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December 2014

# Fostering International Collaboration between WPI and HDU through Mixed IQPs

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# **Fostering International Collaboration between Hangzhou Dianzi University and Worcester Polytechnic Institute through Interactive Qualifying Projects**

An Interactive Qualifying Project  
Submitted to the faculty of  
Worcester Polytechnic Institute  
in partial fulfillment of the requirements for the  
Degree of Bachelor of Science

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Date: December 17, 2014

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## **Abstract**

This project aimed to foster international collaboration, a rising standard for higher education in our increasingly global society, through sharing Worcester Polytechnic Institute's well established project-based curriculum with Hangzhou Dianzi University in Hangzhou, China. Interviews, surveys, and focus groups determined that it is mutually beneficial and possible for WPI and HDU students to jointly conduct sponsored, interdisciplinary research projects concerning the relationship between technology and society. The project produced recommendations to implement collaborative research in the Fall of 2015, allowing students from WPI and HDU to fully experience the long-term benefits of cross-cultural, project-based, and interdisciplinary learning.

## **Acknowledgements**

Our team would like to acknowledge the following for contributing to the success of our project:

Hangzhou Dianzi University School of Management, Project Sponsor

Ms. Xu Quan, Project Liaison

Professor Jennifer Rudolph, Hangzhou IQP Site Director and Faculty Advisor

Professor Shen Yunhong, Site Liaison

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Any other students who participated in our interviews, focus groups, and survey

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Conclusions and Recommendations .....	Victor Chau and Abby Harrison*

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## Executive Summary

Effective higher education prepares students to be productive members of the global community, to apply knowledge of their discipline in their careers, to solve open-ended problems, and to engage in lifelong learning. It is imperative that institutions of higher education, in addition to educating students in the theory of their disciplines, equip their students with the skills to apply their knowledge beyond the walls of their alma mater. One of the ways in which higher education institutions seek to foster these skills in their students is through the use of project-based and interdisciplinary education (Beckett, 2006; Froyd, Wankat, & Smith, 2012; Lee, 2014; Maken, 2013; Raber, 2011; Vaz, 2012; WPI, 2014b). Worcester Polytechnic Institute (WPI) implements this style of learning through junior-year projects that investigate the interactions of technology and society, known as Interactive Qualifying Projects (IQPs). Some WPI students travel to Hangzhou, China. Hangzhou Dianzi University (HDU) and WPI began a relationship in 2010 by signing a memorandum of understanding (MoU) between the WPI School of Business and the HDU School of Management (WPI-HDU, Memorandum of Understanding, November 30, 2010). In 2014, HDU and WPI signed a second MoU; the HDU School of Management and WPI's Interdisciplinary and Global Studies Division signed a third in the same year (WPI-HDU, Memorandum of Understanding, April 14, 2014; WPI-HDU, Memorandum of Understanding, April, 2014). HDU and WPI are interested in IQP teams consisting of students from both universities, known as mixed IQP teams; however, they are unsure if these mixed IQP teams are feasible.

Research shows that students gain long-term benefits from project-based and interdisciplinary learning (Beckett, 2006; Blumenfeld, 1991; Capraro, 2013; Heinricher, etc. al., 2013; Raber, 2011; Springer, 1999; Xu, 2010). These benefits include teamwork,

communication, problem solving, and self-directed learning skills. A survey of WPI alumni shows that project-based learning teaches students to take responsibility for their own learning, develop ideas, and function effectively on a team, among other lifelong skills. Research from the New York City College of Technology shows that students who have taken interdisciplinary courses better perceive their personal strengths and weaknesses, understand the relationship between different disciplines, think critically, and apply knowledge effectively to complex problems better than those who have not (Lansiquot, et.al., 2011). The IQP is both project-based and interdisciplinary; therefore, students gain the benefits of both types of learning.

Currently, WPI shares the IQP with universities in India, Thailand, Namibia, and Russia through mixed IQP teams. These teams are mutually beneficial to WPI and the host universities. Considering these four models, we determined if mixed IQP teams consisting of WPI and HDU School of Management students are mutually beneficial and possible. We determined if HDU's administration, faculty, and students are interested in participating in IQPs; identified where the IQP would best fit within the HDU School of Management's curriculum; and determined the logistical requirements to successfully implement a mixed IQP team program.

We interviewed administrators, faculty, and students from the School of Management; surveyed the School of Management student population; and held focus groups with students. We asked administrators about the educational goals of the School of Management, their interest in mixed IQP teams, and the School of Management curriculum. We asked faculty about the courses they teach, their interest in project-based learning, and their interest in advising HDU students participating in mixed IQP teams. Our survey asked students how much time they devote to school and extracurricular activities, if they are interested in participating in group projects with WPI students, and how much time they would be willing to contribute to these

projects. The student focus groups and interviews gave us a deeper insight than what our survey could, and identified student's class schedules.

Interviews with administrators reveal that the benefits of the IQP meet the educational goals of the HDU School of Management: to encourage community involvement and to promote academic and professional skills. Additionally, an initiative at HDU aims to involve 10,000 students in projects. Administrators are interested in mixed IQP teams at HDU because participation in this program would increase student involvement in projects. Interviews with faculty show that they are enthusiastic about project-based learning and its benefits; however, they expressed concerns about the amount of time and effort required to advise IQPs. Adding new responsibilities to their work could detract from their teaching and research commitments. Survey results, interviews, and focus groups show that students are interested in and willing to take part in mixed IQP teams.

International collaboration between WPI and the HDU School of Management is mutually beneficial and possible. Administrators, faculty, and students are interested in mixed IQP teams and acknowledge the long-term benefits of interdisciplinary, project-based learning. Although many students are willing to participate in mixed IQP teams as volunteers, academic credit would give WPI and HDU students similar incentive to commit to the projects. Through mixed IQP teams, WPI and HDU students will gain valuable, lifelong skills.

We recommend that the HDU School of Management approve HDU student participation in mixed IQP teams for elective credit. In this class, the appointed instructor will advise the mixed teams with the WPI faculty advisor, but evaluate HDU students separately from WPI students. HDU students should communicate closely with their WPI counterparts throughout the course. The approval process for this course will take approximately three years. During the

approval process, we recommend that WPI and HDU participate in trial mixed IQP teams with volunteer students from the HDU School of Management. We also recommend that WPI and HDU extend this mixed IQP program to others schools within HDU to increase the diversity of projects and project teams.

## 1.0 Introduction

Around the world, there is a movement among institutions of higher education to facilitate international collaboration as a platform for exchanging knowledge, resources, and ideas (Wang, et.al., 2012). Parallel is a movement to “develop increasingly interdisciplinary research meeting the demands of society” (pp. 6-7). Colleges and universities are following these movements through the use of project-based, interdisciplinary education and research (Beckett, 2006; Froyd, Wankat, & Smith, 2012; Lee, 2014; Maken, 2013; Raber, 2011; Vaz, 2012; Wang, et.al., 2012; WPI, 2014). The Interactive Qualifying Project (IQP) is a multidisciplinary, social science research project required by all Worcester Polytechnic Institute (WPI) students. The project aims to give WPI students the opportunity to explore the extensive influence of science, technology, engineering, and mathematics (STEM) beyond their field of study: to give students a broad perspective of STEM within society.

One institution looking into project-based learning is Hangzhou Dianzi University (HDU). HDU's School of Management is interested in incorporating its students into WPI's Interactive Qualifying Projects (IQPs) to better equip them with effective problem-solving skills. HDU's School of Management's and WPI's relationship started with the signing of a memorandum of understanding (MoU) on November 30, 2010 which promotes partnership in developing effective educational models (WPI-HDU Memorandum of Understanding, November 30, 2010). HDU students have participated in senior-year capstone projects with WPI students since 2011 (Aragon, Humbaraci, & Papotto, 2011). Now, HDU is interested in the opportunity to expand its involvement with WPI's group projects into the IQP program, but it is uncertain of the feasibility of incorporating its students into IQPs. The concept of WPI and non-WPI students collaborating on IQPs is called a mixed IQP team.

Research demonstrates that project-based learning and interdisciplinary group projects effectively engage students in their own learning. (Beckett, 2006; Blumenfeld, 1991; Capraro, 2013; Raber, 2011; Springer, 1999; Xu, 2010). WPI first incorporated project-based learning into its curriculum in 1970 with the mandatory Humanities and Arts Sufficiency Project, Interactive Qualifying Project (IQP), and Major Qualifying Project (WPI, 2013).

Currently, WPI shares the IQP with universities in India, Thailand, Namibia, and Russia through mixed IQP teams. These teams are mutually beneficial to WPI and the host universities. Students from both universities experience the lifelong benefits of international collaboration, cross-cultural communication, interdisciplinary experience, and project-based learning. WPI's relationship with HDU provides a new opportunity to share the project-based learning through mixed IQP teams.

The goal of our project was to determine the benefits and challenges of incorporating a mixed IQP program and to create a feasible model that is mutually beneficial to HDU and WPI. We accomplished this goal through four main objectives: identifying the School of Management curriculum; determining the interest and availability of School of Management administration, faculty, and students; identifying what would motivate students and faculty to participate in mixed IQPs; and determining logistical requirements needed to implement this program. WPI and HDU students will gain valuable, lifelong skills through further collaboration between these two universities.

## **2.0 Background**

Interdisciplinary, project-based learning using social science research methods is integral to the Worcester Polytechnic Institute (WPI) Plan (WPI, 2014a) and embodied in the junior year Interactive Qualifying Project (IQP). WPI students who complete their IQP off-campus are part of the Global Perspectives Program (GPP). The GPP coincides with an international movement to incorporate cross-cultural interaction in higher education. Cross-cultural interaction combined with project-based learning embodies the GPP. At WPI, the students' education focuses on the blend of theory and practice through project-based learning.

Technical education at Hangzhou Dianzi University (HDU) is predominantly theoretical and taught in a lecture setting (H. Pu, personal communication, September 5, 2014; X. Xu, personal communication, September 25, 2014). This curriculum is a continuation of the teacher-led style of learning that the preparation for the Chinese National College Entrance Exam promotes.

In this chapter, we discuss the purpose and long-term benefits of the IQP, project-based learning, interdisciplinary learning, and cross-cultural experiences in a project environment. We also describe the teaching styles used in project-based learning and lecture-based learning, the HDU School of Management, the current relationship between HDU and WPI, how standardized education affects innovation, and WPI IQP project sites where WPI and non-WPI students collaborate on IQPs in what are known as mixed IQP teams.

### **2.1 The Interactive Qualifying Project**

Worcester Polytechnic Institute adopted the WPI Plan in the 1970s with the mission of “fusing academic inquiry with social needs, of blending abstraction with immediacy, or linking new knowledge to applications” (WPI, 2014b, para. 2). The WPI Plan teaches students the social

and humanitarian contexts of technology through practical application (Vaz, 2012). Through the junior-year Interactive Qualifying Project (IQP), students conduct sponsored research using social science methods to solve cross-disciplinary problems and explore the relationship between technology and society.

The IQP counts for three full classes at WPI and lasts for an entire seven-week term when conducted off-campus. The IQP carries the same academic weight as WPI's senior-year capstone project (WPI, 2014c). In the term prior to the IQP, students take the preparatory courses Social Science Research for the IQP and Pre-Qualifying Project, which are worth a total of one and a half course credits.

The IQP is a student-driven research project instead of a lecture-based class. WPI faculty advisors only act as project consultants and project evaluators (J. Rudolph, personal communication, December 13, 2014). Small teams of students from different majors conduct sponsored research to solve a problem (WPI, 2014a). Project sponsors are often nonprofit, municipal, or government agencies. Students deliver their research findings and subsequent recommendations to project sponsors and faculty advisors through a formal report and oral presentation.

The IQP benefits WPI students both short and long term. An ongoing survey of WPI alumni from the class of 1974 to the class of 2011 shows how project-based learning benefits students professionally and personally long after graduating (Heinricher et al., 2013). WPI administered a survey to over 10,000 alumni with a 25% response rate. The survey asked alumni to rate the long-term impact that project-based learning had on twenty-four aspects of their lives, which can be grouped into three categories: professionally-relevant skills, interpersonal and communication skills, and world views. The participants of this survey not only rated higher



growth in professional skills, but also higher growth in their personal lives. 70% of alumni indicated that their off-campus project work enriched their lives in ways not related to work or academics “much” or “very much”. 47% of off-campus-project alumni noted that the experience contributed to feelings of being able to “make a difference” with their work.

## **2.2 Benefits of Cross-Cultural Learning**

WPI compared the survey data of alumni who went off-campus to complete their IQPs to those who stayed on-campus. Tables 1, 2, and 3 detail these comparisons. WPI found nineteen categories; including understanding ethical responsibilities, people of other cultures, and how decisions affect and are affected by others; for which there was a statistically significant difference between how the two groups responded. Of the nineteen categories, in all but one, a higher proportion of the students who went off-campus – many of whom engaged in cross-cultural learning – found significant long-term benefits from the IQP than did those who stayed on-campus.

