Critical Thinking Across the [Undergraduate] Curriculum (CTAC)

A Plan for RIT

Prepared

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January 10, 2014

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EXECUTIVE SUMMARY:

Critical thinking (CT) has become a major national imperative. Surveys, commissioned reports, and a growing body of evidence demonstrate that it is seriously deficient, to an alarming degree, in recent college graduates, and also highly sought by employers. In 2012 RIT inaugurated the Eugene H. Fram Chair in Applied Critical Thinking, a full-time academic position funded by an anonymous RIT alumnus. The Chair's responsibilities include campus-wide leadership, advocacy, oversight, and management of CT. The Fram Chair's formation also coincided with RIT's conversion from academic quarters to semesters, and extensive work revamping our entire curriculum, as well as the assessment of student learning. Commensurate with this, the Provost requested that the Fram Chair develop a draft plan for CT across the undergraduate curriculum.

RIT is uniquely poised to leverage these circumstances, by integrating and infusing CT into our undergraduate curriculum, empowering our faculty to reflect on their teaching pedagogies, and to more intentionally incorporate CT as a student learning outcome, whenever possible. A strong base already exists. CT is embraced and rigorously imparted by a majority of our faculty. CT is one of five essential learning outcomes identified in the RIT Academic Program Profile, approved by Academic Senate in 2010. Above all, RIT has a unique opportunity to make CT a vital part of our entire campus culture, and a central tenet of our educational mission.

This plan specifies four key ***Goals****, and a set of eleven* ***Strategies*** *by which to achieve this objective. Strengthening the CT skills of our undergraduates is the best way to ensure that they are engaged global citizens, and that they can succeed in the rapidly changing, increasingly complex, and cosmopolitan workforce. This will not occur, immediately. Hopefully, with sufficient resources, persistence, hard work, and deliberation, this distinct focus on CT, sparked by the creation of the Fram Chair, and its deliberate and holistic integration, can prove transformative for our institution. Faculty, student, and staff engagement are crucial for this initiative to succeed, since students will only be induced and motivated to think more rigorously, systematically, and reflectively, when faculty do the same. Instead of a single, mandated course in CT, it is best acquired through repeated exposure, and broad integration throughout the entire curriculum. The ability to think in a critical way, regardless of the subject or circumstance, empowers one for a lifetime. It has intrinsic value, in and of itself. CT should be a top priority for all of our students, and it can help to distinguish them from their peers.*

Critical Thinking Across the [Undergraduate] Curriculum (CTAC)

A. BACKGROUND:

In 2012 RIT inaugurated the Eugene H. Fram Chair in Applied Critical Thinking, a full-time academic position funded by an anonymous RIT alumnus. It was named in honor of an emeritus professor, who taught in the Saunders College of Business for fifty-one years, and who was especially known for his academic rigor, innovative use of case studies, counterfactuals, the Socratic method, and enthusiasm for Bloom's taxonomy. The Fram Chair's responsibilities include campus-wide leadership, advocacy, oversight, and management of critical thinking (CT).[1] A primary impetus for its creation was the benefactor's belief that the CT abilities of most American undergraduates are woefully inadequate, and that this deficiency seriously impedes their careers. A more urgent concern, however, was the conviction that CT is essential to ensure a fully informed and engaged electorate, as well as to ensure that democratic values survive and flourish. Even more profound was the donor's belief that such critical intellectual skills are vital if we are going to face the enormous environmental, social, economic, and personal challenges ahead. The ability to think in a critical way, regardless of the subject or circumstance, empowers one for a lifetime, and it should be a top priority for all of our students. The Fram Chair thereby represents a unique challenge and an exciting opportunity for RIT to become a leader in CT, by specifying the implications of its having been adopted as a core learning outcome, ensuring that it is meaningfully assessed, and above all, fostering and supporting a vibrant institutional culture that values and respects it. CT has long been regarded as the heart and soul of a traditional liberal arts education. RIT has an established reputation as a leading career-focused, technically oriented institution, as well as a leader in deaf and hard-of-hearing education due to our strong ties to NTID. RIT also values the broad historical context, ethical complexity, and deeply enriching dimension that is provided by the

[1] Definitions are important and some explanation of the terminology used in this proposal is warranted. Generally, educators speak of "critical thinking" and the "critical thinking movement" in higher education. The newly established position at RIT, the Eugene H. Fram Chair in Applied Critical Thinking, is committed to critical thinking, first and foremost, and encouraging our faculty to integrate it throughout the curriculum. It seeks to improve the quality of our students' reasoning, and to encourage them to engage in metacognition, in other words, "to think about their thinking." "Critical thinking" is used throughout this proposal instead of "applied critical thinking." "Applied" underscores RIT's strong history of career-focused and technically oriented education, while also emphasizing the need for utility, and to find pragmatic solutions to real world problems. It was the benefactor's wish that the chair include this qualification. RIT also differentiates between critical thinking and creative and innovative thinking, while acknowledging the close ties between them.

humanities, especially when they intersect with the technical sciences, how this links to CT, as well as what it means to be truly educated in the fullest sense of the term.

B. THE CASE FOR APPLIED CRITICAL THINKING:

An enormous amount of evidence supports the position that CT is a *sine qua non* for today's college graduates. CT is a ubiquitous topic in contemporary social media, and the growing national discourse surrounding higher education point to CT with a growing sense of urgency. This includes a variety of stakeholders, such as employers, administrators, faculty, students, as well as national and regional oversight and governance organizations. CT is one of the most frequently identified top priorities in the Quality Enhancement Plans (QEPs) of many colleges and universities. A national survey, conducted by the Association of American Colleges and Universities (AAC&U) in 2013, reported that approximately 93% of employers regarded the capacity to think critically, communicate clearly, and solve complex problems to be more important than the prospective employee's undergraduate major.[2] This recent, heightened concern for CT in American higher education, its broad historical context, and the reasons for its decline has been examined by Derek Bok, who argues for the necessity of widespread reform in order to improve teaching and learning.[3]

C. UNDERGRADUATES ADRIFT:

Richard Arum and Josipa Roksa underscored the importance of CT in their book, *Academically Adrift* (Chicago: University of Chicago Press, 2011), which argued that a majority of college students are not obtaining the necessary core competencies in reading, writing and critical thinking.[4] Undergraduate students are increasingly adrift, is their basic conclusion, and steps must be taken to get them back on track. They read, write, and study less than ever before, and they are graduating without the critical abilities and dispositions necessary for successful careers. The reasons for this alarming trend are complex and tendentious. Arum and Roksa argue that it can be reversed, however, if faculty continue to set high expectations, renew and reinvigorate their emphasis on learning, consistently

[2] AAC&U, 2013, Hart Research Associates, *It Takes More than a Major: Employer Priorities for College Learning and Student Success.* Retrieved from: http://www.aacus.org/leap/documents/2013_EmployerSurvey.pdf.
[3] Derek Bok, *Higher Education in America* (Princeton: Princeton University Press, 2013).
[4] Richard Arum and Josipa Roksa, *Academically Adrift* (Chicago: University of Chicago Press, 2011).

demand rigor and quality, as well as to require that students spend more time reading, writing, and studying for their classes.

