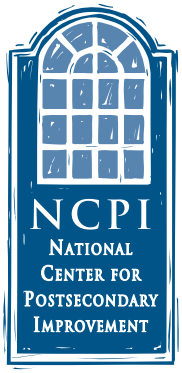

Improving Research on Postsecondary Student Outcomes: A Review of the Strengths and Limitations of National Data Resources

ERIC L. DEY

SYLVIA HURTADO

BYUNG-SHIK RHEE
KAREN KUROTSUCHI INKELAS
LESLIE A. WIMSATT
FENGHUA GUAN

National Center for Postsecondary Improvement
508 CERAS
School of Education
Stanford University, Stanford, CA 94305-3084

The work reported herein was supported in part by the Educational Research and Development Center program, agreement number R309A60001, CFDA 84.309A, as administered by the Office of Educational Research and Improvement (OERI), U.S. Department of Education. The findings and opinions expressed in the report do not reflect the position or policies of OERI or the U.S. Department of Education. Publication Number NCPI-5-01.

Introduction

Reviewing and synthesizing published research is a routine, yet critical, scholarly activity. Such reviews help document the current state of knowledge in particular fields of scientific inquiry while also serving to articulate themes and identify frameworks that are generated across a variety of studies. Although different "approaches to gleaning the accumulated findings of…research" have been suggested (Dunkin, 1996, p. 87), it is clear that such reviews influence research, policy, and practice and are important in helping develop and advance knowledge.

The purpose of this analysis is to review existing national data sets to determine their utility in studying teaching, learning, and assessment issues. We approached this review as one might approach a review of a body of literature, substituting data bases and variables for books and articles. In doing so, we seek to review, compare, and contrast the strengths and limitations of existing national data resources on postsecondary education. The results of this review will help document the existing capacity to study teaching, learning, and assessment activities with existing data resources, while also suggesting directions and priorities for future data collection activities.

The specific focus of this review is on topics related to studying how teaching and learning processes affect postsecondary student outcomes. Interest in assessing the outcomes of undergraduate education and other forms of postsecondary activities has continued to grow in recent years. Unfortunately, the increased demand for empirical evidence on the relationship between teaching, learning, and assessment and student outcomes across the American postsecondary system has largely remained unmet. Despite continuing investments in the production and maintenance of data systems at the institutional, state, and national levels, the data that are currently available tend to be limited in a number of ways. As has been observed elsewhere, "Much of the business of education occurs in the nation's classrooms—elementary, secondary, and postsecondary—yet national surveys presently tell us relatively little about what actually takes place at the classroom level" (National Center for Education Statistics, 1996, p. 16).

Thematic Organization

In conducting our review, we focused primarily on data collected from students participating in some form of postsecondary education. Since faculty activity is an obvious component of teaching and learning in postsecondary education, we reviewed a number of faculty data bases as well but our primary effort was directed toward the student data set.

Data on Students

We drew upon a number of existing frameworks as an aid to organizing our work. As a general organizational tool, we used Astin's (1970) Input-Environment-Outcome (IEO) model for studying college impact. At its most general level, the IEO model is useful in that it identifies a number of different kinds of student data—inputs, environments, and outcomes—that are needed in order to adequately assess the degree to which educational environments are influencing the outcomes measured among participating students. This model, which is depicted in Figure 1, underscores the need to collect detailed data on student characteristics (e.g., demographic, cognitive, attitudinal, and behavioral) before college ("inputs"), the educational environment in which students participate ("environments"), as well as the outcomes of interest. Attempts to assess questions of environmental influence can be seriously flawed if they ignore relevant data in one or more of these categories of data (see Astin, 1970; Astin, 1991).

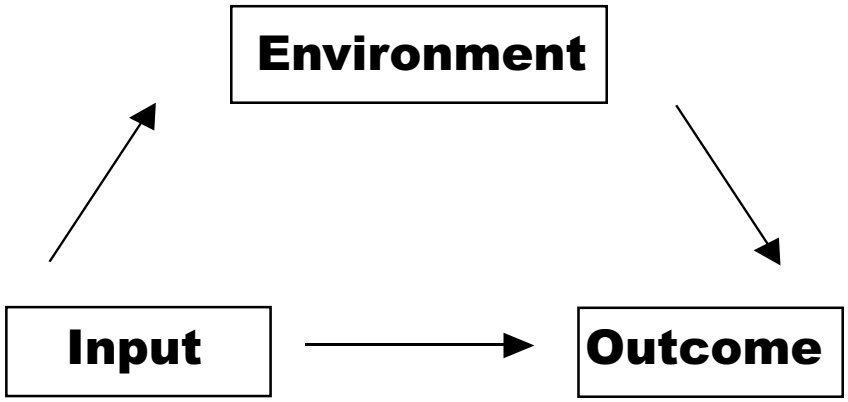

Figure 1: Astin's Input-Environment-Outcome model

The IEO model is important in that it identifies the kinds (or groupings) of data needed for sound analyses of educational impact. It is, however, limited for the purpose of reviewing existing data resources given the wide variety of variables that might be included in each of the three main categories. As such, we used a strategy employed in a recent work by Terenzini (1997) as the basis for identifying and developing relevant subcategories within each of the three main elements of Astin's framework. For example, Terenzini identified a series of student outcomes from which we then adapted and created a format for analysis. Some of the outcomes categories were obtained directly from Terenzini's taxonomy, while we created other categories specifically for the purpose of this review. In addition, we divided the input and environmental classes of data into categories based upon variables commonly found in the existing college impact literature (Pascarella & Terenzini, 1991).

As shown in Table 1, we divided the general input class of student data into four subcategories—pre-postsecondary educational activities, student goals and values, per-

sonal, and family characteristics—which were in turn broken down into more detailed subcategories. For example, educational activities were further subdivided so that individual activities, organized activities, and other types of activities were grouped together. Under these subcategories (and finer groupings of variables) the specific definitions that were used to classify variables into the thematic categories are shown.

Despite the advantages presented by the general nature of the IEO framework, the complexities of teaching and learning processes are such that a number of potentially relevant variables fail to cleanly fall in only one class of data. An example of such a grouping is the Teaching and Learning category represented on Table 1. Given that teaching and learning variables as defined here can be seen as encompassing a number of categories, we have chosen to represent these kinds of variables as a separate categories (as opposed to forcing them into one category or another).

It should be noted at the outset that a universally-useful definition of "outcome" is lacking and a wide variety of measures and needs exist. Some institutions measure outcomes such as student attitudes, concept mastery, and student performance (Laws, 1991), while others assess critical thinking skills (White, 1988). Similarly, researchers have studied topics ranging from student satisfaction and involvement with peers, faculty, and course work (Astin, 1991) to occupational choices and employment outcomes (Adelman, 1994). This variety is a reflection of the many goals that postsecondary institutions have for themselves and for their students, and the ways in which different interest groups view postsecondary education and its role.

For the purpose of this review, we have attempted to include as many possible definitions of different classes of student outcomes (as well as input and environmental considerations) as practical. We do not, however, claim that our approach has generated a list that is entirely comprehensive, nor one that equally represents all views about the important outcomes of postsecondary education. Nevertheless, our intent in undertaking this study is to provide a first step toward assessing the ability of present national data sets on postsecondary education to provide information on student outcomes as a springboard for future empirical research and policy initiatives.