*Table 1 - Comparative Perceptions of Impact of Project-Based Learning on Professionally-Relevant Areas: Alumni with Off- vs. On-Campus Projects (Heinricher et al., 2013)*

Area of Impact	Outcome	% “Much” or “Very Much”		p
		Off Campus	On Campus	
Understand ethical responsibilities	9	43 (n = 1018)	29 (n = 1296)	<.001
Make connections across disciplines	7	57 (n = 1045)	48 (n = 1416)	<.001
Integrate information from multiple sources	7	68 (n = 1049)	63 (n = 1428)	.005
Mastery of fundamental concepts and methods in the major	2	58 (n = 1043)	63 (n = 1423)	.003
Solve problems	6	70 (n = 1044)	66 (n = 1427)	.063
Take responsibility for own learning	10	73 (n = 1049)	71 (n = 1426)	.862
Use current technology	3	59 (n = 1043)	61 (n = 1410)	.685
Develop ideas	10	69 (n = 1045)	68 (n = 1428)	.154
Develop a solid base of knowledge	1,2	58 (n = 1042)	58 (n = 1424)	.347

*Table 2- Comparative Perceptions of Impact of Project-Based Learning on Interpersonal and Communication Skills: Alumni with Off- vs. On-Campus Projects (Heinricher et al., 2013)*

Area of Impact	Outcome	% “Much” or “Very Much”		<i>p</i>
		Off Campus	On Campus	
Deliver effective presentations	4	62 ( <i>n</i> = 1052)	43 ( <i>n</i> = 1401)	<.001
Speak clearly and effectively	4	58 ( <i>n</i> = 1053)	41 ( <i>n</i> = 1417)	<.001
Interact effectively within a professional capacity	5	73 ( <i>n</i> = 1053)	58 ( <i>n</i> = 1410)	<.001
Effectively manage interpersonal dynamics	5	66 ( <i>n</i> = 1052)	52 ( <i>n</i> = 1413)	<.001
Communicate effectively visually	4	60 ( <i>n</i> = 1050)	47 ( <i>n</i> = 1418)	<.001
Function effectively on a team	5	73 ( <i>n</i> = 1039)	61 ( <i>n</i> = 1380)	<.001
Be an effective leader	5	59 ( <i>n</i> = 1044)	49 ( <i>n</i> = 1374)	<.001
Effectively manage a project	5	70 ( <i>n</i> = 1050)	61 ( <i>n</i> = 1420)	<.001
Write clearly and effectively	4	61 ( <i>n</i> = 1054)	52 ( <i>n</i> = 1436)	<.001

Table 3- Comparative Perceptions of Impact of Project-Based Learning on World Views: Alumni with Off- vs. On-Campus Projects (Heinricher et al., 2013)

Area of Impact	Outcome	% “Much” or “Very Much”		p
		Off Campus	On Campus	
Understand people of other cultures	8	47 (n = 948)	18 (n = 997)	<.001
Respect for cultures outside of own	8	43 (n = 960)	16 (n = 1066)	<.001
Understand global issues	8	42 (n = 1014)	22 (n = 1290)	<.001
Understand people of other racial and ethnic backgrounds	8	39 (n = 949)	21 (n = 1020)	<.001
Aware of how decisions affect and are affected by others	8	48 (n = 1042)	36 (n = 1380)	<.001
Understanding of the connections between technology and society	<i>Program Goal</i>	53 (n = 1039)	48 (n = 1417)	.006

International collaboration is a key component to universities seeking world-class status (Wang, et. al., 2012). To facilitate international collaboration, many universities begin productive partnerships with foreign academic institutions, reform their curricula, and encourage students and faculty to study abroad. The aforementioned strategies encourage universities to extend their capacity “for international cooperation, to enrich students’ learning experiences with a multicultural dimension, and to raise their awareness of global citizenship” (pp. 3).

Research shows that intercultural communication and cross-cultural knowledge contribute significantly to the success of multicultural business ventures (Tagreed Issa, 2012; Albescu, Paraschiv & Pugna, 2009). Communication is vital to overcome cultural conflicts that can arise when groups of people from international backgrounds attempt to reach an agreement. Research on cross-cultural learning also demonstrates that, within a culturally diverse team, the amount of collective knowledge and the extent that team utilizes its collective knowledge

contributes to its success (Mitchell et al., 2011). Having culturally diverse teams leads to a greater pool of experience and understanding that helps navigate cultural conflicts.

A hypothetical team consisting of Chinese and American students would possess this type of cultural diversity as well as a wide range of collective knowledge. A study comparing the propensity for lifelong learning between Chinese and Asian American students in engineering fields concluded that Chinese students tend to be much more comfortable with open-ended problems as well as uncertainty in problems than their Asian American counterparts. Another study that compared the motivation and learning strategies between American and Chinese undergraduate students concluded that Chinese students have greater motivation than American students, but have fewer learning strategies (Ning, 2013). Combining both groups, therefore, produces greater depth of analysis and prepares students to navigate multicultural environments.

Additionally, Xu Xiaobing, a visiting scholar from HDU at WPI, mentioned that working with students from a different country positively sets students apart from their peers to potential employers, both in China and in the US (personal communication, September 25, 2014). In the short-term, the international experience helps graduating students acquire jobs because it stands out on a resume to potential employers.

### **2.3 Benefits of Project-Based Learning**

WPI's alumni survey, found that of the alumni that participated in formal project-based learning at WPI, 72% reported it enhanced their ability to take responsibility for their own learning "much" or "very much", 68% to develop ideas, 67% to solve problems, and 66% to function effectively on a team (Heinricher et al., 2013). Alumni were asked about the positive impact of project-based learning in twenty-four categories. In seventeen of the twenty-four

categories, more than half of alumni reported that IQPs enhanced their abilities “much” or “very much.” Tables 4, 5, and 6 detail alumni responses to all twenty-four categories.

*Table 4- Perceived Impact of Project-Based Learning on Professionally-Relevant Areas Related to Undergraduate Learning Outcomes (Heinricher et al., 2013)*

<b>Area of Impact</b>	<b>Outcome</b>	<b><i>n</i></b>	<b>% “Much” or “Very Much”</b>
Take responsibility for own learning	10	2475	72
Develop ideas	10	2473	68
Solve problems	6	2471	67
Integrate information from multiple sources	7	2477	65
Master fundamental concepts and methods in the major	2	2466	61
Use current technology	3	2453	60
Develop a solid base of knowledge	1,2	2466	58
Make connections across disciplines	7	2461	52
Understand ethical responsibilities	9	2314	35

Table 5- Perceived Impact of Project-Based Learning on Interpersonal and Communication Skills Related to Undergraduate Learning Outcomes (Heinricher et al., 2013)

<b>Area of Impact</b>	<b>Outcome</b>	<b>n</b>	<b>% “Much” or “Very Much”</b>
Function effectively on a team	5	2419	66
Effectively manage a project	5	2470	65
Interact effectively within a professional capacity	5	2463	64
Effectively manage interpersonal dynamics	5	2465	58
Write clearly and effectively	4	2490	56
Communicate effectively visually	4	2468	53
Be an effective leader	5	2418	53
Deliver effective presentations	4	2453	51
Speak clearly and effectively	4	2470	48

Table 6- Perceived Impact of Project-Based Learning on World Views Related to Undergraduate Learning Outcomes (Heinricher et al., 2013)

<b>Area of Impact</b>	<b>Outcome</b>	<b>n</b>	<b>% “Much” or “Very Much”</b>
Understanding of the connections between technology and society	<i>Program Goal</i>	2456	50
Aware of how decisions affect and are affected by others	8	2422	41
Understand people of other cultures	8	1945	32
Understand global issues	8	2304	31
Understand people of other racial and ethnic backgrounds	8	1969	30
Respect for cultures outside of own	8	2026	29

In addition to WPI, other top engineering schools in the US have adopted project-based learning into their curricula. Harvey Mudd, a small school in Claremont, California, which was at the top of *U.S. News & World Report's* 2015 Best Colleges for engineering, stresses hands-on learning through team-based projects and real-world experience (Harvey Mudd, 2014). Franklin Olin College of Engineering's curriculum complements topics in design, entrepreneurship, modeling, analysis, systems, and controls with interdisciplinary classes that connect STEM fields to arts and humanities (Olin College, 2014a, 2014b). Rochester Institute of Technology (RIT) replaced its freshmen-year, lecture-based curriculum with a full-year, multidisciplinary, project-based experience in the fall of 2010 (Helguera & Pow, 2011). Less than a year later, Maria Helguera and Joseph Pow from the RIT Center of Imaging Science concluded that faculty are now dramatically more aware of what freshmen can achieve when presented with complex, technical problems. Project findings from the New York City College of Technology, another institution offering courses stressing interdisciplinary learning, show that students who have taken interdisciplinary courses can better perceive personal strengths and weaknesses, understand the relationship between different disciplines, think critically, and apply knowledge appropriately and positively to complex problems with uncertain outcomes (Lansiquot et al., 2011). A study by Harding et al. showed that students in a project-based learning environment have an increased focus on learning as a means to personal growth (2007).

## **2.4 Teaching Styles**

Project-based learning teaches students through facilitation and delegation, two of five primary teaching styles Anthony Grasha outlines in "A Matter of Style: The Teacher as Expert, Formal Authority, Personal Model, Facilitator, and Delegator," (1994). The first of the five is the



expert, who possesses and displays a deep and comprehensive knowledge of his/her subject matter through lecture. Second, the formal authority uses feedback and learning goals to ensure that students complete assignments in the correct, standardized way. Third, the personal model teacher shows students how to complete tasks, then prompts them to use the same method to complete their own assignments. Fourth, the facilitator teaches by asking questions and guiding discussion so that students research and solve problems independently. The delegator, the fifth model, assigns students – or groups of students – tasks to accomplish and acts as an available resource at the request of the students or groups.

The expert, formal authority, and personal model approaches to teaching ensure that students receive reliable information in the classroom and are efficient uses of professors' time, especially when teaching larger classes (Grasha, 1994). However, these instruction styles do not necessarily teach students the skills necessary to learn independently, solve open-ended problems, and explore alternate ways of reasoning and problem-solving.

The facilitator and delegator teaching styles promote independent thought, problem-solving, and a proactive approach to learning, all of which are valuable skills that college students will continue to apply to all facets of life beyond graduation (Grasha, 1994; Heinricher et. al., 2013). However, these two approaches require significant time and effort on the part of the instructors, and can be inefficient modes of educating when a direct approach is necessary. Students may also fail to learn the necessary amount of material when given large degrees of autonomy in their education. WPI has combined teacher-led and self-directed styles of learning in its curriculum to provide students with necessary information and the skills to direct their own learning.

## **2.5 WPI's Curriculum**

The WPI Plan “engages students in open-ended inquiry both in and out of the major field of study, and across the four years” (Vaz, 2012, p. 9). The plan consists of a capstone project demonstrating sufficiency in a field of the humanities or arts, an interdisciplinary project incorporating social science research methods outside of one’s chosen major, and a senior capstone project in which students solve complex problems within their majors (WPI, 2013). Students can also participate in a semester-long project course that explores world issues relating to health, energy, food, education, or sustainability in their first or second year, which introduces students to interdisciplinary project work (Vaz, 2012). The primary focus of all of these projects, with the exception of the MQP, is to broaden the perspective of students to include the individual, social, cultural, and in many cases, global contexts of science, technology, engineering, and mathematics.

## **2.6 Project Sites with Mixed IQP Teams**

Currently, WPI IQP project sites in India, Thailand, Namibia, and Russia incorporate students from Indian Institute of Technology (IIT), Chulalongkorn University (CU), the Namibia University of Science and Technology (formerly known as the Polytechnic of Namibia), and the Financial University under the Government of the Russian Federation respectively, into WPI IQP projects, resulting in teams with students from WPI and the host university – known as mixed teams. The Mandi, India, site has been active for one year, while the Bangkok, Thailand site has been active for over ten years. Both offer credit to students on an institutional level for working on IQPs. In Windhoek, Namibia, there have been three instances of professors offering their students credit for jointly collecting research with WPI students on IQPs (C. Peet, personal communication, October 6, 2014). At the Moscow site, which has been active for two years,

students from the Financial University under the Government of the Russian Federation collaborate on WPI IQPs on a volunteer basis.

Mixed IQP teams provide students with a unique, cross-cultural, interdisciplinary experience, but integrating the students from a university in another country is a challenge on the student, faculty, and administrative levels (I. Shockey, personal communication, September 29, 2014; R. Vaz, personal communication, October 1, 2014; C. Peet, personal communication, October 6, 2014). In each of the four project sites, differences in cultures and university structures pose unique communicative and logistical challenges. These problems take time and effort from all students, faculty, and administration involved.

### **2.6.1 Mandi, India**

The project center in Mandi, India, collaborates with one of 13 campuses of the prestigious Indian Institute of Technology. Site director Ingrid Shockey attributes successful implementation of mixed teams at the Mandi, India project site to the willingness and enthusiasm of IIT to meaningfully integrate IQPs into its curriculum. The IIT Mandi campus is directed by Timothy Gonsalves, a professor who taught in the WPI Computer Science Department in the 1980s. The mission of the WPI Plan resonated with Gonsalves during his time at the university. As the director of IIT Mandi, Gonsalves added a project based on the WPI IQP to the curriculum. The school reached out to WPI to create an India project site where IQP teams would consist of both WPI and IIT Mandi students. Students from IIT Mandi have a similar academic investment in the IQP project to the WPI students. IIT students working on the mixed IQP teams receive 4 credits – approximately a fifth to a sixth of their semester (IIT Mandi, 2010). Site director Shockey mentions that IIT students devote up to a third of their class and schoolwork hours to the project.

### **2.6.2 Bangkok, Thailand**

WPI's Bangkok IQP project center participates in a collaborative program with Chulalongkorn University's Chemistry Department, involving a significant amount of communication and work between them (R. Vaz, personal communication, October 1, 2014). The Chemistry Department of Chulalongkorn University successfully created and implements its own IQP-like project with the help of WPI students and advisors called the Interactive Science and Social Project. The Chemistry Department assigns groups of Thai students to mixed teams to work on IQPs alongside WPI students visiting Thailand. This project provides 6 credits to participating students and is accredited by the university and is usually completed in a student's senior year. Chulalongkorn University was able to set and match the project's schedule to align with the schedules of the WPI IQP teams that travel and work there. Keys to success at the Thailand IQP project site have been Chulalongkorn's ability to adapt their curriculum and students to the intense, 7-8 week schedule of WPI's own project program, and open and willing advisors in the Chemistry department to adapt their schedules so they can advise these mixed groups alongside WPI IQP advisors.