D. EMPLOYERS' EXPECTATIONS:

CT skills also remain some of the most highly sought and urgently needed by employers. A report issued in July 2009 by the White House Council of Economic Advisors, *Preparing the Workers of Today for the Jobs of Tomorrow* identified "workers who can think critically and solve problems" as one of the key attributes of a well-trained future workforce.[5] CT, analytic ability, and communication skills are consistently ranked as top priorities by corporate recruiters. One of the clearest and most concise studies of employer expectations, needs, and desired learning outcomes as they relate to the future workforce are the ongoing series of LEAP-commissioned surveys for the AAC&U. The 2008 National Survey found that employers regarded 31% of recent college graduates as "not well prepared" in the "critical thinking" essential learning outcome.[6] In a similar vein, the 2011 LEAP survey reported that 81% of employers want for colleges to "place more emphasis" on "critical thinking and analytic reasoning" as an essential learning outcome.[7]

E. NATIONAL IMPERATIVE:

It comes as no surprise, therefore, that CT has become a pervasive topic in higher education. The 2002 report *Greater Expectations: A New Vision for Learning as a Nation Goes to College,* also from the AAC&U, recommended that colleges and universities shift their emphasis toward educating students to be more "intentional learners," who are "self-directed and purposeful, empowered by intellectual and practical skills, informed and emboldened by knowledge and ways of knowing, and who take responsibility for their personal beliefs, actions and values."[8] According to the report, an "intentional learner" has a "developing self-awareness about the reason for study, the learning process itself, and how education is used." The AAC&U highlights critical thinking as vital for student success, and it recommends, with a sense of urgency, that it become a top priority. It specifically argues that students need to learn how:

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[5] Executive Office of the President, 2009, *Preparing the Workers of Today for the Jobs of Tomorrow*, White House Council of Economic Advisors, Washington, DC.
[6] AAC&U, 2009, *High-Impact Educational Practices,* Chart B: Employer Views on Achievement of Essential Learning Outcomes, 2008 National Survey Results.
[7] AAC&U, 2011, *The LEAP Vision for Learning: Outcomes, Practices, Impact, and Employers's Views*, p. 26.
[8] AAC&U, 2002, *Greater Expectations: A New Vision for Learning as a Nation Goes to College: National Panel Report, American Association of Colleges and Universities, Washington, DC.*

- to effectively communicate in oral, visual, and written form, and in more than one language
- to understand and use both quantitative and qualitative analysis in order to describe and solve problems
- to identify, interpret, evaluate and use information from a variety of sources in a discerning way
- to derive meaning from experience, as well as to gather information from observation
- to demonstrate intellectual agility and the ability to cope with instability and sudden change
- to transform information into knowledge and use this knowledge for judgment and effective action

The current proposed Middle States Commission for Higher Education (MSCHE) standards (2014) requires institutions to demonstrate a robust general education curriculum designed so that students "acquire and demonstrate essential skills including critical analysis and reasoning."[9] Numerous colleges and universities have adopted and mandated standardized tests of CT. One of the most popular tests has been the Collegiate Learning Assessment (CLA), and its most recently revised version, the CLA+. Another popular instrument is the CAT (Critical Thinking Assessment Test), along with the Cornell Critical Thinking Test, developed by Robert Ennis. In many instances, the decision to adopt such tests has been motivated more by the pressure for an accountability tool, or as a mandated compliance measure. Testing can be a quick and easy means for an institution to demonstrate concern for CT, although it can be quite costly, especially when incentives are necessary. Such instruments provide important data that can be very useful, but there is no consensus that they accurately assess the problem.

F. RIT'S ESSENTIAL OUTCOME: CRITICAL THINKING:

The time is right for RIT to expand on an already strong base, and for it to become known as a university where astute and nimble critical thinkers are made. RIT is uniquely poised to develop a more intentional and comprehensive focus on CT, given all the existing conditions: the Fram Chair, the urgent national imperative, consistently repeated demands of employers, the importance of CT already in our Academic Program Profile, as well as the role of CT as a student learning outcome. This will require a bold community of learners and teachers where an applied understanding of CT in disciplines and majors is promoted, and where the theory and practice of CT is developed in the general education curriculum, and beyond.

Up to this point, RIT has not administered any standardized tests of CT. It is difficult, therefore, to know through any direct assessment measure what the actual CT skills of our undergraduates are. In short, a baseline does not currently exist.

[9] MSCHE, "Characteristics of Excellence," Draft Proposal, November 21, 2013.

We do have self-reported data, however. Recent results of the National Survey of Student Engagement (NSSE), administered biannually, to the freshmen and seniors, have identified our specific areas of strength and weakness at RIT related to CT. As reported by RIT's Student Outcomes Assessment Office, they can be summarized as follows:

> Critical thinking encompasses a variety of skills, many of which are measured indirectly on the NSSE. One of the areas of focus on the NSSE is problem solving, including solving complex real world problems or applying facts or methods to solve problems. The last few years of NSSE results indicate that RIT students are on par with or ahead of their counterparts at peer institutions in relation to problem solving. Aspects of quantitative reasoning also prove to be a consistent strength on this survey. The major areas of weakness for RIT students exist in analyzing ideas in depth, critically evaluating sources, and forming new ideas or understanding from information.[10]

More specifically, the category of Reflective and Integrative Learning on the NSSE survey was an area of academic weakness for our students. This encompasses the ability to synthesize ideas and information, to identify, acknowledge, and respect diverse perspectives, as well as to apply one's ideas to real-world social problems and issues.

RIT's alumni survey will query graduates about their CT skills in the next planned administration (2014). Although we have not formally collected data from our alumni up until now, it is clear that improving CT skills of college graduates is an urgent national imperative. It is also apparent that self-reported information from RIT students reveals areas of weakness in important aspects of CT. Taking both of these facts together supports the need for RIT to embrace a bold and dramatic approach to ensuring that every RIT graduate enters the next phase of their career armed with superior skills and broad curricular experience in CT. These results do not imply that we are not already engaged and committed to ensuring that our students gain key CT skills—because we definitely are, and significant steps have been taken.

