FY15 Innovations in Teaching with Technology Awards: Enhancing Research Experiences for Undergraduates

Proposal Title:  Enhancing Research Experiences for Undergraduates

Investigators:  William Hedgecock

Org Unit:  College of Business

Department(s):  Marketing

Funding Awarded:  $28,010

Teaching and Learning Challenges - Market research analysts and related careers are projected to be some of the fastest growing occupations over the next decade (ref a). This is likely due in part to the exponential growth of data available to businesses (ref b) and increased sources of data such as social media, GPS tracking, and wearable-devices (ref c). We currently lack curriculum that teach students how to collect, analyze, and use the data that come from these new sources. Offering classes that teach students how to ethically and effectively use these new sources of data will enhance their ability to get jobs and advanced degrees. In addition, designing, implementing and reporting on research findings will teach students higher order skills that are prized by employers like analytical thinking, critical thinking, communication, and presentation skills.

Innovative Application of Technology and Enhanced Learning - The course will train students to use a variety of traditional and non-traditional techniques – such as focus groups, online surveys, prediction markets, text analysis, heart rate analysis, eye tracking, and facial expression encoding – to address problems that are relevant to government and business. Projects in the first year might include: (1) using automated facial expression analysis and weather forecasts to predict patterns of food consumption on campus, (2) using eye tracking and field data from a grocery store to explain how changes to store displays affect attention and purchases, (3) using data from social media, focus groups, heart rate, eye tracking, and facial expressions to predict advertising effectiveness or movie box office receipts. Course content will be delivered primarily online while course time will be dedicated to discussion, design and implementation of projects. Students will gain first-hand experience with 1-2 techniques and will work in teams, giving them exposure to other projects and techniques. The instructor will provide guidance on projects and training, but students will also receive training from peers. Evaluation for the course will be primarily project-based including blog entries to a course website, poster presentations, and presentations to students, faculty, and business leaders.
Plan of Work and Time Frame - Initial testing from Spring 2013 to Fall 2014 has demonstrated the feasibility of this course. This included purchasing and testing hardware and software. More than 25 undergraduate and graduate students worked on related projects in the lab.

Fall 2014 – Transition from lab to course:
- Database design (SQL server) will be finalized and reports will be automated. This is necessary as data collection in a typical study can generate 100 million pieces of data or more. This database integrates the various data streams, generates reports on data quality, and executes basic analytics. This frees up student time to focus on experimental design and advanced analytics.
- Software (e.g., Tableau, SPSS Analytics and Modeler) will be tested as a method to analyze and report results.
- Course materials will be developed and stored online.
- Businesses will be approached to discuss curriculum and partnerships.

Spring 2015 – Implementation of first course:
- Funding from this grant will allow us to purchase a second set of software and hardware. This second set is necessary to scale this research capability to the number of students in a typical course. In addition, we will purchase industry standard hardware and software to maximize effectiveness of training.
- First section of the course will be taught.

Summer 2015 to Spring 2015 – Extension of course:
- Course materials for additional techniques will be developed. New partnerships and research projects will be considered.
- The instructor will report to other faculty who are considering offering related courses next year and the Associate Dean of Undergraduate Programs about his experience with the first section to help design these new offerings.
- Database design and analyses will be continuously improved. For example, new methods to analyze data will be automated and implemented.

References – see supporting document.

Learning Objectives - Funding will allow us to expand and improve our current research training capabilities. This course will benefit the students directly through skill development, job placement, and job engagement through increased course engagement and deep experiential learning (ref d). Students will gain hands-on experience executing research projects that are relevant to businesses. At first, the course will focus on techniques that are related to emerging trends such as the
Quantified Self and Wearable Technology – mobile surveys, heart rate analysis, eye tracking, social media analytics, and facial expression encoding. The course will progressively be expanded to include additional of traditional and non-traditional techniques.

