Validity and Sources of Error
Comparison to NCES Statistical Standards
Other Quality Indicators - Measurement error

Is the NSSE Psychometric Framework and policies of the Center for Postsecondary Research comparable to recommended standards and guidelines from a reputable external agency?

Purpose

Overall, the NSSE Psychometric Framework and policies implemented by the Center for Postsecondary Research (CPR) use a variety of approaches and methods to address reliability and validity, and to reduce potential sources of error. The National Center for Education Statistics (NCES) published a revised set of standards and guidelines in 2002, with the primary goal being to "provide high quality, reliable, useful, and informative statistical information to public policy decisionmakers and to the general public" (NCES Standards, p. 1). Comparisons of the NCES standards to the NSSE Psychometric Framework, along with overall CPR policy, can provide additional evidence for the validity of the NSSE instrument.

Methods

The NCES Statistical Standards, available on the NCES website (www.nces.ed.gov), were located. Each standard and guideline listed was compared to the NSSE Psychometric Framework and/or policies utilized by the Center for Postsecondary Research. A table equating applicable NCES standards to NSSE/CPR policies was created (see below).

Results

There are 42 separate NCES standards and guidelines that are addressed by the NSSE Psychometric Framework or CPR policies. Although some of the NCES standards are not applicable to the NSSE instrument or procedures, a wide variety of aspects, from instrument design and properties to data collection and reporting procedures, are relevant.

Table 1: Comparisons of NCES Statistical Standards and NSSE Psychometric Framework/CPR Policy

NCES Statistical Standard / Guideline	NSSE Psychometric Framework/ CPR Policy
Development of Concepts and Methods	
STANDARD 1-1-1: The initial plan for developing a survey or survey system must include the justification for the study and must describe the survey methodology.	Theoretical rationale in NSSE Conceptual Framework (2001 original; 2004revision). www.nsse.iub.edu

STANDARD 1-4-3: The following OERI-sponsored coding systems must be used, where applicable: 1) The Classification of Instructional Programs (CIP), which is the accepted federal government statistical standard on instructional program classifications at the post-secondary level.	CPR Policy: Use of CIP codes with "Major" variable in data set.
Planning and Design of Surveys	
STANDARD 2-2-4: A nonresponse bias analysis is *required* at any stage of a data collection with a unit response rate less than 85 percent.	Nonresponse bias testing described in NSSE Conceptual Framework; CPR Policy to weight NSSE results by gender, enrollment status, and institution size to control for nonresponse bias.
STANDARD 2-4-2: A second type of pretest is a field test. Components of a survey system that cannot be successfully demonstrated through previous work must be field tested prior to implementation of the full-scale survey.	Results of 1999 field tests and cognitive interviews in NSSE Conceptual Framework.
STANDARD 2-5-1: NCES must maintain and report on a consistent set of data series that may be analyzed over time. Ongoing data collections must maintain and report on a consistent set of key variables, which are based on consistent data collection procedures.	CPR Policy: Provide participating institutions with multi-year data when available; provide both "old" and "new" benchmark variables when changes are made.
GUIDELINE 2-6-1A: Relevant experts should review the domain definitions and the instrument specifications. The qualifications of the experts, the process by which the review is conducted, and the results of the review should be documented.	NSSE Psychometric Framework: Evidence for content validity based on expert reviews, NSSE National Advisory Board and Technical Advisory Panel. Instrument development described in NSSE Conceptual Framework and on website .
GUIDELINE 2-6-1B: All items should be reviewed before and after pilot and field tests. Pilot and field tests should be conducted on subjects with characteristics similar to intended participants. The sample design for pilot and field tests should be documented.	Results of 1999 field tests and cognitive interviews in NSSE Conceptual Framework. Instrument development described in NSSE Conceptual Framework and on website.
STANDARD 2-6-2: Validity - All test instruments used in NCES surveys must meet the purpose(s) stated in the instrument specifications. All intended interpretations and proposed uses of raw scores, scale scores, cut scores, equated scores, and derived scores, including composite scores, sub-scores, score differences, and profiles, must be supported by evidence and theory.	NSSE Psychometric Framework: Documenting evidence for content, construct, concurrent, predictive, and known groups validity. Theoretical rationale in NSSE Conceptual Framework.