Data on faculty

Viewed from the perspective of students, the activities and orientations of faculty help constitute the environment within which students study and learn. Although it is conceivable to study faculty using data collected through a variety of research designs, from the student-environment perspective it is most advantageous to concentrate on data bases where data were collected so that faculty respondents are clustered within institutions (as opposed to simply taking a random sample of respondents from the entire population of faculty). This clustered approach allows the potential for studying an institution's instructional climate (and ideally the specific institutional and assessment techniques to which students are exposed).

But in addition to providing an environment for students, data collected from faculty can be used to study how teaching activities and other faculty-related topics are related to faculty characteristics and institutional context. As such, we developed the thematic categories found in Table 2 to organize our review of faculty data. Although this categorization scheme is not tied to a framework such as IEO, it does capture the types of variables that are commonly found in studies of postsecondary faculty (e.g., Finkelstein, 1984).

Methodology

The first step in performing our review was to identify as many potential data bases as possible. In order to do this, we systematically collected information on existing data bases by contacting research organizations and governmental agencies, reviewing printed publications on data collection activities and plans, as well as information available via the Internet. Specifically, we contacted and reviewed materials from relevant federal agencies (e.g., Census Bureau, Department of Education, Department of Labor, and the National Science Foundation), academic research organizations (e.g., UCLA Higher Education Research Institute, the University of Michigan's Institute for Social Research), and private foundations such as the Carnegie Foundation for the Advancement of Teaching. In addition, we reviewed the holdings of the social science data base archives maintained by the Inter-University Consortium of Political and Social Research (ICPSR). All told, we identified 27 individual-level data bases that appeared to have some relevance for the study of teaching, learning, and assessment practices as they relate to the outcomes of postsecondary education.

From this pool of data bases, we narrowed our choices by selecting only those data bases that are intended to be nationally representative, are recent or continuing, have a primary (or potentially strong) focus on postsecondary participation at the undergraduate level, and that have some coverage of teaching and learning topics within the context of postsecondary education. Using these criteria, we chose eleven data sets where individual students are the unit of analysis, and five where individual faculty are the unit of analysis.

Data bases that were originally considered and then excluded on the basis of representation include the 1992 National Study of Student Learning conducted by the former National Center for Postsecondary Teaching, Learning, and Assessment (which has a limited representation of institutional types), the National Science Foundation's Recent College Graduate studies (which are nationally-representative of scientists and engineers but not of graduates in other fields), and normative data from the College Student Experiences Questionnaire developed by C. Robert Pace and now coordinated through Indiana University. Three additional data bases were excluded due to a lack of coverage of teaching and learning topics. These included the National Longitudinal Survey of Youth from Ohio State University through the sponsorship of various federal agencies,

the General Social Survey conducted by the National Opinion Research Center, the Monitoring the Future study, and the Panel Study of Income Dynamics (the latter two of which are conducted by the Institute for Social Research at the University of Michigan).

The Longitudinal Study of American Youth conducted by Northern Illinois University and the Chicago Academy of Sciences was considered potentially relevant, but the data base and associated documentation was unavailable during the period of the review. One series of faculty data (from the Carnegie Foundation for the Advancement of Teaching) was also considered but excluded from review on the basis of its research design. As noted above, one main use of faculty data is to provide information on the faculty environment at postsecondary institutions. The random sampling design used in the Carnegie surveys eliminates this possibility, and we therefore chose not to review it even though it otherwise met the criteria we established. Moreover, a review of the content of recent Carnegie survey showed a good deal of overlap with the faculty surveys that we did review. As with the characteristics of the other excluded data bases noted above, these considerations are limitations only for the purpose of our review, and are not limitations inherent in the data bases or studies themselves.

Most of the data sets we reviewed for this study are administered by the U.S. Department of Education National Center for Education Statistics (NCES), with the balance being administered by the UCLA Higher Education Research Institute (HERI). Most student data sets of interest are longitudinal. The time span of each data set varies from one year to sixteen years. In contrast, all faculty data sets are cross-sectional. Each data set has its distinctive features in terms of primary focus, subjects, sample size, and availability of information on oversample or breakout of minority groups. The last category was especially designed to meet the needs of researchers who are interested in studying Latino or Asian American students. In cases where the student data set included supplementary information collected from respondents' parents, high school teachers, or high school or postsecondary institutions, our analysis is mostly limited to the data collected from the primary student respondents.

Data Sets Reviewed

The data sets we reviewed are summarized in Table 3 and described below. We reviewed seven student-centered data sets from the National Center for Education Statistics (NCES) in the U.S. Department of Education. These included: Baccalaureate and Beyond Longitudinal Study (B&B); Beginning Postsecondary Student Longitudinal Study (BPS); High School and Beyond (HS&B); National Education Longitudinal Study of 1988 (NELS); National Longitudinal Study of the High School Class of 1972 (NLS-72); National Postsecondary Student Aid Study (NPSAS); and Recent College Graduates Study (RCG). In addition, we analyzed data from four different iterations of the Cooperative Institutional Research Project (CIRP) surveys that are administered by the Higher Education Research Institute at UCLA. All the CIRP surveys critiqued are longitudinal, and include coverage from: 1971-1980; 1985- 1989; 1986-1990; and 1987-1991.

The CIRP data sets reviewed do not reflect the totality of the data resources maintained by CIRP, but are the only data sets available to us.

- The National Longitudinal Study of the High School Class of 1972 (NLS-72) has the longest time frame among the student data sets (sixteen years) and focuses on transitions from high school to college and/or to work. A unique characteristic of this data set comes from the sampling strategy, which is designed to include both postsecondary participants and nonparticipants. Other survey studies under review gathered data from either high school students or college students, which may impinge on statistical inference of college impact on students due to the selection bias. The first wave of data collection began in 1972 with a 12th grade cohort, and includes follow-ups in 1973, 1974, 1976, 1979, and 1986. African American students are oversampled, and an ethnic group breakout of Latinos is available.

- High School and Beyond (HS&B:80/92) is comparable to NLS-72 in terms of its data structure. It attempted to collect the same type of data gathered in the NLS-72, with newer elements of the educational process. HS&B provides information on educational, vocational, and personal development as well as on the transition from high school to postsecondary education or to the workforce. It includes a sophomore cohort as well as a senior cohort in 1980. Data collections for the follow-ups were undertaken in 1982, 1984, 1986, and 1992. Hispanic students are oversampled, and an ethnic group breakout of Asian Americans is available.

- The National Education Longitudinal Study of 1988 (NELS:88/94) provides trend data on the transitions students encounter as they progress through their elementary, secondary, and postsecondary education or the work force. The NELS is also comparable to the NLS-72 and HS&B in terms of data structure. It began in 1988 with 8th grade students, and follow-up studies were conducted every two years until 1994. Asian Americans and Latinos are oversampled, and an ethnic group breakout of Asian Americans and Latinos is available.

