Utilizing On-Line Surveys for Program Assessment and Enhancement

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Abstract— At the 2004 WEPAN conference, the WEPAN's President repeatedly referred to the "elephant" in the room – the fact that while we are doing a lot of great things on our campuses, the reality is that our numbers are not going up the way we would like. It is critical that we do a better job of assessing the programs that we design, that we hold ourselves accountable for results, and that we make decisions based on data, rather than just instincts. Most universities have access to an on-line survey system which allows Women In Science and Engineering (WISE) programs and Multi-cultural Engineering Programs (MEP) to electronically survey the constituencies they serve. It is critical that we collect information on the climate of our institutions, the needs of our constituents, and feedback on our programs. This paper will share information on how to use on-line survey instruments, what WISE/MEP directors need to know about Institutional Review Board/Human Subjects applications, as well as provide examples of how the Women in Engineering and Science Program (WESP) at Kansas State University (K-State) is using on-line surveys to improve offerings and track the impact of initiatives.

Introduction

WISE/MEP Program Directors are often selected for their skills in program development and implementation, rather than for their expertise in assessment. They often have a background in running programs, rather than in designing surveys. In addition, research terms can be rather intimidating – formative evaluation, summative evaluation, sample size, non-parametric statistics, ANOVA, methods triangulation – the list goes on and on. WISE/MEP Directors also find themselves in an environment where experts understand and use these terms regularly, often without explaining their meaning.

The WISE/MEP Director's Role as a Researcher

Several types of research are needed when designing and administering programs, even though WISE/MEP Directors may not recognize their tasks as research. Directors need to collect data to provide them with information about how the program is going. For example, they might collect information on day one of a five-day camp to figure out if they want to make any immediate changes. This is called action research (Patton, 1990). They might also want to collect information from the participants of this year's program to impact improvements for next year's

program. This research is called formative evaluation (Patton, 1990). Alternately, directors might want to collect information about whether the goals of a program are being met. This would allow them to make judgments and generalizations about the effectiveness of the program and the conditions when efforts are effective. This research, which allows generalization to other programs with similar goals, is called summative evaluation (Patton, 1990). Many times the number of people participating in the program is very small (the sample size is very small), which means that the statistical methods normally used to analyze data are not appropriate. In these situations, two options that are available to researchers are non-parametric statistics and triangulation. Non-parametric statistical methods do not require the researcher to make strict assumptions about the population from which a sample is taken, making them very useful with small samples. Triangulation refers to using multiple data sources or multiple data collection methods and then comparing the results from each method or source looking for consistencies. WISE/MEP Directors can easily use on-line surveys for all of these types of research.

Using on-line surveys is fast and easy. Since there is a high level of computer literacy in the target population (the people for which WISE/MEP programs are designed), WISE/MEP Directors can expect a good response rate to on-line surveys. As illustrated in Table 1, high percentages of freshmen from each ethnic group report "frequent" computer use. However, the "Digital Divide" appears to be greatest between low and high income levels (Farrell, 2005). If your program is targeting individuals with low socio-economic status, care should be used in solely relying on internet surveys.

Table 1: Students Who Used a Computer "Frequently" in High School

	African-American	Hispanic / Latino	White	Asian-American
1985	24%	23%	28%	30%
1995	45%	45%	55%	58%
2004	77%	81%	87%	91%

Adapted from Farrell (2005).

Based on the authors' experiences, response rates to electronic surveys are typically 30-40%, and have been as high as 50-60% when the target is the engineering student population. The initial reaction might be, "Let's get started," but it is first necessary to make sure that legal obligations are met. While this may seem surprising, it is critical. Readers that are unfamiliar with obligations to human subjects should proceed to the following section. Those that understand the Institutional Review Board process at their institutions may go on to the section titled "On-Line Surveys in Practice."

Obligations to Research Participants

The following paragraphs provide general information about research with human subjects and highlight issues that require careful attention in the design of on-line survey instruments.

