger has retired, but will continue as an emeritus member of the board, and an NTID faculty replacement for Dr. Argetsinger is being selected. Dr. Brister will not continue as the faculty fellow in 2016-17, and we thank her for her service.
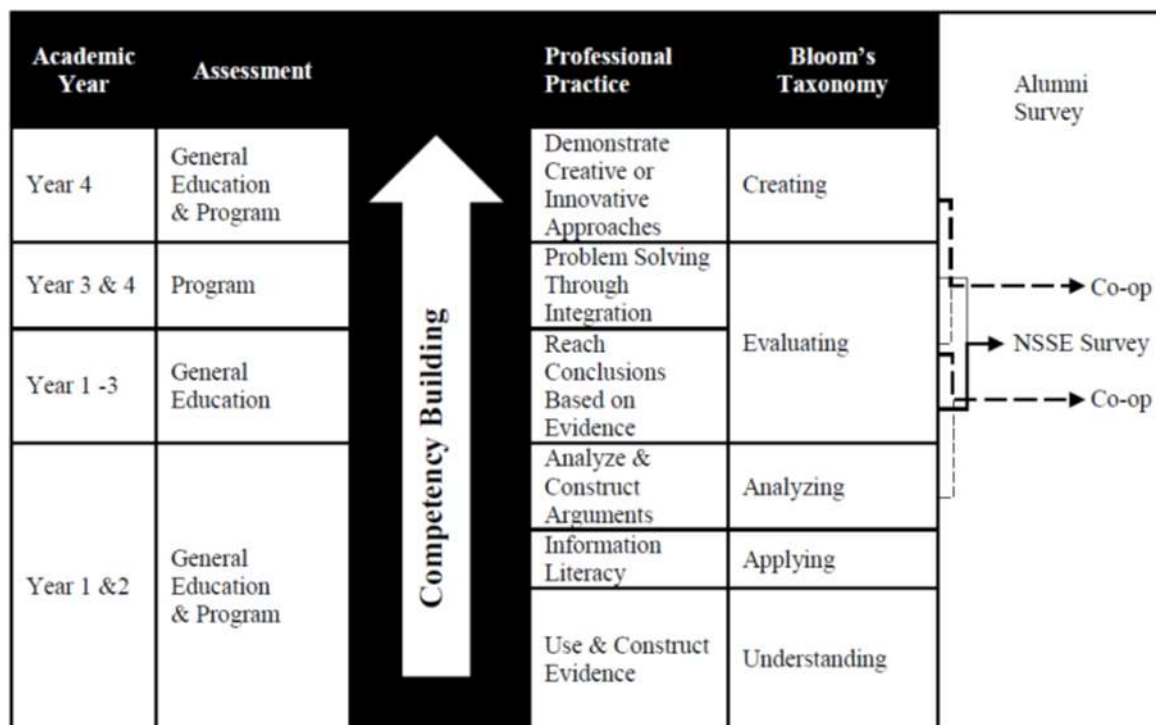
Defining Applied Critical Thinking at RIT

Definitions: Currently, there are at least four definitions at play at RIT. The FAB recommends that establishing a single definition is not useful at this time, rather we should let the definition (s) evolve and possibly coalesce. It is important that we support the **growth of educated thinking** across RIT, which can represented in many ways. Variants of the definitions are included in Appendix 2.

General Education & Program Student Learning Outcomes

The teaching and assessment of applied critical thinking at RIT is managed through a comprehensive general education and program strategy founded on student learning and program goals. The general education and program outcomes are:

Figure 1 – ACT Outcomes Map

Academic Year	Assessment		Professional Practice	Bloom's Taxonomy	Alumni Survey
Year 4	General Education & Program	Competency Building	Demonstrate Creative or Innovative Approaches	Creating	
Year 3 & 4	Program		Problem Solving Through Integration		Co-op
Year 1 -3	General Education		Reach Conclusions Based on Evidence	Evaluating	NSSE Survey / Co-op
Year 1 &2	General Education & Program		Analyze & Construct Arguments	Analyzing	
			Information Literacy	Applying	
			Use & Construct Evidence	Understanding	

Further information on these RIT outcomes can be found in Appendix 3.

Applied Critical Thinking Strategic Action Plan

The major activity for the fall of 2015 was the creation of a strategic action plan to guide overall ACT and Fram efforts. This plan had four major pillars (focus areas) for further development and maturation of ACT at RIT: creating engagement, pedagogy, scholarship and practice. Each of these areas is critical to the implementation of and the recognition of ACT expertise at RIT. The full strategic action plan is included in Appendix 4 of this document.

Highlights of Accomplishments

The full table of accomplishments is in Appendix 4 of this document.

Process:

- Formation of the Fram Advisory board (FAB) of faculty and creation of the Strategic Action Plan: By year end 2015, an implementation oriented strategic action plan was approved by the Fram advisory board to inform RIT's efforts in ACT over the next few years. The FAB meets regularly to evaluate efforts and provide ongoing oversight. Addition of a student feedback and representation is planned for the future.

Creating Engagement:

- Creation of a communication plan and website: By January 2016, a communication plan was underway, and included a functional website. The fully interactive communication plan, including website and social media presence, will be functional summer 2016.