- The National Postsecondary Student Aid Study (NPSAS) is a cross-sectional data set. It is a comprehensive nationwide study of students enrolled in less-than-two-year institutions, community and junior colleges, and four-year colleges and universities. Undergraduate, graduate, and first-professional students who receive financial aid, as well as those who do not receive aid, are included in the NPSAS. A large portion of the data set consists of financial information. The NPSAS also includes information on employment and educational aspiration. Data collection began in 1986, and was repeated every three years. It is notable that NPSAS has two longitudinal subcomponents: the Beginning Postsecondary Student Longitudinal Study (BPS) and Baccalaureate and Beyond Longitudinal Study (B&B).

- The Beginning Postsecondary Student Longitudinal Study (BPS) focuses on student persistence, progress and attainment. It began in 1990 as a longitudinal component

of the NPSAS with beginning students in college. Its sample size is approximately 7,900 first-time postsecondary students in 1990, and these students were followed-up in 1992 and 1994. A unique feature of BPS is that it includes "nontraditional" students, or a heterogeneous sample of students by age. An ethnic group breakout of Asian Americans is available.

- Baccalaureate and Beyond Longitudinal Study (B&B), which is another longitudinal component of NPSAS, replaced the Recent College Graduates Study (RCG). B&B pays special attention to those entering public service areas, particularly teaching. It focuses on education and work experience and transition to graduate school and/or the work force. Data collection began in 1993, and one follow-up study was conducted in 1994. An ethnic group breakout of Asian Americans is available.

- The Recent College Graduates Study (RCG) focuses on graduates qualified to teach at the elementary and secondary school level. It is a study of the immediate post-degree employment and educational experiences of people who obtained a bachelor's or master's degree from an American college or university. The RCG is a cross-sectional study with graduates within one year of attaining a bachelor's or master's degree. The RCG has been conducted periodically since 1976. This study analyzes the 1991 RCG with 14,405 graduates. African Americans and Hispanics were oversampled for the study.

- The Cooperative Institutional Research Program (CIRP) is a longitudinal study of the impact of different types of college environments on a student's development. The survey design of the CIRP is based on the Input-Environment-Outcomes model suggested by Astin. This study analyzes only four data set iterations, which include 1971-80, 1985-89, 1986-90, and 1987-91. The questions included in each study are slightly different, but a primary focus is placed on a student's cognitive and psychosocial development in college. The time span of the studies is consistently four years, except for the CIRP 71-80. A Latino breakout is available for CIRP 87-91. Minority students were oversampled for CIRP 71-80.

The data sets we reviewed with faculty members as the unit of analysis included the American Council on Education Faculty Survey (ACEFAC-72); two cohorts (1989 and 1992) from the Higher Education Research Institute Faculty Survey (HERIFAC-89; HERIFAC-92); and two cohorts (1988 and 1993) from the NCES National Study of Postsecondary Faculty (NSOPF-88; NSOPF-93).

- The National Study of Postsecondary Faculty (NSOPF) is a cross-sectional survey of 25,780 full-time and part-time postsecondary faculty members. The NSOPF was administered by NCES in the 1987-1988 academic year, and repeated in the 1992-1993 academic year. It provides information on the background, responsibilities, workloads, salaries, benefits, and attitudes of faculty in their postsecondary institutions. The faculty survey conducted by the Higher Education Research Institute is also a cross-sectional survey that includes 35,480 faculty members in 1988-89, and

43,940 in 1991-92. A unique feature of these studies is the similarity of questions between the CIRP student and faculty surveys. Finally, the 1972 American Council on Education survey collected data from 53,034 respondents working at 301 colleges and universities. Although not particularly recent, the ACE-72 study is similar in design to the later HERI surveys and was therefore included.

The Review Process

Our multistep review procedure was accomplished in three phases. First, teams of researchers divided up the data sets in the sample and categorized all of the variables within the data sets into agreed upon thematic categories. Next, each team exchanged their reviews with the other team and scrutinized the categorization strategies employed by the other group. Any differences in opinion pertaining to the placement of specific variables within the thematic categories framework were discussed mutually and revisions were made accordingly.

The number of variables (constructs) falling within each subcategory were then tallied in order to provide a basic summary of how well the subcategory was represented in each data set. These tallies were then divided into four levels of representation: Not represented, Limited representation (fewer than six variables), Represented (six to ten variables), and Well-represented (eleven or more variables). These representation cutoff points provide some basic descriptive information on how well each subcategory is represented in each of the data sets we reviewed. However, individual researchers may find that a data set with a "limited representation" of a certain category may be ideally suited for an analysis if the key variable of interest is included. Similarly, a data set that has strong representation in a certain category may not be at all useful for a particular purpose if a specific variable is not available from the data base.

At the same time, the review team also had the option of filling out index cards with information gleaned from the data sets that may not have been readily apparent through the thematic category approach. These index cards were later collected and then summarized into a matrix of themes arranged by data set.

These two systems complemented each other, in that the thematic category framework, or variable-by-variable approach, provided a more micro-view of the data sets, while the index cards/matrix approach contribute to a more macro-approach, since it allowed the researchers to make linkages across data sets and point out strengths/weaknesses/uniqueness among the respective data sets.

Finally, the research team has collected published empirical research studies that utilized the data sets outlined above and scanned the studies for any information pertaining to theoretical or methodological limitations to their studies due to the data sets.

Limitations of the Review

Before proceeding to an overview of the findings from the data set review, it is important to recognize a number of important limitations. We have reviewed the data sets from the perspective of researchers interested in understanding teaching, learning, and student development processes. However, a number of the data sets we reviewed may not have been designed to capture these processes but were included in the review because they met the basic criteria we established for data set selection. Thus, while a certain data set may be limited when viewed through the lens we have employed in this review, this should not be taken as evidence of a general limitation of the data. In fact, the data set may have very effectively achieved its primary goals, but is simply not ideal for a secondary analysis looking at teaching, learning, and assessment issues.

One issue that is not explicitly considered in this review is data quality. Within the general context of survey research, data quality has many different aspects that involve a number of trade-offs (Groves, 1989). In the specific context of the data sets that we reviewed, there are issues ranging from more obvious considerations such as response rates (which, for example, are much higher for the data sets collected by NCES than those achieved by CIRP) to issues of reliability and validity of recall and self-report measures. As such, the student and faculty matrices should be interpreted with caution, especially with regard to psychological constructs, because it was primarily developed based on face validity. The relationship among the items of each subcategory, such as academic activities and values, was not empirically examined. Therefore, the tallies within each thematic category simply provides an indication that measures related to the thematic category content area were available on the data set; the measures were not further investigated.

The student data sets we reviewed varied in terms of their longitudinal design that has implications for the way that outcomes can and are defined. For example, a number of the CIRP data sets are limited in that they are only four-year follow-ups (although longer-term follow-ups are possible). If "outcome" is defined to focus on short-term cognitive and attitude development, this data structure may not be problematic. On the other hand, if the relevant outcome is related to occupational attainment, a much longer-term design would be stronger. Given the diversity of potential postsecondary outcomes that are viewed as important, we have chosen to be flexible in terms of definition of outcomes, and emphasize the inherent strengths and limitations of each particular data set.