An overarching aim to power this vision is to promote a campus-wide conversation and robust exchange of ideas about CT and its importance for student success. The purpose is for CT to become an essential part of our campus culture, and to ensure a deep and broad-based engagement with CT going forward. Strengthening the CT skills of our undergraduates is the best way to ensure that they are engaged global citizens, and that they can succeed in the rapidly changing, increasingly complex, and cosmopolitan workforce.

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[10] Internal email communication from Dr. Anne Wahl. Director, Student Outcomes Assessment, Division of Academic Affairs.

G. THE RIT FRAMEWORK FOR APPLIED CRITICAL THINKING:

In order for RIT to distinguish itself as a university that intentionally embeds CT theory and practice across the entire undergraduate curriculum, the following framework is proposed. CT is already a guiding principle and fundamental value in the RIT Academic Program Profile (APP), which identifies CT as one of five essential learning objectives across all of our academic programs, and a core learning outcome of our undergraduate curriculum. The Academic Program Profile states:

> **"Embedded in every academic program at RIT will be a set of five Essential Learning Outcomes: critical thinking, global interconnectedness, ethical reasoning, integrative literacies, and innovative/creative thinking."**

The APP provides definitions for each of these five items. It defines critical thinking as:

> **"Critical thinking is defined as 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."**

With this in mind, RIT has already recognized the importance of CT. The first stone has been laid.

GOAL #1:
All RIT undergraduates will satisfy RIT's critical thinking student learning outcome(s), which are deliberately integrated within each program of study, as well as imbedded as a suite of outcomes within the General Education framework.

Achieving this goal will require that our students and faculty recognize, accept, and embrace the importance of CT as an essential life-long ability. It is based on two strong, supporting beliefs. First, that learning to think and reason critically is essential for our students to reach their fullest potential, and for them to become responsible, global citizens. And second, that CT cannot be taught in a single mandated course, but that it is best acquired through repeated exposure, and by

means of its broad integration throughout the entire curriculum. This will require incremental, collective effort, since no one course or instructor can do it.

Therefore, building and enhancing CT skills must start with the first year of study, which aims to provide an essential ground for subsequent undergraduate career development. Typically, the first year of study includes First Year Writing (FYW), the non-credit Year One (YO) course, and the initial GE perspectives courses. This skill development will continue throughout subsequent GE courses, the Ethical Perspectives, immersions, and culminate with a student's final program-specific capstone experience. It is here that CT will be a deliberate learning outcome in existing final program-specific synthesizing courses, capstone experiences, senior seminars, theses, or group research projects. Such culminating experiences will vary widely given RIT's broad and extremely varied academic portfolio. It is only reasonable to expect that CT will be demonstrated somewhat differently depending on the discipline. Hence, the RIT definition of CT, and accompanying rubric, seek to be flexible enough to capture such differences within each discipline (to note that skills in many contexts require domain-specific knowledge), while also retaining sufficient generality to identify and measure commonalities across all disciplines (holism). This will be assessed according to a common rubric that will be developed and used across all programs and within most courses. It is recommended that the rubric adopted will be the one devised by the AAC&U, which is highly respected and considered best practice in the field. This rubric will be modified as necessary, to fit the needs of individual programs, departments, and faculty. This should help to develop a common vocabulary among faculty from different disciplines, and hopefully, an enriched discussion of CT teaching and learning throughout the entire campus community. It is also crucial that our faculty identify and articulate what it means to be an exceptional CT in each of their respective disciplines.

Initially, a single, bedrock CT learning outcome will be targeted and assessed (pending its approval and adoption for the GE Framework). This is based on the Fram Chair definition of CT as articulated and adopted for use specifically within the GE framework, namely,

> ***"the ability to identify, analyze, construct, and evaluate evidence and arguments in a deliberate and rigorous way."***

This definition seeks to align with and to follow the implications of the definition of CT already articulated in the 2010 Academic Program Profile, and approved by the Academic Senate in May 2010.

A suite of CT student learning outcomes for General Education has been proposed which will align with the specific undergraduate programs:

CT Outcome (pending approval)	Undergraduate Program Alignment

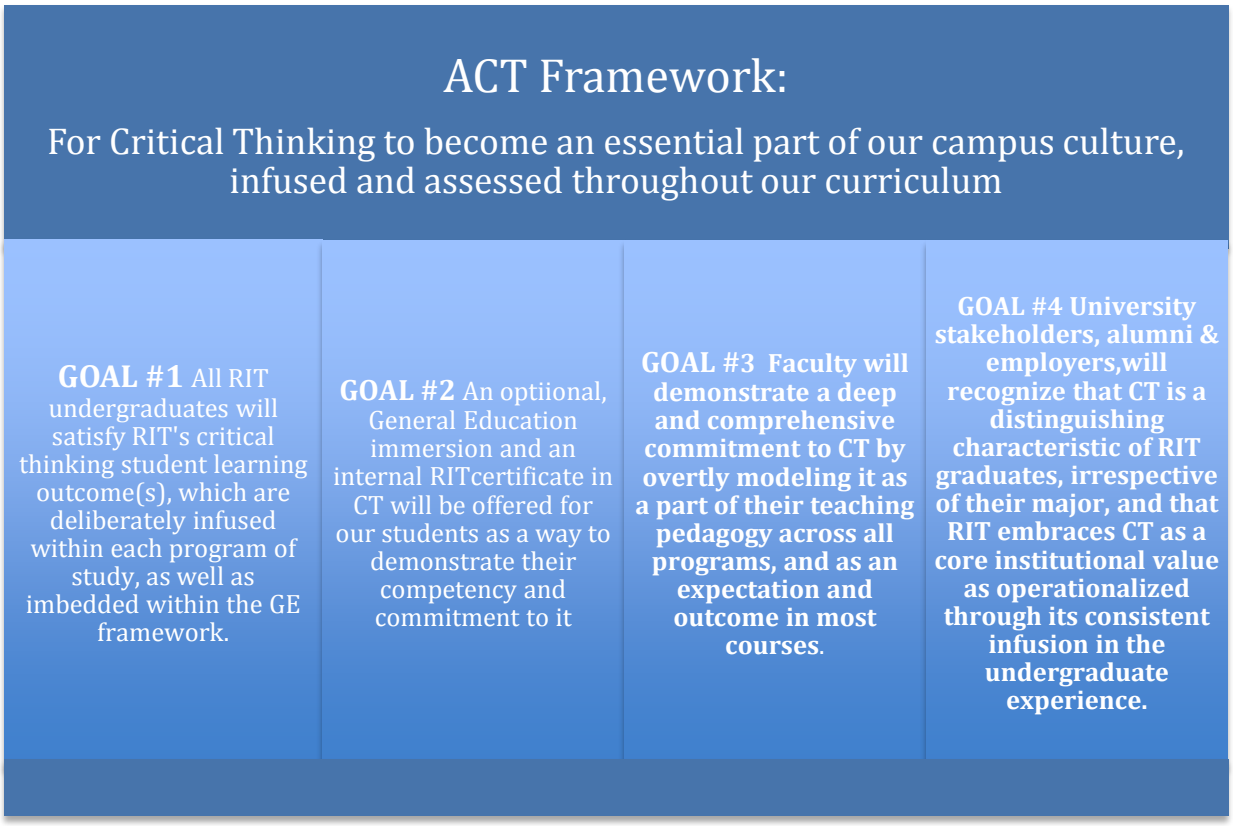
To identify, analyze, construct, and evaluate evidence and arguments in a deliberate and rigorous way	Foundation Course	First Year Writing
	Ethical Perspective	Ethical Perspective Courses
	Immersion	Immersion Courses
	Major/Discipline	Capstone Courses

