A Professional Writing and Skills Development Program for Engineers in the Modern-Day Clinical Setting

**College/School:** Armour College of Engineering  
**Department:** Biomedical Engineering  
**Timeframe (start/end):** June - Dec. 2018  
**Primary theme of activity:** Research, Enhance IIT's industry network, Direct Student Professional Development, Skills Transfer

**PROPOSAL**  
**What project activities were funded by this grant?**  

This is a pilot educational co-curricular program effort that focused on student skills development in systematic academic writing training and professional conduct in the clinical hospital setting.

To achieve these goals, the Faculty Innovation Award (FIA) enabled the following programming by the grant awardees:

a) systematic academic writing training through a series of five dedicated summer workshops, and dedicated meetings in the synthesis of several student organization and departmental (BME) newsletters.

b) six faculty guest speaker sessions - roster attached as appendix, and a student-organized lunch event (BMES and SWE) featuring the eight undergraduate student program participants as featured contributor and panelists to feature these accomplished milestones (i.e. approximately twelve newsletter articles).

c) A faculty-run (Vaicik, Kawaji) 10-week intensive training for National Science Foundation (NSF) Graduate Research Fellowship (GRFP) preparation, which led to eight successful NSF submissions among the program participants. This programming was added as an extension to our summer programming through the Fall 2018 semester.
RESULTS AND IMPACT
Assess and report on results and impact, starting with objectives outlined in your proposal.

Reach: (# of students, faculty, staff impacted)

Students:
14-40 total student participants routinely participated in the programming associated with a) the summer writing workshop series, and b) the guest speaker sessions. The majority of these participants were from IIT’s Armour College of Engineering; mostly BME students. Select undergraduate and graduate (MS and PhD students) from ChBE, ECE, and MMAE were also present in both summer and fall programming. Five inter-institutional exchange students (summer REU and international exchange) were also present. 2-3 high-school students also participated in select summer program academic activities as part of their volunteering endeavors on IIT campus.

For the NSF-GRFP programming in c), four graduate (PhD, MS, Co-terminal GRAD), five undergraduate seniors, and one junior participated in weekly systematic NSF Fellowship application training led by Drs. Vaicik (lead) and Kawaji (support). Of these, 8x students were from BME, 1x was from ChBE, 1x was from MMAE. Three international PhD program students who were not eligible for NSF fellowship application also occasionally participated (i.e. audited) regular weekly programming activities. 1x junior student completed an application draft for 2020 application cycle next year as upcoming senior. 8 of the remaining seniors and graduate students successfully submitted their NSF-GRFP applications.

Faculty:
Vaicik and Kawaji - Successfully applied for and received a two-year AHA AIREA to administer a research and education program. This AIREA awarded programming continues to build upon successful components of the FIA-led effort in 2019-2020.

Additionally, FIA PI (Kawaji) is in negotiations with a non-profit organization (Taktopia and Co; www.taktopia.com) and the Japanese government (Ministry of Economy, Trade, and Industry [METI]) for IIT to jointly host a summer education program with the University of Chicago tailored to Japanese educators. Jointly with this effort, Kawaji is supporting Taktopia to potentially secure the next phase of METI funding.
ASSESSMENT

What were milestones and successes?

Faculty Milestones - We successfully secured external funding from AHA Award for research and education), and are currently in negotiation for a second award/contract with non-profit/Japanese government for new summer program in late-July/August. A third proposal in collaboration with Northwestern University (IIT-Lead PI - Dr. Ali Cinar with co-investigators Kawaji and Eunice Santos in CS Department) is also currently under preparation for an anticipated February 2019 submission.

Program participants were significantly greater than the initial 8-10 graduate BME students planned prior to receiving our FIA support. Our curriculum programming regularly reached out to 20-40 students (and summer participants from multiple departments including MMAE, ChBE, ECE, etc.); we acknowledge most participants were from our department in BME, although upon award receipt, we made a genuine advertising effort through student organization (SWE and BME) that reached out to both summer students in and outside of our department (i.e. posters in summer housing, etc.)