- Fram Focus newsletter, 'Fram It': As a foundational part of communication and engagement, a monthly newsletter and the fun Fram It! problem debuted in December 2015.

- Signature events: The Fram chair hosted several campus wide events over the course of the academic year, which drew in approximately 400 participants. The ACT at RIT effort took center stage with the Signature Lecture events on April 3-5, 2016, hosting Northwestern University's Dr. Luis Amaral. These included:
  - a student leaders dinner,
  - a faculty event focused on building our transformational thinking, 'The Next Big Thing',
  - a student event, 'The Complexity of Climate Change',
  - a graduate student lunch salon,

- the signature lecture, 'A Matter of Life & Death: the complexity of modern medicine'
- dinner for the speaker and Fram advisory board and friends.

In conjunction with the visible events, the post signature lecture reception featured student scholarship from RIT's CHST. In addition, Dr. Amaral met with selected faculty in engineering, imaging science and math to facilitate research and scholarly connections.

- <u>Lecture series and other events:</u> On April 14, 2016, RIT hosted Argonne National Lab researcher, Pam Sydelko, who presented, 'Webs of Deceit: the wicked problem of modern crime', and met with selected faculty in GIS, computer engineering and criminal justice. In addition, the Fram chair co- sponsored a Gray Matter thinking event with student affairs, 'Did Social Media Kill Humanity?, where a diverse group of students, faculty and staff participated in a very wide ranging thought provoking discussion, centered around the loss of thoughtful conversation in our hyper communicative world. These additional events drew approximately 100 participants.

- <u>Creation and awarding of first Fram Award for Excellence in Applied Critical Thinking at Imagine:</u> Both small group and large group awards were given, and full descriptions are included in Appendix 5:

Small Group Award (Exhibit INS-1160): Robotic Eye Motion Simulator Team: Amy Zeller, Joshua Long, Nathan Twichel, Peter Cho, Jordan Blandford

Large Group Award (Exhibit SUS-3260): Your Decisions Make Sustainability Possible!

Team: Jennifer Russell (Coordinator, Golisano Institute for Sustainability) Reema Aldossari, Yi Feng, Shih-Hsuan Huang, Michael Kelly, Nicolas Matthew Miclette, Wilson Sparberg Patton, Wenjing Qi, Kaining Qiu, Elizabeth Stegner , Jiahe Tian, Akanksha Vishwakarma, Hui-Yu Yang, Yue Zhang, Runhao Zhao (Industrial Design Graduate Students)

Faculty, Staff & Community Industry Mentors: Brian Hilton (Golisano Institute for Sustainability), Clyde Hull (Saunders College of Business), Stan Rickel (School of Industrial Design), Bill Davies (President, Davies Office), Doug Pilgrim (National Business Development Manager, Davies Office).

Pedagogy & Practice:

- Hosting & Teaching faculty targeted events: In addition to the signature faculty event, 'All the thinks you'll think' (a Teachers on Teaching presentation) was presented to approximately 15 registrants, recorded, and posted to the web by the ILI.
- Facilitated ACT workshop: Held a two day selected faculty team workshop (June 6&7, 2016) for both the development of the rubric for the Gen Ed student learning outcome for argumentation and the examination of ACT within the programs.
- Initiated the mapping of ACT across the curriculum: Began an assessment of ACT at RIT, at the university level, beginning with cooperative education data. Full analysis by college and program will be completed summer 2016.
- Created and taught new specific ACT courses: Both undergraduate Responsible Knowing and Graduate Salon: Worldmaking were created and piloted. The graduate salon course was part of the provost office interdisciplinary curricula grant process.

Scholarship:
- Creation of scholarship including "Disciplinary capture and epistemological obstacles to interdisciplinary research." (published in *Studies in History and Philosophy of Biological and Biomedical Sciences*), "Disciplinary Capture and Path Dependence: When Interdisciplinarity Goes Bad" (presented to the biannual meeting of the Society for the Philosophy of Science in Practice), both by Dr. Brister, and, "Mapping the development of applied critical thinking in computing, engineering & technology majors" (a paper submitted to *IEEE Frontiers in Education*) by Dr. Schneider with Dr. Wahl and Dr. Long. Several other scholarly efforts are in process.

Integration with RIT's Strategic Action Plan, 'Greatness through Difference'
RIT is in the process of operationalizing a new university strategic plan, and the ACT at RIT initiative is explicitly highlighted in this plan. The importance of ACT in RIT's long term strategy is evident. Development of leaders and entrepreneurs requires fostering of complex visionary thinking that is grounded in ACT skills. ACT supports the integration of domains and views to create the novel possibilities and solutions. RIT will leverage and enhance the experience of our alumni and its growing abilities in ACT development to serve not only our RIT family, but our world.

Difference maker I.1: RIT will build upon its strong academic portfolio, extensive experiential learning and co-curricular offerings, and the rich diversity of its people and programs to develop "T-shaped" graduates possessing both disciplinary depth (the vertical axis of the "T") and breadth across multiple skills and competencies (the horizontal axis, or "transversal" skills).

Objective I.1.1

Introduce a comprehensive co-curricular transcript that will reflect to employers students' competencies in such necessary skills as *critical thinking*, written and oral communication, leadership, visual interpretation, collaboration, and research.

