

The SUTD-MIT Global Leadership Programme: Attempting institutional transplantation through cross-cultural student leadership development

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INTRODUCTION

Over the last decade, numerous higher education institutions have begun to engage in cross-border initiatives, including in the disciplines of engineering and technical education. Successful implementation of these international collaborations is important to achieve fundamental systemic reform in engineering education [1], and “to respond to changing socioeconomic conditions worldwide” [2]. While these efforts have great diversity in size and scope, projects that attempt complete *institutional transplantation* of the academic, student, and research culture of one institution to another merit special attention due to their breadth and resultant complexity [3]. In 2010, the Massachusetts Institute of Technology (MIT) began one such project in collaboration with the Singapore Ministry of Education to co-create the Singapore University of Technology and Design (SUTD), an undergraduate and graduate institution that enrolled its first students in May 2012. The goal of this collaboration was the development “of a new engineering-oriented university that will reach the Engineer of 2020 vision, while in parallel addressing the timely formation of an institutional identity and culture that borrows from those of MIT” [2]. In planning for this project, the MIT-SUTD Collaboration staff identified four crucial pathways in which to focus their efforts towards institutional transplantation: faculty development, state-of-the-art undergraduate curriculum design, collaborative research through the joint International Design Centre (IDC), and initiatives related to student life and student leadership.

In addition to its renowned faculty and rigorous academic programmes, MIT owes much of its historical and present success to the Institution’s unique student body.

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Therefore, in the realm of student leadership, MIT staff members sought to transfuse the innovative, entrepreneurial, bottom-up and free-spirited culture of the MIT undergraduate community to the student body of SUTD through a variety of avenues [4]. The first such avenue was through the MISTI Singapore Leadership Initiative (MISTI-SLI) Programme, an MIT-to-SUTD student exchange programme initiated in the summer of 2012 and currently in its third year [5]. In the summer of 2013, a sister programme called the SUTD-MIT Global Leadership Programme (GLP) was launched in parallel to MISTI-SLI. Through the GLP, 28 members of the inaugural SUTD student cohort participated in a 10-week programme at the MIT campus in Cambridge, Massachusetts to actively engage with the MIT and Boston-area community, while simultaneously receiving training in teamwork, design, entrepreneurship, education, and technical communication through the lens of student leadership. This paper presents the design, development, and execution of the inaugural GLP programme, as well as an explanation of this initiative as a specific vehicle for MIT's institutional transplantation effort in the SUTD project.

1 STUDENT LIFE AND CULTURE

1.1 The importance of student involvement and leadership

Student life, especially participation in co-curricular organizations and activities, is an important component of residential education in modern-day higher education institutions. This type of student engagement can take many forms, including through student clubs, residential communities, varsity and non-varsity athletics, and many more formal and informal activities [6]. Existing research shows that participation in these and other co-curricular activities promotes a student's interaction with his/her community, intellectual development, and overall satisfaction with the college experience [7].

The fundamental theory regarding the importance of student engagement in college is Astin's seminal "student involvement theory," which theorizes that the greater a student's involvement and engagement with the campus community as an undergraduate, the greater their learning and personal development during their years in college [8]. More specifically, students involved in activities such as student clubs are less likely to drop out of college than students less engaged in their campus communities; in the case of students of colour or students academically underprepared for college, this difference is especially pronounced [9].

1.2 Student life and engineering education

Although much literature exists on the broad benefits of students' co-curricular and extracurricular involvement, only in recent years has work been performed to investigate the relationship between student involvement and skill development through an engineering education lens. Most research on students' co-curricular involvement traditionally focuses on how co-curricular activities can develop students' leadership skills [10], which are deemed to be both valuable and important by academic and professional employers of engineering graduates [11]. Studies of engineering faculty indicate that this stakeholder group views co-curricular and extracurricular activities as important opportunities for students to develop leadership outside of the "full" engineering curriculum, in which it would be difficult to incorporate new leadership content [12]. Furthermore, some recent work also illustrates how participation in these activities can promote development of specific student skills specifically relevant to engineering education and practice [6], [13].

To date, there is also some research on the role of specific types of student involvement – such as multidisciplinary design teams or international programs – within the context of undergraduate engineering education [14], [15]. Conversely, some literature in engineering education addresses specific skill areas – such as engineering ethics – and how they can be developed through a student's campus involvement [16]. Addressing the needs of the "global engineer," some current research also concerns how leadership development in engineering education can be particularly relevant to address the needs of particular national contexts around the world; one example of this vein of research is Bairaktarova, Cox, and Evangelou's work on leadership training in science, technology, engineering, and mathematics fields in Bulgaria [17].

