IPRO 301 Project Plan

Fall 2007

Undergraduate Research on Interprofessional Education

Advised by Dan Ferguson and Margaret Huyck

1.0 Objectives:

IPRO301, Undergraduate Research on Interprofessional Education, is an IPRO designed to improve the existing IPRO experience for IIT undergraduates. The four main areas of ongoing research include expanding the current learning objectives, their bodies of knowledge and question banks, assessing the influence of groupware such as iGROUPS on team functioning, increasing rater reliability during assessment periods, such as judging scores on IPRO day, as well as assessing and increasing students' ethical awareness.

Learning objectives improvement has been a multi-semester project. Last summer five new learning objectives (LOs) were added: business planning (EnPROs only), innovation, process improvement, multicultural awareness, and design. This semester's goal includes describing a body of knowledge complete with study guides for three of the five new learning objectives, drawing up a bank of questions for use on the LO test, and collecting data on existing student knowledge in these areas.

The second objective is to assess the impact of groupware such as iGROUPS on team communication and effectiveness. Literature reviews of groupware, as well as an analysis of iGROUPS use for each team and assessment measures such as the teamwork and trust survey, IPRO day judging results, and self-assessments will be included. Hopefully the data will show a positive correlation between groupware use and team effectiveness, but this is the first semester that iGROUPS as been systematically assessed. Testing may continue for more than one semester.

The third goal is to improve inter-rater reliability during judging portions of the IPRO project, particularly during IPRO day. Past semesters have highlighted disparities between mean scores of various judging teams. Statistical models will be implemented to improve the reliability of inter-track and –rater scores, so comparisons between tracks and groups of judges can be made more accurately. Additionally, we hope to include an improved, more detailed and consistent grading matrix and implement judging training for IPRO day. All of these measures will help in future assessments of the IPRO system and allow better cross-track comparisons.

Finally, alumni surveys have pointed to a lack of ethical training in the IPRO program. Last fall drastic changes were made to the ethics LO, including a new textbook, improved question banks, an ethics workshop with the author of the text and professor from Rice

University, and a required IPRO deliverable of a code of ethics. This semester we aim to devise a grading matrix for the codes of ethics, collect data on them and their impact on the ethical awareness of students, as well as test the new question bank for significant distracters or other test-related fallibilities.

2.0 Background:

The IPRO program is sponsored not only by IIT, but outside companies fund particular IPRO projects that are applicable or beneficial to them. Improving the IPRO program as a whole not only benefits the students taking the courses and the jobs that will later hire them, but also all the businesses and the university that invest in the IPRO program.

One year ago, we had four learning objectives, a limited to non-existent literature review, and student-written study guides that varied in quality. Now there are nine learning objectives, with business planning added for EnPROs only. Ethics, the poor child of the LOs, now has a study text directly from the field, improved questions, and a presentation by the book's author. In addition, students now have a code of ethics deliverable, which helps each team examine the ethical issues attached to their particular IPRO.

Due to the IPRO scholars and its predecessors, we have implemented new interventions such as: the learning objectives test itself; the IPRO games, which has been shown to increase team effectiveness and communication in the critical first five weeks of IPRO; the project management workshop that has been hugely effective in raising project plan grades and student awareness of project management; in the last semester feedback is now being provided to students as to the reflections exercises; iGroups has been developed and continually improved, as well as its use encouraged, as a team communications and file storage database.

IPRO301 is the official "improving IPROs" IPRO. It previously was recognized as IPRO400 and before that as simply a group of undergraduates who were working to improve the IPRO experience. The learning objectives themselves, as well as the LO tests are a product of these students' work.

Most of the past implementations have worked out or are still under modification today. Everything is continually assessed using pre- and post-measures, surveys to students, faculty, and alumni, and statistical analysis. Some interventions, namely the reflective thinking

intervention (designed to improve critical thinking skills in students) were proven statistically ineffective even after several semesters of work. This intervention was subsequently abandoned.

The biggest ethical concern of IPRO301 is the testing on human subjects. All parts of our research must be certified by the IRB, every student we collect data from must sign a consent form, and any team that chooses not to cooperate may not be coerced into the system assessment. We struggle with various student and faculty attitudes towards IPRO. For instance, we collect pre- and post-test scores for the learning objectives test, but not all faculty require the test as part of the students' grades. None of these teams show a statistical improvement between pre- and post-tests, obviously due to lack of motivation. This renders it difficult for us to assess the test questions, study guides, or student preparation.