Finally, our review focused on the data sets collected via survey techniques. As such, supplemental data such as student transcripts are noted but not analyzed. Such collections, available for a number of NCES data bases, are rich additions to basic survey data and have led to interesting analyses (Adelman, 1993), but are beyond the scope of the present review.

Results

In describing the strengths and limitations that we observed, we have organized our comments according to the thematic categories we established above. In a number of cases, the data sets were not sufficiently focused on the topics covered by the review and are therefore succinctly summarized. All of the data set review observations are summarized in Tables 4 (student data sets) and 5 (faculty data sets), and described in more detail in the following sections. These observations center specifically upon the purpose of this investigation—namely the utility of the data in studying student outcomes produced by students' educational activities, contextual factors, and teaching and learning processes—and should not be interpreted for application beyond these parameters.

Strengths and Limitations of Individual Student Data Sets

Beginning Postsecondary Student Longitudinal Study (BPS)

The BPS, a longitudinal study, is a component of NPSAS with beginning students in college. Data collection started in 1990, and follow-up surveys were conducted in 1992 and 1994. College transcript data supplements are planned.

The BPS is weak in areas related to high school educational activities. It has no information pertaining to individual academic and social activities and organized curricular, co-curricular, and extracurricular activities. However, the BPS is rather strong in terms of the respondents' pre-college goals and values; it has good representation on variables related to attitudes/values, self-esteem, educational/career aspirations, reasons for attending college, and choice or application behaviors. Conversely, the BPS is relatively weak in areas related to high school characteristics and achievement.

The BPS only contains information about the respondents' SAT or ACT scores, but does not include high school grade information. The BPS has no representation in key personal and family constructs such as English proficiency, information on drug use, religion, family relations, and parental involvement in the respondents' upbringing and education. However, it does include information on the respondents' disabilities, financial assets or liabilities, and socioeconomic status—including a listing of household items owned. In terms of teaching or learning constructs, the BPS data set only includes variables related to respondents' overall satisfaction with their instruction and learning development during college.

With regard to individual academic, social, and co-curricular activities, the BPS provides only limited representation. Curricular and extracurricular activities are better represented. The BPS also has only limited representation with regard to faculty contact or interaction; however, there is abundant information on interaction and satisfaction

with student services. Institutional characteristics are well represented in this data set, while the respondents' impressions of college are adequately represented. Enrollment and tuition/expense information is also well represented.

One of the strengths of the BPS pertains to information in relation to employment activities. The BPS contains information concerning employment while enrolled, employment while not enrolled, and job related training and/or courses. The main strength of the BPS, though, pertains to the wealth of information it has on a respondent's financial aid status. The data set also includes information on why respondents did not apply for financial aid, information on parents' activities in relation to the respondents' financial aid status, and general financial indebtedness.

In terms of student outcomes, while the BPS is well represented with information on the respondents' college achievement, it lacks information on psychosocial development and views on social issues. Civic behaviors such as political behaviors and volunteer work are well represented in the BPS, which is a particular strength of this data set. In addition, the BPS is well represented in terms of variables relating to aspirations, retention, and satisfaction.

Baccalaureate and Beyond Longitudinal Study (B&B)

The B&B is another longitudinal component of NPSAS. Those who pursue a teaching career receive special attention in this data set. The B&B replaced the Recent College Graduates Study (RCG). College transcript data supplements are planned.

This data set provides detailed information on a student's college choice/application behavior, high school achievement, social economic status, and financial assets and wealth. Students' activities in college, including academic, social, curricular and extracurricular activities, are also well represented. Students' employment information while they are enrolled, job related training/courses and interaction with student services are also available. In addition, the data set has many variables describing institutional characteristics, students' enrollment, financial aid, and tuition/expenses. With regard to outcomes, students' college achievement, psychosocial development, views on social issues, aspirations, and success in transition to work or graduate school are well represented.

One of the main limitations of the data set is its lack of information on teaching/learning styles or processes. No variables are provided to describe teaching/learning during the students' college education. In addition, information on students' educational activities before college is limited. Students' family relations, religion, impression of college, and civic behaviors (political behaviors and volunteer work) after college are also absent. Further, an important element of student outcomes assessment, student satisfaction with college education, is not represented.

Cooperative Institutional Research Project (CIRP)

All the iterations of the CIRP included in this study are longitudinal surveys, which typically involve data collection from first year students who were followed-up four years later, except for the CIRP71-80, which was a nine-year follow-up study. All versions (71-80, 85-89, 86-90, and 87-91) of the CIRP include variables that represent high school educational and extracurricular activities of both an individual and organized nature. However, CIRP 71-80 has more limited availability of constructs related to individually-oriented academic and social activities, as well as organized curricular, co-curricular, and extracurricular activities. Institutionally-provided transcript data are not available.

In terms of the pre-college goals and values of respondents (e.g., attitudes/values, self-esteem, reasons for attending college, and educational/career aspirations), all versions of the CIRP are well represented, but college choice or application behaviors have a limited representation in the CIRPs 86-90 and 87-91.
All versions of the CIRP contain limited amounts of information about the characteristics of respondents' high schools and the academic achievement of the respondents. However, versions 86-90 and 87-91 are well represented with regard to high school achievement. The CIRP data bases are not particularly strong in terms of personal information (that is, drug use, English language proficiency, and disability status) about the respondents. For example, only the 87-91 version contains any information about the English proficiency of the respondents, and only asks one question related to this issue. There is also no information about the respondents' drug usage. Finally, only the 86-90 and 87-91 versions of the CIRP contain information about the respondents' disabilities, if any.

While all versions of the CIRP are not strong in terms of personal information about the respondents, all of the versions of the CIRP do at least have some information about the respondents' socioeconomic status, except the 71-80 is slightly more represented in this area. Further, all of the versions have information pertaining to the religion of the respondents, with the 86-90 and 87-91 being slightly better represented on this issue. Only the 86-90 and 87-91 versions of the CIRP have information concerning the respondents' (or their parents') financial assets and liabilities. However, none of the versions contain any information about the respondents' family relations or parental involvement in their upbringing or education. The CIRP 85-89 contains the best representation of variables related to teaching processes, but all of the iterations of the CIRP are relatively limited in this area.

The CIRP data sets (all versions) are particularly strong in terms of college activities of an individual (academic and social) and organized (co-curricular and extracurricular) nature, with the following exception: the 71-80 has only limited representation with respect to co-curricular activities. All versions of the CIRP have only limited informa-

tion about the respondents' curricular activities and employment status during college, and have no information on employment undertaken while the respondent was not enrolled. Similarly, all versions lack information on job-related training and/or courses.

With each subsequent version of the CIRP, more questions were included which relate to student-faculty contact or interaction. While the 71-80 and 85-89 versions have only limited representation in relation to faculty contact, the 86-90 is adequately represented and the 87-91 is well represented in this area. All versions of the CIRP are represented in terms of variables relating to the respondents' interaction and satisfaction with student services.

All versions of the CIRP are well represented in terms of overall characteristics of the postsecondary institutions attended as well as the respondents' impressions of the institutions. The 71-80 and 85-89 versions are better represented in terms of student provided information on course enrollment patterns than the 86-90 and 87-91. While all versions of the CIRP are strong in relation to information about financial aid, none of the versions have any constructs concerning tuition or other related expenses.

