

Enactus Project Center for on-campus IQPs



WPI



enactus™

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Introduction

WPI developed an educational model in 1970 to offer students a unique set of experiences with a project-based curriculum and cooperative work. This model, called “The Plan,” features project work in both major concentrations and general education¹. There are three main projects called for by The Plan that make up an important portion of the graduation requirements: the Humanities and Arts Project (HUA Project), the Interactive Qualifying Project (IQP), and the Major Qualifying Project (MQP). The implementation of these projects into the curriculum has overall been very successful and remains one of the most prominent features of student life at WPI.

The Interactive Qualifying Project (IQP) is a key and distinctive element of the WPI Plan. The IQP serves as the junior year portion of WPI’s project-based curriculum, and it is intended to help students learn to solve real-world problems while understanding the humanistic context of their work². IQPs are typically completed by groups of three to four students, although it is possible to do an IQP as an individual or to form an even larger team. All IQPs have at least one academic advisor who ensures that the learning outcomes of the project are met and grades the project at its completion. Advisors also provide some guidance to the students during the project and approve the IQP topic. There is a wide range of topics for IQP, from education to social services, and healthcare to law, but often the focus is on sustainability, with problems that require students to relate science and technology to society³. Still, there is some flexibility in the choice of topic for an IQP, allowing projects focused on stock trading or narrative writing to be completed in fulfillment of the IQP requirement.

¹ Worcester Polytechnic Institute, The Story of The WPI Plan, Worcester Polytechnic Institute, December 2011, <https://web.wpi.edu/academics/library/history/plan/>

² Worcester Polytechnic Institute. Center of Project Based Learning, 2018, <https://wp.wpi.edu/projectbasedlearning/>

³ Worcester Polytechnic Institute. *WPI Undergraduate Catalog*. Worcester Polytechnic Institute. 2018.

The over 75% of juniors at WPI complete their IQP at an off-campus project center, of which WPI's Interdisciplinary and Global Studies Department operates over 50 project centers⁴. At an off-campus project center, an IQP is completed in one term by a group of four students and each project center hosts multiple IQP during its active terms. For example, the Nantucket Project Center hosts six IQPs during B term⁵. Each project center has a director and advisors, so even students completing their IQP at a project center are able to have face-to-face meetings with their advisors. While at a project center, on top of managing the academic side of the project, advisors also help to smooth out differences between sponsor expectations and IQP realities, while the director fosters connections with sponsors, approves projects, and handles the operations of the center. In addition to working on their project during the term they are off-campus, students completing an off-campus IQP are required to take ID2050 and do a Pre-Qualifying Project (PQP) in the term before they go off-campus, introducing the students to their project, helping them to write their research proposal, and preparing them for their seven-week IQP experience. The focus of ID 2050 and PQP is the development of a proposal for the research that will be conducted off-campus. If a junior chooses not to, or is unable to, go off-campus for IQP, they must complete an on-campus IQP.

Differences between On- and Off-Campus

There are a few similarities between an on-campus and off-campus IQP. Like off-campus projects, the preferred team size is four students and there is at least one academic advisor who

⁴ Worcester Polytechnic Institute, Interdisciplinary and Global Studies Division, December 2018

⁵ Worcester Polytechnic Institute. Center of Project Based Learning, 2018, <https://wp.wpi.edu/projectbasedlearning/>

plays the same role as an advisor off-campus. Overall, there is more flexibility in the on-campus IQPs. Whether or not ID 2050 or the PQP are a requirement depends on the advisor, and the length of the project can be anywhere from one term to three terms. Most on-campus IQPs are done in three terms alongside the other classes the students may be taking, although this depends on the specific advisor and project.

While many engineering schools have some sort of senior year project similar to an MQP, IQP (or a similar project) is a requirement that few other schools implement. Since its implementation, IQP has served as a way for students to work on real world problems, with the emphasis being on the societal aspects of challenge. The project pushes students to work with students of other majors, with the work tending to be less technical because of the societal focus. Because of the unique focus and organization of IQP, students gain valuable experience working on interdisciplinary teams, studying complex issues, and managing the needs of different stakeholders. Combining this experience and MQP, WPI graduates feel long-lasting positive effects, many of which translate well in the workplace. Key among the positive impacts of the project work is an increased understanding of the ethical and cultural issues at play in many problems, an effect that can likely be traced to IQP more so than MQP⁶. Taken as a whole, The Plan has been an outstanding success, even winning the Gordon Prize for Innovation in Engineering and Technology Education in 2016. Winning the Gordon Prize verifies the success of The Plan, especially IQP, as the award specifically refers to “innovative problem solving, interdisciplinary collaboration, and global competencies”⁷. Overall, WPI is able to take great pride in the success of the IQP program.

⁶ Quinn, P. Vaz, R. *Long Term Impacts of Off-Campus Project Work on Student Learning and Development*. IEEE, October 2014.

⁷ Worcester Polytechnic Institute, The National Academy of Engineering Recognizes WPI, Jan 2016.

Because of the crucial role that IQP plays in the education of students at WPI and the success that has come as a result of The Plan, it makes complete sense for IQP to be reinforced in WPI's Strategic Plan, which was introduced in 2015 as a set of goals and plans for the immediate future. Indeed, IQP is addressed, although not by name, in the section "Global Projects for All," with the goal to give every student the opportunity to take part in global studies, which would overwhelmingly take the form of off-campus IQP. To accomplish this, the school has committed to giving a stipend to every undergraduate student⁸. As of the 2018-2019 academic year, that stipend is \$5,000 for students in the sophomore and freshman classes. For students whose main obstacle blocking them from completing IQP off-campus, whether domestically or internationally, would have been money, this stipend will certainly give them access to global projects. For students who have other reasons to stay on-campus, the stipend has no effect on their ability to take part in global projects, and it may not improve their access to excellence.