3.0 Methodology:

This IPRO addresses a wide range of problems, the largest and over-arching being the continual improvement of the IPRO program. Smaller, more detailed problems the IPRO program is currently experiencing include:

- brand new learning objectives without bodies of knowledge, study guides, or tested question banks
- shortage of questions for LOs
- new LO interventions such as the code of ethics that have not yet been assessed
- existing tools have not been tested for concrete contributions (iGROUPS)
- lacking ethical awareness in students
- lack of grading criteria for code of ethics
- significant differences in judges' responses on IPRO day

We aim to solve these problems in a variety of ways. The new learning objectives and the existing trial questions have been added to this semester's LO pre- and post-test for initial data on students' background knowledge. A literature review is underway to identify the best learning methods for undergraduate students. These methods can then be implemented in our approach to teaching LO objectives and test administration. New assessments may be constructed.

Additionally, new texts will be evaluated as potential bodies of knowledge. Some online training sites as well as question banks are being analyzed for their suitability as training tools, test material, or study guides. A small text has already been selected for the old LO of teamwork, and will be passed out to team leaders and faculty advisors with an assessment survey. Once online training tools and leading textbooks or study materials from the field have been identified, quality test questions will be drawn from the literature. These questions will become a part of the LO test and undergo quality testing in future semesters.

Many new interventions have been added since spring 2007 semester. In an effort to improve ethical awareness of students', a speaker was brought in and a new body of knowledge and question bank have been implemented. Codes of ethics are now an IPRO deliverable, and grading matrices will be drawn up. Self-assessment survey items at the end of the semester will ask student and faculty opinions on the new interventions, question banks, and body of knowledge, as well as perceived effectiveness of the code of ethics. Scoring and distribution data for the codes will be analyzed. Comparisons between code scores and LO post-test grades will be carried out and modifications made as needed.

iGROUPS, though it was developed as a past IPRO project to aid in team communication and file storage, has not been through statistical testing as to its effect on team functioning. Data will be collected for each team in regards to iGROUPS usage as a communications and file storage tool. Additionally outside sources such as Yahoo groups, phones, etc, will be examined. Comparisons in IPRO day judging and responses in teamwork and trust surveys, as well as other assessment forms will be made to overall iGROUPS usage. Results will be in the form of statistical testing of collected surveys, IPRO day results, and iGROUPS usage, as well as all collected data, before conclusions will be drawn.

The fourth problem involves demonstrated, statistical differences between judging groups in separate tracks on IPRO day. This prevents teams in different tracks from being effectively judged against each other. The IPRO day judging forms have been adjusted in preparation for this semester's IPRO day. A literature review studying the phenomenon of rater bias or inter-rater reliability is underway, as well as detailing statistical tools that can reduce this effect. Once identified, these models will be run on previous semesters' data and if proven effective at reducing biases between judging groups, will be implemented on IPRO day.

Documentation will be available in the form of a study on reliability and validity, a literature review on rater bias, as well as the statistical model and all analyses run on past data.

In the case of inter-rater reliability, iGROUPS and its effects on team functioning, and to a lesser extent, the code of ethics, the analysis of data is the project's task. Because IPRO301 is a continuation of a multi-semester effort, there exists tons of past data, assessments, and interventions that need to be evaluated. The data analysis for the bodies of knowledge, LO tests and study guides will be done next semester.

In terms of IPRO deliverables, each member of our team is assigned one major IPRO day deliverable, with input from all members of the team and a group consensus for larger deliverables. Usually at least one other team member is used as a continuity and flow check. The organizational strategy and starting plans are all approved by the faculty instructors before actual work is done on the deliverables.

Concrete deliverable results from this IPRO include: improved definitions for new learning objectives, bodies of knowledge for three of the five new LOs, improved test questions and question banks, as well as online training tools; a matrix for grading codes of ethics; and improved IPRO day judging forms and training program. All of these will directly benefit the IPRO program as a whole, either by streamlining and standardizing a grading and assessment process, clarifying existing sub-structures in the IPRO program, or helping students better obtain the learning objectives.

Less concrete results include data analysis that will lead to overall recommendations to the IPRO program. Ethics, a learning objective that has lagged behind others in assessment and satisfaction, will see improvements and assessment of new interventions. If proven more effective at helping students retain the learning objectives or showing higher ethical awareness, the improvements will be considered successful. Further development, training, and assessment will continue in future semesters.

The data analysis of the IPRO day judging will help improve the judging process, and allow accurate cross-track comparisons for the first time in IPRO history. This will not only allow students to better measure themselves against their classmates, but immeasurably help future IPRO301 semesters in their data analysis. iGROUPS data will be used to help improve existing iGROUPS functioning, team functioning and team communication.

All of the results and deliverables from IPRO301 go directly into improving the entire IPRO process. Each of our main problems is in one of the stages of: examination, intervention creation, data collection, intervention analysis, improvements, examination of a new system. This is obviously a cycle of process improvement, all incorporated into the IPRO experience shared by all IIT students. New interventions such as the code of ethics are being introduced and measured; if proven effective they will be retained and improved upon, if ineffective they will be discarded and new interventions will be designed. As the over-arching goal is to improve the IPRO program and the students' retainment of the learning objectives, each of our four main areas of research contribute clear contributions to this area.