STANDARD 2-6-3: Reliability - The scores obtained by a test instrument must be free from the effects of random variations due to factors such as administration conditions and/or differences between scorers. The reliability of the scores must be adequate for the intended interpretations and uses of the scores.	NSSE Psychometric Framework: Documenting evidence for temporal stability, internal consistency of benchmarks, and item equivalence.
GUIDELINE 2-6-3B: When average scores for participating groups are used, the standard error of measurement of group averages should be reported.	CPR Policy: Provide SEM information with all institutional reports of benchmark comparisons.
GUIDELINE 2-6-3C: Reliability information on scores for each group should be reported when an instrument is used to measure different groups (e.g., race/ethnicity, gender, age, or special populations).	NSSE Psychometric Framework: Include separate temporal stability and internal consistency analyses disaggregated by gender, class, major, institutional control, and Carnegie classification.
STANDARD 2-6-6: Administration - Administration of all test instruments used in each NCES survey must be standardized.	CPR Policy: Web-mode survey administration standardized by IU Center for Survey Research; Paper-mode surveys administered locally (i.e. potentially unstandardized administration) excluded from analysis in overall NSSE data set.
STANDARD 2-6-8: Reporting - Test results of the testing should be provided with sufficient detail and contextual information to understand the inferences that can and cannot be made from them.	CPR Policy: Institutions receive written guides for interpreting reports and codebooks to assist in additional data interpretation.
Collection of Data	
STANDARD 3-2-1: The data collection must be designed and administered in a manner that protects the rights of the survey respondents, while encouraging respondents to participate.	CPR Policy: Continuing approval of IU and other institutions' Institutional Review Boards.
GUIDELINE 3-2-A: The method of data collection (e.g., mail, telephone, Internet, etc.) should be appropriate for the target population and the objectives of the data collection.	CPR Policy: Majority of institutions use recommended web-mode survey administration.
GUIDELINE 3-2-B: The data should be collected at the most appropriate time of year.	CPR Policy: Spring data collection allows respondents to reflect on activities of past academic year.
GUIDELINE 3-2-C: The data collection period should be of adequate and reasonable length to achieve good response rates.	CPR Policy: Six-week period allows for multiple reminders; Web-mode respondents have option to complete survey over multiple sessions.
GUIDELINE 3-2-D: When appropriate, respondent incentives should be considered.	CPR Policy: Participating institutions have option to provide incentives to increase response rate (pending IRB approval).
STANDARD 3-2-2: An explanation of the need for data, the goals and objectives of the data collection,	CPR Policy: Students selected for survey participation contacted prior to receiving survey