The Problem

With the increasing effort being put into improving the quality of and widening the access to off-campus IQP, comparatively little is being done to positively impact on-campus IQPs. As the gap between the two main options for IQP increases, students who decide to complete IQP on-campus will continue to receive a substandard experience.

Positives of Off-Campus

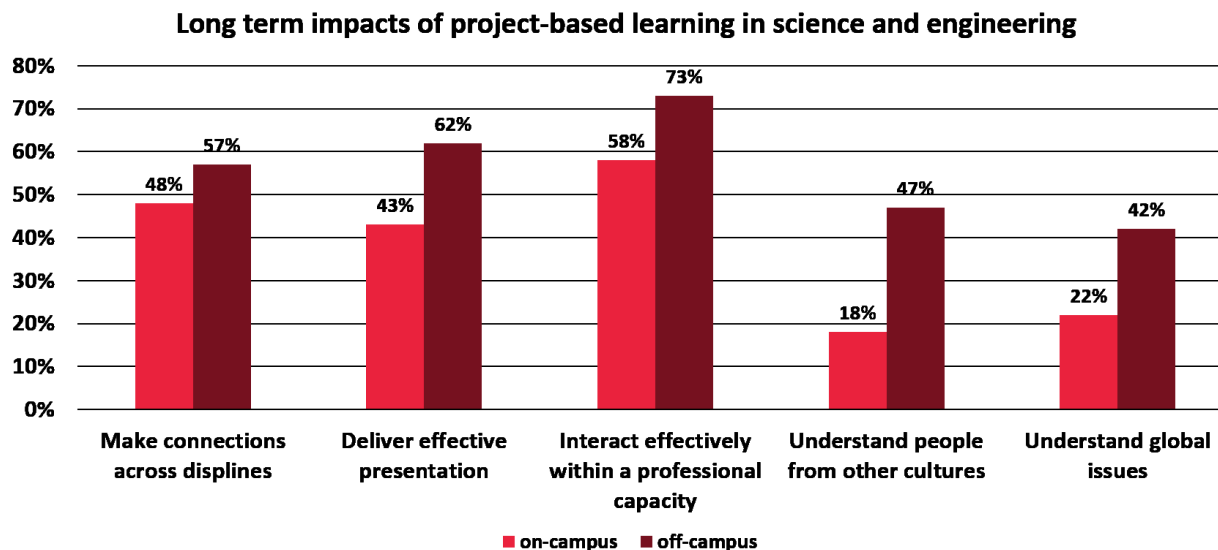
One of the main best features of some of the off-campus IQP, is having a shared work space for the project center. Having shared work space, allow the students to collaborate with different IQP groups and bounce ideas between each other's. It also gives the students a chance

⁸ Worcester Polytechnic Institute, Strategic Plan, 2015.

for more human interaction, which plays a key role in the success and motivation of the students. “I had very little interest, but working for a term solely on that project and communicating with the people, it affected me significantly and increased my engagement” a quote from our conducted survey. The quote shows that the human interaction increased the engagement and interest of the student.

Having the IQP done in one term is another key that helps the students focus on and produce higher quality IQP. “I had very little interest, but working for a term solely on that project and communicating with the people, it affected me significantly and increased my engagement” another response from our conducted survey. We can clearly see that when the students focus their work on one term and putting their entire effort solely on the IQP project helps me stay away from class distractions. Having homework, exams and classes to attend will shift the attention of the student from the project.

The focus in helping a community is another feature that distinguish the off-campus IQPs from the on-campus one. Having a goal to serve a specific community, gives the students more purpose and engagement for their IQP. And it also meets the humanitarian aspect of the IQP learning outcomes. The students in off-campus IQPs have a chance to communicate with the community they are serving, which also improves their communication skills.



(Graph 1)

Graph 1⁹ shows the difference between the on and off campus long term impact of project-based learning. We can clearly see that the off-campus IQPs have greater impact in the social skills, since the students have more human interaction with their community.

Finally, from our surveys, 81.82% of the off-campus IQP students have reported having a sponsor for their projects while only 13.04% of the on-campus IQP students reported having a sponsor. Sponsors provide data and resources to the IQP project, and is an additional key to increase the human interaction for the students.

Limitations of Off-Campus

Although there are many benefits to off-campus IQPs, there are several limitations that they have due to their nature from being located away from campus. Although benefits of the mandatory ID 2050 and one-term project have been documented, through collections of past assessments, interviews, well as recent data, the limitations are also well-known. The collected

⁹ Quinn, P. Vaz, R. *Long Term Impacts of Off-Campus Project Work on Student Learning and Development*. IEEE, October 2014.

data reveal problem from unavailability of advisors, the distance from the research benefits from the library, to the restraints made by jobs, family, and degree plan that students have to deal with as well as the high pay wall that most students faced even with financial assistance.

In on-campus IQPs, the requirements to attend a project are usually what preferences the advisors or sponsors would want in any of the students doing the project, from being in a certain major, grades, or interest level in the project itself. However, in off-campus IQPs, there are other criteria, such as proficiency in the language where the project center is located. This language barrier will prevent students from doing projects in locations where they cannot speak the native language. Another barrier to off-campus projects is the cost of attendance. With the cost of tickets and of living abroad being expensive, many students are unable to go even with financial aid (e.g the global scholarship). Students are unable to go abroad for multiple reasons , from the common problems of having jobs that they can't leave for seven weeks and the structure of their degree plan making them unable to go off-campus to the less common reason , such as having family responsibilities, and medical conditions that make them unable to go abroad.

Positives of On-Campus

Although there are limitations to an on-campus IQP when compared to off-campus projects, there are properties of on-campus projects that benefits students which off-campus project lack. The student's access to the school resources greatly help them in goals such as data gathering and project progress and with less of a burdensome financial hurdle that off-campus projects have, students could have a full IQP experience. While off-campus, students don't have all the WPI resources to their disposal, such the ATC and the research librarians. Resources like the research librarians can help the student with researching, information gathering, finding data

from verified sources, while the ATC aids the students with technological aid , as well as with visual data, as such posters.