Basic Principles of Institutional Review Board Compliance

In July 1974, the United States Congress passed the National Research Extension Act (PL 93-348), creating the Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (URCO, 2004). This action was part of the response to numerous ethical violations brought to light in the middle of the twentieth century involving research with human subjects. In 1979, the commission produced the Belmont Report, a document that outlined the responsibilities of those conducting this type of research. The information that follows draws heavily from training modules developed for K-State researchers by the University Research Compliance Office (URCO, 2004).

Before describing researchers' obligations, let us define what is meant by research involving human subjects. Research is identified as any "systematic investigation designed to develop or contribute to generalizable knowledge" (URCO, 2004). An investigation is systematic if it is designed such that conclusions can be drawn from the data. If the knowledge gained from the investigation is intended to be applicable to cases other than the individuals involved in the study, it is considered generalizable. The intent to publish results almost always indicates that an activity is considered research in this context. A research activity is said to involve human subjects if the subjects are alive and the method includes interaction, intervention, or access to confidential information.

To meet the guidelines set forth in the Belmont Report, all research involving human subjects requires the investigator(s) to submit an application for review by an Institutional Review Board (IRB). The IRB is a body of people from the given institution charged with safeguarding the welfare of participants in all human subjects research conducted by affiliates of the institution. The process of completing an application for IRB review includes documenting the research procedure, the consent process, the risks involved with participation, the anticipated benefits to participants or to society, and the method for selection of subjects.

The description of the research procedure must include the scientific rationale of the study and the objective of the research. The investigator(s) must demonstrate that the design is consistent with sound scientific principles, ethical guidelines, and legal requirements. The documentation must outline any additional safeguards for potentially vulnerable subjects, including the elderly, prisoners, children, people who are cognitively impaired, or people who are economically or educationally disadvantaged.

A key component of the IRB application process for conducting human subjects research, including surveys, is documenting the process of informed consent. First, the invitation to participate must state clearly that the activity is research. Second, the purpose of the research should be made clear and the procedure explained. Informed consent is also closely tied to the understanding of any risks or discomforts, along with any benefits, that may result from participation. The basis for participant selection, including why the participant is appropriate for the study, should also be shared. In addition, participants must be given the option to withdraw from the study or to avoid participation. Plans must be in place to protect confidentiality of participants. Finally, consent must be given by a competent individual. Federal regulations require that parents permit or deny permission for a child to participate in a research protocol.

There are a number of circumstances in which a research activity can be considered exempt from IRB review. These investigations incur very small physical, social, or psychological risks, similar to those of everyday life. Each institution approaches such instances differently, and it is important to know the procedures in place. While some universities prefer that investigators conducting research that is clearly within an exemption category not file an IRB application, others require that every activity undergo the process. Ultimately, the IRB is responsible for making the final determination on any research activity, and familiarity with your institution's policies is critical.

Survey-Specific Concerns

While the process for meeting the obligations mandated by the Institutional Review Board when conducting surveys is straightforward, it is vital to ensuring the welfare of human subjects in all research procedures. The following elements are crucial to making certain that surveys comply with IRB guidelines: complete documentation of the survey instrument used, plans for obtaining informed consent from participants, and procedures for maintaining respondents' anonymity. To address the first element, the IRB must have a copy of the instrument that is used. Should a researcher decide to make any changes to an instrument after receiving IRB approval, the board must be made aware of these changes. It is the ethical and legal responsibility of the investigator(s) to ensure that the board has documentation of the actual instrument used in the study.

As discussed, informed consent is important for all human subjects research. In the case of on-line surveys, the introductory text must describe the nature of the study. An individual then indicates consent by the choice to respond to the electronic survey.

One of the key issues survey developers must consider is how to protect the anonymity of the respondent. The on-line survey system at Kansas State automatically keeps track of who has not responded to the survey and sends them reminders at the frequency and timing that the designer specifies. Other university systems do not have this capability and additional programming would be required to add this feature. If a survey asks any question that uniquely identifies the respondent, a procedure must be defined to separate that information to protect the participant's identity. For example, K-State serves as the host for a benchmarking survey for the Council of Industrial Engineering Academic Department Heads (CIEADH) which collects information on salary levels, research funding, publication levels, and a number of other factors in which the department heads are interested. The department heads want the survey to be confidential, but they also want to know who responded to the survey. In this case, the survey requests the name of the school, but when the data file is downloaded, the host immediately separates the university names from the rest of the data set. The data set is not stored on a local computer with the names attached to the data.