The course will expose business students to research techniques that are increasingly in demand. Sophomores and juniors can continue using these skills in future endeavors (e.g., honors projects, research assistant positions, BIAS, JPEC, Marketing Institute). This will also increase the impact of this course, as these students transmit their knowledge to other students who did not take the course. Training in market research develops skills beyond technical data collection and analysis skills that are increasing important to employers such as analytical thinking, critical thinking, creative thinking, communication, and presentation skills.

Participatory Learning - Students will be admitted to the course after receiving permission from the instructor. The students will be selected to have a variety of skills (e.g., experience working in a research lab, analytics background, experience with the topic). The majority of the course will be hands-on development, implementation, analysis, and presentation of research findings. Students will learn not just from lectures led by the instructor, but also from online resources and fellow classmates. Many of the problems addressed in this class do not have a correct answer that can be discovered by reading a textbook or asking the instructor. Instead, students will learn by executing research as a group.

Assessment - Current course offerings limit experiential market research training to a small number of our undergraduates. Training in basic research or honors level research is limited even further to just a handful of students every year. The proposed course offering could roughly double the number of students who gain hands-on experience doing research in the marketing department, could more than double the number of graduating honors students, and will facilitate experiential opportunities with many more students. The course will benefit the college other ways beyond directly educating undergraduates including increasing the availability of trained undergraduate research assistants, increasing honors project completion levels, improving relationships with alumni and companies through the course website and research partnerships, and demonstrating the value of an education at a research intensive institution (ref e) at a time when funding levels for research intensive schools is in decline (ref f).

We will assess success of the course with a number of metrics including:

- Student interest in the course (number of students requesting information, enrollment, waitlist).
- Student feedback (course ratings, evaluations from recent graduates).
What resources will you need?

- Stakeholder interest (number of stakeholders engaged in website, guest speakers, employers interested in graduates, outside interest in supporting research projects, outside funding for the course). Stakeholders include alumni, business leaders, and the public.
- Student outcomes (number of students completing course, number of students completing honors projects or using skills in future projects, job placement).

References – see supporting document.

Resources Needed - The Tippie College of Business is particularly well positioned to offer this kind of course given existing areas of expertise in the College (e.g., Behavioral Research Suite, the Iowa Electronic Market, Business Analytics & Information Systems degrees) and in the University (e.g., John Pappajohn Entrepreneurial Center, Pappajohn Biomedical Institute, Informatics). We can support this course with current infrastructure including volunteer research assistants, paid graduate assistants, the behavioral research manager, and Stead Technology Services Group. While not necessary to implement the course, additional technical support from ITS could improve the course. This support could include some of the following:

- Managing SQL Server Database and updating reports – the research in this course will generate a large amount of data. Automating data storage and basic reporting will free up student and instructor time to do other tasks.
- Facial expression software integration (C++ programming) – we currently have adequate functionality from our software to execute the course. Programming support from ITS could expand functionality.
- Remote data collection (potentially Java Script) – one advantage of using facial expression encoding is the capability to collect data remotely (from outside of the lab). Several firms have created the capability to collect data from webcams with permission from the user. Adding this functionality would greatly expand the breadth of projects that we could execute.
- Consulting on website optimization – we will design and implement the course website. Given ITS has prior experience with this kind of site, we would welcome suggestions on improvements.
- Access to Google Glass (loan) – facial expression software is currently in development for Google Glass. We would be interesting in testing this application in the future. This most likely would not be implemented in a course until Fall 2015 or later.

Estimate of Costs - Funding will be used to purchase a second set of hardware and software for the behavioral suite. This second set will more than double our capacity to train students. In addition, we will purchase industry standard hardware and software which will increase the effectiveness and portability of our training. The estimated costs are:
What is your rough estimate of costs?

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopac psychophysiological system</td>
<td>$6,710</td>
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<tr>
<td>Tobii X2-60 eye tracker</td>
<td>$18,000</td>
</tr>
<tr>
<td>Dell Precision Workstation</td>
<td>$2,000</td>
</tr>
<tr>
<td>Programming Support (C++ and SQL Server)</td>
<td>$1,300</td>
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</tbody>
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The college will provide additional staff and technological support in addition to other software, desktops and laptops for the course.

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