Another positive of an on-campus project is that it doesn't sideline other commitment. With off-campus projects, the student would have put aside their commitments to their jobs for seven weeks, and for some students, to do so is impossible, as it could be their only income. As said before, some students have degree plans that make it impossible to go off-campus without missing a part of a course requirement. Other students have commitment to their health, such as daily medical intakes, that makes travelling to other location difficult. With on-campus project, the students wouldn't have to choose between a project and their commitments.

Students who are financially unable to go off-campus benefit greatly from on-campus projects. Although WPI has made ways for more students to have an off-campus experience, for some students, it is still unaffordable for them to go off-campus. On-campus projects let these students still obtain an IQP experience and with all the benefits it entails.

Limitations of On-Campus

When looking at the available evidence, there is a clear gap between the qualities of on- and off-campus IQP. For years, on-campus IQPs have lagged behind their off-campus counterparts in terms of report quality, many of the desired learning outcomes, and long term impact on students. In the earliest hard-data we could find about IQP quality, a report that rated IQP reports for overall quality and integration of ABET items from 2001 by Professor DiBiasio, the shortcomings of on-campus IQP is on full display. Each item was rated on a 5-point scale, with 1=poor, 3=acceptable, and 5=excellent. For on-campus IQPs, the average rating for overall report quality was only 2.98, a rather low mark considering off-campus IQPs had an average

rating of 4.19. This, however, is only a measure of the quality of the written report. The ratings of the ABET items better reflect the quality of the learning experience. In the 2001 review, on-campus IQPs averaged below acceptable for the ABET items regarding work on multidisciplinary teams, impact of engineering on society, and the social responsibility of engineers, among other categories¹⁰. Given the goal of IQP and the WPI Plan in general, these results are disappointing. Despite these results being nearly two decades old at this point, many of these problems still exist. In a more recent set of reports published by the UMass Donahue Institute, the long-term impacts of on-campus project work lags behind that of off-campus work. Given that more students complete off-campus IQP than off-campus MQP, when the UMass Donahue Institute finds that 44% of alumni who completed an off-campus project had an expanded understanding of global issues compared to only 24% for on-campus projects only, it can be safely assumed that on-campus IQPs do not give students an exposure to global issues on par with off-campus projects¹¹.

There are a number of factors that contribute to the shortcomings of on-campus IQPs. Some of these are unavoidable as a result of being completed physically on-campus, others can be mitigated, but require additional effort. On-campus IQPs not having the same effect as off-campus IQPs in regards to understanding of other cultures, racial and ethnic backgrounds, or global issues is simply an effect of completing an IQP on-campus here. Unless the focus of the project is on people of other cultures or global issues, students working on-campus will not get exposed to them. Limitations such as this make secondary outcomes, such as expanded respect for other cultures, difficult for on-campus IQPs to achieve. As far as the academic outcomes are

¹⁰ DiBiasio, D. *Summary of Worcester Community Project Center and On-Campus IQP*. Review Activity. July 25, 2003

¹¹ Quinn, P. Vaz, R. *Long Term Impacts of Off-Campus Project Work on Student Learning and Development*. IEEE, October 2014.

concerned, there are two main limitations. First, having to work on IQP alongside other classes makes time and priority management much more difficult compared to an off-campus IQP. In our meeting with Dean Heinricher, he pointed out that having to balance the short-term commitments of a course at WPI with the long-term commitments of IQP tend to result in IQP tasks being pushed off¹². This is a limitation that can only really be mitigated by having an on-campus IQP completed in one term, with no other classes during that term. The other factor that makes academic success more difficult for an on-campus IQP is the fact that most on-campus IQP advisors do not require their students to complete ID 2050 or PQP. Instead, the first term of work during IQP on-campus typically reflects some of the work that would be done during PQP. This is clear from reading the “IQP Guide and Syllabus” provided by the WPI, in which it states that the goal of the first term is “the development of a project proposal,” which parallels the goal of PQP. Overall, this means that students completing IQP on-campus have less time, credit-wise, to work on their projects.

¹² Heinricher, A. Personal Interview. 2018, November 6, 2018.

Methodology

We used multiple ways and channels to obtain the data required for our project. We scheduled multiple meetings with some of our stakeholders and got a lot of information through those interviews. We searched through several databases providing by either IGSD or other staff member. The following section described what we specifically did for each methods.

Survey:

We made a survey to see where a student went for their IQP and how their overall experience was, has been extremely beneficial. We asked students whether their IQP was on or off campus. In addition, we asked how their advisor was during the project, in order to see whether or not the advising administrator plays a role in the quality of the students' IQP experience. We also asked students to rate elements of their IQP experience from 1 to 5 (1 being the worst and 5 being the best). Students who wished to be interviewed left their emails in the survey so we could follow up with them.

We got 274 students to fill our survey, 78 of which did not finish their IQPs during the time of the survey, thus they were unable to answer the survey questions. We ended up with 194 students who completed the survey, 33 students (17.01%) reported completing an on-campus IQP, whereas 161 (82.99%) completed an off-campus IQP. A list of the survey questions and their responses are included in the appendix of this report.

Focus Group:

From the survey, we were able to contact the students who were interested in participating in the focus group. We held a focus group on 30 January, 2019 in order to better understand the IQP experience. We were only able to meet with four students, all of which had completed off-campus IQPs. We built our focus group questions to help us understand their

experience in more detail, and we designed them to have open-ended answers. This led us to uncover some new aspects to the problem that the students were facing, and understanding which factors are most impactful to their IQP experience. We also uncovered some of the issues associated with off-campus IQPs that had been hinted at in the survey responses.

Emails and Appointments:

Upon starting our IQP project, we sent out Emails to many different departments and people of interest requesting pre-existing information. There are surveys and assessments done after the completion and submission of every IQP, and we saw if students are accurately reporting their negative or positive experiences to WPI. We also set up a couple of appointments with the IGSD, and the Registrar's office, so we could find more information about existing data on IQP and how the projects have changed over the years. Through the feedback we got from emails and the appointments, we were able to gain access to some databases and specific information about previous surveys, results, and actions taken by the department in order to improve all IQPs.

