INSPIRE Research Assessment Center

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1. ABSTRACT

The Inspire Assessment Center for STEM Literacy project aims to widen and ease the dissemination of valid and reliable assessment instruments that measure various constructs related to P-12 (pre-college) engineering. Acting as a database, the Assessment Center stores information on over 40 instruments and serves as a platform for the collaboration of a growing body of pre-college engineering education researchers, outreach developers and P-12 teachers. The database also serves as a self-contained search engine, ordering instruments by classifying data such as name, constructs measured, intended respondents, validity and reliability evidence, and sample items. Where available, links to the original conference or journal paper, in a PDF format, are also provided. The Assessment Center also has functionality to track how much it has been accessed and how many times pages have been viewed by visitors.

2. INTRODUCTION

Distribution of information is a defining feature of the 21st century. With wikis and databases created for the storage of the most obscure subjects, it is only natural that engineering assessments are given a suitable storage space on the Internet. The Inspire Research Assessment Center was created to provide an easy-to-access database with a large scope of recognized research assessments that will provide resources for engineering educators and researchers. With the Assessment Center providing assessments, engineering educators can conduct assessments of their students as well and researchers now have another database where they can gather information from.

3. BACKGROUND REVIEW

The Assessment Center is a newcomer to the growing community of scientific databases hosted on the internet. Other assessment databases include Pearweb's Assessment Tools in Informal Science, which also provides a searchable database of assessments focused on science (Hussar, 2009). Another example is EDC's Center for Science Education, which stores K-12 assessments useful for teachers and counselors ("An introduction to," 2009). Assessing Women and Men in Engineering (AWE) database also stores surveys and disseminates useful information and methods for researchers and educators alike (Marra, 2001).

The most important purpose of the INSPIRE Assessment Center is the dissemination of information. Though there are plenty of instruments that provide information researchers and educators can use, the management and search for this information are obstacles. The project was also initiated in response to recent campaigns for increased STEM Literacy such as Educate to Innovate.