1.3 Student life at MIT

In January 2013, MIT's campus had 436 officially registered student groups serving a population of approximately 10,000 students (approximately 4,000 undergraduate and 6,000 graduate) [18]. These organizations represent a variety of organizational types, with the largest representation of cultural interest organizations (60 groups), arts societies (58 groups), service organizations (34 groups), and athletic teams and departmental organizations (32 groups each) [18]. In addition to these school-recognized activities, MIT students also participate in many well-known but unofficial campus activities such as the underground "hacking" community active on the Cambridge campus.

1.4 Student leadership at SUTD

As of summer 2014, MIT and SUTD staff members have developed and implemented numerous initiatives to promote student leadership and campus involvement at SUTD (see Fig. 1 below). Before the formal opening of the SUTD campus in May 2012, SUTD administrators developed a "Campus Builders Programme" to facilitate leadership on the new campus by hiring prospective students to act as campus planners working in collaboration with the Residential Life, Student Life, and Academic Offices at SUTD. After the formal start of campus activities in summer 2012, MISTI-SLI was launched as an exchange opportunity to enable MIT students to experience SUTD and serve as "surrogate upperclassmen" for the first class of undergraduates at the new university [4]. Through this 8-week programme, 18 MIT graduate and undergraduate students were given the opportunity to experience the Singaporean workplace through paid internships and to aid the first class of SUTD students in the establishment over two dozen student organizations (a number that has grown during the university's second year) [4]. A year after the launch of MISTI-SLI, the SUTD-MIT Global Leadership Programme (GLP) was begun to expose the SUTD students to MIT's culture and to further promote bottom-up student leadership at the new institution by fostering student's passion for and commitment to leadership during their time on exchange to MIT.

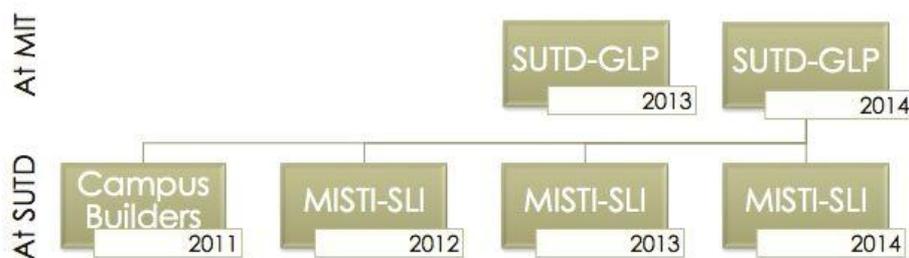


Fig. 1. Student leadership programmes initiated by MIT and SUTD, 2011-2014.

2 GLOBAL LEADERSHIP PROGRAMME OVERVIEW

In the realm of student life and student culture formation, one of the primary goals of the MIT-SUTD Collaboration team is to transfuse MIT's student culture and attitude of innovation, creativity, leadership, and entrepreneurship to the newly established SUTD student community [5]. To address this goal, the MIT-SUTD Collaboration staff developed student exchange and leadership programmes between the two universities particularly tailored to serve the multifaceted nature of this collaboration and to expose Singaporean and American students to the leadership and culture of their institution's international partner. The GLP, the first SUTD-to-MIT exchange programme, launched in the summer of 2013. Through this programme, 28 SUTD students spent 10 weeks on and around the MIT campus in Cambridge, Massachusetts, actively engaging and interacting with the MIT community as well as other stakeholders and universities in the greater Cambridge and Boston area.

The MIT-SUTD Collaboration staff developed this programme with the intent to provide the participating SUTD students the opportunity to experience western academic culture – in particular MIT's unique student culture – and to assist in development of a group of students that would act as leadership "seeds" within the greater SUTD community. To this end, the activities of the GLP program were designed to support students' individual leadership development, while at the same time inspiring GLP participants to establish new organizations, traditions, and ideas upon their return to Singapore at

the conclusion of the GLP. These activities were coordinated by MIT staff members with guidance and support from colleagues at SUTD, and were selected to complement the curricular and extracurricular goals of the SUTD undergraduate curriculum.

Table 1 presents an overview of the topics and programme content included in the 2013 session of the SUTD-MIT GLP. In addition to the leadership and cultural activities referenced above, GLP students also received coursework designed to raise their awareness in regards to global leadership issues of relevance to engineering, including science, technology, engineering and math (STEM) education, design, and technical communication skills.