Constructs related to the respondent's college achievement, psychosocial development, and views on social issues are well represented in all versions of the CIRP. While the other versions lack representation with respect to political behaviors and volunteer work, the 87-91 has limited representation in these areas. All versions are strong in terms of questions relating to future occupational and educational aspirations. However, with the exception of 71-80, none of the versions contain any information on success in transition to work or graduate school. Finally, all versions of the CIRP are well represented in terms of measures of retention and satisfaction with college.

High School and Beyond (HS&B)

The HS&B has a similar longitudinal data structure to the NLS-72, but includes broader measures of the educational process. The survey design of HS&B has a number of strengths, including the existence of a non-college going sample, several waves of follow-up data, and the fact that two different cohorts are being followed simultaneously. High school and college transcript data are available.

This data set contains abundant information on the input elements. Students' academic, curricular, extracurricular, attitudes/values, self-esteem, educational/career aspirations, reasons for attending college, college choice/application behaviors, high school characteristics, high school achievement, and social-economic status are well represented. Environmental elements such as students' extra curricular activities, employment when enrolled, job related training/courses, institutional characteristics, financial aid information, and tuition/expense information are also well represented. Students' college achievement, views on social issues, volunteer work, aspirations, and success in transition to work/graduate school are described in detail.

With regard to limitations, the data set does not provide information on teaching/learning styles or processes. No information is available about students' individual activities in college, students' contact or interaction with faculty or student services, students' psychosocial development, civic behavior after college, or college satisfaction.

National Education Longitudinal Study of 1988 (NELS)

The NELS has a data structure similar to the NLS-72 and HS&B. Although the third follow-up provides information on postsecondary education of students two years after high school graduation, the strongest aspect of the data set thus far is its attention to the experiences of high school students. From a design standpoint, a strength of NELS is that it includes a non-college going sample and that there are several waves of follow-up data, including possibly one more wave after college completion. High school transcripts are available and college transcript supplements are planned.

The NELS is well represented in high school educational activities, including individual academic and social endeavors, and organized curricular, extracurricular activities as well as high school climate, work activity during high school, and antisocial behavior. The NELS is also strong in terms of pre-college goals and values, with excellent representation in attitudes/values, self-esteem, reasons for attending college, educational/career aspirations, and college choice/application behaviors. There is adequate information about the respondents' high school characteristics, including grading system information, location, and climate as well as teachers' and administrators' responses about the school. In addition, the NELS administered its own standardized test in 8th grade, and includes results from that test, in addition to college entry standardized tests, high school grades, and high school tracks.

The NELS is extremely strong in terms of personal and family background information, such as English proficiency, information on respondents' drug abuse, and measures of socioeconomic status. Of particular note are measures relating to family relations and parental involvement in child's upbringing and education. However, the NELS has only limited information on disabilities and religious background.

With respect to college endeavors, individual (academic and social) and organized (curricular and extracurricular) activities are well represented. Only co-curricular activities are of limited representation. Similar to the BPS, the NELS data set is particularly strong in terms of information related to employment, including employment while enrolled, employment while not enrolled, and job training and/or courses.

The NELS is weak in terms of interaction with faculty (limited representation) and student services (no representation). It also has only limited representation in terms of institutional characteristics, but is slightly better represented in relation to the respondents' impressions of their institutions. In addition, the NELS contains no information

on teaching or learning processes. Enrollment and financial aid information is well documented in the NELS; however, only limited information is available regarding tuition and related expenses. Financial aid information includes information on parents' activities in relationship to the respondents' financial aid status.

The NELS is extremely weak in relationship to variables related to cognitive outcomes such as college achievement. There is no information on constructs such as college grades, grade point averages, or honors received. In contrast, the NELS is well represented in terms of the respondents' psychosocial development and views on social issues. While only limited information is available on political or voting behaviors, information on volunteer work is well represented.

Future occupational and educational aspirations are well represented, and the NELS has many constructs measuring success in transition to work. However, special caution should be taken as these variables measure success in transition to work from *high school.* Satisfaction outcomes relate to work-related satisfaction only.

National Longitudinal Study of the High School Class of 1972 (NLS-72)

The NLS-72 has the longest time span of sixteen years among the student data sets being reviewed. Data collection started in 1972 with 12th grade students. As with other longitudinal data sets sponsored by NCES, a strength in the design of the NLS-72 is that it includes a non-college going sample and that there are several waves of follow-up data. High school and college transcript data are available.

The information on educational activities in high school is limited, but the NLS-72 does have good representation on curricular activities. The NLS-72 is strong in terms of the respondents' pre-college goals and values; it has good representation on variables relating to attitudes/values, self-esteem, educational/career aspirations, reasons for attending college, and college choice or application behaviors. It also has representative information on high school characteristics and high school achievement.

Information on personal and family characteristics is limited for English proficiency, respondent's disabilities, and religion. However, a wealth of information on measures of SES is available, and NLS has good representation on parental involvement in the children's upbringing and education as well as on financial assets and liabilities. Constructs related to teaching and learning in college are not represented.

In terms of college activities, the NLS has limited representation on academic, curricular, and extracurricular, and no representation on social and co-curricular activities. One of the strengths of the NLS is that variables relating to employment information and job training are well represented. However, the NLS has no representation on faculty contact and interaction with student services. Institutional characteristics, impression of college, and information on enrollment and financial aid are well represented.

Student outcomes constitute another aspect of strengths of the NLS. It has good representation across all outcome categories, such as college achievement, psychosocial development, values and goals, political behaviors, volunteer work, aspiration, success in transition to work/graduate school, retention, and college satisfaction.

National Postsecondary Student Aid Study (NPSAS)

This data set is mainly concerned with students' financial information when they enrolled in college. As such, NPSAS has detailed information on students' or student families' financial assets liabilities, financial aid status, and tuition/expense. Students' high school achievement, curricular activities in college, employment when they were enrolled, interaction with student services, enrollment information, college achievement, views on social issues, aspirations after college, success in transition to work/graduate school, and satisfaction with college education are well represented.

The data set contains no information on teaching/learning styles or processes. Students' educational activities before college, family relations, religion, individual activities in college, faculty contact or interaction, impression of college, psychosocial development, political behavior after college are not represented, either.

Recent College Graduates Study (RCG 1991)

The RCG is a cross-sectional study (and has been replaced by the Baccalaureate and Beyond study). As such, the application of the Input-Environment-Outcome model to this data set is limited. Information from college transcripts is available.

In a strict sense, variables relating to inputs, such as educational activities, and goals and values, are not available. The RCG contains limited information about the respondents' measures of SES and demographic characteristics. The RCG has good representation on work-related information, job-related training or courses, financial aid and college expenses. However, all other subcategories in the environment section have no representation.

In terms of outcomes, the RCG only contains well represented information on success in transition to work/graduate school. There is no representation on all other outcome categories.