### **2.6.3 Windhoek, Namibia**

At the WPI IQP project site in Windhoek, Namibia, the mixed IQP teams operate on a much less structured basis. Individual professors from the Namibia University of Science and Technology have had their students conduct research with WPI students for an amount of credit that they determine (C. Peet, personal communication, October 6, 2014). There have been three cases of mixed IQP teams consisting of both WPI and Namibia University of Science and Technology students. In each case, the students were primarily advised by a faculty member from their respective schools. WPI students arrived in Namibia in January - before the Namibia

University of Science and Technology began its semester. The Namibian students joined the WPI students in their research collection and analysis in February. The WPI students wrote and submitted their reports before and separately from the Namibian students. Since WPI operates on 7-week terms, the IQP project ends before the Namibia University of Science and Technology finishes its semester. As a result, the Namibian students continued the research and analysis after the departure of WPI students and submitted a separate report at the conclusion of their course. The first mixed-team project was co-advised by a Namibian professor from the Department of Tourism who wished to investigate the potential for tourism companies to hire and train people in conservancies to increase income. The second and third mixed-team projects, happening in the following years, were co-advised by a professor from the Department of Land Use Management looking into the control of erosion in settlement areas. Peet believes that there potential to have more formalized collaboration with the Namibia University of Science and Technology such as IIT Mandi and Chulalongkorn University, but support of such a structure has not been received from administration, deans, and professors.

#### **2.6.4 Moscow, Russia**

WPI students conducting their IQPs at the Moscow, Russia project center are aided by economics and finance students from the Financial University under the Government of the Russian Federation with one exception in each of the two years the site has been active (S. Nikitina, Personal Communication, November 11, 2014). The projects are mostly sponsored by financial and economic consulting companies. The two teams have not included Russian students because the projects were beyond the scope of the Russian students' majors. The projects dealt with software development and water contamination, but the Russian students studied finance. Unlike students from the three previously mentioned project sites, the Russian students do not

receive academic credit for their efforts on the projects. The non-WPI IQP team members are volunteers from the Financial University under the Government of the Russian Federation. They devote anywhere from four to ten hours to the project depending on the demands of the sponsor in addition to taking around 6 classes a semester.

Despite knowing that their work will not be formally recognized by the university, positions to be volunteer members for the IQP groups have been very competitive. Students' investment in the project comes from the social and professional networking opportunities offered by the project. The sponsors have been companies that the Russian students were interested in working for upon graduation. Additionally the projects allowed the volunteer students to trade cultural ideas and knowledge with their American counterparts. Site Director Svetlana Nikitina states that the role of the Russian students is crucial. They attend interviews, group meetings, discussions, and help WPI students analyze the data collected. They are able to read in-between the lines and identify cultural nuances in the language and actions during interactions with the sponsors and interviewees. The Russian students act as guides, translators, and cultural interpreters. In the last few weeks of the project, they practice presentations with the WPI students, put together slides and work on the financial models of the technical solutions that WPI students have proposed.

Nikitina also states that Americans and Russians hold stereotypes and prejudices towards each other. Through the mixed IQP teams, the students learn that they live in the same world, share similar generational experiences, that they are part of a global community: they learn to let go of their stereotypes and prejudices. It is a lesson that changes them as professionals and changes them as people.

### **2.6.5 Advising Mixed IQP Teams**

A major challenge with mixed IQP teams is ensuring that both universities and their students understand the expectations of their respective counterparts (I. Shockey, personal communication, September 29, 2014). The definition of a team and the idea of teamwork differs between cultures. Indian, Thai, Namibian, and Russian students on teams with WPI students have to overcome these cultural barriers when working together. Each university has had its own idea of the purpose and expectations of IQPs. So far, the mixed teams have had advisors from both WPI and the local university working in conjunction with each other. In some instances, the advising from one side has not been consistent with the other. Initially in Mandi, India, project advising was directed to involve market based research as opposed to social science based research. Furthermore, site specific universities have faculty unable to commit the same amount of time and resources that WPI advisors do.

Dean Richard Vaz attests that advising off-campus WPI IQPs is a full time job – generally defined in the US as a minimum of 40 working hours per week (personal communication, December 9, 2014). Although he has never advised a mixed IQP team, he understands that “having mixed teams makes many things more complicated and challenging.” Vaz, Nikitina, Peet, and Shockey unanimously agree that advising mixed IQPs requires a different approach than advising teams with only WPI students. (R. Vaz, personal communication, December 9, 2014; S. Nikitina, personal communication, November 11, 2014; C. Peet, personal communication, December 9, 2014; I. Shockey, personal communication, December 10, 2014). The approaches vary from IQP center to IQP center, but they generally result in a greater time commitment that is difficult to quantify.

In Thailand, Peet and would spend an average of an extra 3 hours per week advising for mixed IQP teams at Chulalongkorn University (C. Peet, personal communication, December 9, 2014). The extra time commitment mainly came from meetings held among WPI and Chulalongkorn University faculty to ensure that each other's efforts to support the mixed teams coincided. In Namibia, Peet felt that advising the mixed teams added a trivial amount of time to his weekly work load. Much of the advising work for the Namibian students was done by their professor very separately. He correlates the amount of extra work mixed IQP teams require to how closely the two universities choose to work together.

Professor Shockey has advised mixed IQPs in India and Thailand and found the workload to be significantly greater than if she were advising a WPI student-only team. (I. Shockey, personal communication, December 10, 2014). Mentoring faculty from the partner university was approximately a 10 hour per week time commitment. She believes that the amount of time mentoring faculty would decrease greatly if the same set of faculty reprised their roles year after year. She estimates that her time spent advising the students increased upwards of 25% in comparison to advising only WPI students. Much of the additional advising time was spent on counseling and mediating unanticipated group dynamic issues. Shockey also taught supplemental modules to students in India and faculty in Thailand. The modules were meant to teach the groups the expectations of IQP work and included topics like report formatting, ethics, designing methodology, establishing goals and objectives, and how to evaluate student work.

In addition to advising work of 6 to 10 hours a week and teaching during the term before Moscow IQPs, Professor Nikitina spent an additional 2 hours per week coordinating with the Financial University in Moscow (S. Nikitina, personal communication, November 11, 2014). She set up and attended Skype sessions with the recruited Russian students and maintained contact



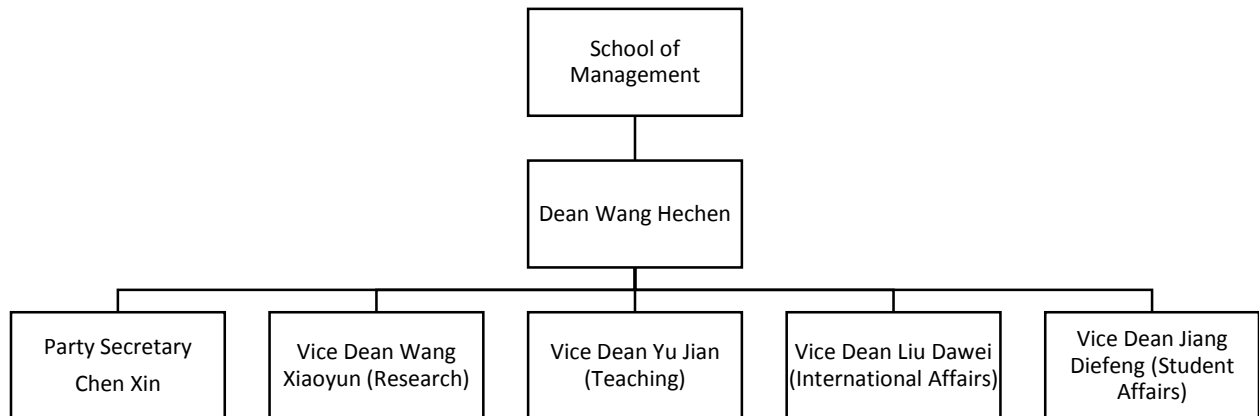
with the faculty of the school. While on site in as an advisor, Nikitina spent 4 to 6 hours per week directly interacting with the Russian students, attending joint team meetings and coordinating their class release and participation. As the final presentation and final report deadlines approached, more time was spent advising both Russian and WPI students.

## **2.7 HDU's School of Management**

Hangzhou Dianzi University (HDU) is a public institution funded by the provincial government of Zhejiang. The Zhejiang Provincial Government supervises HDU. HDU offers majors within multiple disciplines, including engineering, science, economics, management, literature, law, and education.

HDU's School of Management, a school specializing in business, marketing, and information management, sponsored this project. The School of Management is separated into two departments: the Department of Business Administration and the Department of Management Science & Engineering (HDU, 2014). The school offers eight four-year bachelor's degrees, and seven master's degrees (HDU, 2011). Undergraduate students major in information management & information systems, business administration, marketing, e-business, human resource management, logistics management, and industrial engineering (HDU, 2013). All of these programs are instructed in Chinese. Business administration is the only major taught in both Chinese and English.

The head of the School of Management is Dean Wang Hechen. Party Secretary Chen Xin and Vice Deans Wang Xiaoyun, Yu Jian, Liu Dawei, and Jiang Diefeng represent the Communist Party, research, teaching, international affairs, and student affairs of the School of Management respectively (shown in Figure 1). The school employs 20 professors as well as over 80 associate professors and lecturers to teach 1,600 students.



*Figure 1: Administration in the School of Management*

During students' first year, the university assigns them to a class of approximately thirty students that share the same major, teachers, and courses (Q. Xu, personal communication, October 31, 2014). In their second year, students begin to choose their own classes. By their

fourth year, students have fulfilled all of their graduation requirements. However, most continue with their studies in order to increase their chances of success on examinations.

At HDU, the teaching style is predominantly lecture based (X. Xu, personal communication, September 25, 2014). Students generally take seven to ten classes a semester and spend anywhere from 15 to 35 hours in class a week (anonymous, personal communication, November 24, 2014; anonymous, personal communication, December 1, 2014). Students' days typically consist of ten class sessions with periodic breaks. (Q. Xu, personal communication, October 31, 2014). A class session will typically last for 45 minutes.

The teaching style for classes at HDU is predominantly formal authority (described in section 2.4) wherein the instructor defines the importance of what is being taught (CSN, 2011). In the School of Management, teachers occasionally use the facilitator teaching style – where the teacher prompts students to conduct research on their own – through case studies and group work (X. Xu, personal communication, September 25, 2014).

## **2.8 WPI's and HDU's Current Relationship**

HDU's and WPI's relationship started with the signing of a memorandum of understanding (MoU) on November 30, 2010, to partner in developing effective educational models (WPI, 2011). HDU's School of Management and WPI's School of Business signed this MoU to help foster "cooperation in education, academic research and community services" by exchanging faculty and scholars between the two institutions (WPI-HDU, Memorandum of Understanding, November 30, 2010).

In April of 2014, WPI and HDU signed a second MoU, and the WPI Interdisciplinary and Global Studies Division (IGSD) and the HDU School of Management signed a third (WPI-HDU, Memorandum of Understanding, April 14, 2014; WPI-HDU, Memorandum of Understanding,

April, 2014). HDU's School of Management and WPI's IGSD agreed to "implement a Junior-year IQP project center at HDU". This MoU outlined the plans for the first group of WPI students and faculty that would work on IQP projects in Hangzhou, as well as the responsibilities of HDU in assisting WPI and its community members.

## **2.9 Mixed MQP Teams with WPI and HDU Students**

Currently, HDU School of Management students and WPI School of Business students have the option of working together on MQPs in Hangzhou, China. The Major Qualifying Project (MQP), is WPI's senior-year, major-related capstone project, which students complete in small groups (Vaz, 2012). MQP mixed teams consist of WPI students and students from the host university. Mixed groups engage students from both universities to engage in hands-on learning and cultural exchange. Dr. Amy Zeng, the Co-Director of WPI's China MQP Project Center, believes that WPI students greatly contribute to their undergraduate experiences by fostering a relationship with Chinese students during the MQP (personal communication, September 9, 2014). From her experience, Dr. Zeng prefers mixed MQP groups to WPI-only MQP groups because they develop both WPI and Chinese students' teamwork and communication skills, and offer a more enriching experience to those involved.

## **2.10 HDU's School of Management Curriculum**

In China, students do not have many opportunities to engage in problem-solving or innovation in their undergraduate careers (Lucenta, 2012). Like students in many other universities in China, HDU students can only conduct sponsored research as graduate students (Q. Xu, personal communication, October 31, 2014). Undergraduate education at HDU consists of teaching students through lecture as opposed to teaching through self-guided study.

However, HDU's School of Management does offer some opportunities for their students to focus on research. Professor Shen Yunhong, from HDU's School of Management Marketing Department, has described second and third year projects within the marketing major's curriculum (personal communication, November 6, 2014). Students complete these projects, which include independent research over the course of six weeks during summer vacation. In the second-year project, students study topics outside of their majors, while in the third-year project, students study topics within their majors.

### **2.11 Standardized Education and Innovation**

In order to apply to college within China, Chinese students must complete the National College Entrance Examination – known as the Gaokao – during secondary school. Nagano Miho quotes Louis Hsieh, CFO of New Oriental, a private education company in China, as saying the “Gaokao is called the life-determining test” (2008, para. 5). Scores determine the prestige of the university a student may attend, a student's career path, and his/her eventual pay-scale, and thus determine how well students may be able to care for their families. Families will devote most of their resources to the education of their children, especially those with only one child (Bradsher, 2013). In the year leading up to taking the Gaokao, students will study up to 16 hours a day for the test (Lafraniere, 2009, 2013). Because of intensive preparation for the national college entrance exam, a government run school system, and a history of theoretical, rather than practical, study, China's K-12 education system is very standardized with little room for non-lecture-based learning.

Some consider the Gaokao to hurt creativity and free-thinking among Chinese students because of the strong emphasis on preparing for the Gaokao – mainly through memorization – in secondary school (Chan & Chan, 2005; Gaoming, Yong, & Jing, 2012). With rapid reformation

to the education system within China, higher education institutions have placed more emphasis on independent thought (Wu & Tseng, 1985). With a shift towards increased critical thinking and creativity in Chinese higher education, universities may shift their curricula toward project-based learning.

### **2.12 No Prior Research into Mixed WPI and HDU Student IQP Teams**

Currently, four international IQP project sites have teams consisting of WPI and non-WPI students. WPI and HDU are interested in growing their relationship through IQPs. However, there has been no research thus far on the feasibility of creating IQP teams consisting of WPI and HDU students. This project plans to address this research gap.

### **3.0 Methodology**

We conducted our research solely within the Hangzhou Dianzi University (HDU) School of Management because Worcester Polytechnic Institute (WPI) already has a relationship with the School of Management, which it can use to create a pilot program of IQP teams including both School of Management and WPI students.