Table 1. Overview of Global Leadership Programme topics and activities

Topic	Program Content
Intensive LeaderShape Program	One-week off campus leadership camp with MIT staff and graduate student mentors
GLP Orientation	Orientation regarding MIT campus life, policies, and structure of GLP program
MIT Student Art Association Classes	Weekly ceramics classes organized and facilitated by the MIT Student Art Association
Electric Vehicle Challenge	Electric vehicle design course designed and run by MIT students with culminating design competition event
MIT Leaders Series	Invited speakers and coordinated visits to Boston-area start-up organizations
Writing Workshop	Workshop focused on written communication skills for engineers
Introduction to K-12 Outreach Programmes	Couse focusing on the possible development of an SUTD student-run K-12 STEM outreach program
e-Club	Various sessions and workshops designed by the MIT entrepreneurship club
Educational Weekend Trip	Field trip including physics-related academic activities and a hands-on project
Ad-hoc Workshops	MIT special sessions on various topics organized throughout the programme
Social Events	Social events organized by the MIT-SUTD Collaboration office (on- and off-campus)
Weekend Leisure Trips	Weekend leisure trips organized by SUTD students in the north-eastern United States

By presenting the visiting SUTD students with a variety of topics of both social and academic natures, MIT Collaboration staff sought to enable the students to develop their leadership, communication, and critical thinking abilities in both formal and informal settings throughout the duration of the programme. Detailed explanation of primary GLP topics are presented in Section 3 below.

3 GLOBAL LEADERSHIP PROGRAMME TOPICS

3.1 Student leadership

In the course of the summer 2013 GLP, students participated in two distinct leadership activities designed to promote development of students' leadership skills and inspire the students to become driven student leaders within their campus community.

First, during their first week in the United States, SUTD students participated in LeaderShape, a weeklong off-campus leadership development workshop coordinated in conjunction with the MIT Student Activities Office. This experience complemented a short, 2-day outdoor leadership training program in Singapore in which the GLP students participated before leaving for the United States. At LeaderShape, trained leadership facilitators coordinated the GLP students' activities. During this programme, students were joined by MIT staff and student mentors, several of whom remained in contact with the students throughout the 10-week duration of the GLP programme.

In addition to the leadership activities at LeaderShape, an “MIT Leaders” speaker series was also organized for the students throughout the rest of the GLP programme upon the students’ return to the MIT campus. Through this series, GLP students interacted as a small group with notable alumni and staff members of the Institute, gaining exposure to the unique accomplishments of many prominent personalities from the greater MIT community. MIT coordinators designed this series in an effort to inspire students’ individual leadership on the SUTD campus and beyond.

3.2 Electric vehicle challenge

The academic centrepiece of the 2013 GLP experience was the Electric Vehicle Challenge (EV Challenge), in which participating students were broken into small groups and charged with designing a single-driver electric vehicle for a competition at the end of the summer. This course was designed and run by MIT graduate students with prior experience in MIT design courses and included practical and instructional work in computer-aided design, manufacturing and machining, and team design. To construct their vehicles, students gained access to around-the-clock manufacturing and fabrication facilities, a set-up reflective of traditional MIT mechanical engineering and design experiences. The concept of around-the-clock, innovative design challenges is a cornerstone of the MIT undergraduate learning experience, and the EV Challenge allowed the SUTD students to experience a similar academic environment in the context of their summer at MIT, while in parallel engaging with current MIT students in their roles as instructors and mentors. After the conclusion of the GLP, students’ vehicles were shipped back to their home campus in Singapore for future work and exhibition on the SUTD campus.

3.3 K-12 outreach seminar

In addition to the summer-long Electric Vehicle Challenge program, GLP students were enrolled in a weekly K-12 Outreach seminar focused on topics of science, technology, engineering, and mathematics (STEM) education. Currently, both the United States and Singapore are facing challenges in pre-collegiate STEM education, and this course was designed to serve as an “inciting force” to spark students’ interest in educational community service and outreach activities.

In addition to investigating issues such as international comparative STEM education, access for women and minorities in STEM fields, and teaching the “E” in STEM education, students worked in teams to design proposals for an inaugural K-12 STEM outreach program at SUTD. After returning to SUTD, some GLP participants collaborated with their fellow SUTD students in development of outreach activities, and in January 2014, SUTD held its first entirely student-developed design workshop for 28 middle and high school students.