If program coordinators wish to match responses from pre- and post-surveys from an event like a workshop, a number, code name, or other method may be used to match data sets and then remove the identifiers. Researchers must avoid putting themselves in a position to have access to

the data if they really should not see the names. Every researcher has an obligation to protect the rights of the survey respondents.

On a recent survey at K-State, we needed to be able to divide the responses by department and level of program, but we were afraid that if the students were asked to provide this demographic information that they might be reluctant to do so. In some departments, students might have believed that this information would uniquely identify them. Consequently, we decided to remove all of the demographic information from the survey and to issue the survey by departments. In other words, instead of creating one survey offering for the college, we created a survey offering for each major in the college. In departments where there were very few women, we felt that they might still be reluctant to respond to climate questions, so we added information to the introductory statement to indicate how many students received the survey. With this approach, if a student typically attends classes in her major and there are only one or two other female students, she might have the impression that her response could be uniquely identified. However, if a person knows that the survey was distributed to 20 students, it more evident that it likely would not uniquely identify her.

On-Line Surveys in Practice

On-line surveys are an excellent way for WISE/MEP Program Directors to understand more about their constituents and programs. This section describes some of the tools available, the advantages of using on-line surveys, and examples of applications at Kansas State University.

Tools Available for Creating On-Line Surveys

Most universities have one or more tools available on-line for developing surveys. At Oregon State University, each of the Colleges had independently created their own tool or modified a tool available on the market. At Kansas State University, the university maintains the on-line survey system and controls access. Individuals are only allowed to have access to the survey system after completing several training modules available through the University Research Compliance Office. These training modules are available on-line, and automated so that the viewer cannot progress through the slide at a pace faster than the slides can be read. University on-line survey generators are typically very easy to use and require minimal effort to learn.

In addition to campus resources, researchers also have access to a large number of web services for creating surveys. For example, the survey instrument that WEPAN uses is called SurveyMonkey, and is available at http://www.surveymonkey.com/. WEPAN uses this instrument for membership surveys and for setting up meeting times for groups. Using these types of web services is fairly inexpensive.

Reasons to Use On-Line Surveys

In addition to the ready availability of on-line survey development tools, this method has several other advantages. Roztocki and Lahri summarize a number of these advantages from the literature, noting that time and cost savings, quality of responses, and reduction in human error are substantial benefits of on-line survey methods over paper surveys (Roztocki and Lahri,

2003). For example, in an effort to document the continuous improvement required for the ABET accreditation process, the University of Pittsburgh School of Engineering developed an on-line survey tool that could be used by multiple universities (Hoare, 2001). This approach helped stretch the time and financial resources of departments for administering and analyzing surveys. Another advantage of using an on-line survey system is that the researcher instantaneously receives a graphic of the survey responses. The on-line system creates bar charts of survey responses automatically. In many cases, one can use the survey report that is automatically generated rather than creating a separate document to report findings.

Examples of On-Line Survey Use at K-State

At Kansas State University, on-line surveys have been used to collect information about climate issues, to identify the needs of the students we serve, to evaluate programs, and to simply answer a question. Each of these survey types is discussed in the following sections.

Climate Issues: In the spring of 2003, the College of Engineering's Diversity Committee and the Dean's Office with the assistance of The IDEA Center (an external consulting organization) conducted an on-line survey to solicit student feedback about their experiences in the College and their specific experiences related to diversity issues. The overall response rate for this survey was 31% for first year students and 49% for upper class students (all other undergraduate students) (The IDEA Center, 2003). While this survey included questions about whether the students were familiar with the Women in Engineering and Science Program (WESP), the questions asked were not specific enough to gauge if the female students were experiencing issues with the climate that needed to be addressed.

