

Lessons Learned in Helping Develop and Use a Quality of Assessment Rubric for Construction Program Learning Outcomes Assessment

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Meta Assessment is the evaluation of the quality of assessment practice. The majority of construction programs in the United States have to produce assessment reports for both their host university and external accreditation agencies such as ABET or the American Council for Construction Education (ACCE). These reports have to demonstrate how graduates have met student learning outcomes. Indeed, every regional accreditor in the United States (e.g., SACSCOC) requires institution to practice assessment, with an emphasis on program improvement (Smith, Good, Sanchez, & Fulcher, 2015). To best facilitate and support assessment across a variety of programs, some institutions develop a rubric or checklist that specifies characteristics of good assessment practice. During the autumn of 2015 the authors were involved in the development and adoption of a rubric that articulates quality assessment practice at Auburn University. The rubric provides academic degree programs at Auburn University with a framework for quality assessment practice and allows for faculty peer review of assessment reports so that each academic degree program receives specific assessment quality feedback. The rubric is aligned to the elements of the traditional assessment cycle (e.g., student learning outcome development, curriculum mapping, measurement alignment) and also emphasizes the role of communication among faculty in the process. This paper shows how the rubric was used by the leadership of the McWhorter Building Science undergraduate program at Auburn University to refine their assessment process and reporting structure, and how the results of the first year of meta assessment were used to make improvement to the assessment process with the ultimate aim of continually improving the program.

Keywords: Assessment, Accreditation, Construction Education, Rubric, Quality, Learning Outcomes.

Introduction

Assessment is the process of evaluating programmatic student learning outcomes (i.e., when a student graduates from a program, what specific knowledge, skills, or abilities does the program hope they have achieved?). Assessment is often conducted to tell a story about how well students are learning in the program, and also to identify areas within the program that can be targeted for improvement. Although assessment is required by all regional accreditors and often disciplinary accreditors (e.g., ACCE, 2016), the spirit behind these requirements is to inspire programs to continuously improve (Smith, Good, Sanchez, & Fulcher, 2015).

The process of assessment does not have a uniform definition; indeed, faculty and staff often interpret the word ‘assessment’ differently. Likewise, the quality of assessment practice can vary among programs. For example, program X may collect data using students’ self-report data while program Y may evaluate students’ work directly with the aid of a rubric. If the spirit of assessment is to improve the program, it would be best if programs were

making data informed decisions based on reliable and valid data, in which case program Y would have a stronger assessment process. “Meta-assessment,” or the practice of evaluating the assessment process, can help provide programs with a clear definition of quality assessment and it allows for systematic feedback (Ory, 1992).

In 2012, Fulcher, Swain, and Orem discovered over 50 institutions using some form of meta-assessment, most commonly through the employment of a rubric (Fulcher, Swain, & Orem, 2012). The practice of meta-assessment can be useful to a university because 1) it clearly communicates assessment quality expectations to programs, 2) it allows for programs to receive systematic feedback on the quality of their assessment practice, 3) it is formative for the assessment office—they can target professional development opportunities where faculty need it most, and 4) it allows the assessment office to capture an institutional snapshot of assessment and track quality assessment improvements over time.

In recent years, shifts toward learning outcome based construction education, focus on assessment, building curricula backwards toward those learning outcomes, and alternative learning methods have provided a foundation for a more learner-centered educational model in construction education. Huba and Freed (2000) argued that learner-centered assessment promotes enhanced organizational culture, quality curricula, and quality instruction all of which are attributes of quality education. This paradigm shift in construction education changes the focus from providing instruction in construction management to producing learning in construction management. Assessment and the evaluation of assessment is an important element of continual feedback to help promote such production of learners.

In 2015 at Auburn University, there was much variability in the quality of assessment practices and many definitions of assessment existed across the 250 academic degree programs. In order to clarify stable expectations and best support programs with their assessment work, the newly formed Office of Academic Assessment chose to create a meta-assessment infrastructure specifically for Auburn University. The purpose of this paper is to share one program’s experience with this work in the hopes that it may assist other programs as they develop and validate their own outcome assessment process.

Developing the Quality of Assessment Rubric

During the fall of 2015, the Office of Academic Assessment recruited (13) faculty across Auburn University’s campus to participate in a working group with the charge of creating a Quality of Assessment Rubric. This rubric was designed to articulate quality assessment practice for all academic degree programs. Meeting weekly for 60-90 minutes, the group began by defining the assessment cycle and exploring other quality meta-assessment rubrics (e.g., James Madison University’s rubric; Fulcher, 2015). Next, the group decided on the major rubric elements that corresponded to the assessment cycle and specific sub-elements, which in total include 1) Specificity of Outcomes, 2) Comprehensive Outcomes, 3) Communicating Outcomes, 4) Curriculum Map, 5) Outcome-Measure Alignment, 6) Direct Measures, 7) Data Collection, 8) Reporting Results, 9) Interpreting Results, 10) Communicating Results, and 11) Purposeful Reflection and Action Plan (Auburn University, 2016).