GOAL #2:
An RIT General Education immersion and an internal RIT certificate in CT will be offered for our students as a way for them to elect to demonstrate their competency and commitment to it.

GOAL #3:
Faculty will demonstrate a deep and comprehensive commitment to CT by overtly modeling it as a part of their teaching pedagogy across all programs, and as an expectation and outcome in most courses. They will emphasize its importance in their course syllabi, course design (or redesign), assignments, student learning outcomes, and course delivery, whenever feasible. They will also adopt, refine, and use a common CT rubric as an overt part of their instruction, to the largest extent possible. Students will only be induced and motivated to think more rigorously, systematically and reflectively, by faculty who do the same.

GOAL #4:
University stakeholders, alumni, and employers will recognize that CT is a distinguishing characteristic of RIT graduates, irrespective of their major, and that RIT embraces CT as a core institutional value as operationalized through its consistent infusion in the undergraduate experience. Goal #4 can only occur, if **Goal #3** is also met. In other words, the implementation of this framework sets the standard for RIT to be a university where graduates are known as exceptional critical thinkers. It is a skill and ability that is urgently needed and desired by employers as recent studies and ongoing research demonstrates. It thereby can distinguish our graduates potentially from their competitors, and enhance the reputation of the university in the marketplace. If successful, then prospective employers will testify to the critical thinking skills and abilities of our undergraduates.

The four key goals for CT are intended to enrich and strengthen the entire undergraduate curriculum at RIT. The aim is to ensure that every RIT undergraduate has multiple, intentional opportunities for CT within their General Education (GE) courses, as well as within their program specific courses, and which culminates, in most instances, with their final program-specific, synthesizing capstone experience or project, taken within their chosen major, department, or field of study. Not all of these goals will be obtainable immediately, especially **goal #4**, but each goal is regarded as closely interrelated, and is an important component of the holistic framework.



H. STRATEGIES TO ACHIEVE THESE GOALS:

In order to accomplish these goals, specific strategies are recommended as follows:

STRATEGY #1: YEAR ONE (YO)

YO is a required, non-credit course designed to promote community, to ease the transition of our students, and to ensure academic success.

There is an opportunity in YO for more specific academic content and intellectual rigor, especially to emphasize and encourage metacognition, which is essential for CT. If "increased self-knowledge," "self-discovery," and "social responsibility" are some of the primary goals for the course, then one of the best ways to achieve these would be to include assignments that trigger or spark such self-reflection and which thereby promote metacognition. Writing and oral presentations could be a very effective means to help reach these goals. In particular, this could include assignments such as the following:

*Require each student to write a personal belief inventory or a reflection essay which begins with the phrase "This, I believe . . ."

*Provide each student with the necessary tools to evaluate the question "What are your learning strengths/weaknesses?"

*Require each student to write a vita (they could conduct interviews with one another as a way to begin, using a standard list of common questions, and this would also build and strengthen community). This could serve then as an important evolving document throughout their undergraduate years as they apply for jobs, coops, scholarships, fellowships, and postgraduate study. It would trigger awareness of the need to build and add to this by noting milestone achievements along the way (e.g. Dean's list, awards, recognitions, study abroad, volunteer service, etc.).

*Pilot an activity tied to local experiential learning such as a visit to the Memorial Art Gallery, George Eastman House, or a concert at the Eastman Theater, followed by a brief written response assignment. Recent studies have shown that visiting a museum on a field trip leads to stronger critical thinking skills, higher levels of social tolerance, greater historical empathy, and a developed taste for cultural institutions.[11]

In the long-term, a common book or reading would be an important way in which to engage more deeply with ideas, and to build community in YO. This could also be an important place in which to showcase some of our most outstanding faculty, but in a more personally engaging way. In other words, they could reflect on their own academic trajectories, career paths, and personal interests in a series of short lectures, and thereby, offer inspiration, role models, and bits of advice and wisdom.

STRATEGY #2: UNIVERSITY WRITING PROGRAM

The University Writing Program (UWP) consists of three related units: First Year Writing (FYW), the University Writing Commons, and Writing Across the Curriculum. The mission of the UWP is to advance writing excellence throughout RIT's programs, colleges, and global locations. Especially in First Year Writing and Writing Across the Curriculum, there are numerous instructional, curricular, and assessment opportunities that can directly support RIT's goals for Applied Critical Thinking.

First Year Writing

First Year Writing (FYW) is a General Education "Foundations" course that plays an essential role in students' academic transition to the university. In FYW, students will learn about the social and intellectual aspects of university writing,

[11] Brian Kisida, Jay P. Greene and Daniel H. Bowen, "Art Makes You Smart," Op-Ed., *NY Times,* (November 24, 2013).

and develop critical literacy practices required for academic success. For example, students completing first year writing will learn to:

- Revise and improve their writing
- Express themselves effectively in common college-level written forms using standard American English.
- Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information (General Education Framework)

Each of these learning outcomes is intimately connected to Applied Critical Thinking. For this reason, FYW is a key, initial site for students to gain instruction in critical thinking, to apply critical thinking to their written work, and begin to anticipate how critical thinking skills from one instructional context can transfer to other academic, workplace, civic, and personal contexts.

Already, there are curricular activities common to the FYW course that offer students instruction in and opportunities to practice critical thinking as it relates to reading, writing, and metacognition. Additionally, in the FYW program, there is a regular practice of direct and indirect assessment of student writing that can directly support the efforts of the Fram Chair.

