

## **Taming Data: Collect, Compare and Report Results Using AWE ADAPT**

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Tracking data to assess outcomes of recruitment and retention activities is a critical component of overall assessment of program recruitment and retention activities. Without more sophisticated data collection to support survey results, effective evaluation based on outcomes is not possible. Other measures beyond formative surveys are needed. In engineering outreach programs for underrepresented students this provides a particular challenge. While faculty developing courses and curricula can use student grades as one type of outcomes measure, recruiting events and retention activities need additional data to understand whether or not objectives and goals of programming are being met. Or, put simply, “What is working; what is not?” The most straightforward way to do this is to document activities thoroughly to gain an understanding who is participating, how often, and whether participation in particular activities correlates with higher retention and recruitment results.

Even when data *beyond* survey results are collected, they are not always easy to use. Taming unruly data is a common problem for all who coordinate student activities and direct recruitment and retention programs. It has also become a compelling need for engineering administrators and faculty in general with the advent of ABET outcomes based assessment. When the time comes to write up work for journals or conferences; provide a report to supervisors or funders on the demographics of participants; compare participants across yearly offerings; tally up total participation in a suite of activities; or check to see if girls being recruited enroll or women engaging in activities are retained, data are too often missing in action or scattered. Faculty, administrators, directors and coordinators typically find themselves scouring hard and virtual drives, trying to remember which student might have entered data, or digging up hard copy information that has not yet been entered and analyzed. Additional challenges may be to force fit data fields so that data can be translated into a common software program or cross comparing activity participation within a given program.

The root causes for this situation are numerous and common: understaffed and under-resourced programs(9,14), multiple people entering data in a variety of formats, data fields and names recreated for each activity, and generally treating assessment as an add on, rather than as an integral part of activity, workshop or course development.

This paper describes ADAPT, the AWE Database for Activity and Participant Tracking, a tool to enter and collect data important for assessment and program reporting in one place and one format for easy retrieval. ADAPT will retrieve information for reports, provide a basis for

outcomes measures, and provide a way to track important stakeholders. AWE, Assessing Women in Engineering, is explained below.

### **Integrated Data Collection and Assessment**

Effective data collection is a necessary component of assessment, which has become a watchword in engineering education, particularly with the advent of ABET (Accreditation Board for Engineering) outcomes based accreditation. At the pre-college and undergraduate diversity outreach level, the need for better assessment is also recognized. (4). Even with the current emphasis on assessment and outcomes sound data remain scarce. Typically programs continue to rely heavily on formative-type surveys given at the end of an activity or event. Other outcomes data, comparable across programs and institutions, are also not in evidence. This is particularly true with regard to comparable retention and recruitment results related to outreach programming. Some institutions have gathered and analyze longitudinal data (2, 7, 12, 13); but they remain part of a pioneering group. A conclusion in a literature review of assessment in engineering education reinforces the need for better data collection: “college and universities should pay more attention to retention and graduation data” as well as gather more evaluation and research on effectiveness of programming. (8)

Moreover, while the need for better assessment is generally recognized, the integration of assessment into activities from conception of an activity or course and continuing well beyond the end is still rare. Major barriers to better assessment practices are the expense of mounting good assessments and analysis and the need for assessment expertise. More complex questions, post-survey instruments, qualitative studies and tracking data are more difficult to create and/or collect on limited budgets, with limited person power and a lack of easily accessible assessment expertise. As important, the collection of pre-college outreach activity participant data to determine whether participants go on to matriculate in engineering or of cohort data on who is retained in the engineering curriculum and who is not are often not done systematically or collected and not analyzed. (5)

Finally, a major barrier to undertaking effective assessment is a lack of recognition of the value good assessment adds. In fact, assessment well done becomes the basis for a systemic approach to program development.

### **Assessing Women in Engineering Project**

The AWE Project (HRD 01 20642) (6,10,11) addresses the need to undertake effective assessment within the context of Women in Engineering and related outreach programs. AWE activities are based on a systemic model of program development in which program goals, objectives and activities are inherently tied to program assessment and evaluation.

The AWE Project ([aweonline.org](http://aweonline.org)) identified and continues to address the critical need of developing high quality assessment instruments for Women in Engineering and related program or activity directors that will enable them to: 1) refine activities to better meet their recruitment and retention objectives; 2) have access to and know how to use high quality data for making sound evaluation and programming decisions; and 3) to leverage results in funding requests/grants and for reports to key stakeholders. AWE has created, tested and validated these instruments and has created a substantial number of support products for the projected users.