Using the Quality of Assessment Rubric for Assessing the Quality of Auburn University’s McWhorter School of Building Science Student Learning Outcomes Assessment

The undergraduate building science program at Auburn University is required to report the results of its student learning outcomes (SLO’s) assessment activities both to the Office of Academic Assessment at Auburn University and as part of the re-accreditation process for the American Council for Construction Education (ACCE). The requirement to assess SLO’s for ACCE accreditation has only been a requirement for programs being accredited or

re-accredited from Fall 2016 onwards. This follows the approval of ACCE Document 103: Standards and Criteria for Accreditation of Post-Secondary Construction Education Degree Programs in July 2014. ACCE Document 103 requires that “all degree programs shall provide evidence to show that graduates from the degree program have met” 20 ACCE SLO’s. Programs not only need to demonstrate they have included the 20 ACCE SLO’s in their curriculum, but also assess the outcomes using a minimum of two assessment methods, at least one of which must be a direct measure. Programs are also required to have a degree program assessment plan. Part of this plan requires programs to assess SLO’s using appropriate tools and set performance criteria to measure the achievement of these outcomes. An assessment implementation plan also requires programs to compare assessment results with performance criteria to identify any need for improvement. Finally, programs are also required to review their assessment process periodically and make changes for improvement (American Council for Construction Education, 2016). It is therefore evident there are many similarities between the assessment requirements for Auburn University and those required for ACCE accreditation. The similarities and overlap of requirements are set out in figure 1 below. After initial consultation between the School Head, Undergraduate Program Chair and the Director of Academic Assessment, it was decided that the annual assessment report submitted to Auburn University would be incorporated into the schools Building Science Degree Program Assessment Plan & Implementation Report as an appendix. After the Quality of Assessment Rubric was developed it was decided that the annual assessment report would follow the format suggested by the rubric.