Many methods described in this chapter achieve multiple objectives. For example, the same interviews with School of Management administration are mentioned in “Identifying the School of Management’s Curricula,” “Determining Interest,” and “Logistical Requirements.” For this reason, we would like to clarify that the same methods are detailed in more than one section.

Many of the faculty we interviewed were not proficient in English. For these interviews, another faculty member or a student acted as a translator. However, these translators are not native English speakers, so some details were lost in translation.

### **3.1 Identifying the School of Management’s Curricula**

We examined the curricula in the School of Management to identify the School’s educational goals, its graduation requirements, and existing courses for which HDU students could receive credit for collaborating on IQPs.

#### **3.1.1 Identifying the School of Management’s Educational Goals**

We identified the HDU School of Management’s educational goals by interviewing Liu Dawei, the Vice Dean of International Affairs, and Yu Jian, the Vice Dean of Teaching. We interviewed two of the four vice deans from the School of Management because they were available and willing to be interviewed. Other administrators were either unavailable or unwilling to interview with us. Vice Dean Liu Dawei supervises the School of Management’s

international affairs. This interview was useful because a mixed IQP program with WPI would be relevant to his work. We also interviewed Professor Yu Jian, the Vice Dean of teaching. Vice Dean Yu Jian is especially knowledgeable of the School of Management curriculum. Both vice deans are also professors, so they understand the School of Management on an administrative and faculty level. The project sponsor and teacher at the HDU School of Management, Ms. Xu Quan, acted as an interpreter for Vice Dean Yu. The administrator interview protocol is detailed in Appendix J.

The School of Management's course catalogue, as an official document of HDU, directly states the educational goals of every major within the school. However, in light of the information provided from administrative interviews, it is not a comprehensive list of the School of Management's educational goals.

We also indirectly identified the educational goals of School of Management faculty by asking administrators and professors what they saw as the benefits of project-based and cross-cultural learning to be for their students. Although administrators may not explicitly state some educational goals, through these questions, we identified which learning outcomes professors and administrators saw as beneficial to the undergraduate experience. For example, if an interviewee lists improving professional skills as a benefit of these learning styles, it is reasonable to infer that the School of Management seeks to improve students' professional skills.

### **3.1.2 Identifying Graduation Requirements**

The School of Management course catalogue, which details graduation requirements, is written in Chinese. It also did not provide the context of HDU's culture, so we interviewed students and Chen Xinfeng, the Chief of the Student Administration Office, about graduation



requirements. In our interview with Chen Xinfeng, an undergraduate student acted as an interpreter. The interview protocol for Chen Xinfeng is detailed in Appendix G.

We also identified graduation requirements through student interviews. Initially, we intended to conduct interviews with individual students because it was easiest to schedule interviews with one student at a time. However, the student we interviewed individually had difficulty articulating her responses in English and didn't remember all of her graduation requirements. Therefore we conducted all further student interviews in groups of two or three. The students were able to help each other communicate and combine their knowledge to answer questions. The student interview protocol is detailed in Appendix H.

We had planned to hold focus groups with HDU School of Management professors to learn the social climate of project-based work at the School of Management. However, because professors are very busy, it was incredibly difficult to organize a focus group of four or more professors. We also learned from our sponsor that culturally, professors risk "losing face" to their colleagues who are more proficient in speaking English, making a focus group potentially risky. The purpose of a focus group is to have participants be comfortable discussing a given topic with each other, so a faculty focus group would not achieve this goal. Therefore, we abandoned that part of our initial methodology.

### **3.1.3 Identifying Classes Sharing Characteristics with the IQP**

We considered the option of substituting the coursework of an existing class with IQP work. To explore this option, we aimed to find classes that share key characteristics with the IQP (i.e. involving social science research, working on a group-based project, or compiling a research paper). In order to identify classes that share characteristics with the IQP, we interviewed faculty and students and surveyed students from the School of Management. We limited the scope of our

research to faculty and students because this model of incorporating non-WPI students into IQPs occurs on the professor and student level, independent from administrative involvement. We asked faculty whether they require their students to conduct research, write a research paper, or work on group projects.

Our team conducted the survey through SurveyMonkey, an online survey distribution website. We wrote the survey in English and a graduate assistant and Chinese professor at WPI translated it into Chinese. We originally intended to distribute three separate surveys, which posed questions related to student availability, courses sharing characteristics with the IQP, and student interest in group project work with WPI students. However, all three questionnaires targeted the same demographic, so the three surveys were consolidated into one. This maximized the number of respondents because with three separate surveys, students would likely confuse them and not take more than one.

To obtain 5% error with 95% confidence in a population of 1,600, we needed to survey 310 students from the School of Management. We aimed to survey 310 students, but due to time constraints, were only able to reach 254. This still gave us 5.6% error with 95% confidence, according to CustomInsight, a provider of online HR assessment and development tools.

The project sponsor, Xu Quan, distributed the survey link to 6 School of Management professors through QQ, a Chinese social media website, who then sent the link to their students. Furthermore, we created flyers with a QR code that, when scanned through a smartphone, led to the survey. We distributed these flyers at evening study halls that only contained School of Management students. Because fourth-year students take little to no classes, professors are unlikely to contact them for the survey. Also, only first-year students are required to attend study

hall. For these reasons, our methods of distribution did not produce a random sample and are therefore biased in favor of younger students. A copy of the survey is found in Appendix K.

### **3.2 Determining Interest in Mixed IQP Teams**

To gauge the interest and willingness of administrators, professors, and students to participate in mixed IQP teams, we interviewed School of Management administration, faculty, and students. Additionally, we surveyed and held focus groups with students from the School of Management.

#### **3.2.1 Administrative Interest**

Any form of implementation of mixed IQP teams requires support from administrators. In interviews with Professor Liu Dawei, the Vice Dean of International Affairs, and Professor Yu Jian, the Vice Dean of Teaching, we measured administrators' interest in introducing the IQP to the HDU School of Management and what they perceive the benefits of project-based learning, interdisciplinary work, and international collaboration to be. We also asked if they were interested in awarding academic credit to HDU students who participate in mixed IQP teams.

#### **3.2.2 Faculty Interest**

To gauge professor interest, we interviewed professors from the HDU School of Management. HDU professors could provide credit for HDU students participating in IQPs. We asked professors what potential benefits and challenges they saw in participating in IQPs and if they were interested in more opportunities for projects in the HDU School of Management curriculum. We asked whether they assigned their students group work or social science research projects within their classes, and if they would be willing to substitute any of this work with participation in IQPs.

HDU professors could also serve as faculty advisors. As faculty advisors, they would act as liaisons between WPI and HDU students and supervise the HDU students' IQP work. In addition to our questions about interest in project-based learning, we asked if professors' would be interested in working as faculty advisors for HDU students.

### **3.2.3 Student Interest**

To gauge student interest in participating in mixed IQP teams, we surveyed and held focus groups with students from the HDU School of Management. The survey questions identified students' willingness and interest to conduct research using social science research methods, analyze the resulting qualitative data, work with American students in a predominantly English-speaking setting, and to perform this work for credit.

We conducted two focus groups with nine then seven students. In the first focus group, all nine students were second-year Industrial Engineering majors. The second focus group had two third-year Industrial Engineering students, five second-year Industrial Engineering students, and one second-year Human Resources student. Only three of the nine students from the first group were proficient in English, which made communication difficult. To improve upon this in the second focus group, we simplified the questions' language and gave more in-depth explanations. In the second focus group, five out of the seven students consistently communicated with us in English, and with greater proficiency than those in the first focus group. We asked if students are interested in project-based learning, what they perceive to be the benefits of group project work, and if they prefer learning through lecture or through projects. The focus group protocol is detailed in Appendix I.

### **3.3 Logistical Requirements for Mixed IQP Teams**

In order to incorporate HDU students into IQPs, we must consider the logistical issues of student incentives, student and faculty availability, scheduling, and monetary cost.

#### **3.3.1 Student Incentive**

Much of the success of mixed IQP teams comes from non-WPI students' investment in the project (I. Shockey, personal communication, September 29, 2014; R. Vaz, personal communication, October 1, 2014; C. Peet, personal communication, October 6, 2014, S. Nikitina, Personal Communication, November 11). Academic credit is the most commonly used incentive for the non-WPI students in mixed IQP sites (three out of four). The fourth IQP site, Moscow, incentivizes students with networking opportunities - both personal and professional - instead of academic credit. Initially, we only aimed to incentivize students to work on IQPs by awarding credit through a new course or replacing current coursework with IQP work. After learning that the Moscow project site does not award credit for IQP work, however, we changed our methodology to include the option of not giving students academic credit. With this in mind, we added questions to our administrative interview protocol on whether students would be invested in a project that does not offer academic credit.

To identify what would motivate students to participate in mixed IQP teams, we interviewed students, administrators, and faculty, held focus groups with students, and surveyed the School of Management student population.

In interviews with Professor Liu Dawei, the Vice Dean of International Affairs, and Professor Yu Jian, the Vice Dean of Teaching, we asked how they believe project-based learning, interdisciplinary work, and international collaboration benefit HDU School of

Management students. We also asked if awarding credit for IQP participation would be feasible. We posed these same questions to the non-administrative faculty.

During the two student focus groups, we asked what would motivate the students to participate in IQPs with WPI students. Our survey asked students if and why they would want to work on a seven-week project with American students with seven possible responses: academic reasons, social reasons, resume building, teamwork skills, international experience, other, and not interested.

### **3.3.2 Student Availability**

In current models of mixed IQP teams, non-WPI students work 4-10 hours per week on the project, while WPI students work a minimum of 40 hours per week (I. Shockey, personal communication, September 29, 2014; R. Vaz, personal communication, October 1, 2014; C. Peet, personal communication, October 6, 2014, S. Nikitina, Personal Communication, November 11, 2014).

Our survey determined the amount of time students in the School of Management would be able and willing to devote to a seven-week project with American students in addition to their current work schedules. We asked how much time students spend in class, doing homework, and participating in extracurricular activities. Our survey determined how many hours outside of their usual course load HDU students believe they could devote to an IQP. However, no HDU student has participated in an IQP, so they cannot be certain how much time they could devote to an IQP, but the students themselves are the most reliable source of this information.

In student focus groups we asked how many hours per week they devote to class, homework, studying, and extracurricular activities. We also asked if they would be willing to

devote 4-10 hours per week to a project with American students and which academic years they believe to devote the most and least time to school work.

### **3.3.3 HDU Faculty Availability**

In some current models of mixed IQP teams, two sets of advisors are present: one or more primary advisors from WPI, and a co-advisor from the host university. In these models, the two advisors work in tandem to advise the students from their respective universities. Models involving a co-advisor require a certain level of commitment from host institution professors (I. Shockey, personal communication, September 29, 2014; R. Vaz, personal communication, October 1, 2014; C. Peet, personal communication, October 6, 2014). If a WPI-HDU IQP program were to include two sets of faculty advisors, professors from the host institution would need to be available and willing to fill the position. During faculty interviews, we described the roles of IQP faculty advisors and asked if they would be willing to fill this position.

### **3.3.4 Scheduling**

The academic years of WPI and HDU do not align; WPI divides its academic calendar into four seven-week terms while HDU divides its calendar into two semesters, lasting fifteen and sixteen weeks, respectively. WPI students travel to Hangzhou during the WPI B-term, which lasts from late October to late December, or the second half of HDU's fall semester. To identify possible avenues of fitting mixed IQP teams into both academic calendars, we interviewed students, faculty, and administrators, held two focus group with students, and surveyed students.

In all of our interviews, we asked how busy students and faculty are throughout the year. We asked in student interviews and focus groups how many courses they take each semester and how much time per week they commit to school, homework, and extracurricular activities. We also asked if they would be willing to commit 4-10 hours per week to act as translators and

cultural interpreters in a group project. We initially asked these questions without mentioning awarding academic credit, then introduced the idea of receiving credit for their work and asked if this would change any of their responses. This way, we could compare how much effort students would be willing to devote to an IQP if they were receiving academic credit or not. The survey asked students how much time per week they would be willing to commit to an IQP and what class year they would prefer to work on this project.

### **3.3.5 Monetary Cost**

The potential resources required for the creation of a new class include: compensation for HDU faculty advisors and students and university costs to design a new class. We had planned to determine the cost of implementing mixed IQP teams through administrative and faculty interviews. We intended to explore the possibility of creating a new class specific to working on IQPs. However, we did not contact any faculty with a thorough knowledge of HDU's finances.



#### **4.0 Findings and Analysis**

We categorized findings according to the three project objectives: identifying the curriculum of the Hangzhou Dianzi University (HDU) School of Management, determining HDU's interest in participating in Interactive Qualifying Projects (IQPs), and identifying the logistical requirements of a mixed IQP program. Through our findings, we determined the best approach to establishing a mixed IQP program between WPI and HDU.

#### **4.1 School of Management Educational Goals**

The educational goals of the HDU School of Management are to foster in its students a comprehensive knowledge of the fundamental concepts and current state of their areas of study, and the skills necessary to pursue successful and rewarding careers.

Vice Dean Liu Dawei listed three educational goals for his students: to be knowledge of management theory, be able to program, and be able to innovate. Furthermore, when asked about their thoughts on project-based learning, Professors Liu Dawei and Yu Jian expressed support of increasing project-based learning in the School of Management. They cited the professional skills developed through these teaching styles: teamwork skills, the ability to innovate, and the ability to proactively investigate a problem.

WPI's ongoing study on the long-term benefits of project-based learning (further detailed in Sections 2.1, 2.2, and 2.3) has shown that alumni who participated in IQPs report that project-based learning has enhanced their professional skills, communication skills, and world views. (Heinricher et al., 2013). It is evident that the IQP fosters the same professional and academic skills and global awareness that HDU's School of Management aims to promote through its curriculum. This contributes to the feasibility of a mixed IQP program at HDU because the IQP would help accomplish the School of Management's educational goals.

## 4.2 Graduation Requirements

HDU's School of Management's graduation requirements are split into five distinct categories: A, B, C, W, and S. Students must obtain a certain number of credits in each category in order to graduate. If the School of Management creates a course in which students receive credit for working on IQP teams, this class would feasibly satisfy "W-level" or elective ("C-level") credit.