Strengths and Limitations of Individual Faculty Data Sets

Higher Education Research Institute Faculty Surveys (HERI-89; HERI-92)

The HERI faculty data sets have a cross-sectional survey design. The data sets can be considered as parallel studies to the CIRP because of the similarity of questions. The

strongest aspect of the 1989 and 1992 HERI faculty data pertains to information relating to teaching methods used. A weak aspect of the data relates to a lack of information about the professional teaching associations to which the faculty member belongs.

The HERI faculty data is adequately represented in terms of time spent on teaching, types of classes taught, satisfaction with environment/climate, and views on social issues. Of the variables related to teaching and learning, the HERI faculty data has only limited representation in terms of intended learning outcomes for students, time spent on service activities, a general student orientation, advising and/or mentoring roles, teaching awards incentives, professional development, and demonstration of racial or cultural awareness in both teaching and research arenas.

American Council on Education Faculty Survey of 1972

Similar to the HERI Faculty data, the ACE Faculty data set of 1972 is represented in terms of time spent on teaching, types of classes taught, and satisfaction with environment/climate. In contrast, it has more information on faculty members' intended learning outcomes for students. However, there is no representation on professional teaching associations or professional development, racial or cultural awareness in teaching or research activities, and views on social issues.

National Study of Postsecondary Faculty (NSOPF)

The NSOPF is a cross-sectional study of postsecondary faculty members, which was conducted in 1988 and 1993. NSOPF-88 and NSOPF-93 are very similar in terms of representation on each thematic category of interest. Only one exception lies in information on teaching methods used. While NSOPF-93 has good representation on the category, NSOPF-88 has no information on it. The NSOPF data sets are adequately represented in other categories, such as time spent on teaching and types of classes taught. However, the NSOPF data sets have limited representation on time spent on advising/mentoring and time spent on teaching committees as well as some generally student-oriented questions.

Results Across Student Data Sets

Inputs

While many of the data sets include information about high school educational activities (e.g. academic, social, curricular, co-curricular, extracurricular, and other activities), the BPS, NPSAS, and RCG by-and-large do not contain such information. These data sets, however, tend to be cross-sectional in design and have samples that are either composed entirely of postsecondary students (NPSAS) or of students who have finished their postsecondary degree work (RCG). B&B, CIRP 1971-80, CIRP 1985-89, and NLS-72

are weaker with respect to high school educational activities than CIRP 1986-90, CIRP 1987-91, HS&B, and NELS. Overall, it is the NELS data set that has the most abundant data relating to high school educational activities.

The pre-college goals and values of the respondents (attitudes/values, self-esteem, educational/career aspirations, reasons for attending college, choice/application behaviors) are well-documented in a majority of the data sets. Exceptions to this include CIRP, which lacks detailed questions regarding the college search process, and RCG, which has only one question about this pre-college educational/career aspirations. Further, although B&B and NPSAS provide good information regarding college choice and application behaviors, these data sets are weak with respect to all other pre-college goals and values information.

Information regarding the characteristics of the respondents' high school is generally limited. HS&B is the only data set that is well represented in this area, although NELS and NLS-72 do provide several questions on this issue. However, no questions about high school characteristics are included in BPS, NPSAS, or RCG. It is also interesting to note that some data sets provide information about the specific skill capabilities of the respondents (CIRP 1987-91) and other data sets include standardized test results (NELS). While high school achievement is well documented in many of the data sets, BPS, CIRP 1971-80, and CIRP 1985-89 have just limited representation. Further, BPS does not include information about the respondents' high school grade point average. Detailed personal information about the respondents is not included in many of the data sets. For example, information regarding English proficiency and drug use is scarce. While a few questions about the respondents' English proficiency are included in data sets such as B&B, CIRP 1987-91, HS&B, NLS-72, it is the NELS data set which is particularly well represented with questions regarding the respondents' English proficiency levels. NELS also provides abundant information about the respondents' use of drugs. In addition, information regarding the physical disabilities of the respondents is available in many of the data sets. However, CIRP 1971-80, CIRP 1985-89, and RCG do not contain this information.

Only HS&B and NELS offer information about family relations, yet four of the data sets include questions about parental involvement in students' upbringing and education - B&B, HS&B, NELS, and NLS-72. The CIRP 1986-90 and CIRP 1987-91 which provide more information about the respondents' religious affiliations than the other data sets. However, CIRP 1971-80, CIRP 1985-89, HS&B, NELS, and NLS-72, also contain some questions relating to religion. All of the data sets except CIRP 1971-80, CIRP 1985-89, and RCG include questions about the respondents' financial assets/ liabilities although B&B, BPS, and NPSAS are the most represented in this area.

Teaching/Learning

None of the data sets document teaching or learning processes as defined by the parameters of our study (see Table 1), with the possible exception of the CIRP 1985-89, which asks the student respondents to indicate his/her frequency of experience with different types of examinations or class assignments. However, a few data sets include broader questions relating to the respondents' overall satisfaction with or evaluation of their instruction or learning development (BPS, CIRP). While these data sets may be limited in terms of specific variables related to teaching or learning processes, they can be used to assess student outcomes through key input and environment constructs, many of which are strongly represented in the individual data sets.

Environments

While individual college activities (academic, social) and organized college activities (curricular, co-curricular, and extracurricular) are included in many of the data sets, RCG is the only data set that does not have any college activities represented. The majority of questions pertaining to individual and organized college activities are contained in B&B, all versions of the CIRP except 1971-80, and NELS. In contrast, HS&B and NPSAS lack information about the respondents' academic activities. Social activities have at least some representation in all of the data sets except HS&B, NLS-72, NPSAS, and RCG, and co-curricular activities have at least some representation in all of the data sets except B&B, NLS-72, NPSAS, and RCG.

Every data set includes employment information about the respondents during college. However, only BPS, NELS, NLS-72, and RCG provide any information regarding the respondents' employment while not in college. It is important to note, however, that the NELS, NLS-72, and HS&B include a non-college going sample. Other college activities documented in the data sets include job-related training (excluding CIRP versions and NPSAS), faculty contact and interaction (B&B, BPS, CIRP versions), interactions with student services (B&B, BPS, CIRP versions, NELS, NPSAS), and other related activities (all versions of CIRP except 1987-91, NLS-72). Institutional characteristics are not only included but are particularly well represented in most of the data sets. However, the respondents' impression of college (an institutional construct) is not contained in the B&B, NPSAS, or RCG.

All data sets have a strong showing of enrollment and financial aid information other than RCG, which lacks enrollment data. In particular, NPSAS has abundant information about the respondents' financial aid, including the sources of financial aid and the reasons, if any, why the respondent did not apply for financial assistance. Some interesting financial aid information is also available from BPS: reasons why the respondent did not apply for financial aid; parent's activities in relationship to the respondents' financial aid status; and the financial indebtedness of the respondents. NELS has information on the parents' activities in relationship to the respondents' financial aid status as well. However, while most data sets document the respondent's tuition and expenses, NLS-72 and CIRP do not.

Outcomes

Many of the data sets are well represented with regard to cognitive and psychosocial outcomes. However, cognitive outcomes are not included in RCG or NELS and psychosocial outcomes are not represented in either RCG or BPS. Specific information about the respondent's views on social issues is contained in all data sets except BPS and RCG. In addition, BPS and NLS-72 provide the most abundant information about the respondents' political behaviors and volunteer work and NELS, CIRP 1987-91, and NPSAS also contain some questions about the respondents' civic behaviors.