and examples of uses of the data that benefit respondents must be provided to the respondent.	instrument; informed consent provides information about survey instrument, benefits and risks of participation, and importance of research.
STANDARD 3-2-3: All NCES data collections must provide information concerning the confidentiality of responses.	CPR Policy: Student Social Security Numbers not allowed to be used as identifier variable. Institutions' data sets are not shared with other institutions without permission.
STANDARD 3-2-4: In keeping with the goals of the particular data collection effort, respondent burden must be minimized, as required by the Office of Management and Budget clearance process.	CPR Policy: NSSE instrument has a 4 page (paper-mode) limit. Experimental or consortia item sets have recommended 20-item limit and respondents can only receive one additional item set.
STANDARD 3-2-5: All data collection programs require some follow-up of nonrespondents to achieve desirable response rates. Follow-up strategies designed to protect the respondents' rights, while achieving acceptable response rates must be included in the data collection plan.	CPR Policy: Students selected for survey participation receive up to 5 reminder contacts. After every contact, students have the opportunity to opt out of future contacts.
GUIDELINE 3-3-1F: The COR should ensure that software used for weighting, imputations, and variance estimation is accurate. This may be done through a series of "checkpoints" imbedded within the program(s).	CPR Policy: All NSSE reports are double-checked for accuracy, with 2 NSSE research analysts independently preparing each report.
STANDARD 3-4-1. Survey system documentation must include all information necessary to properly analyze the data. This information shall, at a minimum, include the following: 1) Final data set(s); 2) Final instrument(s) or a facsimile thereof; 3) Definitions of all variables; 4) Data file layout; 5) Descriptions of constructed variables on the data file that are computed from responses to other variables on the file; 6) Description of variables used to uniquely identify cases in the data file; 7) Description of sample weights and how to apply them; 8) Description of the strata and primary sampling unit (PSU) identifiers to be used for analysis; 9) Description of how to calculate variances appropriate for the survey design; 10) Description of all imputation methods applied to the data and how to remove imputed values from the data; and 11) Descriptions of known data anomalies and corrective actions.	CPR Policy: Participating institutions provided with data sets, codebooks, and institutional reports; survey instruments, syntax for benchmarks, recoded variables, scales and scalelets, and weighting information available on CPR website. NSSE Psychometric Framework: Documenting evidence for potential sources of error and attempts to minimize.
Processing and Editing of Data	

STANDARD 4-2-2: All contractors whose activities might involve contact with individually identifiable information must provide NCES Project Officers with a list of all staff who might have contact with such data; all such staff must have a signed notarized affidavit of nondisclosure on file at NCES.	CPR Policy: Only NSSE research analysts and administrators have access to data files; institutions upload population files and download data sets using a secure, password-protected interface; all NSSE staff are required to complete the IU IRB's Protection of Human Subjects test.
STANDARD 4-2-4: Respondents must be told in a cover letter or in instructions that " Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law." Furthermore, the routine statistical purposes for which the data may be used must be explained.	CPR Policy: Institutions must prepare informed consent forms, which are reviewed by Center for Survey Research staff to ensure compliance with IU IRB requirements.
STANDARD 4-3-1: All proposed and ongoing surveys conducted by NCES must include an evaluation component in the survey design plan. The survey evaluation must include the following: 1) Range of potential sources of error; 2) Measurement of the magnitude of sampling error and sources of the various types of nonsampling error expected to be a problem; 3) Studies that identify factors associated with differential levels of error and assess procedures for reducing the magnitude of these errors; 4) Assessment of the quality of the final estimates, including comparisons to external sources, and where possible, comparisons to prior estimates from the same data collection; and 5) Technical report or series of technical reports summarizing results of evaluation studies; for example, a quality profile or total survey error model.	NSSE Psychometric Framework: Documenting evidence of predictive and concurrent validity; documenting potential sources of error and attempts to minimize. CPR Policy: Provide SEM information with all institutional reports of benchmark comparisons.
STANDARD 4-4-1: Any survey stage of data collection with a unit or item response rate less than 85 percent must be evaluated for the potential magnitude of nonresponse bias before the data or any analysis using the data may be released.	Nonresponse bias testing described in NSSE Conceptual Framework. CPR Policy: Weight NSSE results by gender, enrollment status, and institution size to control for response bias.
GUIDELINE 4-4-2C: Comparisons of respondents to known population characteristics from external sources can provide information about how the respondents differ from a known population.	NSSE Psychometric Framework: Documenting evidence for known groups validity.
Analysis of Data/Production of Estimates or Projections	
STANDARD 5-1-1: Statistical analyses must be approached from an analysis plan that considers relevance to policy, prior findings in existing literature, and/or results of previous survey	Theoretical rationale and literature review in NSSE Conceptual Framework; results of research with NSSE data available on CPR website.