4. METHOD

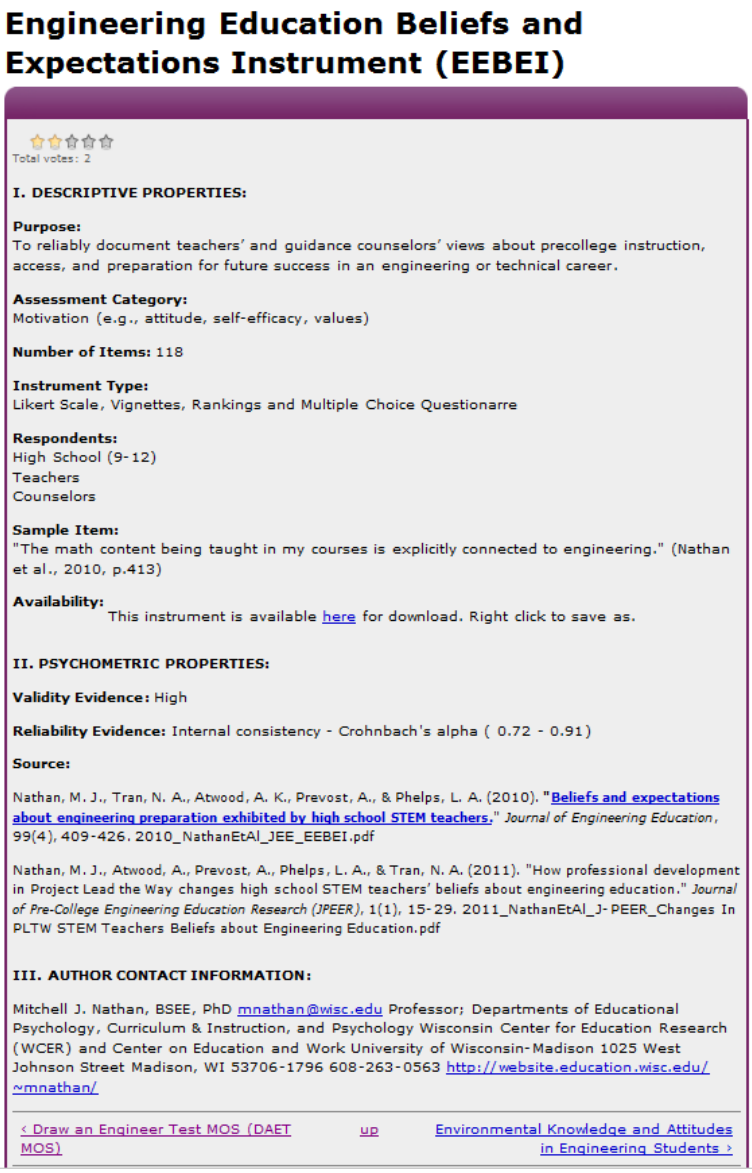
4.1 Drupal Database

The Assessment Center uses a Drupal pipeline. All of the webpages are stored in a SQL server created and managed by the Drupal software. All assessments are stored as "pages" in a book format so they can be easily accessed. This format of storage allows the database to be searched both with a basic search algorithm, based on keywords, and a much broader search that distinguishes information by field. Google Analytics tracks the use of the Assessment Center by keeping track of how many users have accessed the assessments.

Assessments that are added to the database are gathered from journals, conference papers, as well as submissions to the database by the primary authors. The Assessment Center has a submission form that allows prospective additions to be reviewed and then added with intimate support from the primary author. Two assessments have been added this way to the Assessment Center since the form's inception.

4.2 Assessment Fields

The assessment center includes two major categories of information on the instruments: descriptive properties and psychometric properties. As shown in Figure 1, these categories are expanded with more specific fields such as instrument purpose and instrument type. Additional fields such as the following are also available: number of items, scale used, a copy of the instrument, validity evidence, reliability evidence, and author contact information. Figure 1 shows a sample instrument and the information provided by stored assessments.



Engineering Education Beliefs and Expectations Instrument (EEBEI)

Total votes: 2

I. DESCRIPTIVE PROPERTIES:

Purpose:
To reliably document teachers' and guidance counselors' views about precollege instruction, access, and preparation for future success in an engineering or technical career.

Assessment Category:
Motivation (e.g., attitude, self-efficacy, values)

Number of Items: 118

Instrument Type:
Likert Scale, Vignettes, Rankings and Multiple Choice Questionarre

Respondents:
High School (9-12)
Teachers
Counselors

Sample Item:
"The math content being taught in my courses is explicitly connected to engineering." (Nathan et al., 2010, p.413)

Availability:
This instrument is available here for download. Right click to save as.

II. PSYCHOMETRIC PROPERTIES:

Validity Evidence: High

Reliability Evidence: Internal consistency - Crohnbach's alpha (0.72 - 0.91)

Source:

Nathan, M. J., Tran, N. A., Atwood, A. K., Prevost, A., & Phelps, L. A. (2010). "Beliefs and expectations about engineering preparation exhibited by high school STEM teachers." *Journal of Engineering Education*, 99(4), 409-426. 2010_NathanEtAl_JEE_EEBEI.pdf

Nathan, M. J., Atwood, A., Prevost, A., Phelps, L. A., & Tran, N. A. (2011). "How professional development in Project Lead the Way changes high school STEM teachers' beliefs about engineering education." *Journal of Pre-College Engineering Education Research (JPEER)*, 1(1), 15-29. 2011_NathanEtAl_J-PEER_Changes In PLTW STEM Teachers Beliefs about Engineering Education.pdf

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‹ Draw an Engineer Test MOS (DAET MOS) up Environmental Knowledge and Attitudes in Engineering Students ›

Figure 1: A sample instrument

4.3 Search Engine

A user-friendly interface makes finding information in the database easy. This feature allows the provision of easily accessible resources. This ease of access is achieved through the search system developed with the backend Drupal system. Both a basic keyword search and a much more advanced search are available for finding relevant information. Figure 2 shows the view of the advanced search engine, and what fields can be used to narrow down the search for a particular instrument.