Writing Across the Curriculum

Writing Across the Curriculum (WAC) is a well-founded approach to improving writing instruction throughout the curriculum through faculty development and assessment. WAC at RIT prepares students for the written communication demands of their coursework, co-op experiences, and their future workplace. To achieve this, the UWP is guided in large part by the following principles:

- Writing practice fosters critical thinking. Writing is a complex activity that must be continually adapted to contexts, and is shaped by disciplinary, multidisciplinary, and professional audiences and purposes. Writing abilities are essential for graduates to secure jobs, advance in their chosen professions, and participate in all forms of civic life.
- Writing proficiency develops over time. Students develop writing abilities when they have frequent opportunities to address multiple audiences and practice the genres typical in their fields of study.
- Writing instruction, ideally, takes place across the curriculum where Faculty accepts shared responsibility for teaching students the conventions and rhetorical practices of their disciplines. Writing instruction that is spread throughout the curriculum, thereby, enables the robust development and transfer of writing competencies.

Based on these precepts, WAC provides additional opportunities for significant integration with Applied Critical Thinking. Such integration can include programmatic assessment across the curriculum and throughout their time at

RIT. Also, faculty development in both WAC and ACT could include a more deliberate exploration of the relationship between writing and critical thinking. Within the WAC context, this integration has already been initiated by means of Faculty Learning Communities that have used the textbook by John Bean, *Engaging Ideas: The Professor's Guide to Integrating Writing, Critical Thinking, and Active Learning in the Classroom, 2nd ed. (2011).*

The writing assessment instruments developed by the University Writing Program Director will aim to elicit substantive CT overtly and demonstrably as a central outcome.

STRATEGY #3: GENERAL EDUCATION (GE)

Within the GE framework the "intellectual inquiry" outcomes are being revised in order to more intentionally align with CT as a suite of student learning outcomes (SLOs).

The General Education framework comprises 60 credit hours of required coursework. It aims to provide an intentional progression through three distinct educational phases intended to give each and every student a strong *Foundation*, exposure to a series of distinct topical categories known as *Perspectives*, and finally, the opportunity for deeper study and integrative learning experiences through *Immersion* in a series of closely related courses. Each phase of GE is intended to provide a breadth and depth of knowledge irrespective of the student's major. In other words, GE is a core aspect of every undergraduate's academic experience. This proposal would require that each GE course will have at least one commonly defined SLO tied to CT, that is embedded in the course learning outcomes. By doing this, the CT skills are developed and reinforced throughout the students' general education curriculum experiences.

STRATEGY #4: PROGRAM SPECIFIC CT OUTCOMES:

Each undergraduate program has integrated the CT outcome intentionally into its program and has articulated where the outcome is assessed in the program level assessment plan.

Through review of these program-level assessment plans, it is clear that most (but not all) programs have embedded CT into a program-synthesizing experience, usually in the 4th or (in the case of COOPS), the 5th year. These experiences include: senior capstone projects and presentations, seminars, written theses, sometimes, accompanied by an oral defense, as well as exhibitions, portfolios, and collaborative capstone assignments. There are already a number of outstanding examples, or "signature capstones" which epitomize this feature. They can serve as a model for other programs.

Two notable examples include:

Imaging Science BS: (100% of students will pass the senior capstone research project) The relevant metrics related to CT include:

-a statement of experimental goals
-soundness of the experimental design
-ability to respond to unanticipated results or problems which arise while conducting the experiment
-quality of the data analysis and interpretation
-ability to effectively communicate results in an appropriate format

Philosophy BS: (100% of students will, prior to graduation, compose, present, and defend a senior thesis to the satisfaction of a thesis committee composed of three faculty advisors) The relevant metrics related to CT include:

-to formulate a thesis
-to conduct a literature review
-to perform the necessary research
-to present and defend a cogent, sustained argument in support of a defined philosophical position.

STRATEGY #5: ASSESSMENT

Through proper assessment we will be able to demonstrate the degree to which each of the four goals is being met. Assessment, however, must be meaningful, sustainable, and realistically manageable.

- RUBRIC DEVELOPMENT:
  Rubric development and implementation at the general education and program- specific level will play an important role to help ensure the goals. Teams of faculty will need substantial support and encouragement to develop such program and course specific rubrics, and to modify the AAC&U Critical Thinking VALUE (Valid Assessment of Learning in Undergraduate Education) Rubric to meet their assessment needs. Faculty will be encouraged to tailor the language of the rubric to fit the conception of CT in their respective disciplines, while keeping the descriptors and categories constant.

  Rubric development will occur and be facilitated by small faculty teams. The four key members of the ACT working group within Academic Affairs (Chip Sheffield, Anne Wahl, David Martins and Elizabeth Hane) will help to plan and coordinate these workshops. A call for faculty participation will

be announced by the end of spring semester 2014, and the team meetings will occur during the early summer 2014. The GE perspectives teams already used this strategy quite successfully. Faculty participants would be remunerated for their efforts. The Assessment office would review the final rubrics for consistency, completeness and feasibility.

It will also be necessary to recruit additional faculty within the specific programs and colleges to refine and devise strategies for the implementation of the CT rubric.

- OTHER METHODOLOGIES:
  In addition to rubric development, other alternatives, which we might consider would include:

  1. Administer an actual test of CT (such as the CLA+) for all of the incoming undergraduates, as well as upon graduation. This would provide an important longitudinal assessment, and thereby demonstrate actual gains/improvements in CT. It would also provide a baseline, which we do not presently have. Piloting such an assessment tool for a small, manageable group of this cohort should be considered (e.g. some of the approximately 800 Honors students, or a select group of the students from Elizabeth Hane and Scott Franklin's STEM and Metacognition research study). There are obviously, significant financial implications associated with this.

  2. Administer the brief California Critical Thinking Disposition Inventory (to a pilot group of students) as a part of YO. It could provide important evidence regarding our incoming students' actual engagement in self-reflection, metacognition, and the web of dispositions (or conative cluster) related to CT.

  3. Administer the Faculty Survey of Student Engagement (FSSE) in order to provide a baseline of how our faculty perceives student abilities and interests with respect to CT. Over time, we would determine if faculty regard student attitudes to be changing, and hopefully, improving with respect to CT, suggesting that the plan is gaining traction.

Indirect instruments of assessment such as NSSE, the Co-op Evaluation, and alumni surveys will be used in support of **Goals #1** and **#4**.

- Co-Op Evaluation Critical Thinking Survey Items:
  Work has already begun to include the following items on RIT's Coop Evaluation Survey:

  "Effectively solve problems by integrating a diverse body of knowledge and skills" (Employer Evaluation)

  "Describe how the experience encouraged, improved, or strengthened your critical thinking abilities?" (Student Evaluation) [In order for this question to be meaningful, a brief definition of CT would need to be provided to the evaluee].