research. The analysis plan must specify the main research questions, and justify the choice of statistical methodology.	
STANDARD 5-1-3: The criterion for judging statistical significance in all reported hypothesis tests will be α = 0.05 (0.95 for confidence intervals).	CPR Policy: Use α = 0.05 or lower when citing statistical significance for inferential statistics.
GUIDELINE 5-1-4D: When it is appropriate, the use of multiple regression and multivariate analysis techniques should be considered to examine relationships between a dependent variable (e.g., test score) and a set of independent variables (e.g., race, sex, and family background).	CPR Policy: Multiple regression is used to examine relationships between variables while controlling for variance contributions of class, enrollment statutes, housing, sex, age, race/ethnicity, major, Carnegie classification, sector, undergraduate enrollment, selectivity, urbanicity, and academic support per student.
GUIDELINE 5-1-4F: When the results of an analysis are statistically significant, it is useful to consider the substantive interpretation of the size of the effect. For this purpose, the observed difference can be converted into an effect size to allow the interpretation of the size of the difference.	CPR Policy: Effect size regularly included in institutional reports, along with guide for interpreting effect size.
STANDARD 5-4-3: All figures (graphs, maps, or charts) must be understandable without reference to the text. 1) Each figure must have a concise title that identifies the content of the figure and the reference period for the survey. 2) Each figure must include all notes necessary to convey information not immediately evident from the main graphic, such as notes that define acronyms, explain special terms, or define the underlying population included in the analysis.	CPR Policy: Any tables or figures have separate titles and footnotes indicating statistical significance levels, weights, or control variables used in the analysis.
STANDARD 5-4-7: All tables that should logically sum to either 100 percent, or to a numeric total, must include a note that states: NOTE: Detail may not sum to totals because of rounding.	CPR Policy: Footnotes indicate when column percentages are weighted but frequency counts are not weighted, and the column % cannot be directly calculated from counts.
Dissemination of Data	
STANDARD 7-1-6: All variables must be clearly identified and described.	CPR Policy: Codebooks are provided to institutions with detailed explanations of variable names; Syntax for created and recoded variables available on website.
GUIDELINE 7-1-6B: Variables names should be consistent across surveys within a survey system, within and across years.	CPR Policy: Variable names are consistent for items that remain on the instrument from year to year; Codebooks describe any new variable names for items that may have changed.

STANDARD 7-2-1: All NCES reports must include documentation that allows the reader to understand the nature and limitations of the results presented.	CPR Policy: Institutions receive written guides for interpreting reports and codebooks to assist in additional data interpretation.
STANDARD 7-2-2: Sampling standard errors must be available for all estimates included in reports. Sampling standard errors (se's) or confidence intervals (CI's) for statistics in tables and graphs can be included in reports in their entirety.	CPR Policy: Provide SEM information with all institutional reports of benchmark comparisons.
STANDARD 7-3-1: All NCES products must be disseminated according to a plan that identifies intended and potential users.	CPR Policy: Participating institutions given reports and access to data sets for additional analyses. Special analyses for institution-specific questions available on request for additional fee.
GUIDELINE 7-3-1D: Innovative ways to disseminate NCES data should be explored. Presentations at annual meetings, seminars on specific publications, training on the use of databases, outreach to external groups, and special research efforts using NCES data should be encouraged.	CPR Policy: CPR staff regularly present research using NSSE data at conferences and publish in peer-reviewed journals. NSSE Institute sponsors user workshops, webinars, consultations, and other services to help institutions understand, present, and effectively utilize their results.
GUIDELINE 7-3-1E: NCES should have strategies in place to collect user feedback on the utility of its products and solicit recommendations for making NCES data more useful.	CPR Policy: NSSE Institute works with participating institutions to provide services based on institutional need.

References

NCES Statistical Standards. (2002). Institute of Education Sciences, U.S. Department of Education. NCES 2003-601. www.nces.ed.gov

NSSE Psychometric Portfolio. (2009). Bloomington, IN: Center for Postsecondary Research, Indiana University, School of Education. www.nsse.iub.edu