3.4 Topical workshops

To complement the other academic activities of the GLP, programme coordinators organized a series of workshops on additional professional and personal skills of relevance to a 21st century engineer. As written communication is a critical skill in preparation for leadership in technical fields, the largest of these activities was a weekly writing workshop that served as an introduction to academic and technical reading and writing. All of the workshops were designed to supplement components of the first-year SUTD undergraduate curriculum, which was itself designed in collaboration with MIT faculty and staff members [3].

3.5 MIT campus activities

In addition to the academic activities organized for the GLP students, they were also provided with opportunities to experience some aspects of MIT’s student culture despite the fact that few undergraduates were on campus for the duration of the programme. These activities included social events, a weekly class coordinated by the MIT Student Art Association, and meetings of the MIT Entrepreneurship Club (e-club). Additionally, a current MIT undergraduate student was hired to serve as a liaison between the visiting SUTD students and the MIT student community, aiding the GLP participants in navigating their new home in Cambridge. All of these activities were meant to aid in the communication of MIT’s culture to the visiting SUTD students in hopes that they would adapt and transfuse MIT’s cultural norms to fit the SUTD environment upon their return to Singapore.

3.6 Trips and social activities

Throughout the duration of the program, GLP students participated in both staff-organized and student-organized trips and social activities. While most activities took place in the greater Boston area, students also participated in long-distance trips to locations such as Niagara Falls, New York City, and Provincetown, Massachusetts. These excursions gave students the opportunity to experience other aspects of American culture; to gain exposure to nature, architecture and engineering design; and engage with communities very different than in their home in Singapore. These experiences further supported the goal of exposing the SUTD students to the culture surrounding MIT and provided context for the broad environment surrounding the Institute.

4 CONCLUSIONS AND FUTURE WORK

At the conclusion of the 2013 GLP, MIT administrators and staff members sought both formal and informal feedback from the SUTD student participants regarding their time visiting the MIT campus to assess students' perceptions of GLP activities as well as their time in the United States more broadly. While the students expressed some criticisms and concerns in regards to pieces of the programme's content, overall impressions of the GLP were extremely positive. Students who had not previously visited the United States expressed especially strong appreciation for the GLP, as it gave them the opportunity to gain exposure to a new culture very different than anything they had experienced before. The content of these programme assessments was then used in designing the 2014 iteration of the GLP, which was held from June to August 2014.

In addition to the successes with the first cohort of GLP students, MIT-SUTD Collaboration staff members have received positive feedback from the greater SUTD community regarding the success of the GLP. For the 2014 iteration of the programme, staff at MIT received requests to expand the GLP opportunity to include a greater proportion of the SUTD student community due to overwhelming student demand; as a result, the 2014 program has been expanded to include 30 participants, an enrolment that will likely grow in future iterations of the programme. In designing the GLP for 2014 and beyond, the MIT-SUTD Collaboration team hopes to enhance the program to incorporate broader needs of "global engineers" beyond the scope of this collaboration.

To better tailor future GLP experiences to the goals of the MIT-SUTD Collaboration, the MIT team is putting additional effort into developing a deeper understanding of the SUTD students' pre-collegiate educational background through informal interviews and engagement with SUTD students, faculty, and administrative staff, measures established in an effort to identify new and different content to deliver to students during their time on exchange to MIT. As a result of the insights gained through this engagement, future GLP programmes will include topics and teaching methodologies that differ between eastern and western academic cultures. For example, two topics absent from traditional Singaporean academic curricula include a lack of exposure to wilderness environments and a lack of "do-it-yourself" culture; as such, content that emphasizes these issues was incorporated into the 2014 GLP programme.

Furthermore, the MIT-SUTD Collaboration team plans to continue its emphasis on connections with Singaporean K-12 education stakeholders given its status as a new university with an innovative pedagogical approach. Although SUTD utilizes traditional marketing avenues in recruiting new students, continuing to encourage the GLP students to coordinate initiatives with the Singaporean secondary education system – as MIT students do with American K-12 students – may help SUTD continue to gain positive public exposure in Singapore. These types of activities allow younger students to actually experience the SUTD culture, while in turn allowing SUTD students to gain teaching and leadership experience.

Finally, the MIT team hopes to further benefit the global engineering education community by designing and implementing a series of studies related to the perceptions of engineering leadership in western and eastern contexts in coordination with future iterations of GLP and MISTI-SLI. In addition, the MIT team plans to pursue detailed and rigorous assessments of future GLP participants' learning outcomes and perceptions of the programme as a whole to determine whether or not the GLP has contributed to the students' pursuit of leadership opportunities upon their returns to SUTD. While this type of assessment was infeasible during the first GLP, future iterations of the programme developed using students' previous feedback will provide unique opportunities for this type of research.

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