Objective I.1.2

Develop a national reputation for applied critical thinking and ensure that it is deeply interwoven in every program and in general education.

Building of a national reputation relies upon a university commitment coupled with a notable external contribution to the development of applied critical thinking. Achievement of these objectives will require a complete understanding of how RIT shapes critical thinking capability in its students, and evidence of exceptional outcomes. To ensure success, the university must (1) perform an assessment and create a GAP analysis, (2) determine best practices and opportunities, (3) integrate high quality ACT across general education and program experiences, and (4) demonstrate results that are recognized internally and externally. With the implementation of the new Strategic Action Plan beginning December 2015, each of the crucial four interrelated components are underway, and the foundation is building built that can create the national presence for RIT. In particular, we are gaining an understanding of our own actions, processes and outcomes, and we have made strides in creating an environment of engaged excellence, setting the stage for our goals to be realized.

In addition to those explicit mentions of critical thinking, ACT is also a key skill to success in many other facets of the RIT strategic plan, and our efforts also contribute directly to:

Difference maker I.2: RIT will offer opportunities for study at the intersections of technology and the arts, imagination and application, and rigor and curiosity—all designed to meet the demands of future careers in the complex global economy.

Difference maker I.6: Through a blend of curricular, co-curricular, and experiential offerings, RIT will build a leadership program that will equip more graduates to become leaders in their fields.

Difference maker I.8: RIT will be a center of innovation, creativity, and entrepreneurship that serves as an important economic engine for Rochester, the region, and the nation.

Difference maker I.9: RIT will establish a campus-wide culture that embraces alumni, contributes to their lifelong learning, and relies upon them for counsel and support.

ACT Forecast and Recommendations

Applied Critical Thinking has begun to gain footing at RIT, and a significant foundation has been created to support its growth. The FAB has been key to the success of the effort. Much of the activity this year has focused upon engaging the campus in the work, raising the reputation and footprint of ACT both internally and externally, and initiating the constructs for ongoing success. However, in order to truly mature ACT at RIT, much remains to be done.

The Fram Chair is ultimately responsible for the leadership of the ACT initiative by creating engagement with the whole community, increasing faculty, staff and especially student capacity to do ACT through education and the student experience, and to contribute to our world through scholarship and critical thinking output. The goals for 2016-7 are focused on operationalizing the Fram/ ACT effort, supporting its integration within RIT systems and culture, and the growth and dissemination of ACT at RIT beyond the RIT community. In particular, the specific major recommendations for the leadership of ACT at RIT in 2016-7 are listed below:

Process
- *Initiate and codify in policy or practice an annual review* of ACT at RIT, to inform the ongoing update and forwarding of the strategic action plan
- *Guide standardized processes* for Fram/ ACT activities as appropriate through the creation of SOPs and documentation of Fram/ ACT related procedures

Engagement
- *Lead the continued the implementation of the engagement and communication plan*, especially through the appropriate rollout and upkeep of a fully functional Fram/ACT site and presence on social media with a recognizable look

- *Grow and support the ACT at RIT reputation* including the hosting of lectures and other events
- *Recognize and celebrate* excellence (e.g. Fram award) in ACT at RIT

Pedagogy & Practice

- *Lead the process and assessment* of critical thinking at RIT, including the ongoing creation and collection of rubrics, toolkits and best practices
- *Facilitate and participate in the implementation and improvemen*t of ACT through the establishment of a community of practice for ACT, and the continued creation and implementation of ACT focused curricula and pedagogy
- *Facilitate the integration and cross pollination* of ACT into corollary efforts at RIT

Scholarship

- *Grow and support the scholarly reputation* of ACT at RIT reputation through excellence in artifacts; seeking external funding opportunities, contributing to external events and conferences; Participate in cross campus efforts to grow a national presence in the teaching of the core skills of ACT, persuasive communications and ethics

Conclusion

The Applied Critical Thinking initiative at RIT has gained a solid footing over the past year and is now positioned to become an integrative and yet forward-thinking presence at RIT and beyond. We must foster critical thinking to have effective and engaged citizens, to face the challenges of our evolving world, and create a compelling future.

Appendix 1 – Fram Faculty Fellow Report

Evelyn Brister, Fram Faculty Fellow 2015-16

This year I've developed critical thinking research related to critical thinking pedagogy, to applying theories of knowledge, and to problems plaguing policy-relevant collaborative research. My pedagogical research in critical thinking involves generating a framework that assists teachers in identifying key critical thinking concepts and problems in their curriculum. Traditionally, critical thinking has been limited to the logical structure of argument and to fallacious violations of logical thinking. While logical reasoning is important, critical thinking in the professions also requires identifying cognitive bias, areas of ignorance, the role of prediction and uncertainty, and anticipated ethical issues. Together with Elizabeth Hane and Scott Franklin, I applied this framework in a science course to test how we could improve student learning by teaching them to pay explicit attention to the ways that evaluations of evidence can be biased.

The pedagogical projects have resulted in early-stage plans for a conference panel on integrating critical thinking across the curriculum at a subsequent American Philosophical Association conference. Elizabeth Hane and I are preparing an article manuscript titled "Critical Thinking and Metacognitive Techniques for Evaluation of Scientific Argument." Finally, I have prepared a framework for identifying critical thinking concepts in diverse teaching contexts. Future research will involve testing the framework collaboratively with teachers in diverse fields.