Interviews:

During our research, we interviewed a number of faculty at WPI to gain their insight on topics related to IQP.

Dean Kent Rissmiller, Dean of IGSD at WPI. Professor Rissmiller gave us a background regarding on-campus and off-campus IQPs and what are the main differences between them. In addition, Professor Rissmiller guided us to some major weaknesses of the on-campus IQPs.

Professor Suzanne LePage, Director of the Sustaining WPI on-campus project center, gave us some information on how to form and run an on-campus project center. Seeing as this is a fairly uncommon endeavor to undertake, it was important to understand her experience in order

to apply it to our own goal. In addition, she was able to give us some features of her project center that we applied to our proposal.

Professor Robert Hersh directs and co-directs a number of project centers, both on- and off-campus, Professor Hersh has a unique perspective on the differences between the two types of IQP. Interviewing him helped us understand if there are any serious deficiencies in the on-campus IQPs.

Professor Arthur Heinricher, the Dean of Undergraduate Studies, was able to give us some more general information about the student response to the IQP experience and the school's efforts to evaluate IQPs. In addition, Dean Heinricher was able to give us the overview of the students' responses to the IGSD surveys students fill out after completing their IQPs.

Proposal

Excellence should be accessible to all WPI students, regardless of their ability to go off-campus. We believe this is possible if on-campus IQPs are held to the same standards as off-campus projects; many of the features that make off-campus projects successful can be applied to on-campus projects to allow students who do not travel the chance to work on projects they can be proud of. The Enactus On-Campus Project Center will reduce the inequality in experience between on- and off-campus IQPs by combining the best features of the current on- and off-campus project centers. We believe it will be an effective and attractive alternative to current on-campus project centers and off-campus projects. The center will collaborate with Enactus as a sponsor which will help in closing the gap between on-campus students and communities across the globe, by finding sponsors and stakeholders for the projects. Teams will collaborate with each other in a shared project space with the help of advisors and the sponsors to produce

innovative solutions that can be implemented and add value to the communities normally outside the scope of an on-campus project.

Structure

Clearly, there are many factors that play into the success of an IQP, and many of them can be used together to enhance the overall experience. In order to achieve our goal of creating an on-campus IQP experience that engages students and fulfills their expectations, we have come up with a set of detailed recommendations that combines many of the features we see are important into a single outstanding project center. Many of the proposed features are logistical in nature, things like required course work or team structures, but these are necessary to have the strong base on which to implement the more innovative ideas.

The first recommendation is also the one that we believe should be the most widely applied: ID2050 and PQP are necessary for our proposed project center. There are few reasons not to have this preparation time attached to an IQP, and no reasons of merit not to include it in our proposal. Because of the way IQP is scheduled on-campus, ID2050 and PQP are typically missing from these projects, which has an inherently detrimental effect on the project outcome and learning experience. For most on-campus IQPs, the first term of work is spent formulating the research proposal and determining what the project will entail. For off-campus IQPs, students take ID2050 and complete a PQP in the term before their project, in which they also write a research proposal and gain an understanding of their project. This has the effect that most on-campus IQPs finish their first term of work just to have the same progress that the off-campus team began their IQP with. In addition, ID 2050 teaches students about social research design, methods, and analysis, among other skills that are important for IQP. Having students learn these

skills before beginning their actual IQP improves their ability to complete excellent research. In addition, the PQP allows students to start meeting with their advisors and contacting their sponsors before the beginning of their IQP and serves as another important advantage over the traditional on-campus IQP structure. While taking ID 2050, students for the Enactus On-Campus Project Center will meet their group, start meeting with their advisors, contact their sponsors within the first half of the term, and build a work-plan for the following term. Contacting the sponsors earlier than other projects is important for our proposal, as we found that students tend to have conflicts with their sponsors if they wait to contact them. This has to do with the students putting a considerable amount of effort into a proposal which the sponsor only accepts part. Having the students contact sponsors sooner gives both sides a clearer picture of what will be done. As for building a work plan, this is related to the proposal, but the work plan is intended to give the students more freedom in exchange for more responsibility. Overall, ID 2050 and PQP are key parts of what make off-campus IQPs so successful, and this can certainly be applied to on-campus IQPs like those to be done at the proposed project center. In fact, we believe that the inclusion of ID2050 and PQP for our project center will play a large role in the success of the program.

In addition to requiring ID 2050 and a PQP like off-campus IQPs, projects completed at the Enactus On-Campus Project Center will be done in one term. Having the projects be a single term long as opposed to the typical three-term length has many advantages. As we researched the factors that made some IQPs better than others and what could be done to improve an on-campus IQP, the idea of student motivation and focus came up often. It became clear that it is simply more difficult to maintain a student's motivation over a three-term project, and that it is difficult for students to focus on their IQP if they are enrolled in other classes at the same time.

Having the IQP be a single-term project is the simple solution to the problem of maintaining motivation and focus. The students will be able to focus on making their IQPs as successful as possible without having attention taken away for other classes or losing motivation over the course of months. The single-term length is possible because ID 2050 and PQP allow students to begin work on their IQP at the project center with an understanding of their project and a plan in mind.

In order to make the most of the single term of focused work, the Enactus On-Campus Project Center will also require an actual on-campus workspace for the enrolled students to do most of their work. Having a shared and dedicated workspace for the teams will not only allow them to complete their own work as a team, but will also allow the teams to work somewhat collaboratively, bouncing ideas off each other as necessary or practicing presentations. A shared workspace also makes it easier for advisors to keep track of the work being completed, as the teams meet in the same place every day, as opposed to meeting wherever they find space on a given day. Overall, having a shared workspace is an idea with support from advisors and students alike. When asking Professor Suzanne LePage, director of the Sustaining WPI on-campus project center, about the ways in which her project center fell short, she focused on the lack of a dedicated space. To her, having a dedicated workspace for the teams is an important feature, as having the teams work in the same area builds synergy and makes it easier for advisors to walk in and interact with the teams outside of dedicated meetings ¹³. This support for a shared workspace was also found in the feedback on our survey, with one student writing that “project centers should not be split up,” as this makes the advisors less accessible and exacerbates any tension in small groups.