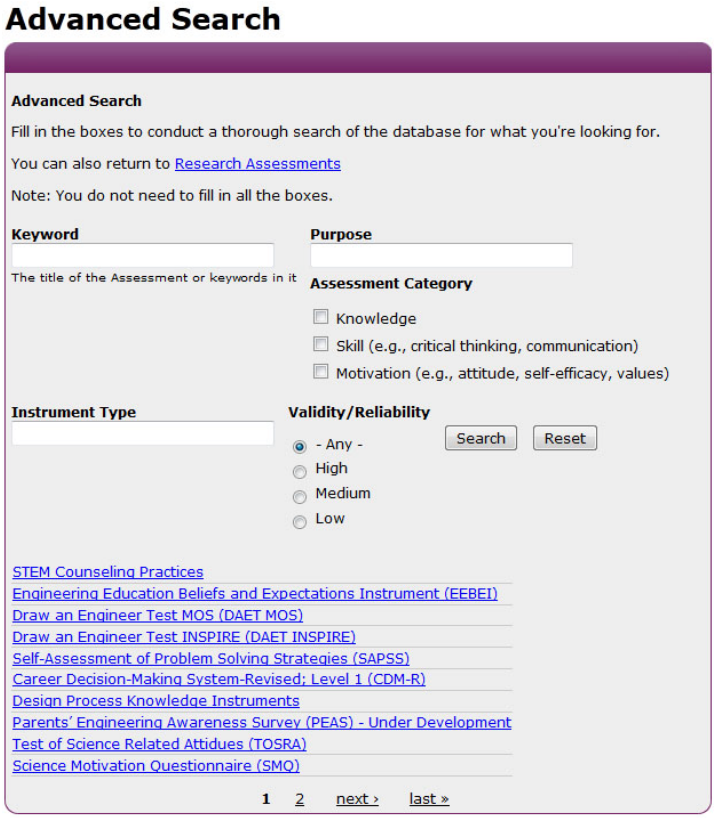

Figure 2: The advanced search function

4.4 Additional Instruments

More assessments can be submitted to the assessment center for inclusion. After a prospective new instrument is found or submitted, information is gathered on the various fields required to be completed for the database. If the assessment has enough information and has enough validity then it is added to the database as a complete instrument.

5. ACCESSING THE DATABASE

The Assessment Center is a free-access resource that requires no registration to use. It can be found at https://engineering.purdue.edu/Inspire_center/assessment-center.

6. RESULTS

The Assessment Center was developed to accommodate various browsers at various versions while still implementing user friendly interfaces. Over the course of three months 40 assessments have been documented and over 3,000 views and 481 visits have been logged. While one fifth of the visits were from Purdue and West Lafayette, the rest of the visits were from across the globe. The usage data was gathered using a Google Analytics account.

7. CONCLUSIONS

Currently, more assessments are being reviewed to add to the Assessment Center. The Assessment Center will continue to grow more and more useful to the cause of spreading information and increasing STEM literacy. What it needs now is more users and exposure. With about 1000 views a month, the Assessment Center is getting significant attention. However, the information stored in the center is still underutilized. With time and more exposure, though, the Assessment Center will become a useful tool for educators and researchers alike.

REFERENCES

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AUTHOR INFORMATION

Kavin M. Nataraja is an undergraduate student in the department of Computer Graphics Technology at Purdue University. He works as a member of UPRISE, the INSPIRE (Institute for Engineering Research and Learning) undergraduate researcher mentoring program, focusing his research on assessments and dissemination of information through the Internet. Nataraja created the database structure and search engine.

James He is an undergraduate student in the department of Computer Graphics Technology at Purdue University. He works as a member of UPRISE, the INSPIRE (Institute for Engineering Research and Learning) undergraduate researcher mentoring program, focusing his research on assessments and dissemination of information through the Internet. He refined the appearance of the Assessment Center and created a user friendly interface.

Senay Purzer is an assistant professor in the School of Engineering Education at Purdue University. She is the Director of Assessment Research at INSPIRE. Her research focuses on P-12 engineering education and assessment.