An AWE hypothesis is that many, if not most, Women in Engineering (WIE) and related programs are unable to develop effective assessment instruments because of their practitioner orientation—simply put, they are focused on offering programs, are often under-resourced and typically without easy access to the time or expertise to create effective assessment tools. (5, 9, 14)

During the past three years, AWE has developed and tested instruments with directors at partner institutions selected to represent diversity of student populations, WIE programs and directors, and institutions. A short list of AWE products includes 1) a suite of tested and validated pre-college and undergraduate engineering instruments for WIE program activities; 2) literature overviews that provide a research basis for assessment and programming; 3) an annotated bibliography that relates literature to programmatic objectives; 4) online instrument documentation; 5) ADAPT, an information management tool; 6) workshops and educational materials focused on assessment; 7) AWEonline.org, a comprehensive website for delivery of all AWE products and tools.

AWE Partner Institutions are PIs at the University of Missouri and Penn State University and WIE program directors at Georgia Tech, the University of Arizona, the University of Louisville, the University of Texas - Austin, and Rensselaer Polytechnic Institute. AWE Partners represent a diversity of types of institution, student populations and director expertise.

### **Exportable Database: Quick Access to Data and Reports**

ADAPT addresses the collection and management of data—important components of integrated assessment. It also makes retrieval of a variety of information quick and easy. Figure 1 describes the main features, functions, assessment uses and other benefits of ADAPT.

Quick access to data that are too often scattered throughout offices and computer hardware is a primary function of ADAPT. ADAPT, a formatted database shell, provides a secure, central place to enter and collect all program and activity data electronically for easy retrieval and comparison. Data can then be retrieved for insertion into presentations or as part of a report preparation function. ADAPT is downloadable to institutional and/or individual computers and customizable for programs and activities.

Based on Microsoft Access, ADAPT is designed to maintain information about program activities in one place, in one format, as a transparent system that anyone can use. Data entry is done through simple forms connected to a set of tables and queries; users who are knowledgeable about MS Access can also access the tables directly. The flexible design also allows the administrator to set up controls when installing the database so that users have individualized permissions. For example, a student worker may have permission to enter data only for one activity while a permanent staffer would have permission to enter and view data for all program activities. (Figure 2)