All students within HDU, regardless of school and major, must take 50 credit hours of general education, or "A-level" courses. A-level courses include English, History, Math, and Marxist-Communist Theory. Students take these courses in their first and second years. School of Management students must take 75 credit hours of major-specific courses, or "B-level," courses, and generally take them after their second year. They must also take 24 credit hours of elective, or "C-level," courses. The School of Management awards C-level credits through classes at HDU, study abroad programs, and independent study approved by teachers.

School of Management students earn at least 20 credit hours (8 credits) of "S-credits" for completing an internship, which is required for graduation, over a period of one month during summer vacation. These internships culminate in a final presentation and written report, for which a professor grades them and gives them credit. This internship is an independent project for the students and the professor rarely meets with the students during the term.

Lastly, students must complete 12.5 credit hours (10 credits) of "W-level" courses to graduate. Students obtain W-level credits through conducting research related to a course, writing book reports, and attending guest lectures. A student must attend ten guest lectures or write eight book reports to receive one W-level credit. The faculty and administration determine the activities and lectures for which students can receive credit.

W-level and C-level credits cover the widest range of potential topics. It may be possible for School of Management students to receive W-level credits for being volunteer members of IQP teams. This model would be similar to the Moscow, Russia IQP center. However, if the School of Management were to create a new course that provides credit for students working on IQPs, this course would best satisfy elective (“C-level”) credits. Faculty and students stated that as a whole, they are more invested in A, B, and C-level credits than S or W-level credits. The School of Management would not require IQP work for any major, much less all School of Management students, so it would not satisfy an A or B-level course. The process of creating and approving a new class takes approximately three years. A model where volunteer HDU students work on teams with WPI students is a more immediate strategy.

#### **4.3 Courses Sharing Characteristics with the IQP**

One course within the HDU School of Management shares key characteristics with the IQP (i.e. conducting social science-related research, compiling a research paper, or working in a group-based project). Students of Professor Zhou Qing, a professor of Technology Innovation Management, direct their own research using social science research methods like interviews and surveys during two-month-long group projects. For example, some projects research the cooperation between Volvo and Chinese manufacturers within the broader context of the cooperation between Sweden and China. Students compile a report of their findings at the end of the term.

This course shares characteristics with the IQP, but it does not provide a feasible avenue to award credit to HDU students for work on IQPs. Professor Zhou Qing does not believe that students can substitute his coursework with IQP work. In order for IQP work to substitute a professor’s coursework, the professor must agree that the IQP work accomplishes the same goals

as their coursework. IQP's investigate a wide range of topics within the field of commerce, as well as other fields, such as education, the environment, and government, and project topics change year-to-year. Professors would likely not agree to substitute their coursework with a project if it is not relevant to their course's subject matter.

#### **4.4 Administrative Interest**

Vice Dean Liu Dawei and Vice Dean Yu Jian praised the benefits of project-based, interdisciplinary, and cross-cultural learning, both on students' education and on the School of Management as an institution. Both administrators believe that participation in mixed IQP teams would give students new cultural perspectives and self-directed learning skills. Students from different backgrounds contribute their own perspectives and knowledge to a project, so HDU students can learn how to approach problems from different perspectives by working with American students with majors different from their own. The IQP also promotes skills not otherwise exercised in a lecture setting like communication and teamwork.

Professor Chen Xinfeng and Vice Dean Liu Dawei spoke of a national focus to increase project-based learning and international collaboration in Chinese universities. In response to this, HDU created the four Ten Thousands Initiatives. One of the four Ten Thousands Initiatives is to involve ten thousand students in projects. Sharing the IQP with the School of Management would contribute to this initiative. It is clear that the administrators we interviewed are interested in expanding project-based learning in the School of Management.

#### **4.5 Administrative Concerns**

Although the two Vice Deans showed interest in mixed IQP teams and the program could benefit HDU students greatly, they also expressed concern that there may not be enough student interest and that adding a class to the curriculum would be too difficult. Students must want to be

a part of a large group project for the program to be successful. Vice Dean Yu Jian stated that Chinese students generally do not like group work. For example, students can complete the summer practical project that the School of Management currently offers in small groups, but many students still choose to work alone. Vice Dean Yu Jian also mentioned that the project is done on a student's own time, often at home, which may contribute to their preference to work alone.

The School of Management's administration must submit an application at least three years before the class can be added to the curriculum. The School of Management administration's interest in mixed IQP teams opens up the avenue of incorporating IQPs into the HDU curriculum. However, creating a new course is a lengthy and difficult process. If we are to explore this option, but wish for HDU students to work on IQPs before a new course can be created, we must create a short-term structure for mixed IQP teams.

#### **4.6 Teaching Faculty Interest**

Interviews with teaching faculty members Chen Xinfeng, Pu Hansong, Shen Yunhong, Wang Yi, Zhou Qing, Vice Dean Liu Dawei, and Vice Dean Yu Jian suggest that School of Management professors are enthusiastic about project-based learning, but are concerned that advising mixed IQP teams would add additional work to their research and teaching commitments.

In interviews, faculty unanimously supported an increase of project-based and cross-cultural learning in the HDU School of Management. They showed interest in incorporating students into WPI IQPs; however, few displayed interest in substituting for their IQP coursework or acting as faculty advisors. Two professors stated that they were not interested in being faculty advisors because their schedules are already occupied with teaching and research.

The faculty we interviewed all believe that increased project-based learning would benefit the students. Professor Zhou Qing believes that increased project work would improve students' ability to think for themselves rather than having teachers and books think for them. Professor Wang Yi believes that increased project-based learning at the HDU School of Management would provide balance to the lecture-based learning, with which Chinese students are familiar. Students would learn to guide their own study instead of receiving information to memorize. Additionally, professors Liu Dawei, Yu Jian, Chen Xinfeng, and Shen Yunhong believe that the international experience from mixed IQP teams would help HDU and WPI students find jobs, learn new learning methods, and understand different cultures.

Professors Wang Yi and Shen Yunhong both stated that faculty do not have the time or motivation to advise mixed IQP teams. The university awards faculty with raises and promotions based on publishing articles and presenting papers at conferences; therefore, professors are often heavily invested in their research. Professor Shen Yunhong believes that faculty are much more willing to take on additional work within the school if they are paid as opposed to being volunteers. Changing the teaching style of a class does not change a teacher's salary. He also believes that advising a project lasting more than several weeks is more difficult for Chinese teachers because there are between thirty and one hundred students in the School of Management for every professor. The interview results imply that School of Management faculty believe that advising mixed IQP teams would be additional work to their research and teaching.

#### **4.7 Student Interest**

Through interviews, focus groups, and an online survey of HDU School of Management students, we found that HDU students are very interested in the prospect of working with American students on cross-disciplinary projects like the IQP. However, the schedule for

students at HDU include a heavy course load and little free time for the significant commitment working on an IQP entails.

The survey of HDU's School of Management undergraduate population shows that 99.53% of School of Management students have reasons for their interest in collaborating with WPI students on a project like the IQP. Figure 2 lists the reasons for interest from most common to least common. These reasons include international experience, social reasons, and teamwork skills, resume building, and academics. In focus groups, HDU students stated that working on a project with WPI students would be an opportunity to improve their English, stimulate their creativity, teach them about different cultures, and prepare them for working with people from different backgrounds. The emphasis on project-based learning would also provide balance to their lecture-based courses.

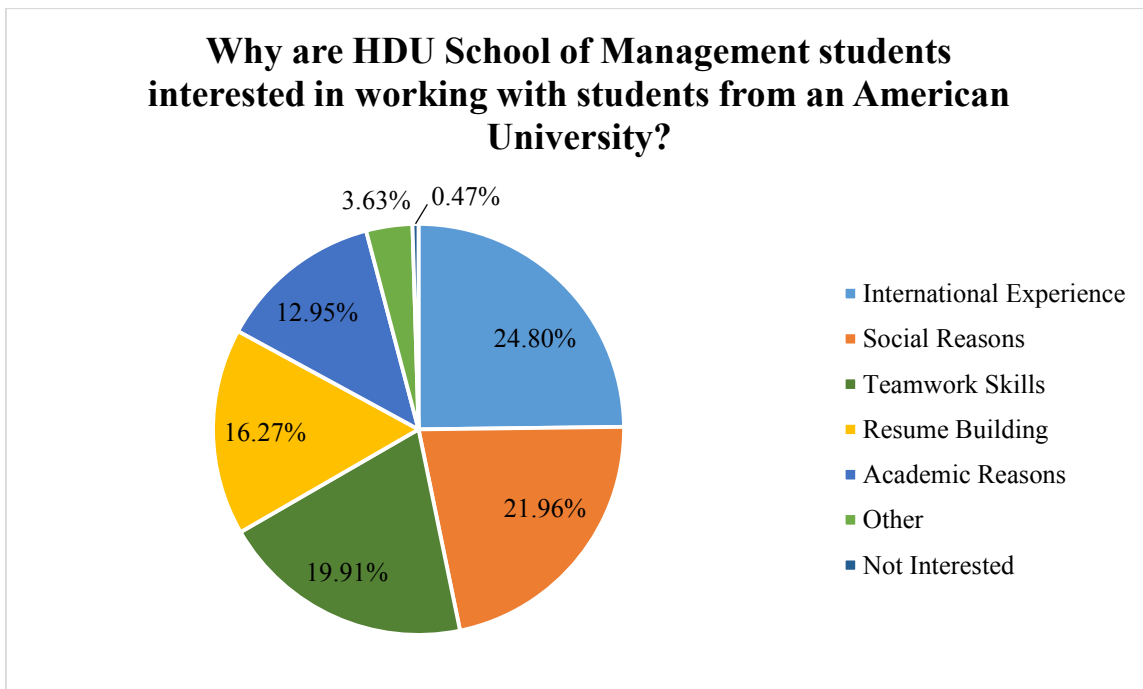


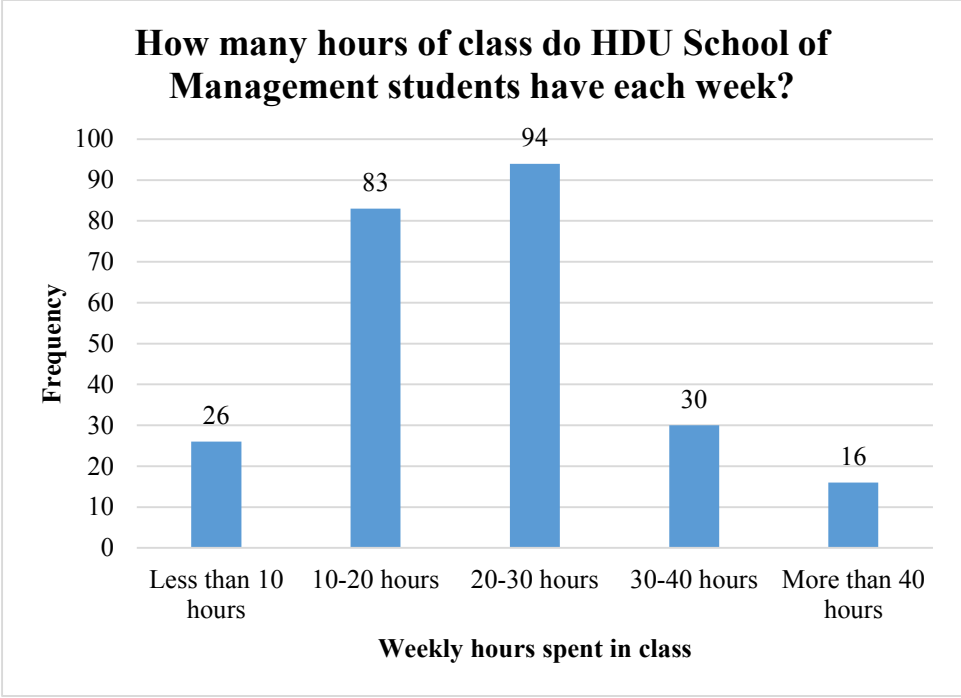
Figure 2: Survey Results - Student Reasons for Interest

In one focus group of seven students, five stated that they would be willing to participate in mixed IQP teams without credit. These students felt that the cultural exchange and exposure to a group project was enough compensation. One student said that participating in a mixed IQP team would improve her chances of being accepted into foreign universities or a study abroad program. Faculty and administration listed similar incentives for students to participate in mixed IQP teams.

#### **4.8 Student Availability and Scheduling**

Survey results represented in Figure 3 showed that 71.08% of the respondents spend 10 to 30 hours per week in class. Figure 4 compares the amount of time that students spend on homework, extracurricular activities, and their free time shown in yellow, blue, and green respectively. 73.09% of the respondents spend another 0 to 12 hours per week doing homework outside of class, 78.31% devote 0 to 12 hours per week to extracurricular activities, and 66.67% of the respondents report having more than 13 hours of free time per week. If HDU students devote a similar amount of time to projects as the non-WPI students at the Moscow IQP site do (4-10 hours per week), they will have adequate time to contribute.