Initially defined milestones were all successfully met. These were:

1. Four students supported by the writing workshop successfully presented their summer research at the BMES conference in October; i.e. these students each authored a successful BMES abstract, and were awarded a partial conference registration subsidy as an FIA award. A total of 10 undergraduate and graduate student participants of our program had also attended the BMES conference. We deliberately chose not to report this number as an FIA milestone, as we anticipated risking double-counting (e.g. REU-supported and independently funded doctoral students) into this cohort tally.

2. About 12 students contributed to program-specific writing deliverables (various news articles, newsletter layouts, etc.) that comprised a significant portion of our 28-page department newsletter draft in Fall 2018 (delivered to department/dean). These articles were also used for BMES and SWE student programming.

3. Students in BMES and SWE (~7 student organizers) successfully facilitated a series of 3-4 FIA-embedded workshops, including a joint event on Oct. 24th with guest student speakers (i.e. authors of articles).

An Additional Key Milestone - Eight students successfully submitted NSF GRFP applications from IIT. Of these mentored students, seven were from BME.

What challenges did you face? (What would you have changed?)
We did not expect any challenges beyond what was expected from the time of our initial May application submission.

We have made several notable observations that may benefit analogous IIT-based programs, and will list these below:

1) At the time of our initial application, we (faculty) overestimated the summer availability of interested students for the didactic programming at the time of initial application submission. An initial 8 summer program session was reduced to 5 session events between June and August. This was in part due to significant drop in student availability between early August and start of semester. Several guest speakers sessions conflicted with workshop programming; students showed preference (and likely only had the bandwidth in their schedule) to attend one or the other, but not necessarily both. Out of the original 11 external speaker commitments provided to the award committee at the time of application, we eventually hosted six guest speakers for Summer-Fall, where only two were the initially provided lists (Tamura, Narang) were part the originally planned and committed speakers (more on this in the next point).

2) Further regarding external speaker availability: We found that having a departmental list of soft-committed speakers with zero time window was more productive than potentially imposing a time range; for example, at a time/date aligned with this award programming. For instance, one of the initially listed speakers for Fall 2018 has in place committed as BME department seminar speaker in Spring 2019 (Amit Patel MD, Univ. of Chicago Cardiology), although this speaker event now lies outside of FIA programming. We also noted significantly fewer industry personnel (e.g. we had 3x scientists from Philips - all from out of town - committed as guest speakers; however, during 2018 summer, Philips issued a company-wide travel embargo, which canceled their respective Chicago visits and in-person meetings). Accordingly, we adjusted to be more flexible in accommodating soft commits to better suit their own terms (i.e. the next time they visit Chicago, likely outside of current FIA window). and we schedule speaker events if the availability mutually aligns with department schedule.

3) We adjusted to all of the above by facilitating fewer summer-specific courses (from 8 to 5) and guest speaker events (from 10 to 6); a major pivot was made to additionally include 10 weekly NSF graduate fellowship preparation workshop seminars in Fall 2018, which led to an intensive training by select committed undergraduate and graduate students who completed our weekly curriculum from end-August through Oct 23 fellowship application deadline date. This in our own opinion became our most successful student milestone. n=8 successful NSF GRFP applications were submitted from our program participants.

What did you learn?

IIT-BME Students who took part in this programming were overall positive about partaking through this experience; student feedback obtained by BMES student (for a summer project)
showed positive feedback. Faculty involved in academic curriculum programming benefited from additional detailed attention given to pedagogy and curriculum development; for instance, Kawaji (and BME 309) course received overall favorable student feedback and end-semester review. This was directly due to the writing-training focused curriculum that were complementary between the FIA-supported co-curricular programming and the core BME 309 curriculum that emphasized on academic writing and BME in the clinical hospital setting.

We anticipate establishing an IRB to formulate a formal research student towards an eventual publication in education research. One student organizer (Akila Goel) has successfully initiated this process since this summer through this FIA program support.

**FUTURE PLANS AND SUSTAINABILITY**

**How will this project be sustained? Did anything change from the original plan?**

Primary Faculty team that facilitated this summer and fall programming (Kawaji, Vaicik) have successfully secured American Heart Association funding for expanded research and education program based on this pilot effort. A complementary program is expected to run at IIT in summer 2019 with Japanese gov’t support. We have successfully published aspects of our summer findings at BMES 2018 in Atlanta, GA - although the initial abstract submission was not a direct outcome of this FIA award.