I have also conducted research on how theories of knowledge can be applied to difficult problems in knowledge production. One of these projects involves making a high-level theory of knowledge justification (called "epistemic contextualism") relevant to problems in the justification and dissemination of scientific knowledge. In particular, the research addresses the relationships among skepticism, relativism, and denialism and examines when skepticism is justified, when it is not, and why. I presented this analysis at the Pacific Division meeting of the American Philosophical Association, and it is forthcoming as a chapter in *The Routledge Handbook on Epistemic Contextualism*.

I have been continuing research on interdisciplinary collaboration that was first published this spring in an article in *Studies in History and Philosophy of Biological and Biomedical Sciences*. That article is titled "Disciplinary capture and epistemological obstacles to interdisciplinary research." Disciplinary capture is an explanation of why interfield collaborative research projects often fail to produce research that is truly collaborative. It commonly becomes locked in within the methods and conceptions of one field or another, despite apparent willingness to integrate fields. Since interdisciplinary research is often policy relevant and serves the public interest, it is important to identify how and why collaborations break down. I delivered a presentation titled "Disciplinary Capture and Path Dependence: When Interdisciplinarity Goes Bad" at the biennial meeting of the Society for the Philosophy of Science in Practice. In the presentation I use concepts from political economy to identify a mechanism for the breakdown of knowledge integration. This research project demonstrates the importance of thinking critically about how research problems are framed from the earliest outset of the research process and demonstrates the importance of critical thinking not just for college students but also for researchers and policy-makers.

Appendix 2 – Definitions

There are currently at least 4 definitions of ACT at RIT. After consideration, the advisory board decided that there was not a need to select just one definition for all applications, and supported the notion that various views was not only appropriate but reflective of the wide impact of critical thinking:

1. **The RIT program essential outcome definition and a general education set of student learning outcomes definitions** (See Appendix 3)**,**

Critical Thinking Across the Curriculum Report (2014):

2. **'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)

Rochester Engineering Magazine article (October 2015):

3. **'RIT believed critical thinking to be so important that it established the Eugene H. Fram Chair in Applied Critical Thinking (ACT), to lead a university-wide initiative to build that competency through curricula, scholarship and the student experience. Critical thinking is accomplished by analysis of information to assess veracity and relationships; use of hypothesis and experimental results; application of multidisciplinary methods to support evaluation and possible creation of new ideas, products or views. Critical thinking also seeks to resolve weaknesses in thinking such as insufficient inquiry, ambiguity, unexamined assumptions, biases, and subjectivity.'** (J. Schneider, 2015)

Description of Fram Award for Excellence in Applied Critical Thinking at Imagine (2016):

4. **'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 domains to more fully inform our evaluation and resultant strategies.'** (RIT website)

Appendix 3 – Learning Outcomes

RIT Essential Outcomes | Critical Thinking

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 Essential Outcome Definition)

Data Sources	Academic Programs	Co-op Employer Evaluation 2013-14	NSSE 2013	Alumni Survey 2014
Measure and Results	100% of programs identified at least one program goal/slo Other: TBD	**Critical Thinking:** *Effectively solves problems by integrating a diverse body of knowledge and skills.* (n=3134) 4.1 out of 5.0 **Met** **Information Literacy:** *Accesses and synthesizes information from appropriate sources* (n=1461) 4.2 out of 5.0 **Met**	NSSE 4b *Applying facts, theories, or methods to practical problems or new solutions* Senior **Approaching** RIT 3.1, Carnegie Peer 3.2 NSSE 4c. *Analyzing an idea, experience, or line of reasoning in depth by examining its parts* Senior **Approaching** RIT 3.0, Carnegie Peer 3.1 NSSE 4d: *Evaluating a point of view, decision, or information source* Senior **Not Met** RIT 2.7, Carnegie Peer 3.0 NSSE 4e. *Forming a new idea of understanding from various pieces of information* Senior **Approaching** RIT 2.9, Carnegie Peer 3.0	**Critical Thinking** (n=~1350) Importance: 94% RIT Effective: 86% Gap Score: 8% **Problem Solving** (n=~1340) Importance: 97% RIT Effective: 90% Gap Score: 7 % Note: check to see if % are at top end of scale – see below
University Level Benchmark	100% of programs will identify at least one program goal/slo 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 Carnegie Peers (n= 1500)	Needs to be determined Importance Scale: Not at All to Very Important Effective Scale: Not at all – A Great Deal
Preliminary Action Items	Develop faculty team to determine criteria, core assignment(s) and set benchmark	Review/analysis co-op student evaluation responses to qualitative questions re: CT	Review NSSE 2015 data for trends	Determine benchmark

RIT Student Learning Outcomes Assessment Office 2015

Appendix 3 (continued)