*Figure 3: Survey Results - Student Weekly Class Hours*

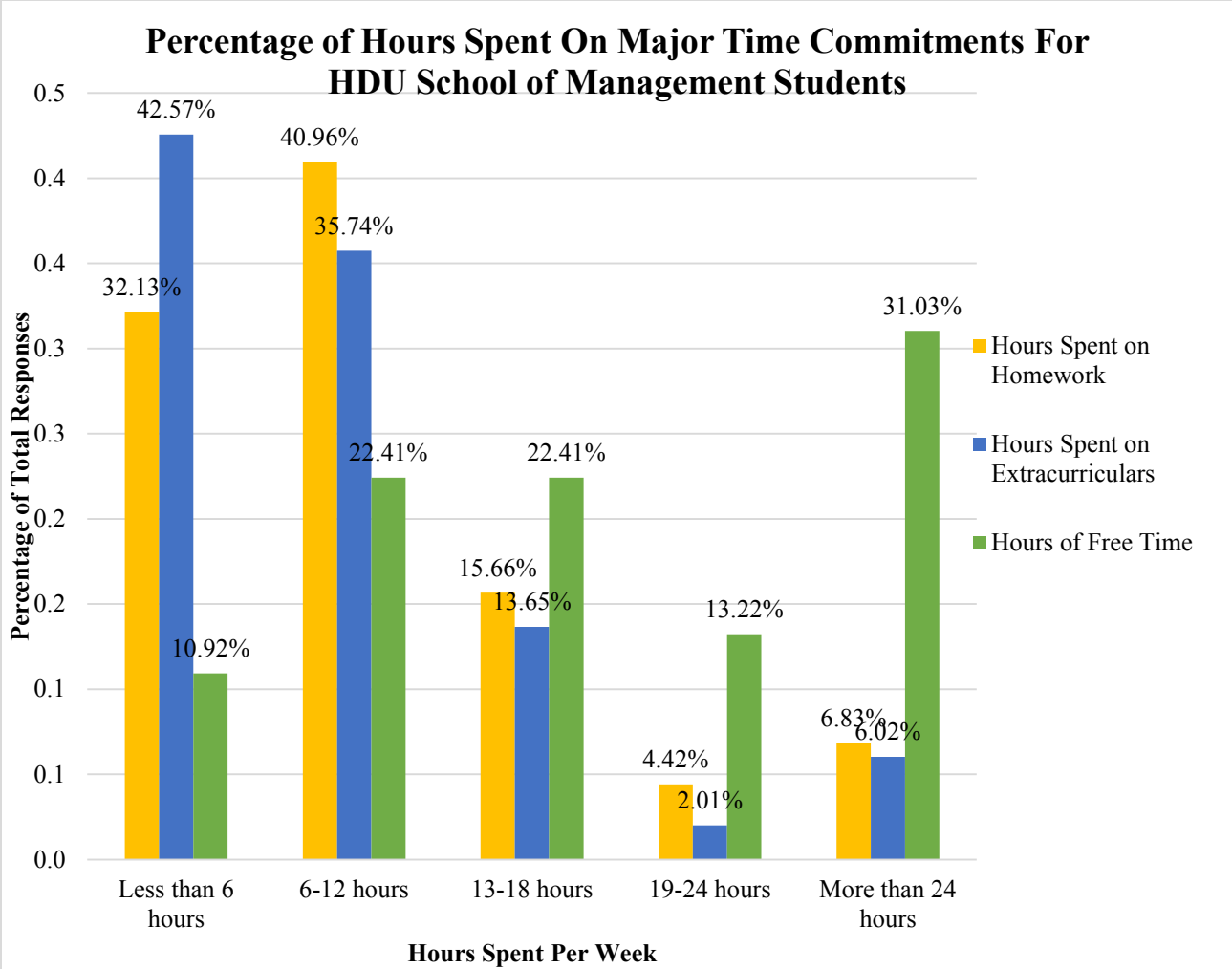
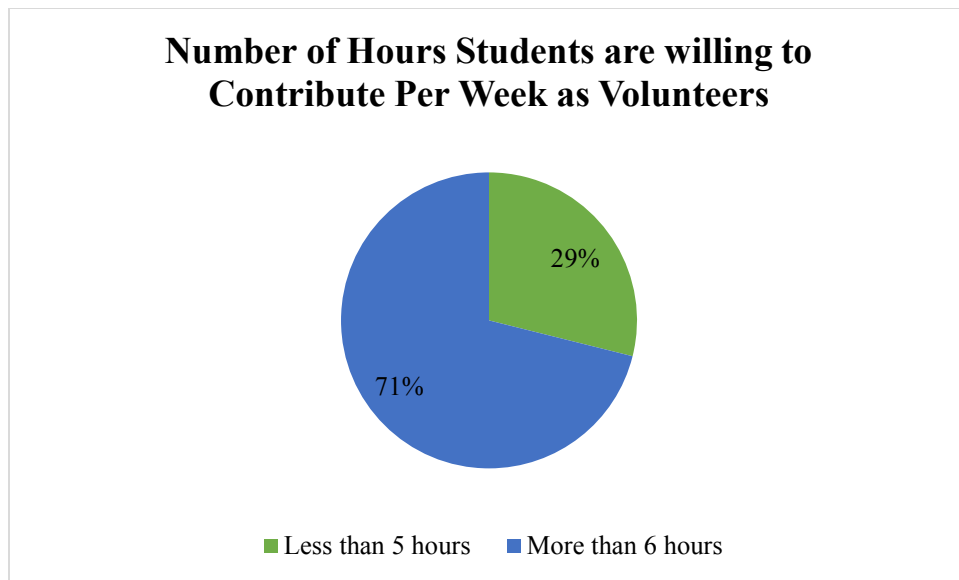


Figure 4: Survey Results - Student Time Commitments

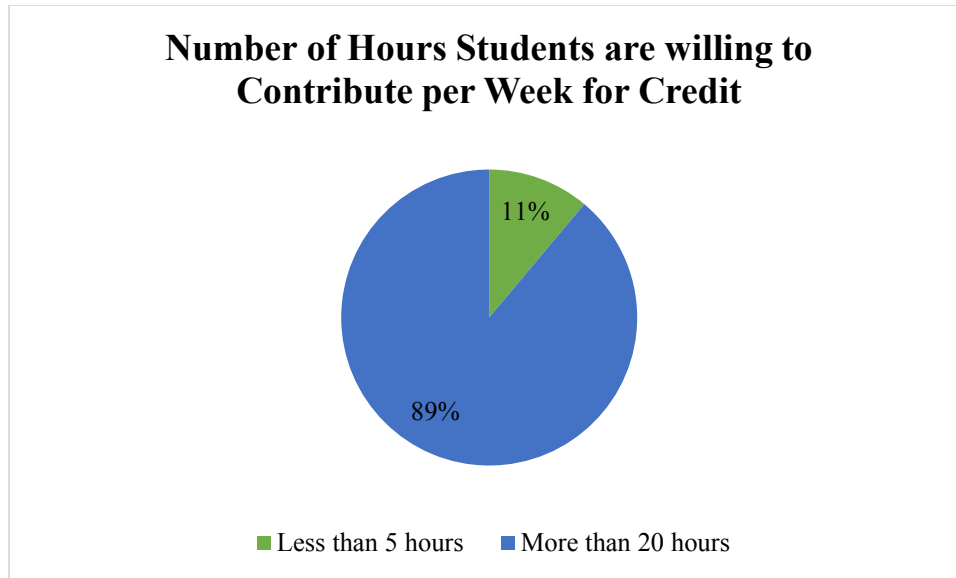
Even with the heavy course load at HDU, students are willing to participate in IQPs.

Figures 5 and 6 illustrate the amount of time surveyed students are willing to commit per week to group research projects with American students as volunteers and for academic credit respectively. 71.11% of students indicated that they would be willing to devote 6 or more hours per week to a research project with American students without receiving credit, while 88.9% of students stated they would be willing to devote 6 or more hours per week to the project if they were to receive course credit. Several students in the focus groups stated that they could devote a similar amount of time to mixed IQP teams. Others, however, stated that they could not devote

much time to a project. For example, many students devote one to two hours per day to extracurricular activities, like the student union, which consumes their otherwise free time. One student stated that if she could work on the project but not meet every day, she would be available to volunteer for IQPs. The number of students from the focus groups who stated that they could devote 6 or more hours to mixed IQP teams increased when given the incentive of credit which supports the survey.



*Figure 5: Survey Results - Volunteer Willingness to Participate in Hours per Week*



*Figure 6: Survey Results - Willingness to Participate for Academic Credit in Hours per Week*

In interviews, the administrators and faculty stated that collaborative projects between HDU and WPI would be easiest during the summer because HDU students would not need to share their time between the project and other school work. However, this is not feasible for WPI students. WPI students do not want to participate in summer IQPs because they are costly, and take up time in students’ summers that they could otherwise devote to jobs or internships. Participating in an IQP program over the summer incurs additional tuition and living costs that scholarships do not cover. During this time, WPI students much prefer paid job experience. The lower number of WPI students applying for off-campus summer E-term project sites than any term during the academic year clearly demonstrates the lower level of interest.

Interviews revealed that third and fourth-year students have the most flexible course schedules of any year. Seniors in particular have fulfilled most of their graduation requirements and thus take few to zero courses during the spring semester. They typically spend their last year in school writing their senior thesis and applying to jobs. Faculty and administrators agree that the School of Management could target students in their first semester of their senior year to

participate in mixed IQP teams. Two faculty members also mentioned that marketing majors have the most flexible curriculum.

#### **4.9 Monetary Cost**

Interviews with administration yielded information that we found to be critical to forming a recommendation to the HDU School of Management. Student tuition does not contribute to the budget of HDU. Tuition money goes to the government, which in turn gives money to universities based on perceived need. HDU administration, such as Vice Dean Liu Dawei, seek sources of additional funding for the school. We were not able to contact people with a knowledge of HDU's finances. We were also not able to estimate the cost of creating a new class.

## 5.0 Conclusion and Recommendations

Our research shows that long-term academic collaboration between Worcester Polytechnic Institute (WPI) and Hangzhou Dianzi University (HDU) through WPI IQPs is feasible. Creating a program of mixed IQP teams consisting of HDU School of Management and WPI students is mutually beneficial and possible. The HDU School of Management's administration, faculty, and students are enthusiastic about the benefits of project-based learning, international collaboration, and interdisciplinary learning. Mixed IQP teams would increase project-based learning at HDU and contribute to its four Ten Thousands Initiatives. Faculty show greater interest in participating if the responsibilities of advising mixed IQP teams contribute to their teaching and research commitments. Although students are willing and able to participate in mixed IQP teams as volunteers, awarding them credit for their work would give WPI and HDU students similar incentive to contribute to the projects.

We recommend that the HDU School of Management approves HDU student participation in mixed IQP teams for elective (C-Level) credit. The course will be structured as an independent study project. Students will be expected to contribute approximately 6 hours per week to the projects. The HDU faculty member appointed to instruct the class will work with WPI faculty in Hangzhou to advise the mixed teams; however, the HDU faculty will evaluate HDU students separately from WPI students.

WPI and HDU students should be in contact with their counterparts as early as possible. WPI project advisors assign their students to project teams at least two months before the students travel to Hangzhou in mid-October. To match the schedule of WPI students, the first half of HDU's semester-long course will be project preparation. Project preparation consists of literature

review and developing research methods. Once WPI students arrive in Hangzhou, the mixed teams will collect and analyze data together. WPI and HDU students will present their findings and recommendations to the advisors and project sponsors together. When WPI students leave Hangzhou, the HDU students will write their own research paper during the remaining few weeks of the semester.

During the approval process, which will take approximately three years, we recommend that WPI and the HDU School of Management begin trial mixed IQP teams. The teams will consist of two to four volunteer HDU students in every WPI IQP team. HDU will appoint a faculty advisor for the volunteers. The volunteers will be expected to devote 4-10 hours per week to the projects – the same time commitment of volunteer students on mixed IQP teams in Moscow, Russia.

The formal class with an appointed instructor addresses faculty concerns that advising mixed IQP teams would add additional work to their research and teaching because this class would be part of their expected workload. The class also secures long-term establishment of mixed IQP teams. Academic credit awarded through the class ensures that both WPI and HDU students working on the mixed IQP teams will have similar motivation to participate in the projects. The result of the class will be long-term, project-based cultural exchange between WPI students and HDU students that increases international presence on both campuses.

Furthermore, we recommend that WPI and HDU offer to extend mixed IQP team participation to students from other schools within HDU. This will increase the diversity of students within mixed IQP teams and present new project opportunities; faculty at other schools research topics that future IQPs could explore.

International collaboration between WPI and the HDU School of Management through WPI IQPs will expose students from both schools to the long-term academic and professional benefits of project-based, cross-cultural, and interdisciplinary learning. Students can learn many of the skills IQPs teach in a classroom setting; however, they will acquire these skills through hands-on projects in a real world setting. The projects' depth of analysis will increase from the greater collective academic and cultural knowledge of the mixed teams. Students will direct their own learning, which will give them the skills to engage in lifelong learning. They will also gain valuable teamwork skills, professional communication skills, and global and cultural perspectives that they will possess for the rest of their lives.



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**Appendix A: Interview Protocol – Xu Xiaobing**

Institution: \_\_\_\_\_ Hanzhou Dianzi University \_\_\_\_\_

Interviewee (Title and Name): \_\_\_\_\_ Xu Xiaobing \_\_\_\_\_

Interviewer: \_\_\_\_\_ Abby Harrison, Alessandra Cerio \_\_\_\_\_

Survey Section Used:

\_\_\_\_\_ A: Interviewee Background

\_\_\_\_\_ B: Institutional Perspective

\_\_\_\_\_ C: Assessment

\_\_\_\_\_ D: Teaching and Learning

\_\_\_\_\_ E: Post-interview Comments/Questions (no specific questions)

Other Topics Discussed: \_\_\_\_\_

\_\_\_\_\_

Post Interview Comments or Leads:

\_\_\_\_\_

A. Interviewee Background

How long have you been ...

...in your present position? \_\_\_\_\_ MBA Program Director? \_\_\_\_\_

...at this institution? \_\_\_\_\_ Visiting Scholar \_\_\_\_\_

Briefly describe your educational background:

Interesting background information on interviewee:

What is your highest degree? \_\_\_\_\_

What is your field of study? \_\_\_\_\_

1. Briefly describe your role as it relates to student learning and assessment (if appropriate).

2. What motivates you to use innovative teaching and/or assessment techniques in your teaching?

## B. Institutional Perspective

1. What is student life like at HDU?

- How many classes do students take at a time, and for how long?
- How much work do students have, and is it more collaborative or individual?
- We understand that the term ‘classmates’ is used much differently in China than in the US.  
How do you define classmates at HDU?
- Do classmates/students ever work in groups together?
- Can students in the School of Management take classes from other Schools such as the School of Electronics Engineering?
- How often do students from different majors or even different schools interact with each other?