- Alumni Survey Item
  Likewise, the next iteration of the Alumni Survey will include an item that asks alumni to reflect on their education and to indicate how effective was RIT in supporting their development in the area of Critical Thinking. They will be asked to rate the level of importance and the level of effectiveness.

STRATEGY #6: FACULTY WORKSHOPS & SUPPORT

- Faculty Workshops and related programming will be used to help achieve **Goal #3**. These are an important way to ensure that CT is embedded in our courses, and that it explicitly infuses the teaching, reasoning skills, and learning outcomes across the entire curriculum. Workshops also provide an opportunity to discuss issues of pedagogy, to identify effective CT strategies, and to assist faculty with their refinement. In short, some faculty will need to be more deliberate regarding how they prioritize and assess CT. While a faculty member might be an astute critical thinker, this does not imply that they are adept at teaching critical thinking to their students. Student answers when queried: "This course challenged me to think critically," on a semester course evaluation, could be one of several indicators.
- A website for the Fram Chair with CT resources for faculty will assist with this goal. It will provide ongoing support and resources for RIT faculty, staff, and students.

STRATEGY #7: RIT IMMERSION AND AN INTERNAL CERTIFICATE IN CT: This strategy is in support of **Goal #3**. A sufficient number of approved GE courses take key aspects of critical thinking, logical reasoning, and rational problem solving as their primary focus to justify this idea. These courses could potentially form a possible immersion and internal certificate in CT. An immersion is defined as three GE courses that are closely related, and which further broaden and deepen a student's knowledge of a specific subject. There

are approximately fifty-one approved immersions, at present. The majority of such courses are in COLA, although there are also some relevant courses in other colleges, as well. An immersion in CT could consist of <u>any three</u> of the following courses, or other newly developed courses:

POSSIBLE COURSES
Immersion in
Critical Thinking:

COLLEGE	DEPT	COURSE NO	TITLE
SCB	MGMT	330	Design Thinking and Concept Development
CMS	CMDS	333	Wicked Problems
CMS	CMDS	441	Creative Critical Thinking and Problem Solving
COLA	COMM	305	Persuasion
COLA	COMM	356	Critical Practice in Social Media
COLA	ENGL	360	Written Argument
COLA	ENGL	463	Writing the Self and Others
COLA	PHIL	103*	Critical Thinking
COLA	PHIL	302	Symbolic Logic
COLA	PHIL	401	Great Thinkers
COLA	PHIL	408	Critical Social Theory
COLA	PSYC	331	Language and Thought
COLA	PSYC	332	Decision, Judgment and Problem Solving
COLA	STSO	441	Cyborg Theory: (Re) thinking the Human
COS	MATH	200	Discrete Mathematics and Introduction to Proof
COS	STAT	325	Design of Experiments
GCCIS	CMPR	271	Computational Problem Solving for Engineers
GCCIS	IGME	581	Innovation and Invention
CIAS	ARTH	573	Conceptual Art
CIAS	ARTH	605	Thinking about Making

*Since courses at the basic (100) level are ineligible to count for an immersion, a proposed upper-level Philosophy course on CT, which requires this course as a prerequisite, is recommended. This would also allow for a more robust and comprehensive study of CT than provided by the introductory course.

Consistently strong student enrollments in both courses would be an indicator of heightened interest and indicate some success.

Students who complete the immersion in CT could receive a special internal RIT certificate in CT, which would be noted on their official transcript. An alternative way to achieve this recognition (without taking the required coursework) would be for a student to take, at his/her own initiative and expense, the CLA+ and to obtain a score in the upper 20% percentile or better**.** A steadily increasing number of students pursuing the CT certificate and immersion, would indicate success.

STRATEGY #8: <u>FACULTY DEVELOPMENT, PEDAGOGICAL AND CURRICULAR SUPPORT</u>

Each program level assessment plan will be reviewed, and the CT assessment activity particular to each program, will be identified. The Fram Chair will work closely with the program head and respective program faculty to schedule Faculty Workshops and related programming in support of this aim. It will be critical, at this juncture, to ensure that each program uses the common assessment rubric. This will be an important means to ensure that CT is embedded in the course, and that it explicitly infuses the reasoning skills, and SLOs across the entire undergraduate curriculum. These workshops also provide an opportunity to discuss issues of pedagogy, to identify effective CT strategies, and to assist faculty with their refinement. Ensuring that all programs have faculty with these skills, and that this is occurring, particularly in 2nd and 3rd year courses, and not solely in the 1st and 4th year remains crucial.

During 2012-2013 workshops have been open to all full-time faculty. Six workshops have been held, alternating between lunch and breakfast format. Approximately, eighty faculty members have attended. Looking ahead, these workshops will be targeted to specific departments and degree-granting programs within the nine individual colleges, as well as the Golisano Institute of Sustainability, and CMS. A primary aim will be to assist faculty with incorporating the core CT learning outcome, applying the AAC&U CT VALUE Rubric, modifying it for their respective subject areas, and individual teaching pedagogy. Another objective will be to assist with refining the CT SLO for the capstone within the respective majors, where it exists. As mentioned previously, each program level assessment plan has identified courses and assignments that align to RIT's Essential Outcome—Critical Thinking. This information can be used to guide faculty as they work to integrate it within their syllabi, course plans, and programs.

It is proposed that these targeted workshops be rolled-out according to the following schedule:

<u>2014-2015</u>

COLA, COS

2015-2016

GCCIS, CIAS, CAST

2016-2017

SCB, KGCOE, CHST, GIS, and NTID

STRATEGY #9: PROGRAMMING:
Programming is another extremely important way in which to promote awareness and continue to build support for CT on the RIT campus, as well as the local and regional community. The annual Eugene H. Fram Lecture is regarded as a marquee event. The lecture series has brought N. Katherine Hayles, an RIT alumna (Chemistry '66) in 2012, and Richard Arum of NYU in 2013.

Co-sponsoring additional lectures and campus events provides a similar opportunity and will help to strengthen our CT initiative.

An ideal scenario would be to have one keynote Eugene H. Fram lecture, per semester, as well as 2-3 lectures, in addition, over the course of each semester, approximately one every 4-5 weeks. These could be based on an annual theme, possibly (e.g. Critically Thinking about Beauty, Justice, Identity, Difference, Truth, Happiness, Evil, Technology, Culture, Nationality, etc.). Planning for this would need to be done at least a year in advance, in order to get the maximum benefit. It would be important to consult with faculty and to suggest tie-ins with the course readings and learning assignments. A poster and related marketing would also need to be done well in advance. The BABEL series in Buffalo could serve as an exemplary model of just this kind of cultural programming. See the website: http://www.justbuffalo.org/babel-2013-14/
An endowed lecture series focused on CT and an annual theme, as sketched above, would be a great asset and tremendously enriching. It would also help to generate broader interest beyond our campus.