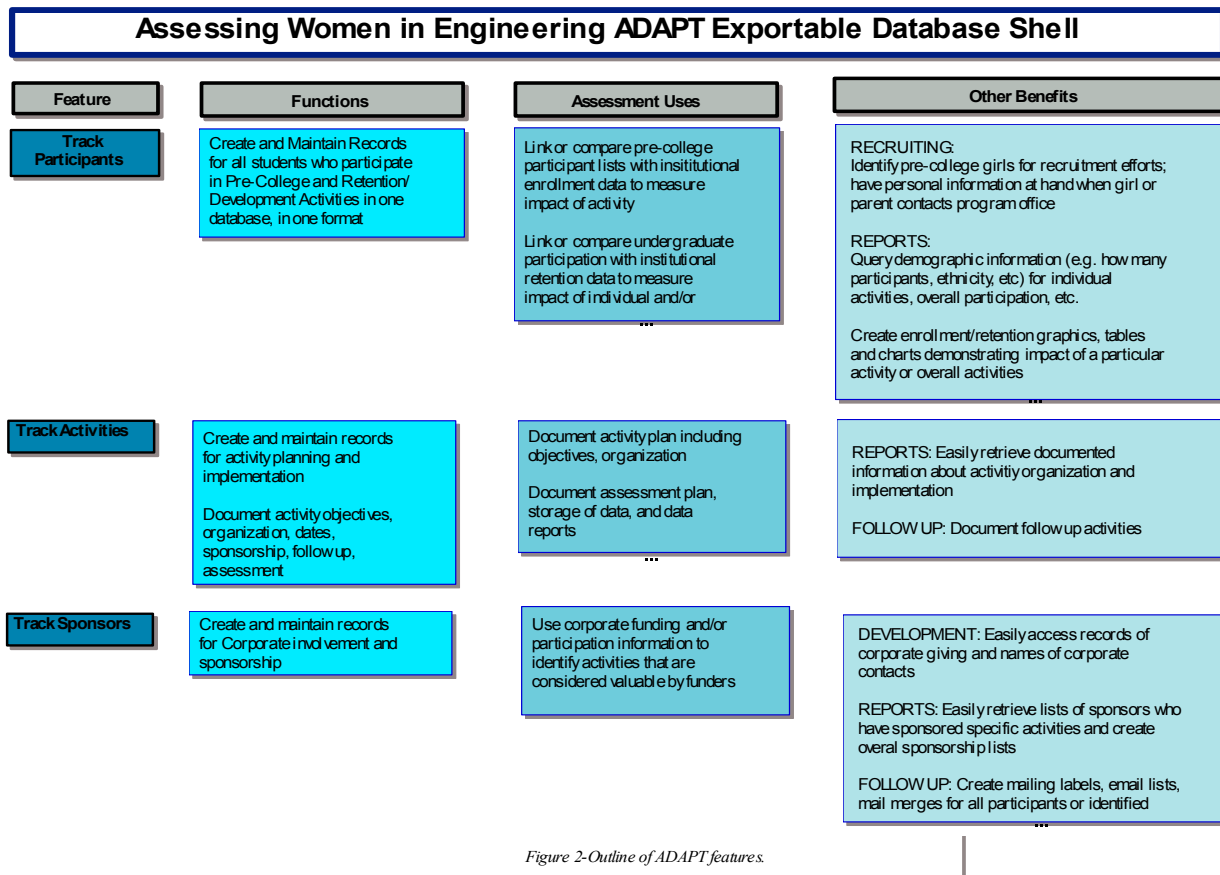


Figure 2-Outline of ADAPT features

ADAPT was developed on Windows platform using Windows XP and Microsoft Access 2000. Requirements include Microsoft Windows 2000 version as an operating system with Microsoft Data Access Objects (DAO) 3.x library and Microsoft ActiveX Data Object 2.x libraries installed. These libraries are responsible for managing the connection between the database and database objects using Visual Basic code. The installation of ADAPT will come with special libraries called .dll files which will be compiled with the database in order to avoid platform dependency. Testing of ADAPT other Microsoft Windows environment and on various platforms is ongoing. It is anticipated that ADAPT will be ready for general distribution in Fall 2005.

Implementation will allow users to develop reports of activities that include objectives, a description geared towards sponsors or participants, list sponsors and funding sources. There are three main functions, described below:

#### 1) Data Entry (Data entry and management)

This covers three areas:

- Activity Tracking—Basic activity information (when and how often offered, objectives, funders, descriptions geared toward students and sponsors or other stakeholders, information on where relevant materials are filed). This function provides a planning framework as well as a platform for creating reports on specific activities or across activities.
- Participant Tracking—Students entered by activity (as they register for a camp or participate in a retention activity) or individually (visits or requests). Each student will be

tracked through a key, most typically the student identification number, which allows for retrieval of demographic information for searches and reporting.

- Sponsor Tracking—Data entry forms for sponsoring companies or foundations that include contact information as well as a record of what the companies have sponsored.

## 2) Data Retrieval (View/Search Data/Data Reports)

Once the data are entered, users can retrieve the information through a set of queries and reports:

- Quick Counts—The user can perform a “quick count” to gain a demographic summary of how many precollege students participated in overall programming during a given year or years, or how many participated in a particular camp that includes sorting by ethnicity, age, etc.
- Searches—Search the data base to find information by year, activity, goal or type of activity; or to find particular students or lists of types of students; or individual sponsors and sponsor information.
- Reports—Reports can be created for sponsors that include the name of the event, the event description, and how many students participated.
- Follow Up—ADAPT also provides the ability to query email and other types of mailing or contact lists for participants or sponsors for use in following up with participants and sponsors.

Directors can facilitate development/fund raising and recruitment through use of ADAPT. WIE programs are able to maintain and easily access records for individual students, of support for activities or by sponsor; gain background information for face-to-face meetings for both students and sponsors.

### Using ADAPT to Measure Outcomes

ADAPT offers more than an administrative tool for collecting and maintaining data. With longitudinal participation data available on ADAPT,

users can link those data to an institutional data warehouse to determine outcomes. For example, a query of whether participants in a pre-college camp have applied or enrolled in the offering institution provides an outcomes measure of how effective that camp is as a recruiting tool. Likewise, a comparison of students who have participated in Women in Engineering Program activities and those who have not can provide one measure of how effective that programming is in retaining and developing participants. Because the data are entered by activities, programs will also be able to compare recruitment or retention by activities. Are girls who participate in a career workshop more likely to matriculate than those who attend an open house? Are students who participate in the first year orientation more highly retained than those who do not? If they

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Figure 2-Example of AWE ADAPT Secure Login Page.

also participate in a networking function, does that result in higher retention rates? By identifying and analyzing such data, programs can combine this with other assessment data to make decisions on what is effective, what needs to be changed, and which activities can be laid down. It should be noted that such data are only one assessment tool and are most effectively used in an integrated approach that includes assessment instruments/surveys and other measures.

## Conclusion

Assessment provides a systems perspective for good evaluation of ongoing activities and, as such, should include a variety of measures. The collection of participation data for comparative use with matriculation and retention data provide valuable outcomes measures. AWE ADAPT, a formatted, importable database, provides a platform for such data collection and is designed to be useable by programs and activities that may not have the resources to create and maintain unified databases.

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