4.0 Expected Results:

The overall result we hope to achieve with IPRO 301 is the improvement of the IPRO program, specifically the areas of inter-rater reliability on IPRO day, iGroups usage, learning objectives definition and ethical awareness. From our research, we hope to find background to base our thinking off of and attempt to learn how other people have, in the past, improved similar, created or studied similar programs. During the data analysis phase, we would like to learn how our program is working and how effective it is, preferably by using one or more methods we acquired from the above research. So our research really may include finding two things: how other programs have improved their programs similar to the IPRO program and what methods other researchers used to study such programs. We would like to apply these methods then to the IPRO program.

Our outputs will hopefully include at least two papers from each individual, one being a compilation of the research done in our respective subjects of interest and the other being recommendations by which the IPRO program may be improved, the latter would include our data analysis of the current IPRO program and it's methodology, or that may be included in another paper altogether. These results relate directly to improving the IPRO program, we aim to improve our students' ethical awareness, improve the learning objectives such that their better understood, improve the iGroups suite such that it is more usable for the student and improve the way students are evaluated such that their grades are more agreed upon, fair and consistent. Should we accomplish these goals, the IPRO program could potentially be greatly improved.

Each of the results will be implemented differently. For ethics, perhaps more interventions will be added during the semester to improve ethical awareness among our students. For groupware, more modules may be added to iGroups to improve the student's want to use it, or perhaps options may be added to iGroups for students to indicate how they are utilizing external (relative to iGroups) communication. For learning objectives, the definations will be made more clear and (perhaps) concise, so that students will be able to distill the key points out of them. And for inter-rater reliability, perhaps the number of judges will be reduced and/or the judges will be trained more appropriately.

5.0 Budget:

Budget	
Dinner	$ 75.00
Books	$ 250.00
Dinner	$ 75.00
IPRO Day	$ 100.00
Total Budget	$ 500.00

6.0 Schedule of Tasks and Milestone Events:

Please see attached MS Project File.

7.0 Individual Team Member Assignments:

A. Team members and background

Jonathan Beagley is a senior applied mathematics major with a minor in computational structures. He has spent the last two summers on NSF-REU grants doing research in algebraic structures and algebraic graph theory. He is as such, an experienced researcher and can pick up mathematical concepts fairly easily. He is on the inter-rater reliability subteam because of his experience with mathematics and statistics, as well as his conversation with Dan Ferguson about biased data collection.

Carolyn Wood is a senior physics major with a minor in math. She has worked in university laboratories in material science and solid state physics for the last two summers as part of the REU program, as well as shadowing the IPRO scholars program for a semester. Her strengths include detail-orientated problem solving, grammar checking, and the ability to complete tasks quickly. Carolyn is on the LO improvement subteam because of her writing ability and because she volunteered to join the Scholars program to improve the LO test.

Philip Kalata is a senior Business Administration and Applied Science major who is focusing on life sciences as his techinical focus. He has three and a half years of experience as a student manager at the IIT Campus and Conference Centers. IPRO 301 appealed to him as an effort to improve the program and he was given the opportunity to work on the ethics sub-team. Major skills he contributes are well developed written communication skills, rapid problem solving and the ability to solve problems of both intuitive and analytical nature.

Kory Woods is a biology and computer science major who thinks logically and is meticulous. Although only being in one IPRO so far with no prior experience, he hopes to learn research methodology while improving the IPRO program.

B. Team Leader

One thing that makes this IPRO unique is that we are all our own team leaders and we must use resources available to us, such as the IPRO faculty and perhaps even experts in our respective fields of study, editors, and other prominent figures who appear in our research. So rather than simply collaborating as a team, we collaborate amongst each other to exchange information, data and possibly methods to go about searching through the raw data. Essentially, Phil Kalata heads the ethical awareness subteam; Jon Beagley heads the inter-rater reliability subteam, Lizzie Howard heads the reflective thinking subteam; Kory Woods heads the use of groupware subteam; and Carolyn Wood heads the learning objectives subteam.

C. Subteams, D. Sub-Team Leaders, E. Responsibility, F. Sub-Team Members

Subteams, as well as team leadership, is explained above.

G. Explanation of Lack of Sub-teams

As explained above, it is each team member will go about and create their own subteam using our research and findings from other members of the team or professors. Our

subteam is not a traditional IPRO subteam, though, rather than strictly being made of other students, it is our responsibility to use the resources available to us, as well as the other team members and faculty for advice and suggestions.

8.0 Designation of roles:

A. Meeting Roles

Minute Taker: Phil Kalata

Agenda Maker: Carolyn Wood

Time Keeper: Phil Kalata

B. Status Roles

Timesheet Collector/Summarizer: Lizzie Howard

Master Schedule Maker: John Beagley

iGROUPS organizer: Kory Woods