STRATEGY #10: CO-CURRICULA SUPPORT:
Co-curricular activities that provide deeper exposure to CT outside of the classroom or the students' respective field of study are another important way to ensure broad campus engagement with CT. The Gray Matters Discussion Series is one such current example. For the past two years, this informal group of students, faculty, and staff has met to discuss a specific topic or question that has been announced in advance. Moderators have helped to open and guide the discussion. Increased attendance and more visibility for this public forum should be a priority.

STRATEGY #11 THINKING OUTSIDE OF THE BOX: ASPIRATIONS/BIG DREAMS

1. CT and Metacognition: Scott Franklin and Elizabeth Hane's NSF grant focusing on developing metacognition in the STEM disciplines for students who are deaf-and-hard of hearing, as well as first-generation college attendees provides tremendous potential for further collaboration with the Fram Chair. Metacognition is regarded as a necessary condition for CT, and is seen by many experts as almost commensurate with it. NTID is one of the unique, distinguishing features of our campus and it provides an opportunity for us to reflect on multimodal approaches to learning and language use.

2. Eventually, to use the Immersion/Concentration to develop a Minor/Major in CT (an initial required course would be PHIL-Critical Thinking, a second upper-level course which has this as a prerequisite), followed by a series of courses and cross-college faculty who have demonstrated a deep commitment to CT pedagogy.

3. Within certain specific degree programs and majors, a specific CT track or emphasis could be developed, especially if the faculty have embraced and refined their teaching pedagogy, and are willing to employ a CT approach to teach their subject.

4. A First Year Seminar that is team taught by faculty across different colleges and possibly tied to Required Common Book or Summer Reading should be explored. Collaborative team-taught courses (especially for GE) would also provide a greater opportunity for CT. [See: Stephen D. Brookfield] different perspectives, pedagogies, expertise, and dialog.

5. To continue to refine our definition of CT. In particular, consider including dispositions and attitudes in a future iteration of our CT definition. We might consider piloting a CT Disposition Assessment tool to a select group of students. We will also need to address CT in our graduate programs as well.

6. Consider the essential outcome #5 (Creative and Innovative Thinking) in our Academic Program Profile (APP), and its relationship to CT. In a similar fashion, the links between CT and the essential outcomes #2 (Global Interconnectedness) and #3 (Ethical Reasoning) should be considered.

7. Address new faculty during their orientation, and explain the background for the Fram Chair, our institutional goals for CT, as well as some examples of how CT has been implemented in some classes.

8. The Admissions, Development, and Alumni offices should also highlight the Fram Chair in the literature distributed by them as an important part of our distinct academic profile. There are opportunities for collaboration and dialog with other local and regional institutions regarding our CT initiative, as well as their plans for CT which should be continually explored.

9. Develop and conduct a questionnaire to be used after our semi-annual job/career fairs in which we ask prospective employers to rate the perceived critical thinking skills and abilities of our students based on their interactions/interviews with them. They could identify the number and types of students they interviewed (by academic program or level) along with their evaluation of their CT skills across the five key categories framed on the AAC&U VALUE Rubric. This has already been used by Florida State University during their job/career fairs, as a part of their QEP.

10. Collaborate with MAGIC and the Games and Interactive Media faculty in GCCIS, as well as New Media Design in CIAS on a possible app or interactive game that focuses on logical fallacies and other aspects of critical thinking. Examples of this, already developed by an Australian design firm include: http://bridge8.wordpress.com/2012/01/30/critical-thinking-animations

11. Ensure that resources are available for Wallace library to continue to acquire new and important titles devoted to CT (books, journals, and new media), especially given the steady number of new and forthcoming titles. An adequate resource library on CT is fundamental for faculty and students.

12. Develop additional basic CT courses in each of the colleges, perhaps in close collaboration with the Philosophy faculty as well as the Fram Chair.

I. CONCLUSION:

We must not lose sight of the intrinsic value of CT in and of itself. Given the ambitious scope of this plan, and the enormous amount of media attention currently devoted to CT, there is a risk that it could become a cliché. This would be unfortunate. The ubiquity of the term is no guarantee that deep and meaningful engagement with it is occurring. CT is notoriously difficult to define, and also extremely challenging to assess. There is some consensus however, on the skills, abilities, and qualities of an exemplary critical thinker, as well as the links between CT and some "intellectual virtues." This plan is not meant to be reactive or temporary. The goals and strategies that are set forth herein are intended to be deep, long-term, transformative, and substantive. It makes no claim to being exclusive, exhaustive, or definitive. It aims to build upon RIT's existing academic strengths, substantial progress that has already been made, as well as to recognize our distinct history.

RIT must do more than merely prepare our students for a job. We need to prepare them to become fully engaged global citizens, nimble and resilient thinkers, who can respond and adapt to sudden change, uncertainty, and paradox with grit, humility and verve. Ideally, our graduates should possess confidence and a secure belief in their own intellects; they should recognize the power of reason and logic, as well as an awareness of their own, human-all-too-human, limitations. CT is no easy

task. It entails a process of continual refinement that is never truly complete, and which can be quite humbling. This should not deter us from the challenge, however, just as it should not preclude us, from aspiring to become exceptional critical thinkers.

J. ACKNOWLEDGMENTS:

This document has been strengthened and greatly improved by the constructive comments, helpful suggestions, and the occasionally, trenchant critique of many colleagues. Acknowledgment and thanks to: Provost Jeremy Haefner, Senior Associate Provost Christine Licata, Deans Jamie Winebrake and Sophia Maggelakis, my core advisory team in Academic Affairs, Anne Wahl, Elizabeth Hane, and David Martins, faculty members of the Fram Chair Advisory Group, Amit Ray, Larry Torcello, David Ross, Sandra Rothenberg, Roberley Bell, Joel Kastner, Andy Phelps, Liz Lawley, Jen Schneider, Kristen Waterstram-Rich, Sandi Connelly, Tom Moran, and Susan Foster, as well as other faculty, John Capps, Evelyn Brister, and Carl Lutzer. Staff from the office of student learning, support and assessment, Nicole Boulais, Philippa Powers, and Colleen Johnson provided additional feedback. Last, but not least, I'm immensely grateful to Professor Emeritus Eugene H. Fram for his always, insightful comments and unflagging support. The same applies to the anonymous benefactor of the Chair, who made this all possible. I have tried to consider all of their remarks, and I accept sole responsibility for any errors or infelicities that remain.