¹³ LePage, S. Personal Interview. 2018, October 2, 2018.

Another feature of our proposed project center that is far from unique is the size of our teams. Just like at most off-campus project centers and many on-campus projects, the teams at the Enactus On-Campus Project Center will be made up of four students. If a situation arises where a group of four students cannot be formed, then three students will be acceptable, although not preferred. Any less than three students and it becomes unlikely that an acceptable amount of work will be completed in the span of a term, as well as making it much more difficult for the IQP to give the students experience in working on a team. Any more than four students on a team makes organization more difficult and starts to require the implementation of formal roles. Overall, for this project center, the teams should only be made up of four students. Larger groups make it harder to resolve team dynamics and smaller groups reduce the capability of the team. In addition, we are recommending that the project center host six teams per year, with all the projects taking place in the same term. This is to make the best use of a shared workspace, as well as make efficient use of the advisors' time. Having 24 students working at the project center is in line with many off-campus project centers as well.

As far as the administration of the project center is concerned, we recommend that there be a faculty director and three advisors. The role of the faculty director is to determine the topics that will be covered by the project center, contact potential sponsors for projects, and assess projects that have been completed at the center to ensure that it is achieving its goal to have a sustainable impact. They will also work with the advisors to select the specific projects that will be offered in a given year, to form the student teams, and to settle any disputes. After coming up with many of the suggestions for the project center, we came to the conclusion that a faculty director would be necessary, as there would need to be a person to contact sponsors and organize the overall operation of the project center. We are recommending three advisors to work in three

combinations. Each combination would advise two IQPs. Having multiple advisors per team increases the accessibility of the advisors for the students and gives students more sources of expertise. As Professor DiBiasio concluded in his report, having knowledgeable advisors helps to make projects more successful¹⁴. In the cases he investigated, there were no sponsors, so the advisors provide the knowledge that sponsors would normally pass on. Because the sponsors for the projects at this project center may be across the globe or may not be as accessible as anticipated, having advisors that can step in and provide help will be important. Having the advisors work in teams will help to ensure that each project has access to more of this important information.

The primary aspect of the project center that separates it from the other on-campus project centers is an association with the WPI chapter of Enactus. Enactus WPI is a student organization on campus that helps student team's work on projects, many of them similar in scope to IQP. Enactus WPI is very interested in sponsoring projects in this project center and connecting teams to sponsors in the Enactus network. Enactus has a global reach, with chapters in 1,650 universities in 36 countries, so being able to connect to sponsors in this network would give teams at this project center the experience of working with international stakeholders, like at an off-campus project center. In addition, Enactus puts an emphasis on the social, environmental, and economic impact of their projects, like IQP is in many ways intended to. By bringing Enactus onboard, we can ensure that the projects offered here achieve more of the learning outcomes of IQP than some of the current on-campus offerings. To further innovate on the typical project center formula, we suggest that there be a student director from Enactus who works with the faculty director to find sponsors and select topics for projects. Because Enactus

¹⁴ DiBiasio, D, Mello, N. *Multi-Level Assessment of Program Outcomes: Assessing a Non-traditional Study Abroad Program in the Engineering Disciplines*. Education Resources Information Center, 2004.

has different guidelines for projects than WPI does for IQP, having a pair of directors, one from each side, to make sure that all the guidelines for both types of project are met is necessary. The student director is also needed to connect to other schools and sponsors in the Enactus network. An additional responsibility of the student director is to advertise the project center to students. The goal is for the Enactus On-Campus Project Center to be something that students would be interested in applying for and would be picked alongside the traditional off-campus offerings. In addition to the advertising through Enactus, we also recommend that the project center show up alongside the other project centers in the WPI Global Project Portal and the new project database.

Enactus

Enactus is a global entrepreneurship organization that works with students to help them solve world problems in an innovative and sustainable way, thus creating a substantial impact on the world and benefiting communities in the long term. The Enactus name is inspired by the belief that “investing in students who take ENtrepreneurial ACTions for others creates a better world for US all” (Enactus). Hundreds of organizations together donate millions of dollars to Enactus such as KPMG, Unilever, Ford and Walmart to name a few¹⁵. With this support, Enactus works with the 72,000 students in 1,730 campuses across 36 countries to tackle unsolved or ignored global humanitarian problems impacting the lives of more than 1.3 million people¹⁶. Given the right motivation and project, students are able to compete with other projects in a competition on a global scale of the most impactful and sustainable solutions. Enactus was founded in the United States in 1975, and since has sponsored and supported the success of hundreds of projects.

Student working with Enactus is sponsored to create low-cost, innovative, and sustainable solutions to social, environmental, and economical problems. In the course of their project work, students are given the opportunity to see another side of life in a community and to contribute towards improving the quality of life. For example, the Enactus team investigated waste management alternatives in Zimbabwe to create fuel from plastic waste¹⁷. This project is a perfect example of what Enactus represents because it created environmentally and economically sustainable jobs and benefited 600 local residents. Projects like these are tackled by Enactus-

¹⁵ Enactus, Partners & donors. Retrieved Feb 2019, <https://enactus.org/who-we-are/partners-donors/>

¹⁶ Enactus, Our Story, Retrieved February 2019, <https://enactus.org/who-we-are/our-story/>

¹⁷ Enactus, Turning Plastic Into Fuel and Income, Retrieved February 2019, <https://enactus.org/project/turning-plastic-into-fuel-and-income/>

sponsored students every year. By contributing to humanitarian causes, Enactus improve the lives of millions of people.