2. What is the role of the professor/instructor at HDU?

- What is the interaction between students and professors at HDU? Do they hold office hours (hours specific to a class for students to come by for help)? Do students and instructors have the opportunity to get to know each other beyond the classroom (such as networking, discussions, and events)?
- For the IQP, professors act as advisors to groups of students - they generally devote 5 hours a week to the groups during the IQP preparation, and then travel with the groups (if the IQP is done off campus). Do you think that professors at HDU would be willing to commit to the amount of time and energy of such a role?

3. What are your thoughts on mixed IQP groups with WPI and HDU students?

- Do you think that interdisciplinary group work would be beneficial to the students?
- In your opinion, how willing would students be to work with American students on projects that might not be related to their fields of study (regardless of whether it would be for credit)?

#### C. Assessment

3. How would you currently assess the effectiveness and overall quality of the curriculum and measuring a student's knowledge? What do you think could be done to improve the system?

#### D. Teaching and Learning



2. What kinds of teaching styles, or combination of styles, do you feel are most effective for students in China? Most efficient for teachers?

*Formal Authority* - lecturing, instructor defines what they feel students need to know

*Demonstrator* - develops procedures and situations for the procedures to be used. Demonstration can be done by either instructor or student(s)

*Facilitator* - focus is on student-centered learning, active, hands-on approaches, and student-student collaboration

*Delegator* - Instructor acts as a consultant and students design and implement their own projects based on a goal/topic/situation set by the instructor

3. Which teaching style(s) do you find to be the most common at HDU? Are there some that you do not see at all?

E. Post Interview Comments and/or Observations:

**Appendix B: Interview Protocol – Ingrid Shockey**

Institution: \_\_\_\_\_WPI\_\_\_\_\_

Interviewee (Title and Name): \_\_\_\_\_Professor Ingrid Shockey\_\_\_\_\_

Interviewer: \_\_\_\_\_Abby Harrison, Alessandra Cerio\_\_\_\_\_

Survey Section Used:

\_\_\_\_\_ A: Interviewee Background

\_\_\_\_\_ B: Institutional Perspective and Assessment

\_\_\_\_\_ C: Teaching and Learning

\_\_\_\_\_ D: Post-interview Comments/Questions (no specific questions)

Other Topics Discussed: \_\_\_\_\_

\_\_\_\_\_

Post Interview Comments or Leads:

\_\_\_\_\_

A. Interviewee Background

How long have you been ...

...in your present position? \_\_\_\_\_Assistant Teaching Professor, IGSD\_\_\_\_\_

Briefly describe your educational background:

Interesting background information on interviewee:

What is your highest degree? \_\_\_\_\_PhD, Brandeis University, 1996\_\_\_\_\_

What is your field of study? \_Interdisciplinary Studies, Ethnography, Environmental Sociology

1. Briefly describe your role as it relates to student learning and assessment (if appropriate).

## B. Institutional Perspective and Assessment

1. From an advising standpoint, what is the dynamic between students from WPI and Indian Institute of Technology?
2. What kind of feedback have you gotten from students on mixed groups?
3. Are there groups that are not mixed at the India project site? If so, can you give a comparison of their project outcome?
4. In your opinion, what are the pros and cons of mixed IQP groups in general?
5. What is the work division between IIT and WPI students?
6. How does the scheduling work? Are IIT students a part of the ID 2050 process? Do they have their own preparation?

## C. Teaching and Learning

1. What kinds of teaching styles, or combination of styles, do you find most prevalent at IIT?

What are the comparisons between IIT's teaching styles and WPI's teaching styles? What is the effect on the mixed IQP groups?

*Formal Authority* - lecturing, instructor defines what they feel students need to know

*Demonstrator* - develops procedures and situations for the procedures to be

used. Demonstration can be done by either instructor or student(s)

*Facilitator* - focus is on student-centered learning, active, hands-on approaches, and student-student collaboration

*Delegator* - Instructor acts as a consultant and students design and implement their own projects based on a goal/topic/situation set by the instructor

D. Additional Questions/Comments (during interview):

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

E. Post Interview Comments and/or Observations:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Appendix C: Interview Protocol – Dean Richard Vaz**

Institution: \_\_\_\_\_WPI\_\_\_\_\_

Interviewee (Title and Name): \_\_\_\_\_Dean Richard Vaz\_\_\_\_\_

Date and Time: 10/1/2014, 10:00-10:30am

Interviewers: \_\_\_\_\_Victor Chau, Lewis DuBois\_\_\_\_\_

Survey Section Used:

\_\_\_\_\_ A: Interviewee Background

\_\_\_\_\_ B: Institutional Perspective and Assessment

\_\_\_\_\_ C: Teaching and Learning

\_\_\_\_\_ D: Post-interview Comments/Questions (no specific questions)

Other Topics Discussed: \_\_\_\_\_

\_\_\_\_\_

Post Interview Comments or Leads:

\_\_\_\_\_

A. Interviewee Background

How long have you been in your present position? Dean of IGSD ; Director of Bangkok Project Center

Briefly describe your educational background:

Background information on interviewee:

What is your highest degree? PhD, WPI, 1987

What is your field of study? Electrical Computer Engineering

1. Briefly describe your role as Dean of IGSD and Director of the Bangkok Project Center.

#### B. Institutional Perspective and Assessment

1. From an advising standpoint, what is the dynamic between students from WPI and Chulalongkorn University in mixed team projects?
2. What are Chulalongkorn University students' roles in IQPs?
3. How does the scheduling work? Are Chulalongkorn students a part of the ID 2050 process? Do they have their own preparation?
4. What kind of feedback have you gotten from students on mixed groups?
5. Are there groups that are not mixed at the Bangkok project site? If so, can you give a comparison of their project outcome?
6. In your opinion, what are the pros and cons of mixed IQP groups in general?

#### C. Teaching and Learning

1. What kinds of teaching styles, or combination of styles, do you find most prevalent at CU?

What are the comparisons between CU's teaching styles and WPI's teaching styles? What is the effect on the mixed IQP groups?

*Formal Authority* - lecturing, instructor defines what they feel students need to know

*Demonstrator* - develops procedures and situations for the procedures to be

used. Demonstration can be done by either instructor or student(s)

*Facilitator* - focus is on student-centered learning, active, hands-on approaches, and student-student collaboration

*Delegator* - Instructor acts as a consultant and students design and implement their own projects based on a goal/topic/situation set by the instructor

D. Additional Questions/Comments (during interview):

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

E. Post Interview Comments and/or Observations:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Appendix D: Interview Protocol – Creighton Peet**

Institution: \_\_\_\_\_WPI\_\_\_\_\_

Interviewee (Title and Name): \_\_\_\_\_Professor Creighton Peet\_\_\_\_\_

Interviewers: \_\_\_\_\_Victor Chau, Abby Harrison\_\_\_\_\_

Survey Section Used:

\_\_\_\_\_ A: Interviewee Background

\_\_\_\_\_ B: Institutional Perspective and Assessment

\_\_\_\_\_ C: Teaching and Learning

\_\_\_\_\_ D: Post-interview Comments/Questions (no specific questions)

Other Topics Discussed:\_\_\_\_\_

\_\_\_\_\_

Post Interview Comments or Leads:

\_\_\_\_\_

A. Interviewee Background

How long have you been in your present position?

Associate Teaching Professor, Interdisciplinary & Global Studies Division

- Director, Namibia Project Center
- Director, Hong Kong Project Center
- Project Coordinator

Briefly describe your educational background:



Background information on interviewee:

What is your highest degree?

- BA, Harvard College, 1966
- MPhil, Columbia University, 1978
- PhD, Columbia University, 1978

What is your field of study?

1. Briefly describe your role as Director of the Hong Kong Project Center and Namibia Project Center

#### B. Institutional Perspective and Assessment

1. What was the name of the University that you worked with in Namibia?
2. We heard from Dean Vaz, that mixed-groups with -Insert Namibia University here- students did not reach expectations, what were some issues that arose?
3. What were the reasons why mixed teams with Namibian students were an unsuccessful venture?
4. From an advising standpoint, what has the dynamic been between students from WPI and (Insert Namibia University here) in mixed team projects?
5. How did the scheduling work? Are -Insert Namibia University here- students a part of the ID 2050 process? Did they have their own preparation?
6. In your opinion, what are the pros and cons of mixed IQP groups in general?

7. Do you have any experiences or knowledge from the Hong Kong IQP site that you would like to share with us?
8. Have there been any ventures to incorporate Hong Kong Students with WPI students in IQPs?

### C. Teaching and Learning

1. What kinds of teaching styles, or combination of styles, do you find most prevalent at -Insert Namibia University here-? What are the comparisons between -Insert Namibia University here-'s teaching styles and WPI's teaching styles? What is the effect on the mixed IQP groups?

*Formal Authority* - lecturing, instructor defines what they feel students need to know

*Demonstrator* - develops procedures and situations for the procedures to be used. Demonstration can be done by either instructor or student(s)

*Facilitator* - focus is on student-centered learning, active, hands-on approaches, and student-student collaboration

*Delegator* - Instructor acts as a consultant and students design and implement their own projects based on a goal/topic/situation set by the instructor

### D. Additional Questions/Comments (during interview):

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

5. \_\_\_\_\_

E. Post Interview Comments and/or Observations:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

**Appendix E: Interview Protocol – Svetlana Nikitina**

Institution: \_\_\_\_\_WPI\_\_\_\_\_

Interviewee (Title and Name): \_\_\_\_\_Professor Svetlana Nikitina\_\_\_\_\_

Interviewer: \_\_\_\_\_Abby Harrison, Alessandra Cerio\_\_\_\_\_

Survey Section Used:

\_\_\_\_\_ A: Interviewee Background

\_\_\_\_\_ B: Institutional Perspective and Assessment

\_\_\_\_\_ C: Teaching and Learning

\_\_\_\_\_ D: Post-interview Comments/Questions (no specific questions)

Other Topics Discussed: \_\_\_\_\_

\_\_\_\_\_

Post Interview Comments or Leads:

\_\_\_\_\_

May we have your permission to use your responses in our IQP paper?

A. Interviewee Background

How long have you been in your present position? \_\_\_\_\_Associate Teaching Professor,

Humanities and Arts\_\_\_\_\_

Briefly describe your educational background:

Interesting background information on interviewee:

What is your highest degree? \_\_\_\_\_PhD, Moscow University, 1989\_\_\_\_\_

What is your field of study? Comparative Literature, Interdisciplinary Education, Digital Narrative, Environmental and Moral Issues in Literature

1. Briefly describe your role as it relates to student learning and assessment (if appropriate).

## B. Institutional Perspective and Assessment

7. What is the University has students collaborate with WPI on IQPs? Can you describe it to us in short detail (number of schools, majors offered, population, students/teacher distribution)?
8. How did mixed IQP teams between Russian and WPI students come to be? We understand that it was something that began with the first IQP group to go to Moscow. How was the program formed/decided?
9. From an advising standpoint, what is the dynamic between students from WPI and Moscow Host University?
10. Are there advisors from the Moscow Host University? What is your relationship with them?
11. What are Moscow University students' roles in IQPs? Are they awarded credit for their contributions? How so? If not, how does it work? What level of investment do the Russian students have in the project?
12. What kind of feedback have you gotten from students on mixed groups? What feedback have you gotten from the Russian university?
13. Are there groups that are not mixed at the Moscow project site? If so, can you give a comparison of their project outcome?
14. In your opinion, what are the pros and cons of mixed IQP groups in general?

15. In your opinion, what is the benefit to WPI students? To WPI itself? The Russian students?  
The Russian university?
16. What is the work division between Moscow and WPI students?
17. How does the scheduling work? Are Moscow students a part of the ID 2050 process? Do they have their own preparation?
18. Other mixed –IQP teams exist in Mandi, India, Bangkok, Thailand, and Windhoek Namibia. (may need to describe their implementation) What are the similarities and differences in the methods of mixed-team implementation?
19. What have been the greatest challenges in having mixed IQP teams in Moscow? Are there any that you have not yet mentioned?
20. What are the biggest lessons you have learned regarding mixed IQP teams? What is the best advice you can give us regarding our project here at Hangzhou Dianzi University?

### C. Teaching and Learning

1. What kinds of teaching styles, or combination of styles, do you find most prevalent at the Moscow University? What are the comparisons between their teaching styles and WPI's teaching styles? What is the effect on the mixed IQP groups?

*Formal Authority* - lecturing, instructor defines what they feel students need to know

*Demonstrator* - develops procedures and situations for the procedures to be

used. Demonstration can be done by either instructor or student(s)

*Facilitator* - focus is on student-centered learning, active, hands-on approaches, and student-student collaboration

*Delegator* - Instructor acts as a consultant and students design and implement their own projects based on a goal/topic/situation set by the instructor

D. What are your opinions on interdisciplinary projects like the IQP? What do you think makes the IQP work? What could be fixed? What is the biggest takeaway from doing a project like the IQP?

E. Additional Questions/Comments (during interview):

6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

E. Post Interview Comments and/or Observations:

6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

## Appendix F: Faculty Interview Protocol

Name: \_\_\_\_\_

Institution: \_\_\_\_\_

Years at HDU: \_\_\_\_\_

Department: \_\_\_\_\_

1. What classes do you teach here at HDU? What majors do you usually teach classes for? Do you have students who are not from the School of Management?
2. Do you have your students do group work together?
  - a. What kind of group work?
  - b. In which classes?
3. Do your students conduct social science research (i.e. interviews, surveys, focus groups, case studies, or observe groups of people)?
4. If so, what is your reasoning for having your students conduct social science research? If not, why?
5. What are your thoughts on project-based learning?
6. Where do you think the School of Management could benefit from increased project-based work? Why?
7. Where do you think the School of Management could benefit from increased work with cross-disciplinary groups? Why?
8. Do you have any concerns about the idea of increased project work?
9. Do you have any concerns about the idea of increased cross-disciplinary work?



10. IQPs are very large and require a lot of resources, which include faculty advisors, and successful implementation requires administration or professors to agree to award credit.  
Do you think group work with WPI students could be approved by administration?
  - a. Do you think that it could replace the work of any classes offered at this school?
11. Do you think that a new class specific to working with WPI students on a project could be a possibility?
12. Do you think any faculty could devote the time to advise a group of students on a complex project?
13. Do you know of other classes/teachers that have their students work in groups?
14. Do you know of other classes/teachers that have their students conduct social science research?
15. Do you have any questions for us?