Finally, most data sets are well represented with regard to aspirations (excluding RCG) and success in the transition from college to work/graduate school (excluding CIRP 1985-89 through 1987-91). Again, it should be noted that some data sets which are cross-sectional (e.g. NPSAS) do not have information about post-college activities, and some longitudinal data sets have not yet collected data on students after their graduation, such as the NELS:88. Questions relating to the retention of students in college and to college satisfaction are well represented in BPS, CIRP, and NLS-72. College satisfaction is also well represented in NPSAS.

Results Across Faculty Data Sets

Some of the faculty data sets included in this study (HERI:89, HERI:92, ACE) contain at least a few questions relating to goals faculty members have for their students. However, with the exception of NSOPF-88, abundant information is available regarding the types of teaching methods used by faculty. Specifically, the HERI data sets contain the largest number of questions relating to teaching methods, but NSOPF-93 and ACE also provide a limited amount of information (e.g. ACE asks whether or not faculty work with a teaching assistant). Information about service functions performed by faculty varies from one data set to another, with NSOPF-88 and NSOPF-93 focusing on teaching committee loads while HERI and ACE rely on time-spent-on-task-information.

The extent to which faculty are student-oriented is measured to a limited degree in all five data sets. Further, there is a good amount of information about the amount of time faculty spend teaching and the types of classes which they teach. A limited number of questions also address the amount of time faculty invest in student advising and mentoring. However, although teaching awards and incentives are included in the HERI and ACE data sets, no professional teaching association information is represented in any of the surveys.

Both of the HERI data sets contain information regarding attendance at racial/cultural training workshops as well as indications of cultural awareness and sensitivity. HERI data sets also include good representation of faculty views on social issues, a topic that

the other data sets do not examine. However, faculty satisfaction with the environment or climate of the institution is documented in each of the data sets. Finally, it is important to note that while the NSOPF data sets cannot be readily merged with other student data sets at the level of the institution, the HERI:89, HERI:92, and ACE data sets can be merged in this manner. By allowing for comparisons across student and faculty surveys when merged together, researchers can investigate a broader range of teaching and learning issues and outcomes than are possible using a single data base. Although it would be preferable to be able to link students and faculty together in ways that are possible in studies like High School and Beyond, institutional-level merges can at least provide some basic information on institutional context.

Limitations of the Data Sets Cited in Empirical Studies

In addition to our analyses of the federal data sets, we also undertook a review of literature related to limitations of the data sets cited in published empirical studies. Our selection and analysis process began by identifying all empirical research studies utilizing any of the student, faculty, or institutional level data sets that we identified for this project. Materials such as technical reports and manuals were not included in this phase of the project since they were consulted for the data set analyses.

Keyword searches were conducted using the ERIC (Educational Resources Information Center) database. The full names and acronyms of the data sets were used in keyword searches from the year 1982 forward, with the exception of the ACE Faculty Survey of 1972, which was searched from the year 1966 forward. The list of studies found were divided among the research team and each team member scanned the works for any limitations cited in the text pertaining to the data set itself, and not to other facets of the research or study. The research team then constructed broad categories—survey design, survey sampling, measurement, index or scale, and "other"—based upon the predominant themes uncovered by the review process. Each team member organized the limitations of the data sets that they discovered in the literature review into these categories and relevant subgroupings. Later, these categorizations were cross-checked by another team member. Discrepancies were mutually discussed and revisions were made when necessary. All of the limitations were organized into an appendix (see Appendix A) and then summarized in a matrix based upon the general categories. These are shown in Table 6.

The limitations cited in the following section of this report are reflective of comments found in published research studies. These studies were typically found in educational, economic, sociological and social psychological journals as well as in conference proceedings, and published/unpublished reports. Generally speaking, most of the authors cited issues concerning sampling representation**,** and a lack of constructs or variables appropriate to their research inquiry.

The most popularly utilized—and thus critiqued—data sets in the empirical literature were (in rank order) the High School and Beyond Survey (HS&B), Cooperative Institutional Research Project (CIRP), National Postsecondary Student Aid Study (NPSAS), National Longitudinal Study of the High School Class of 1972 (NLS-72), and the National Education Longitudinal Study of 1988 (NELS). For the HS&B, several of the authors indicated that the data set was in need of more variables or more in-depth coverage with regard to: the respondent's cultural background, financial aid information, and measures related to achievement, income, educational or occupational aspirations after college graduation, and types or levels of graduate schools attended. Other limitations cited for the HS&B included a high individual item non-response bias and questions about the representativeness of the sample.

Similarly, comments about the CIRP tended to focus on representation (mainly an issue of low response rates), variable availability, and the depth of categories. Several authors suggested that more in-depth survey information was needed with regard to the following topics: college choice, quality of effort, intensity of faculty-student interaction, work values or job characteristics, affective measures, voluntary or involuntary withdrawal, and home environment characteristics.

While the overwhelming majority of limitations cited for the NPSAS involved representation issues, limitations of the NLS-72 cited in the literature were spread out across several categories. Questions pertaining to the NLS-72 included issues such as: the length of the survey, the reliability of its measures, sampling errors, and individual item non-response. Finally, since the NELS data set is still collecting information through what would be the respondents' postsecondary years, many of the limitations of the NELS cited by authors has related to a lack of national representation in terms of parent and secondary school teacher responses.

Fewer empirical studies have been conducted which focus on faculty and institutional data sets. Several authors have expressed the wish that the Higher Education Research Institute (HERI) Faculty Survey and the National Study of Postsecondary Faculty (NSOPF) were longitudinal instead of cross-sectional in order to better reveal causal relationships and the emergence of patterns over time. In addition, one author suggested that the NSOPF should contain information about how faculty members perceive the expectations of their institutions concerning their workload, and another author recommended that the HERI Faculty Survey include more information about the background and historical legacy of the institutions in which the faculty members worked.

Concluding Observations

The purpose of this analysis was to review existing national data sets to determine their utility in studying teaching, learning, and assessment activities. In doing so, our intent is to provide guidance to those interested in using one or more of the existing data sets for research and policy development purposes, but also to help strengthen future research on these topics by identifying areas where new data collections could make strong contributions to our knowledge base.

The results presented above demonstrate that our existing national data resources can be described as having a variety of strengths and limitations when viewed from the perspective of those engaged in studying teaching, learning, and assessment. It is possible to view these results and, by emphasizing the limitations, see a glass that is half empty. Given the practical and theoretical complexity of studying teaching, learning, and assessment in postsecondary education, our view is that a balanced consideration of these findings produces the image of a glass that is half full; even though there is much room for improvement, the existing data resources provide many opportunities to add to our knowledge about certain aspects of teaching, learning, and assessment.