In 2016, a group of students at Worcester Polytechnic Institute (WPI) embarked to bring an Enactus branch to their campus. Since its founding, the WPI Enactus branch has grown into an organization of 20 students developing projects for potential funding and implementation (Enactus WPI). The organization is working to expand its numbers by gaining the attention of WPI's many engineering students who don't have many opportunities to apply their skills to solving social problems. Despite still being in its infancy, Enactus WPI shows enormous potential to add lasting value to the lives of community members as well as students. And from here, we were inspired to honor all of these team efforts and the upcoming projects and link them to a credit-based system that gives students academic incentive to do the projects to the best of their abilities. Our team, thereby, aims to take Enactus WPI's mission a step further by integrating it into the on-campus IQP experience.

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Appendix A: Enactus IQP Student Surveys Results

Q1 - Have you completed IQP?

#	Question	On-Campus		Off-Campus (including Worcester Community Project Center)	
1	Yes	100.00%	33	100.00%	161
2	No	0.00%	0	0.00%	0
	Total	Total	33	Total	161

Q2 - Was your IQP on-campus or off-campus?

#	Answer	%	Count
1	On-Campus	17.01%	33
2	Off-Campus (including Worcester Community Project Center)	82.99%	161
	Total	100%	194

Q3 - Did your IQP have a sponsor?

#	Question	On-Campus		Off-Campus (including Worcester Community Project Center)		Total
1	Yes	4.11%	6	95.89%	140	146
2	No	56.25%	27	43.75%	21	48

Q3b - What did your sponsor provide?

#	Question	On-Campus		Off-Campus (including Worcester Community Project Center)		Total
1	Space for work (office, room, building)	1.08%	1	98.92%	92	93
2	Research (data, survey results, etc)	3.17%	2	96.83%	61	63
3	Equipment (tools, electronics, bicycles, etc)	2.70%	1	97.30%	36	37
4	Connections (with the community, with experts, with	0.88%	1	99.12%	112	113

	people relevant to the project)					
5	Funds (for work)	9.09%	2	90.91%	20	22
6	Other - Text	10.00%	1	90.00%	9	10

Q3b-6	Other - Text
	Food
	Not much
	Nothing- useless
	Transportation and housing for data collection trips
	Access to online database
	No space, no funds, no outside connections, just the two professors we worked with and the 24 students we were supposed to teach
	Chinese Language Speakers
	Guidance, translation for interviews and surveys
	Rewards (giftcards) for focus group

Q4 - Likert Table

Q4 - On-Campus

#	Question	Extremely		Very		Moderately		A little		Not at all		Total
1	How engaged were you in the project work?	43.33%	13	40.00%	12	10.00%	3	3.33%	1	3.33%	1	30
2	How interested were you in your project topic?	36.67%	11	43.33%	13	13.33%	4	6.67%	2	0.00%	0	30
3	How valuable was your project outcome to the relevant community?	30.00%	9	3.33%	1	30.00%	9	23.33%	7	13.33%	4	30
4	How much did you enjoy your IQP?	20.00%	6	40.00%	12	10.00%	3	6.67%	2	23.33%	7	30

5	How proud are you of the work you completed?	26.67%	8	26.67%	8	20.00%	6	13.33%	4	13.33%	4	30
6	How accessible was your adviser?	53.33%	16	20.00%	6	16.67%	5	10.00%	3	0.00%	0	30
7	How helpful was your advisor's feedback to your project?	40.00%	12	26.67%	8	10.00%	3	13.33%	4	10.00%	3	30

Q4 - Off-Campus (including Worcester Community Project Center)

#	Question	Extremely		Very		Moderately		A little		Not at all		Total
1	How engaged were you in the project work?	48.92%	68	37.41%	52	9.35%	13	2.88%	4	1.44%	2	139
2	How interested were you in your project topic?	30.94%	43	30.22%	42	28.06%	39	7.19%	10	3.60%	5	139
3	How valuable was your project outcome to the relevant community?	20.14%	28	32.37%	45	26.62%	37	12.95%	18	7.91%	11	139
4	How much did you enjoy your IQP?	41.01%	57	28.78%	40	12.95%	18	11.51%	16	5.76%	8	139
5	How proud are you of the work you completed?	34.53%	48	35.25%	49	18.71%	26	8.63%	12	2.88%	4	139
6	How accessible was your adviser?	36.69%	51	35.25%	49	15.11%	21	8.63%	12	4.32%	6	139
7	How helpful was your adviser's feedback to your project?	33.81%	47	23.02%	32	24.46%	34	7.19%	10	11.51%	16	139

Q5 - Optional - If you would like to elaborate on any of your responses, feel free to do so here.

*Note: Identifying information have been redacted to protect anonymity

Q5 - On-Campus

If you would like to elaborate on any of your responses, feel free to do so here.
Advisors often rejected our ideas and then would later bring them back up later as their own and blame us for not doing them sooner even though we thought of it before.
Created my own IQP with four other students
I really think I only had a good on-campus IQP experience because of my advisor. If it was someone else I don't think it would have gone as well lmao
2 of our advisors were always available and helped a lot, the other did very little. We also did part of the IQP over the summer and the advisors were much less available then.
I appreciated how reusable my project was for upcoming years.
I was interested in the area of research beforehand, but the IQP itself made me even more interested on it.
For my IQP I made a Java applet to show off a professor's research. There was no educational value for me or my partner.
I found our project extremely interesting, and when we did get advisor feedback, it was extremely helpful. Some challenges included the following, though: -An absentee group member, eventually taken off of the project -Competition for limited lab resources between various IQP groups - Coordination between multiple advisors All told, however, I had an extremely positive experience with my on-campus IQP.
It was a genuinely worthless experience that actually devalued my investment in my other courses because of the way it detracted from my focus on other subject material.
Expectations were way too high compared to off-campus, he said we were doing perfect at the halfway mark, ended up getting a "solid B" and we couldn't do much work due to being bottlenecked by the facility/staff members involved in the project.
I believe that my IQP topic was very interesting, I just didn't have the best team mates and ended up doing most of the work. But, besides that I enjoyed the research and my faculty advisor ,[redacted] was very helpful!

