Creating the Research and Innovation Ecosystem

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Introduction

Studies have found compelling evidence indicating the importance of mentoring in promoting the development of a scholar in higher education. Often it is viewed as a relationship between professors and graduate students or junior faculty members. It also assumes professors' influence on students' development through the courses they teach. The topic has been studied thoroughly but it still raises some concerns. As practice indicates, tenure-track/tenured professors mostly teach advanced courses, and term/adjunct instructors, who generally do not have extensive research experience, focus on undergraduate education. This creates a gap in how research and teaching are viewed and approached at different levels, and may have a negative impact on students' success if they choose to pursue their education at a higher level. The Personalized Learning in Applied IT (PLAIT) laboratory offers a comprehensive approach by promoting a nourishing research environment in which professors (adjunct, term, tenure-track, tenured) and students at all levels are empowered in an innovative research ecosystem by participating in a wide variety of synergic research activities.

Undergraduate Education: Awaking a Scholar

The Information Sciences and Technology (IST) department is the largest department in the Volgenau School of Engineering (VSE) with approximately 1,5000 undergraduate students. While the program helps students build strong problem-solving and higher-order thinking skills, it has never actively promoted scholarship activities throughout its curriculum.

In 2016, the IST team, lead by the co-directors of the PLAIT lab, received the OSCAR Curriculum Scholarship Development Grant. Starting Fall 2016, the IST students will have an opportunity to participate in a wide variety of research and creative activities in five undergraduate courses. One of the main goals for the proposed curriculum changes is to provide scaffolded learning experiences for the IST students and help them better understand how research may be applied in the IT field. It is expected that students who complete a sequence of the targeted courses will progress from the Discovery of Scholarship level to the Creation of Scholarship level and will be prepared to perform research independently and create original scholarly or creative projects by the end of their undergraduate college career. This will also open new doors for many students who are interested in pursuing Master's and Doctorate level degrees and certificates.

Courses (Required (R)/ Concentration (C))	Yearly Enrollment	Curriculum Level	Level of Competence	Timeline
IT 105: IT Architecture Fundamentals (R)	600	Discovery of Scholarship	2-3	Fall 2016
IT 214: Database Fundamentals (R)	580	Discovery of Scholarship	2-3	Fall 2016
IT 314: Database Programming (C)	120	Scholarly Inquiry	3-4	Fall 2017
IT 390: Rapid Development of Scalable Applications (C)	25	Scholarly Inquiry	3-4	Fall 2016
IT 490: Application Maintenance and Spiral Development (C)	25 (exp.)	Creation of Scholarship	4	Fall 2017

Table 1: IST Courses Targeted for *Students as Scholars* Development

Graduate Education: Nourishing a Scholar

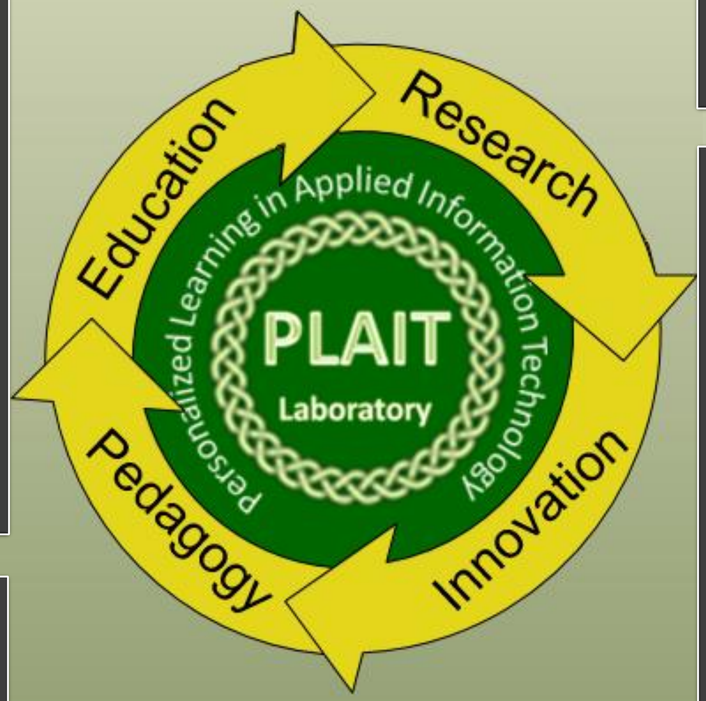
As a graduate student with PhD and research ambitions, developing essential research skills is critical. The program's course curriculums provide an outlet to maintain the basic research skills developed through undergraduate studies, but stop short of providing the opportunity to advance those skills to a mastery level.