General Education Student Learning Outcomes
Assessment Schedule 2016-2022

Framework	General Education Student Learning Outcome	2016.17 Assessment		2017.18 Assessment		2018.19 Assessment		2019.2020 Assessment		2020.21 Assessment		2021.22 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						X		
	Analyze or construct arguments considering their premises, assumptions, contexts, and conclusions, and anticipating counterarguments	X						X					
	Reach sound conclusions based on logical analysis of evidence					X						X	
	Demonstrate creative or innovative approaches to assignments or projects						X						X
Social	Analyze similarities and differences in human experiences and consequent perspectives					X						X	
Global	Examine connections among the world's populations						X						X
Ethical	Identify contemporary ethical questions and relevant positions	X						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			
Artistic	Interpret and evaluate artistic expression considering the cultural context in which it was created	X						X					

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Appendix 4 – 2015-16 Strategic Action Plan & Accomplishments

Applied Critical Thinking at RIT

RIT will support and grow applied critical thinking by:

- engaging with the whole community,
- growing faculty, staff and especially student capacity to do ACT,
- contributing to our world through our responsible thinking and quality scholarship;

History: The Applied Critical Thinking initiative began in 2012 with the establishment of the Eugene H. Fram Chair in Applied Critical Thinking (ACT). Much effort went into the laying of the foundation for the ACT at RIT, including establishment of the annual Fram Lecture series, the creation of an advisory board, exploration of the essence of critical thinking and why it seems to be lacking in today's young people, evaluation of the opportunity for RIT within Critical Thinking, and the writing of the Critical Thinking Across the Curriculum, 'CTAC' (Jan 2014). This action plan moves forward from that foundation toward an active implementation plan.

Structure of the initiative: The growth and longevity of the Applied Critical Thinking effort depends upon the engagement of the whole community. Therefore, to support this engagement, the Eugene H. Fram Chair for 2015-18 is Dr. Jennifer Schneider, a professor of risk engineering of the College of Applied Science & Technology. Dr. Evelyn Brister, associate professor of philosophy, has been appointed the Fram Faculty Fellow. Supporting and advising their efforts is a Fram Advisory Board.

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- Guide Applied Critical Thinking efforts at RIT, including creation and stewardship of this strategic action plan.
- Advocate for/be a conduit for Applied Critical Thinking within the colleges at RIT.

2015-2016 Fram Advisory Board	
Jerry Argetsinger, National Technical Institute for the Deaf	gsanla@rit.edu
Callie Babbitt, Golisano Institute for Sustainability	cwbgis@rit.edu
Heath Boice-Pardee, Student Affairs	h.boice@rit.edu
Roger Dube, College of Science	rrdpci@rit.edu
Clark Hochgraf, College of Applied Science & Technology	cghiee@rit.edu
Barbara Lohse, College of Health Sciences and Technology	balihst@rit.edu
David Long, College of Imaging Arts & Sciences	dllppr@rit.edu
Les Moore, Saunders College of Business	lmoore@saunders.rit.edu
Sylvia Perez-Hardy, Golisano College of Computing & Information Sciences	sphics@rit.edu
Collette Shaw, Student Affairs	cmsldc@rit.edu
Lawrence Torcello, College of Liberal Arts	lgtghs@rit.edu
Brian Thorn, Kate Gleason College of Engineering	bkteie.rit.edu

Definitions of Applied Critical Thinking: Currently, there are at least four definitions at play at RIT. The Fram Advisory Board recommends that establishing a single definition is not useful at this time, rather we should let the definition (s) evolve and possibly coalesce over some time. Due to our diverse domains, Applied Critical Thinking can be represented in many ways.

Theme(s): Applied Critical Thinking is a wide and deep construct. Therefore, it is useful to select a series of themes to guide our programming over the next few years. During the 2015-2018 cycle we will focus our efforts around the themes of *"Diversity & Complexity of Thought" (2015-16),"Uncertainty" (2016-17) and "Creativity" (2017-18).* While each theme has been assigned a specific year, we will not be bounded by that year, but instead see this as an interrelated arc of knowing from which to draw.

Creating Engagement: Creating engagement and alignment with this initiative is a crucial step toward building capacity and reputation in ACT, and supporting the implementation of the strategic action plan. This will be an ongoing process, however, planning and communication are priorities.

2015-16

Engagement: Perhaps the most important area of effort, with much success; signature events and follow up event totaled over 450 attendees; traffic on twitter, stronger registration, student events and dinner added; Faculty event added that was well received; worked very hard to turn into a positive initiative; Working to complete short intro video (done by students in spring) surrounding ACT at RIT, edited version due in fall with new logo, and fully functional website and social media presence;

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)	Status
Create Fram Strategic Action plan	Revise based upon input	Completion of Fram plan Prep budget request;	J. Schneider, FAB (by Jan 16) possible campus wide publication/presentation?	Complete, and budget request submitted; no budget increase;
Continue Fram lecture series	Determine annual theme and select, schedule & host event	Fram Lecture	J. Schneider, FAB (Spring 16)	Complete, with much larger impact; multiple events for signature, and follow up lecture;
Create student engagement (in conjunction with communication plan)	Plan & execute activities & opportunities to increase student engagement	Track engagement profile	J. Schneider, A. Brodie (ongoing)	Greatly increased, student attendance markedly increased over prior years (no benchmark data to compare);
Develop communication plan including brand, recognition and presence, especially student centered;	Create a communication plan to get the 'message' across to various stakeholders and audiences Especially: "Fram It", logo, social media;	Recommendations & initial implementation	J. Schneider, E. Brister & FAB (Jan 2016)	Initial implementation complete; full website and plan held up due to provost redesign; to be fully complete summer 2016; Newsletter- Fram Focus, begun Dec 2015, pushed monthly with Fram It! problem /puzzle as part of it;