Q5 - Off-Campus (including Worcester Community Project Center)

<p>If you would like to elaborate on any of your responses, feel free to do so here.</p>
<p>The experience was wonderful and we accomplished so much. It was however, very stressful as the advisors expected a lot from us. Because of this I wasn't able to sleep much at all during the last week. Being in a foreign country comes with a lot of stress as it is and our advisors put a lot of pressure on us to exceed expectations</p>
<p>IQP was in [redacted] in 2017</p>
<p>Our project impacted the community of [redacted] around [redacted]. Our sponsor picked us up everyday to drive us to the forest to conduct our surveys and survey the land for our restoration designs. It was an exciting project to work on</p>
<p>My project was basically obsolete the second I began working on it because the system we were analyzing was going to be overhauled the next year. My sponsor was not transparent about this until late into ID 2050. Our advisors and sponsor did not review our material/deliverables until the last few weeks, making adjustments very difficult. Our project also required us to do about half of our work during ID 2050, as there were many resources in the US that we needed to interview. Despite front-loading our IQP, we were told while abroad that we were being lazy and not doing enough. We ended up having to do twice as much because the advisors and sponsor did not care to pay attention to our content. I was engaged with this project until I realized that it did not matter and none of our research or suggestions would have any impact. This could have been impactful, but the biased attitude of those who were supposed to be guiding us was very detrimental to the final outcome. My team got a good grade, but I can't help but feel my entire ID2050 and IQP experience was wasted on an inconsequential project.</p>
<p>Our advisor was more concerned with the grammar in our paper than with actually advising us on how to do such a complex project. Worst advising experience I've ever had.</p>
<p>I had a really good experience with my IQP, in part to how organized my location was ([redacted]), how open and willing my advisors were, and the open communication with my [redacted] Professor who was running the project. It also meant a lot that my project did help to solve a problem that was very prevalent in the area and was able to be implemented.</p>
<p>N/A</p>
<p>We had two advisers that had mixed opinions and one was super helpful and the other was less so.</p>
<p>I was bullied by my teammates for the entire duration of ID2050 and IQP and, despite communicating this with my advisor, my advisor did nothing to help mitigate the situation.</p>
<p>The project given by the sponsor was disjointed and not very well thought out. During our time at the site we had to reinvent something suitably involved to qualify for an IQP, though even still it didn't feel like we were able to figure out a way to make a real meaningful impact within our sponsor's constraints.</p>
<p>ID 2050 didn't prepare us for the project at all, and worse, actually distracted from our project prep with our advisor because the ID 2050 professor gave conflicting instructions and assignments.</p>
<p>I went to [redacted], enough said. We had no sponsor, our sponsor was the startup our advisor was CEO of.</p>
<p>My sponsor had extremely ridiculous expectations that my team could not reach no matter how hard we worked. My advisor was completely useless and borderline incompetent. I couldn't even reach out to them when I had a medical emergency. Basically, IQP was a nightmare LMAO and I'd love to talk/complain about it more</p>

Our advisor was great, I only put “very” since he was not able to accompany us to the project site
Advisor could not read competently or write cohesively. Did not know our names or projects after 14 weeks. Could not provide any information or help whatsoever. Sponsor was abusive and manipulative. IQP is an utter waste of time and money. IGSD employees have absolutely no idea how to even vaguely fulfill their job requirements.
The adviser's feedback was often super vague and often needed additional meetings so we could understand what they meant
ON-site advisers served more as a barrier to work then as helpful advisers.
Project teams were in three different locations, advisors were only in one location at a time. Advisors took vacation time but took many of our weekends away saying we were required to work. It should be necessary that each project team is given a place OUTSIDE OF THEIR APARTMENT BUILDING to work. And project centers should NOT be split up. All 24 students should stay together- if impossible to do so- then only 12 students should be left alone together at once. Less than that is not good - not enough people to disperse tense energy between if only 8.
Our original sponsor dropped the project when we got to the site which made the experience not very rewarding or enjoyable since it was a mad dash to get things done for a new sponsor and new project.
[redacted] is a treasure of WPI.
I was at the [redacted] project center last [redacted] term. Advisors were not helpful during the term - I had trouble with my project due to lack of teammate participation and they did not help me with that, and graded me the same as the rest of the team even though the rest of the team did little project work. Housing on [redacted] also wasn't great - the people accommodating us were not very friendly/welcoming so that made the stay unpleasant. The project would have been great if advisors were a little more supportive and housing a little better.
I did not feel my IQP was valuable towards my education. Employers are confused when I tell them about the project I participated in and I am embarrassed to talk about the project since I had such a negative experience with my site and advisors. I personally thought my advisors were unprofessional and did not give valuable feedback for the project. Almost everyone I want on IQP with did not want to be at the project center we were placed in but took the project to avoid being stuck on campus. By the end of IQP every single team was given a B except for one. This had huge psychological impacts on students participating in the project center and made me wish I did not participate in the global project program.
While the project itself was interesting, engaging stuff, my randomly assigned team's dynamics were so awful it ruined any enjoyment I might have gained, and due to being consistently shut out of any and all major decisions I feel like I did nothing and learned less.
nah
Our advisor was pretty good, our co-advisor was less than perfect. He was hard to reach at the best of times and was slow to provide us feedback. In general he was uninformed and slow to respond.
My advisor pushed us hard, but was very hypocritical and made us afraid to ask her questions. The only thing that really hindered us was them, but they did also push us.
Our WPI advisor was fairly helpful, but the university contact-our sponsor, was not helpful at all. She knew what she wanted, but wouldn't tell us and made us guess what she wanted and would reject everything until we guessed what she wanted.
I'm very lucky with my team and with my adviser professor [redacted]