Given the appropriate resources, plans, and designs, all of the data sets we reviewed could be improved. For example, the response rates of some of the data sets—especially the CIRP surveys—could be improved dramatically, and the longitudinal span of all the data collection schedules could be extended. All of the data sets could contain a wider array of measures on attitudinal, cognitive, and employment outcomes, and these kinds measures could also be improved from a technical standpoint in terms of validity and reliability. In addition, the data sets could be consistently supplemented with unobtrusive and archival data provided by college transcripts and employment records. These kinds of improvements might be excellent priorities for improving current data collection systems, but it is not clear that such investments would yield more than incremental improvements in our knowledge about teaching, learning, and assessment. (This is not to say that such investments should not be made; the data sets reviewed have multiple uses and modest investments in critical areas may well yield tremendous benefits for purposes other than studying teaching, learning, and assessment issues.)

It should be noted that our review specifically focused on national data bases that were generated primarily through survey approaches, since these are the kinds of data most generally available for secondary data analysis. Survey research has tremendous value in helping provide data on many important aspects of postsecondary education, but it may be that the approaches used to generate the data we reviewed are not ideally suited to studying teaching, learning, and assessment issues. For example, each of the student data sets we reviewed had a good deal of strength in terms of selected outcomes represented in the data, but there was tremendous variability in the measures available to study how teaching and learning processes might contribute to such outcomes. Outcome measures are very important, of course, but process indicators are likely key

elements to understanding the rich complexity of how students, faculty, and institutional contexts interrelate when fostering learning within postsecondary education.

Survey approaches that allow linkages between student respondents and their peers, their families, and the faculty who teach them might be useful additions to current survey approaches to collecting quantitative data. Such strategies have been used successfully in collecting data in elementary and secondary settings, but are not well represented in national data resources at the postsecondary level. The paths that students take when moving through the postsecondary system are obviously more varied and complex than those that exist in pre-postsecondary systems, but the ability to link students with people and settings that may influence their development would be a welcome addition. Non-survey approaches can also make strong contributions—and possibly stronger contributions—to our knowledge about these topics, while also informing subsequent survey data collection efforts. Ethnographic and other qualitative approaches, as well as technology-facilitated data collection efforts such as those provided through video and audio recordings of classroom interactions, should all be considered as useful additions to the data provided by national surveys.

An expanded emphasis on the changing role of faculty and staff in the development of postsecondary students should also be considered. The current approaches to collecting data are useful in portraying global trends in the activities of these personnel, but the lack of longitudinal data makes it difficult to understand how faculty and staff can best develop in their ability to serve changing student needs. This, coupled with an ability to link faculty and staff data with the students with whom they interact, would add a tremendous amount to our knowledge about the effectiveness of faculty and staff in facilitating student development.

In considering directions for future data collection efforts, the results of this review do in fact underscore the observation that "national surveys presently tell us relatively little about what actually takes place at the classroom level" (National Center for Education Statistics, 1996, p. 16). There are many possible paths that can be taken to rectify this limitation—from large-scale longitudinal data collection efforts that track the development and experiences of postsecondary students (and their professors, families, and employers) to more intensive cases analyses of teaching, learning, and assessment in a small number of classrooms or campuses. Each of these alternative paths necessarily involve design and resources trade-offs, and given the diversity of postsecondary settings, it is likely that there is no "one best path" to take in rectifying the current limitations in existing data sets. Instead, a multitude of approaches may be the most useful.

References

Adelman, C. (1994). *Lessons of a generation: Education and work in the lives of the high school class of 1972*. San Francisco: Jossey-Bass.

Astin, A. W. (1970). The methodology of research on college impact, part one. *Sociology of Education, 43*(3), 223-254.

Astin, A. W. (1991). *Assessment for Excellence: The Philosophy and Practice of Assessment and Evaluation in Higher Education*. New York: American Council on Education and Macmillan Press.

Astin, A. W., Korn, W. S., & Dey, E. L. (1991). *The American college teacher: National norms for the 1989-90 HERI faculty survey*. Los Angeles: Higher Education Research Institute.

Bayer, A. E. (1973). *Teaching Faculty in Academe: 1972-73. American Council on Education Research Reports, 8*(2). Washington, D.C.: American Council on Education.

Carroll, D. (1995). *High School and Beyond Fourth Follow-up Methodology Report*. Washington, D.C.: National Center for Education Statistics.

Dey, E. L., Ramirez, C. E., Korn, W. S., & Astin, A. W. (1993). *The American college teacher: National norms for the 1992-93 HERI faculty survey*. Los Angeles: Higher Education Research Institute, UCLA.

Dunkin, M. J. (1996). Types of errors in synthesizing research in education. *Review of Educational Research, 66*(2), 87-97.

Finkelstein, M. J. (1984). *The American academic profession*. Columbus, OH: Ohio State Press.

Green, P. J., Meyers, S. L., Giese, P., Law, J., Speizer, H. M., & Tardino, V. S. (1996). *Baccalaureate and Beyond Longitudinal Study: 1993/94 First Follow-up Methodology Report*. Washington, D.C.: National Center for Education Statistics.

Groves, R.M. (1989). *Survey errors and survey costs*. New York: Wiley.

Higher Education Research Institute. (1991). *The American college student, 1990: National norms for 1986 and 1988 college freshmen*. Los Angeles: Higher Education Research Institute.

Higher Education Research Institute. (1992). *The American college student, 1991: National norms for 1987 and 1989 college freshmen*. Los Angeles: Higher Education Research Institute, UCLA.

Ingels, S. J., Dowd, K. L., Baldridge, J. D., Stipe, J. L., Bartot, V. H., & Frankel, M. R. (1994). *National Education Longitudinal Study of 1988: Second Follow-Up Student Component Data File User's Manual*. Washington, D.C.: National Center for Education Statistics.

Knepper, P. (1994). *Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:90/92) Final Public Technical Report*. Washington, D.C.: National Center for Education Statistics.

Laws, P. (1991). Workshop physics: Learning introductory physics by doing it. *Change, 23*, 20-7.

MacGregor, J. (1994). Learning communities taking root. *Washington Center News, 8*(2), 1-5.

Maline, M. (1993). *The National Longitudinal Study of the High School Class of 1972: Annotated Bibliography of Studies, 1980-1992*. Washington, D.C.: National Center for Education Statistics.

Malizio, A. G. (1995). *Methodology Report for the 1993 National Postsecondary Student Aid Study*. Washington DC: National Center for Education Statistics.

National Center for Education Statistics. *From data to information: New directions for the National Center for Education Statistics, Synthesis Report* (NCES 96-878). Washington, D.C.: U.S. Department of Education.

Pascarella, E. T. & Terenzini, P. T. (1991). *How College Affects Students*. San Francisco: Jossey-Bass, Inc.

Stowe, P. (1994). *1991 Survey of Recent College Graduates Methodology Report*. Washington, D.C.: National Center for Education Statistics.

Terenzini, P. T. (1997). *Student Outcomes for Policy-Making*. Paper prepared for the Outcomes Data for Policy Working Group of the National Postsecondary Education Cooperative.

White, E.M. (1988). Process vs. product: Assessing skills in writing. *AAHE Bulletin, 13*.

Wingard, T. L., Treviño, J. G., Dey, E. L., & Korn, W. S. (1991). *The American college student, 1989: National norms for 1985 and 1987 college freshmen*. Los Angeles: Higher Education Research Institute.