2016-

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)
Implementation of ongoing engagement & communication plan	Continually refine messaging and communication	Measures of the engagement of community	J. Schneider, E. Brister & FAB (ongoing)

In order to reach toward our goals for this initiative, RIT must support and grow three interrelated pillars of excellence. Each of these pillars is vital to our long-term success in Applied Critical Thinking, both internally with our students and externally, by building uniquely skilled alumni and reputation.   This plan outlines our efforts to drive RIT's contribution and recognition in the domain of Applied Critical Thinking. While each is presented separately, it is recognized that the work is interrelated.

Pillar 1

Pedagogy: Teaching & Learning

Effort in ACT must be led by the faculty and staff at RIT. Therefore, we must support efforts to develop this capacity in our faculty and select related staff (eg. student services) to teach this complex skill to our students. It is our goal that all UG will satisfy RIT's applied critical thinking student learning outcomes through *integration of outcomes* within each program of study and a suite of outcomes within general education framework; Elements of this effort include the assessment of the state of teaching and learning of applied critical thinking at RIT (See Appendix A), the development and delivery of pedagogy and increasing faculty capacity to teach applied critical thinking. It is imperative that we begin by establishing a *community of practice* through which faculty can exchange information and learn about applied critical thinking. The measureable outputs will be opportunities and events for building faculty and select staff capacity. This can also be a mechanism to create engagement with the entire effort and share best practices, celebrate exemplars, and support further creation and delivery of pedagogy.

2015-16:

Pedagogy:

In addition to the planned actions below, the following are additions: 1.Graduate Salon: Worldmaking was also created and offered for a dozen select graduate students in spring 2016. This course was truly an exploration of interdisciplinary thinking; 2. Co- lead a faculty team 2 day workshop to create the general education rubric for the argumentation SLO and examine ACT within academic programs;

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)	Status
Collect, Collate, Assess where CT is taught at RIT	Work with assessment office	Produce report	J. Schneider (May 16)	Initial assessment complete April 16, full assessment held up due to updates to taskstream; tb done summer 2016
Evaluate implementation of campus wide assessment model	Benchmark best practices and determine path forward	Draft results for consideration by provosts, assessment office, academic senate	J. Schneider (Dec 16) (Note: longer than first year as other results inform this)	On track
Develop & Implement: Create & run CT GE course	Work with COLA to ensure scheduled	Successful course	E. Brister (May 16)	complete
Develop modules/curricula to insert in other courses	Create curricula	Plan piloting of curricula within other courses	E. Brister (May 16)	No piloting
Support faculty CT capacity development *through a community of practice*	Evaluate and offer (workshops, etc.) for faculty to learn and increase CT capacity	Offer opportunities for faculty to increase capability in CT pedagogy	J. Schneider & E. Brister (May 16)	Initiated, with materials; further events planned fall 16 (full implementation needs website toolkit)
Assess efficacy of GE immersion & internal certificate in CT (was Sheffield, CTAC goal 2);	Benchmark best practices & evaluate RIT path forward	Report & draft plan	J. Schneider & ICC/ GE committee, FAB (May 16)	Assessed, first course (responsible knowing) initiated, immersion is an opportunity; creation of full certification dependent on initial enrollment numbers;

2016-

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)
Evaluate the implementation of internal grants for creation & delivery of ACT related pedagogy	Assess need & opportunity, benchmark similar programs at RIT.	Report and possible draft plan, determine funding level required, create budget request.	J. Schneider (Dec. 2016)
Ongoing Assessment of ACT	Work with assessment office and FAB to gather best practices	Produce report, recognize and publicize best practices (ongoing faculty lectures?)	J. Schneider (annually, beginning 2016-17)
Update assessment process	Use process to support & inform ongoing efforts	Set up system to support ongoing assessment	J. Schneider (ongoing)
Run ACT GE course(s)	Work with COLA to ensure scheduled	Successful course(s)	E. Brister (May 2017)
Integrate modules/curricula to insert in other courses	Engage other professors and courses	Piloting of curricula within other courses	E. Brister (May 2017)
Support faculty & staff ACT capacity development	Evaluate and offer (workshops, etc.) for faculty to learn and increase ACT capacity	Offer opportunities for faculty to increase capability in ACT pedagogy	J. Schneider & E. Brister (annual)
Encourage new & cross disciplinary ACT teaching	Determine best practice methods of encouraging new & co-curricular programming	Report, determine process & actions.	J. Schneider & E. Brister (2016-2017)
Explore creating of active ACT experiences student engagement	Create opportunities for active participation in ACT that spans domains.	Assess opportunities for student engagement, determine process & actions	FAB, J. Schneider & E. Brister (Spring 2017)

Pillar 2

Scholarship: Scholarship is a crucial part of our long- term contribution to applied critical thinking external to RIT. It also builds our external recognition and reputation for our efforts. Early feedback on our efforts highlighted RIT's noted strength in a wide spectrum of education and research. By leveraging that diverse capacity, we can contribute much to the ongoing discussion in applied critical thinking. Further, our history as an experientially focused institution gives us a deep foundation in the application of applied critical thinking to today's challenges.