Despite the fact that my project was canceled on-site and my team was put on a different project, it ended up being a rewarding experience.
IQPs are extremely inconsistent across project sites. ID2050 is largely a massive waste of time and could be taught better. Specifically, ID2050 should focus on teaching students how to write their papers since that is the only thing that matters in the end. I remember we had to have a lesson while off campus on proper ways to write out background chapter, a lesson that belonged in the first week of ID2050, not almost 3 months later. Also, the amount of work required throughout ID2050 is inefficient and unnecessary. Advisers should focus on providing clear projects and criteria in order to avoid students having to rewrite the same thing over 6-8 times.
Interest and engagement in the topic changed over time; initially I had very little interest but working for a term solely on that project and communicating with the people it affected significantly increased my engagement.
Through IQP, I felt that my sponsor's feedback on my project work was more valuable than my Advisor's.
I loved my project but the advisors and their demands made it unbearable. I was in a constant state of anxiety, I brought mental health concerns for me and other students to the advisors and they were not taken seriously. It was a mess and people were redoing their entire project in the last week we were there because of how disorganized and chaotically this IQP was run.
Much of the critique from one my advisors was usually always negative, not constructive. We never had a good experience with this advisor and they made our IQP experience absolutely miserable. No matter what we did the advisor was never happy and always tore apart our project. It was my worst term/experience at WPI. I was in the [redacted] IQP that was cancelled and remained in Worcester. Horrible experience. The advisor was not understanding. We had to create our own project, and the work of ID2050 and IQP in one term. We worked every hour every day of the week. When we mentioned this to our advisor, they said "that doesn't mean anything. I'm a math professor so I work every hour every day."
There should be more of an emphasis on the language requirements. I felt I was held back when choosing my project once accepted to the specific site because many of them requires proficient language skills
We had a wonderful sponsor and a fun, sound project. It was just arguable whether it had a significant impact because it was about investigating how to improve a museum exhibit. It would depend on how you look at it. Great project, and had a great time though.
We had a first time sponsor who was not very easy to reach and even once at the IQP site it was difficult to get him to look at our papers or make our meetings. Our main WPI adviser also was very difficult to reach out to and we opted to use our secondary adviser more often since he was more willing to help our team.
My advisor, [redacted] and [redacted], were minimally helpful at best. Additionally, [redacted] was very passive aggressive towards the students. [redacted] was ok but I would highly recommend that [redacted] not be allowed to advise any future IQPs.
My group and I developed a website and other forms of social media to raise knowledge of a new psychological service that brings a therapist to people with no easy access to one via teleconference. The project was done in [redacted]. My sponsor was very helpful in giving us contact information of people to conduct interviews with, equipment such as cameras and space to work at the office. Overall it was a great experience.
The [redacted] Project center was horribly mismanaged, and WPI's response was unacceptable.
The feedback from my sponsor was non-ideal because she was very biased, but my advisers were

extremely accessible and tried their best to give really helpful feedback because they knew we really cared about our project. My project was made difficult, however, because we had two separate sponsor organizations who both wanted different things from the project.

So my project was originally suppose to take place in [redacted] but the hurricanes prevented that from happening so we lost our sponsor and had to make our own project topic with the same general idea. Thankfully local organizations were willing to help us out with that. So the project was something that I got to plan out which was more engaging than the project I was originally going to do.

Appendix B: Focus Group Questions

- Where was your project?
- What major problems did you face?
- Did you face any problems working with your team and how did you resolve them?
- What was the most important lesson you learned during your IQP?
- What could have made your project better?
- How do you think spending a single term to focus only on completing your IQP or spending three terms to complete your IQP alongside classes impact your outcome?
- What was your motivation for completing your IQP where you did?
- For those of you who completed your IQP in one term, how did you like spending all of your time working just on your IQP?
- For those of you who completed IQP over multiple terms, how did the extra overall time help you? How did you manage classes and IQP together?

Appendix C: IGSD Student Survey Responses

Questions	Survey Question	2013-14			2014-15			2015-16		
		On-Campus (n=385)	Off-Campus (n=579)	WPI Avg. 2013-14 (n=964)	On-Campus (n=318)	Off-Campus (n=630)	WPI Avg. 2014-15 (n=948)	On-Campus (n=310)	Off-Campus (n=730)	WPI Avg. 2015-16 (n=1040)
Q1	Learning how to set and meet goals for research and projects	4.28	4.42	4.36	4.26	4.39	4.34	4.24	4.34	4.31
Q2	Learning how to find and use information resources	4.2	4.3	4.26	4.19	4.27	4.24	4.28	4.18	4.21
Q3	Learning to analyze and critically evaluate ideas and information	4.29	4.37	4.34	4.27	4.34	4.32	4.26	4.26	4.26
Q4	Developing skill in expressing oneself in writing	4.13	4.26	4.21	4.1	4.18	4/16	4.17	4.19	4.18
Q5	Developing skill in expressing oneself orally	3.92	4.34	4.18	3.82	4.31	4.15	3.94	4.25	4.15
Q6	Acquiring skill in working with other as a member of a team (if applicable)	4.22	4.41	4.33	4.09	4.4	4.3	4.22	4.41	4.35
Q7	Overall, my level of effort on this project was	4.33	4.45	4.4	4.2	4.43	4.35	4.33	4.38	4.36
Q8	Overall, I rate my learning from this project was	4.11	4.24	4.19	4.03	4.23	4.17	4.09	4.08	4.09
Q9	The intellectual challenge presented by the project was	4.29	4.38	4.34	4.22	4.36	4.31	4.29	4.29	4.29
Q10	The project's overall value as an educational experience was	4.4	4.71	4.58	4.32	4.64	4.54	4.39	4.6	4.54
Hours	In the final term, I worked on average the following number of hours per week on the project.	10.03	36.2	25.74	10.46	37.13	28.18	11.56	34.93	27.96