The PLAIT lab is available to graduate students who wish to expand their skill sets beyond the course curriculums. Graduate students are offered the opportunity to expand their education, learn new skills, and cultivate existing skills by working with faculty, undergraduate, and graduate students at all levels on a variety of research opportunities and projects.

PhD Education: Raising a Star Scholar

For PhD students, a research ecosystem offers the balance between overspecialization on their studied topic as well as the broadness and diversity that a research team has to offer. Working within a research team gives PhD students ample occasions to enlarge their research horizon, participate in related research projects and publications and receive constructive feedback on their own research ideas.

One of the goals to obtain a PhD is to be able to further advance the state of the art in the field, often requiring the ability to lead and coordinate large research teams. Unfortunately, there is little if any formal education for such activities during a traditional PhD program. However, by participating in a research ecosystem (e.g. PLAIT), PhD students will have the opportunity to be in direct contact with, and lead other students (master and undergraduate) in, research projects. Such an environment will offer PhD students the practice and preparation needed to lead future research teams.



Adjunct Faculty

Adjunct faculty is a vital part of the IST department. The department employs highly credentialed industry leaders who bring their expertise to classrooms. Over the years, the IST department developed and implemented an approach that helps synchronize the efforts of full-time and adjunct faculty, and creates more opportunities for the latter to become early adopters of innovative learning and teaching techniques, or participants in other creative activities.

One example illustrating this approach is IT 214: Database Fundamentals. IT 214 is a required IST course offered in three formats (in-class, on-line, Active Leaning) in eight sections during the Fall/Spring semesters as well as one section during the Summer. Though only one section is co-taught by two full-time faculty (course coordinators), all instructors follow the same instructional approach and use the same course content defined by the coordinators to ensure consistency across all sections.

In Fall 2014, course coordinators of IT 214, also the co-directors of the PLAIT lab, were selected by the Center for Teaching and Faculty Excellence as the first VSE faculty to teach in the Active Learning Technology (ALT) classroom. Once a new pedagogical methodology was developed and tested in the ALT environment, it was successfully implemented in other sections of IT 214 taught by adjunct faculty to support them in their effort to explore and discover new dimensions of innovative learning.

As one of the courses included in the OSCAR Curriculum Scholarship Development Grant, IT 214 also incorporates scholarship activities. Course coordinators, full-time research faculty members, provide scholarship activities for the students in all IT 214 sections and collaborate with IT 214 adjunct faculty to create a synergetic approach in raising a new type of researcher – an undergraduate scholar.

By actively participating in a wide variety of research activities and disseminating the results throughout the IST department, the PLAIT lab creates a nourishing research environment for faculty of every academic rank.

Term Faculty

As a term faculty member, applying for research grants offers both an opportunity and a challenge. It offers an opportunity to conduct primary research as a principal investigator (PI), and to contribute to the field of inquiry. It also offers an opportunity to work with the public or private sectors. The process is time-consuming, and requires strict attention to detail, as well as assistance from your co-PIs through help writing portions of the grant. Frequent communication and planning are critical during the grant writing process. As a term faculty member, your primary responsibility is to the students and teaching. This creates a time management challenge for most in that the demands of the students and teaching have to be carefully balanced with the required deadlines for grants. All of this is worthwhile though, because the opportunity to contribute to the area of study is critical for any academic, whether teaching or research is the focus.

Tenure Track/Tenured Faculty

The tenure track and tenured faculty must play multiple roles in an academic environment: from teaching the students how to perform research, to guiding them while they assist in current research projects, with the final goal of making them capable of initiating their own research topic leading to a successful PhD Thesis. While it is common for tenured faculty working in research centers or large laboratories to delegate such tasks to other junior faculty and senior PhD students, the PLAIT ecosystem is innovative in its approach by encouraging the participation of adjunct and term professors.

In long term, these coordinated research projects will not only benefit students through a hands-on, personalized learning experience with experienced faculty members, but will also result in a larger audience with greater research opportunities for the department.

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