2015-16

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)	Status
Ensure RIT presence at well-known CT conferences/ journals	Author/present within venue (E. Brister) Attend & outreach (J. Schneider)	Measureable scholarly outcome(s)	J. Schneider & E. Brister (Spring 16)	Two philosophy conference presentations & paper (Brister & Hane), FIE paper (Schneider, Wahl, Long); included ACT in Rochester Engineering Society article;
Seek funding sources (eg grants, foundations, or development) to support ongoing efforts and conference	Seek funding	Determination of possible funding sources, possible grant application	J. Schneider & E. Brister (Spring 16)	2 external grant applications: ACT part of NSF SFS proposal and NIST curricular proposal; Possible other NSF funding sources determined, and working on foundations (summer 2016);
Evaluate the opportunity to engage RIT pedagogy scholars in the effort	Determine interest in developing ACT pedagogical scholarship	Active outreach & possible measureable outcomes	J. Schneider & E. Brister (Spring 16)	Continuing to leverage work on metacognition (Franklin and Hane); this is part of larger pedagogical initiatives, NOT separate initiative.

2016-

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)
Ensure RIT presence at well-known ACT Conferences/Journals	Author/present within venue (E. Brister) Attend & outreach (J. Schneider)	Measureable scholarly outcome(s)	E. Brister & J. Schneider (Spring 2017)
Plan & Execute ACT conference (dependent on funding level)	Conduct a 1 day conference in conjunction with Fram speaker event	Successful event	J. Schneider, FAB (Spring 2017)
Evaluate & support the development of further RIT scholarship in ACT domain	Seek out opportunities to build the RIT scholarly brand in ACT; seed grants?	Scholarly outcomes and recognition	J. Schneider, E. Brister & RIT scholars (ongoing)

Pillar 3

Practice: Practice is the outcome of the entirety of the efforts. It is evidenced by an RIT community that exhibits and actively demonstrates applied critical thinking. Not only do our students gain applied critical thinking skills from within our classrooms, they also gain from exposure in extracurricular activities, and through cooperative education, internships, etc. Further, critical thinking is a skill that supports the growth of leadership, innovation, diversity and contributes to the ability to be good citizens. We aim to integrate applied critical thinking within the whole student experience, by leveraging efforts in corollary initiatives at RIT such as, T-shape, the Simone Center for Innovation, Leadership, International Education, Grey Matter, and various student experiences at RIT.

2015-16

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)	Status
Explore leveraging of Writing Across Curriculum agenda with CT	Significant opportunity exists, determine best path	Report & draft plan	J. Schneider & David Martens (May 16)	Preliminary discussions started with committee led by Licata, strategy & plan to be developed 2016-7;
Explore leveraging of corollary efforts with CT	Significant opportunity exists	Implementation where appropriate, and report & draft plan	J. Schneider, FAB, & other leadership (May 16)	Implemented (Gray Matter, TOT, etc.) more to come.
Determine the implementation of a Fram prize at Imagine	Create process to award prize for best ACT related	implement	J. Schneider, FAB, & other leadership (May 16)	Implemented.

2016-

Strategy/Action	Description	Metric of Performance/ Deliverables	Responsible party (Target date)
Commence leveraging of corollary efforts with ACT	Where significant opportunity exists	Implementation where appropriate, and report & draft plan	J. Schneider, FAB, & other leadership (ongoing)