WESP programs are intended to influence positive changes to the campus climate. Therefore, a survey was designed to assess campus climate and it will administered to all female students in the 17 departments served by WESP on an annual basis. The purpose of this survey was to track experiences with the climate over time to determine if WESP programs have a positive impact. The questions about climate focused on how welcoming the university, college, and department are to female and male students; how happy female students are with their degree program choice and if they would recommend it to other female and male students; and whether they feel they are treated with respect by faculty, staff, and peers who are either male or female. The survey results were used to provide a snapshot of how K-State is doing with respect to climate. At the department level, responses to specific questions identified areas of opportunity to explore. More importantly, this same set of questions will be asked each year during fall term to determine if the pattern of responses changes over time.

Each fall additional questions may be added to the base survey, depending on what additional information is needed. Since K-State was transitioning to new leadership, it was important to use the fall 2004 survey to assess constituent needs. The next section discusses the method used to do this.

Constituent Needs: In the fall of 2000, one of the authors reviewed over 25 Women in Engineering Programs and Multicultural Engineering Programs around the country to identify best practices. From this review, a set of 26 programs or activities were identified that were

commonly included in WISE/MEP programs, or were novel and looked promising. This research was used to design an on-line survey to identify the needs of female engineering students at K-State. First, the survey asked for a "yes-no" response to the question "Would the following programs be beneficial at K-State?" This question was followed by another which focused on identifying students' highest priorities: "Which of the following programs would be MOST beneficial to K-State? Please select THREE programs." This approach allowed the use of methods triangulation to analyze the results. The same information – what programs K-State should pursue – was sought from two separate angles, and the consistency of the responses indicated the recommended area of emphasis. In addition, the data were analyzed with three units of analysis: the individual responses, the department priorities (whether it appeared on the department's list), and the rank of preference within the department.

Program Feedback: K-State also uses on-line surveys for program feedback. For example, WESP runs a program called EXCITE! (EXploring sCIence Technology & Engineering) for 9th and 10th grade girls. To assess this program, pre- and post-surveys are used for both summative and formative evaluation. These surveys were traditionally paper surveys that were filled out prior to arrival on campus as a part of the registration process, and during the closing ceremonies. After using the on-line survey system, the decision was made to create the surveys for use on-line for summer 2005, but to actually enter the data from the summer 2004 into the system to generate the findings report. Beginning in the summer 2005, the girls will fill their pre-survey out on-line before they arrive to campus, and will go to one of the computer labs to fill their post-survey out before going home. Also, beginning in summer 2005, parent surveys will be placed on-line.

Simply to Answer a Question: The WESP office at K-State uses on-line surveys in a number of ways to support day-to-day operations. For example, WESP recently was considering holding a "Making a Difference" event and needed to know what to anticipate the level of interest to be. We designed a quick survey with three questions that was sent out to all of the students WESP serves. Giving them a week to respond the response rate was only 13%. However, roughly fifty people wanted to participate in the event, which was exactly the number we wanted. The on-line survey was an excellent way to gauge interest before devoting significant resources to designing an event.

In another example, the Women Mentoring Women group decided that they wanted to redesign their logo and they held an event at a local restaurant to have members use the butcher paper and crayons to come up with a new logo. The designs from the evening were scanned and posted to a webpage where the women went to review the designs. They then used the on-line survey system to pick their first, second, and third choice for the new logo. The automated process was very smooth.

As a WEPAN member, you probably recently participated in a "simply to answer a question" survey when WEPAN's President Bevlee Watford asked how the members felt about holding the 2007 conference in Hawaii. In addition, several WEPAN committees are currently designing an on-line survey of WEPAN members to support committee activities. On-line surveys are a very effective method for getting answers to questions quickly without a huge time or money investment.

Summary

As Directors and Program Coordinators for WISE and MEP programs, it is critical that we find ways to assess the impact of our efforts. This paper discussed the role of being a researcher, provided information on dealing with human subjects, reviewed resources available for creating on-line surveys, discussed advantages of on-line survey administration, and provided examples of how on-line surveys are being used at Kansas State University. On-line surveys are a valuable resource for improving offerings and tracking the impact of initiatives. The elephant may not immediately leave the room, but we can use on-line surveys to demonstrate the progress we are making.

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