PROPOSED TIMELINE FOR ADVOCACY, GOVERNANCE, AND STAKEHOLDER SUPPORT: The plan will require discussion and vetting before various key campus constituencies, shareholders, and governance groups. The following timeline is proposed:

Key Shareholders:	Target Dates:
Submission of Preliminary Draft to Provost and Senior Associate Provost	December 2, 2013
Discussion of Preliminary Draft with Provost and Senior Associate Provost	December 11, 2013
Discussion of Preliminary Draft with Key Academic Affairs CT Team	December 20, 2013
Revised Draft to Provost and Senior Associate Provost	January 6, 2014
Discuss Revised Draft with CT Faculty Advisory Group	January 13, 2014
Discuss Revised Draft with Exec. Committee of Academic Senate	February 24, 2014
Presentation to Provost's Council	March 4, 2014
Present a Motion to Academic Senate to establish an Ad Hoc AS Taskforce (similar to IWC) to Refine and Develop the CT Proposal over the Summer	Feb/March 2014
Application Deadline for AAC&U Summer Institute	March 14, 2014
Develop and Refine Formal Proposal with the assistance of an Ad Hoc Taskforce approved by the Academic Senate	Summer 2014
Attend the AAC&U Institute on Integrative Learning and the Departments and focus on our goals#1 and #2 with a select, core group of faculty	July 9-13, 2014

Presentation of Revised Proposal to Academic Senate
along with a timeline for implementation, and proposed
for approval: Fall 2014

APPENDIX ONE:

DEFINITION OF CT (As reformulated by the Fram Chair):

Critical thinking is the ability to identify, analyze, construct, and evaluate evidence and arguments in a deliberate and rigorous way.

It entails testing one's beliefs against different and occasionally, competing perspectives, questioning assumptions and inferences, and conducting a reasonable assessment of alternatives. It enables one to interpret, integrate and assess information in a nuanced and fair-minded way, as well as to tolerate ambiguity, indeterminacy and paradox. It demands accountability, that the individual take responsibility for their beliefs and values.

EXTENDED DEFINITIONS AND AMPLIFICATIONS OF THIS DEFINITION:

Deliberate: Critical thinkers willingly, intentionally, and actively aim to improve their reasoning skills. They accept that errors are inevitable, but they also try to minimize them. Critical thinkers constantly assess their reasoning strategies and choices in order to reach more sound solutions, decisions, and beliefs in the future. This element of critical thinking involves reflection and introspection. It is metacognitive. In other words, it consists in "thinking about thinking."

Rigor: Critical thinkers are methodical in their approach to reasoning. They admit there is an underlying logic to figuring something out, and they search for order, clarity, patterns and relationships, as well as a deeper meaning below the surface.

Questioning: Doubt and skepticism are fundamental aspects of critical thinking. Critical thinkers pose initial questions, and follow-up with more relevant and probing questions in an iterative manner. Critical thinkers accept the importance of questioning everything. This includes one's very own reasoning strategy, as well as one's core beliefs, values, assumptions, and worldview in an effort to identify biases, avoid errors, and to improve one's reasoning in the future.

Evaluation: Critical thinkers scrutinize the basic components of arguments, beliefs, scenarios, problems, contexts, as well as information itself. This involves analysis and synthesis, the identification of omissions and counterexamples, and other such

evaluative strategies as posited by Bloom's taxonomy, as well as more discipline-specific techniques.

Understanding: Critical thinkers strive to possess knowledge that is truly meaningful, relevant and significant. Such robust and rigorous understanding is more than superficial; it suggests a depth, subtlety and nuance, as well as a lasting meaning. Critical thinkers also aim to effectively communicate their knowledge to others.

Claims: Claims, ideas, convictions or beliefs about a situation, event, scenario, artifact, individual, or state of affairs can be simple and/or complex.

Information and Evidence: Critical thinkers continuously question their sources of information and evidence. They scrutinize such data for value, relevance, meaning, clarity, consistency, accuracy, completeness, and ideological context.

Arguments, Theories and Contexts: Arguments and theories encompass the wide variety of circumstances, learning contexts, and discipline-specific domains encountered by the critical thinker. In a Health Science and Technology course, for example, a critical thinker often aims to accurately diagnose and treat a disease based on a set of symptoms. In a mathematics course, a critical thinker encounters a specific mathematical problem, and they seek to generate a correct answer or formulate a solution. In a history course, a critical thinker encounters evidence, arguments, interpretations, and conclusions, and they aim to respond with their own well-founded position and interpretation.

Perspectives: Critical thinking implies a perspective, framework or viewpoint, and it acknowledges that having such a position, however flawed, is better than having no position at all. Critical thinking recognizes, accepts and respects different, sometimes competing perspectives. It rejects a monolithic, single perspective or an indubitable foundation.

Testing: Critical thinkers rigorously test their beliefs and conjectures and thereby aim to strengthen them. Ideas and concepts that fail to withstand such rigorous and thorough examination or to stand-up to critical scrutiny are modified, replaced, or rejected.

Assumptions and Inferences: Critical thinkers can identify their beliefs, assumptions, and inferences as well as explain their reasoning processes. Critical thinkers can defend their conclusions, and assess the quality of their thinking. They also encourage others to question and evaluate their conclusions, and to challenge them, so as to continually improve the quality of their reasoning.

Solutions, Decisions, Positions: Critical thinkers strive to reach sound solutions to problems, to make clear and reasonable decisions, and to articulate well-founded, defensible positions. A sound argument has true premises and it is deductively valid. Critical thinkers seek to forecast the implications and consequences of their reasoning. They consider alternatives and acknowledge constructive critiques.

Ambiguity, Indeterminacy and Paradox: Critical thinkers recognize and accept that not everything is black and white, and that there are often many shades of gray. They admit the fluidity of identity, the non-fixity of borders and the reality of contingency and uncertainty. They are able to cope with enigma, indeterminacy and paradox, and to admit that some problems are exceedingly difficult, if not unsolvable.

Nuanced and Fair-Minded: Critical thinkers admit that subtleties and complexities exist. They strive to be reasonable, non-dogmatic, and open-minded, to avoid bias and cynicism, not to fall prey to emotion, and to acknowledge and respect different perspectives.

Accountability and Responsibility: Critical thinkers are actively engaged; they take responsibility for their beliefs, values and actions, and they are accountable for them, especially when they are in error. In short, they admit their mistakes, biases, errors of judgment, and instances of unintended harm, and they try to learn from them in hopes of not repeating them in the future.

Faculty Advisory Group for the
Eugene H. Fram Chair in Applied Critical Thinking
(2013-2014)
[Consists of 14 members and includes faculty from each of the 10 RIT Colleges/Centers/Institutes

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