Assessment of Applied Critical Thinking at RIT

The following graphic is a representation of the process of practicing applied critical thinking at RIT. It visually represents the state of the 'pipeline' of creating the skillset in our students and the assessment process, both by what is currently available and what is planned to be measured. This forms the foundation for further development of assessment at RIT.
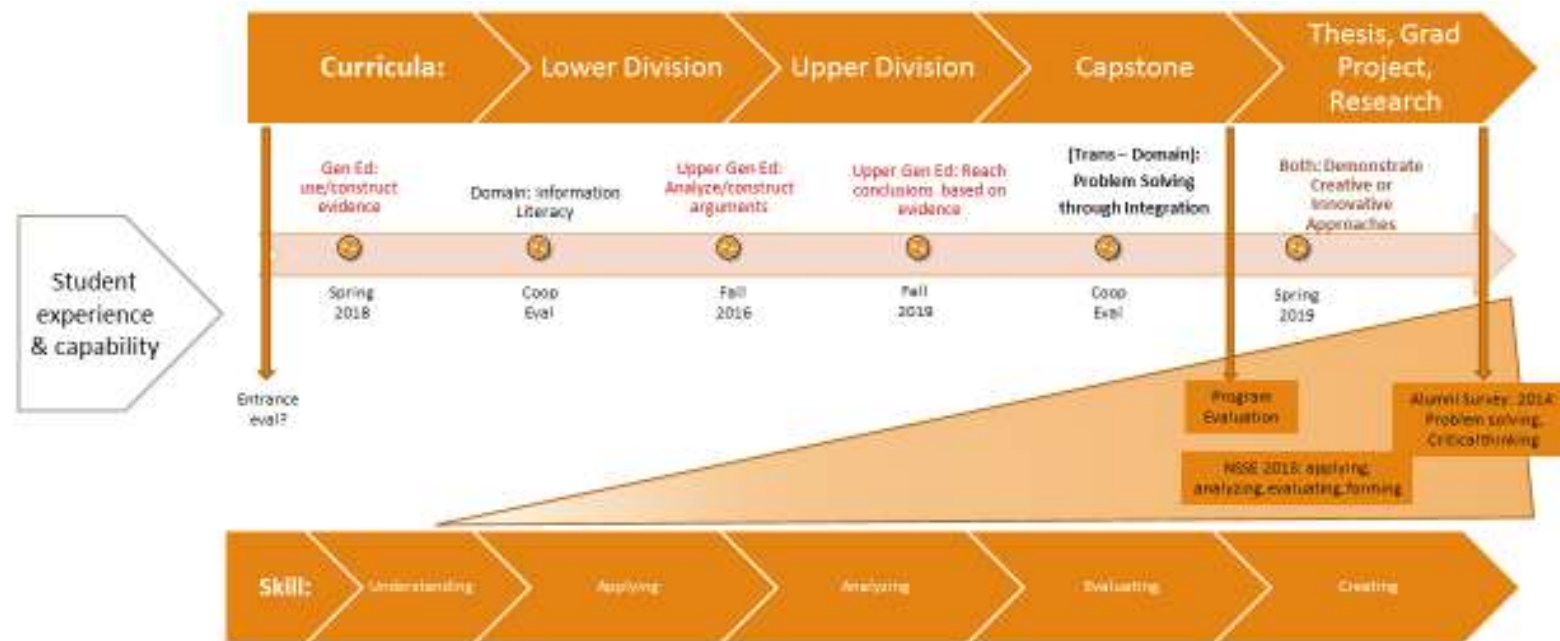

Figure 1 Map of assessment for ACT at RIT

Appendix 5 – Fram Award for Excellence in Applied Critical Thinking at Imagine

Since Applied Critical Thinking at RIT is an active process, awards are based upon the applicant's ability in their response to show evidence of the quality of the critical thinking process used to arrive at the final outcome of the exhibit. Responses are evaluated to the degree with which they demonstrate excellence in applied critical thinking.
https://www.rit.edu/provost/eugene-h-fram-chair-applied-critical-thinking-0#Awards

2016 Winners

Small Group Award (Exhibit INS-1160): Robotic Eye Motion Simulator
Team: Amy Zeller, Joshua Long, Nathan Twichel, Peter Cho, Jordan Blandford
Synopsis: The objective of this project is to develop a robotic eye that mimics human eye movement to provide a standard for eye tracker testing and to do this within a budget of $2,000. Our senior design team has utilized critical thinking since day one in senior design. It has allowed us to evaluate ideas and to make informed decisions about our project. One of the biggest challenges that our team had to overcome was coming up with a motor to use for our design that both our team and customer agreed upon. An eye tracker is a device that tracks human eye movement and estimates gaze position. Eye trackers have long been used in psychology research, visual system research, marketing, and, recently, as an input device for human-computer interaction. The quality of the data eye trackers output is a fundamental aspect for any research based on eye tracking. There is currently no standardized test method for evaluating the quality of data collected from eye trackers. The lack of standard may lead to research being based on unreliable data. Different manufacturers measure quality using their own methods and researchers either measure it again using different methods or simply report whatever numbers the manufacturer provides. However, the goal of this project is to make the robotic eye affordable, which is necessary to make the use of this eye practical for eye tracker manufacturers and eye tracking researchers to use as a standard. Therefore, our team set out to find a motor that was less than $2,000, had a velocity of 8.73 rad/s and a repeatability of 0.015 degrees.

Large Group Award (Exhibit SUS-3260): Your Decisions Make Sustainability Possible!

Team: Jennifer Russell (Coordinator, Golisano Institute for Sustainability) Reema Aldossari, Yi Feng, Shih-Hsuan Huang, Michael Kelly, Nicolas Matthew Miclette, Wilson Sparberg Patton, Wenjing Qi, Kaining Qiu, Elizabeth Stegner , Jiahe Tian, Akanksha Vishwakarma, Hui-Yu Yang, Yue Zhang, Runhao Zhao (Industrial Design Graduate Students)

Faculty, Staff & Community Industry Mentors: Brian Hilton (Golisano Institute for Sustainability), Clyde Hull (Saunders College of Business), Stan Rickel (School of Industrial Design), Bill Davies(President, Davies Office), Doug Pilgrim (National Business Development Manager, Davies Office).

Synopsis: Our society is facing some significant environmental and social challenges; some of these must be tackled through government and industry initiative, but for many of those challenges the most effective solutions can start right at home with the individual. Our increasing consumption of goods and services is putting significant pressure on our natural systems, as well as on our communities as they deal with increasing waste and resource constraints. We believe that, although consumers may feel helpless to fix some of these problems, in fact they have the potential to be among the most powerful drivers of needed change.

We use this Imagine RIT exhibit to explore how consumers make choices about the products they consume, and how their behaviors and evaluations are affected by new information. Specifically, we seek to understand how the consumer evaluates a 'greener' product relative to a 'normal' product, and how the product characteristics of 'cool' and 'innovative' interplay in their choices.