## Appendix G: Faculty Interview Protocol – Chen Xinfeng

Name: \_\_\_\_\_

Institution: \_\_\_\_\_

Years at HDU: \_\_\_\_\_

Department: \_\_\_\_\_

We are a team of students from WPI conducting our Interactive Qualifying Project (IQP) in Hangzhou, China. The main focus of the WPI Plan – which is embodied in the IQP - is to teach students the social and humanitarian contexts of technology through practical application (Vaz, 2012). The Interactive Qualifying Project (IQP) is typically completed in a student's third year. Students conduct independent research in a group setting and analyze the qualitative results to solve cross-disciplinary problems. It is required that all WPI students complete an IQP in order to graduate. We are currently conducting our IQP in Hangzhou. The background research, methods of collecting data, and discussion of results from this project are compiled into a paper which is published by WPI.

16. Can you briefly describe your role here at HDU?

17. How many credit hours of each course type are required for graduation?

18. WPI's mission revolves around project-based learning. Project-based learning is a hands-on learning style where the instructor presents the students with a subject and a goal. The students then guide their own study with the intent of achieving the goal. The instructor acts as an advisor to the students. At WPI, such projects are usually done in teams. For example, we are conducting interviews with HDU faculty and administrators and surveying students, analyzing the information, and presenting our findings in a research paper. How would project-based learning benefit or not benefit HDU students?

19. Do you think that introducing a large, complex project like the IQP to the School of Management would benefit the school? How so? If not, why?
20. Do you have any concerns with the idea of bringing more project-based learning to the School of Management?
21. What do you think are the benefits and challenges of HDU students volunteering vs. receiving credit IQP work?
22. Are students required to be involved in clubs on campus?
23. Work on an IQP would require HDU students to devote 4-10 hours per week to the project. Would this be possible?
24. What are the busiest and least busy school years?
25. Is there any reason to restrict volunteers to any given year?
26. Do you think students would be interested in volunteering (i.e. not receiving credit)?
27. Do HDU students have the ability to make a gap in their weekly schedule to work with students at some point between 9am and 5pm on a weekday?
28. When do students choose their schedules?
29. Do you have any further comments or questions for us?

## Appendix H: Student Interview Protocol

Name: \_\_\_\_\_

Class Year at HDU: \_\_\_\_\_

Department: \_\_\_\_\_

Major: \_\_\_\_\_

1. How well do you know your graduation requirements here at HDU?

Can you explain to us what is required for you to graduate from HDU?

2. How many classes, what types of classes, etc.

How many classes are you currently taking?

3. How many classes do you usually take each semester? How much time are doing schoolwork – in and out of class? Do you feel that you have enough free time to do/for extracurricular activities?

4. How many/which of those classes are in your major?

5. How many/which of those classes are electives?

6. How many/which of those are other general requirements? \*\*

7. How many electives can you take during your four years at HDU?

8. What kinds of classes can you take each year? Electives vs required classes?

9. Several professors have mentioned internships in the junior and/or senior year. What are the logistics? How long does it last? Does everyone do an internship?

\*\* If they have these types of classes

## **Appendix I: Student Focus Group Protocol**

Introduction to the IQP:

We are a team of students from WPI conducting our Interactive Qualifying Project (IQP) in Hangzhou, China. Our school wishes to teach students the social and cultural contexts of technology through hands-on learning. The Interactive Qualifying Project (IQP) is typically completed in a student's third year. Students conduct independent research in a group setting and analyze the results to solve problems outside of their major. It is worth at least one half of a semester's worth of credit – and it is just as important as our senior thesis. It is required that all WPI students complete an IQP in order to graduate. We are currently conducting our IQP in Hangzhou. We conduct research, examine results, and write a report.

Our project is to see if it is possible for WPI and HDU students to work on these projects together.

We are looking for your participation. This is an open discussion, so feel free to speak whenever you want.

Before we start, may we use what you say in our paper? We will not be using your names.

Engagement Questions:

1. What is your year and major here at HDU?
2. Have you done project-based learning at HDU?

Exploration Questions:

3. What are some classes you've taken/are taking that involve social science, writing a research paper, and/or a group-based project? Did you prefer the work to lecture? Why or why not?

4. How do you think you could benefit from working on an IQP with WPI students? Do you think the WPI students would benefit? Why or why not?
5. How do you think you could contribute to an IQP with WPI students? How much time do
6. What would motivate you to participate on a project with WPI students? Why?
7. What is your current schedule? How much time do you spend in class, on homework, on other activities? What is the work that takes up most of your time? What are the differences between different years?

Exiting Question:

8. Are there any further questions or comments?

## **Appendix J: Vice Dean Interview Protocol – Liu Dawei and Yu Jian**

Name: Vice Dean Yu Jian

Institution: HDU School of Management

Years at HDU: \_\_\_\_\_

Department: Administrator

We are a team of students from WPI conducting our Interactive Qualifying Project (IQP) in Hangzhou, China. The main focus of the WPI Plan – which is embodied in the IQP - is to teach students the social and humanitarian contexts of technology through practical application (Vaz, 2012). The Interactive Qualifying Project (IQP) is typically completed in a student's third year. Students conduct independent research in a group setting and analyze the results to solve cross-disciplinary problems. It is required that all WPI students complete an IQP in order to graduate. We are currently conducting our IQP in Hangzhou. The background research, methods of collecting data, and discussion of results from this project are compiled into a paper which is published by WPI.

Our project is a feasibility study of incorporating HDU students into WPI IQPS through mixed teams. We are trying to gauge whether or not there is an opportunity for students from the School of Management to be a part of future IQP projects here in Hangzhou.

Before we start, we could like to ask if we have your permission to use the answers you give us to this interview within our paper. It will only be published at WPI and we can keep your name out of the paper if you wish (keep it anonymous).

1. What is your role here at HDU? Can you briefly describe it to us?

2. What would you describe as the educational objectives of the HDU School of management?
3. WPI's mission revolves around project-based learning. Project-based learning is a hands-on learning style where the instructor presents the students with a subject and a goal. The students then guide their own study with the intent of achieving the goal. The instructor acts as an advisor to the students. At WPI, such projects are usually done in teams. For example, we are conducting interviews with HDU faculty and administrators and surveying students, analyzing the information, and presenting our findings in a research paper. What are your thoughts on project-based learning? Do you think HDU students would benefit from project-based learning? How difficult do you think it would be for professors and teachers to adjust to a different style of teaching?
4. Do you think that introducing a large, complex project like the IQP to the School of Management would benefit the school? How so? If not, why?
5. Do you have any concerns with the idea of bringing more project-based learning to the School of Management?
6. We know that mixed MQP teams currently exist at HDU's School of Management, are you familiar with these projects? Do you think that this arrangement has benefited HDU's School of Management? How so? How do you think the arrangement could be improved?
7. A unique characteristic of the IQP is its interdisciplinary focus. Do you think that work with students from different disciplines could benefit the students at the school of management? Do you have any concerns with the idea of cross-disciplinary work? For example: marketing students from HDU working with various majors from WPI.



8. Do you think that if School of Management students worked with WPI students, their global perspective would be broadened? If so, what do you think the benefits would be? Do you have any concerns with the idea?
9. IQPs are very large and require a lot of resources. In current models of mixed IQP teams, non-WPI students have strong academic investment in the project. For WPI students the project is worth 3.5-4.5 classes. For non-WPI students on mixed IQP teams at some sites, they receive a similar (equivalent), but not necessarily equal amount of credit. Do you think that a model that awards credits to students could work at HDU? Why? \*be able to explain the models further If you don't think a model with credit is necessary, how do you think students could be interested? What would be done to make sure that both WPI and HDU students are equally invested on a joint project?
10. We are looking into the School of Management's curricula.
  - a. Do you think that the IQP could replace the work of any classes offered at this school?
  - b. Do you think that a new class specific to working with WPI students on a project could be a possibility?
  - c. What are your thoughts on revising the curriculum to accommodate such a project like the IQP? If you do not think it is possible, what are some opportunities for the project outside of the curriculum? Where do you think it would best fit?
11. Several sources have directed us towards the marketing syllabus. Professors have mentioned that the marketing curriculum has a large amount of project work similar to the IQP. We also have noted that seniors may have the most time to devote to a project of the IQP's size.

- a. What are your thoughts? Do you agree with this?
- b. From your point of view, what would be the best time for students to have this project? Why?
- c. Do you think having an international experience will help with jobs? How do you think students will grow from working with WPI students on an IQP project?

12. Do you have any further comments or questions for us?

## Appendix K: School of Management Student Survey

Name: \_\_\_\_\_

Institution: \_\_\_\_\_

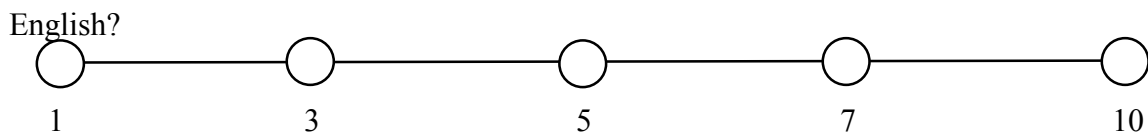
Year: \_\_\_\_\_

Department: \_\_\_\_\_

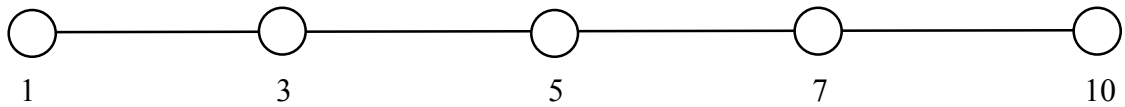
Major: \_\_\_\_\_

Hello. We are a group of students from Worcester Polytechnic Institute (WPI) in the United States. We are currently conducting a project involving the relationship between WPI and HDU. At WPI, all students are required to complete an Interactive Qualifying Project (IQP), which is typically completed in a student's third year. Students work in a group (usually of 3-4 students). Over the course of a semester, they conduct independent research and analyze the results to solve problems outside of their major. The background research, methods of collecting data, and analysis of results from this project are compiled into a paper. For their work, students receive credit for three to four and a half classes. We are currently conducting our IQP in Hangzhou. The goal of our project is to determine how it would be possible for students from the HDU School of Management to work in the same groups as WPI students in future projects in Hangzhou. Please take the time to respond to our survey. We value your response.

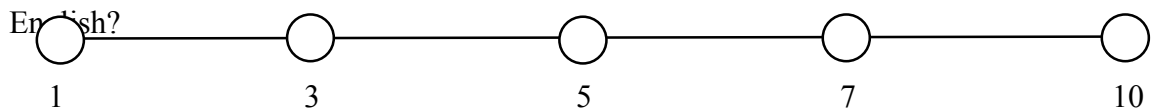
1) On a scale from 1 - 10, 1 being very poor and 10 being fluent, how well do you speak



2) On a scale from 1 - 10, 1 being very poor and 10 being fluent, how well do you read English?



3) On a scale from 1 - 10, 1 being very poor and 10 being fluent, how well do you write in



4) How many classes are you currently taking?

5) How many total hours do you spend in class each week?

a) Less than 10 hours

b) 10-20 hours

c) 20-30 hours

d) 30-40 hours

- e) More than 40 hours
- 6) How many total hours to you spend on classwork outside of class each week?
- a) Less than 6 hours
  - b) 6-12 hours
  - c) 13-18 hours
  - d) 19-24 hours
  - e) More than 24 hours
- 7) How many hours do you spend on extracurricular activities and clubs each week?
- a) Less than 6 hours
  - b) 6-12 hours
  - c) 13-18 hours
  - d) 19-24 hours
  - e) More than 24 hours
- 8) How many hours of free time do you have each week?
- ) Less than 6 hours
  - a) 6-12 hours
  - b) 13-18 hours
  - c) 19-24 hours
  - d) More than 24 hours
- 9) How many hours per week would you be available to spend time on a project involving research through interviews, focus groups, and survey techniques, analyzing the results from this research, and writing a report?
- a) Less than 5 hours

- b) 6-10 hours
  - c) 11-15 hours
  - d) 16-20 hours
  - e) More than 20 hours
- 10) Would you be interested in working on a project about technology and society with people from different majors?
- a) Yes
  - b) No
- 11) What year in your education would you prefer to do a large, group project?
- a) First Year
  - b) Second Year
  - c) Third Year
  - d) Fourth Year
  - e) During Summer Vacation
  - f) Not at all
- 12) Have there been any courses you have taken so far that have involved social-science research (i.e. Social-science research can include interviews, surveys, focus groups, and observations of a population, among other methods)?
- a) yes
  - b) no
- 13) If you answered yes, please list the classes.
- 14) Have there been any courses you have taken so far that have involved group project work?
- a) yes

b) no

15) If you answered yes, please list the classes.

16) Do you enjoy group project work?

a) yes

b) no

17) Do you think you would enjoy conducting social-science research?

a) yes

b) no

18) How interested are you in working on a group project with students from an American university?

a) Very Interested

b) Interested

c) Somewhat Interested

d) Not Interested

19) Why you are interested? (circle all that apply)

a) Academic reasons

b) Social reasons

c) Resume building

d) Teamwork skills

e) International experience

f) Other

g) Not interested

- 20) Would you be willing to work on a 7-week group project with American students as a volunteer, a student who offers some help to the visiting university but does not get credit?
- a) yes
  - b) no
- 21) Would you prefer to work on a group project with American students to satisfy a part of your graduation requirement?
- a) yes
  - b) no
  - c) It does not matter
- 22) How much time would you be willing to devote to such a project every week if it were for course credit?
- a) Less than 5 hours
  - b) 6-10 hours
  - c) 11-15 hours
  - d) 15-20 hours
  - e) More than 20 hours
- 23) How much time would you be willing to devote to such a project every week if you did not get academic credit?
- a) Less than 5 hours
  - b) 6-10 hours
  - c) 11-15 hours
  - d) 16-20 hours
  - e) More than 20 hours