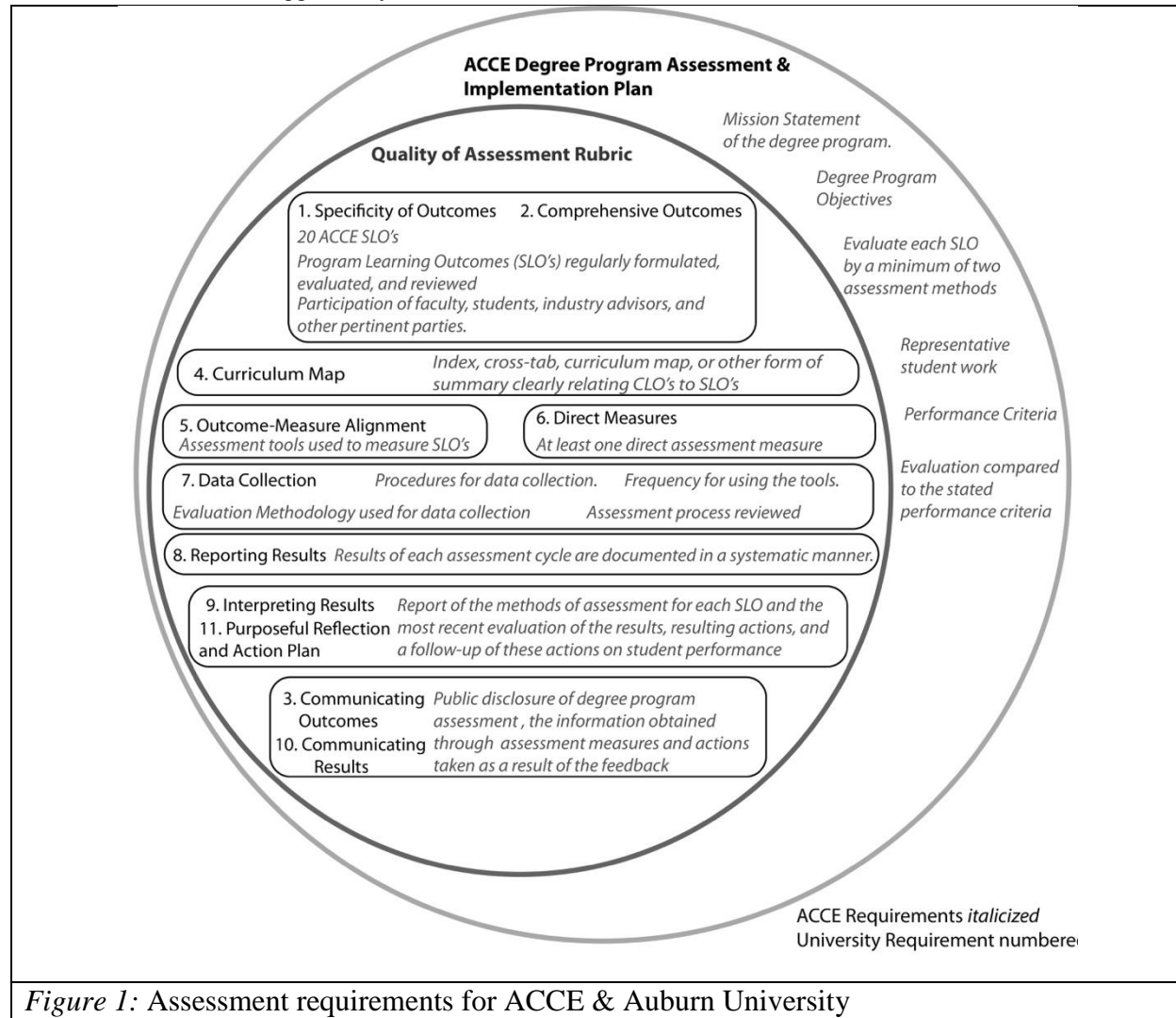


Figure 1: Assessment requirements for ACCE & Auburn University

Results of 2016 Academic Assessment Cycle

An assessment report is submitted to Auburn University on an annual basis (i.e., July 1). Throughout the academic year, Auburn University's Office of Academic Assessment recruits faculty from across the university to participate in an Assessment Institute, in which faculty participants receive two days of intensive training on the assessment cycle and associated quality of assessment rubric. Upon completion of their two-day training, participants are paired and assigned a set of approximately 20 assessment reports, all from outside their discipline. Daily, using the quality of assessment rubric, each participant independently rates three to five reports. Faculty pairs adjudicate their independent ratings to provide one rating for each element of the rubric (i.e., eleven ratings in total). Adjudication is completed to ensure ratings are agreed upon and accurate. Each program is provided with a feedback report that includes the average adjudicated score for each element as well as high quality actionable formative feedback.

McWhorter School of Building Science's Assessment Process

The first part of the quality of assessment rubric deals with the specificity and comprehensiveness of the SLO's and how they are communicated to students and faculty. The annual assessment report contains an explanation that the program uses the 20 ACCE SLO's for assessment purposes. Details are provided of the requirements from Document 103 and a complete list of the outcomes are provided in the report. For some of the SLO's the program has developed a commentary on the interpretation of SLO's and development of course learning outcomes. These documents tell the story of how the faculty together with input from its industry stakeholders interpreted what the ACCE SLO meant to them and what course learning outcomes were required so that it could demonstrate that the students had met the ACCE SLO. The use of this commentary was commended by the peer evaluation panel in the feedback report.

Following the release of the quality of assessment rubric earlier in the year, the program increased its efforts to communicate the SLO's to its stakeholders. The SLO's, together with the goals and objectives for the program are set out in the accreditation section of the school's website. Students are also informed of the SLO's during the Pre-Building Science Convocation which is held during their first semester of study and during the Professional Program Convocation that is held during the first semester of their junior year. An introduction to assessment, accreditation and SLO's is provided to all new Building Science faculty as part of the new faculty orientation process. Existing faculty are informed of the SLO's during faculty meetings and via email correspondence. All faculty are involved in the curriculum review process and documents detailing the SLO's play a central part in this process. All faculty are required to evaluate and grade the Building Science Thesis which is currently used to evaluate five of the 20 SLO's. To satisfy the ACCE requirements, the school is required to have an Industry Advisory Council (IAC) which consists of approximately 25 members consisting of senior level managers drawn from construction companies across the region and beyond. Members of the IAC are made aware of the SLO's in two ways. First, members of the IAC were involved in two curriculum review workshops held in July 2015 where they were presented with the list of SLO's and asked to review for completeness and the need for any additional SLO's. Secondly, IAC members are given an abridged version of our annual assessment report at their spring and fall meetings which also contains details of the SLO's.

The fourth criteria evaluated on the quality of assessment rubric is a requirement for a curriculum map. There is also a similar mapping requirement for ACCE accreditation. Document 103: 3.1.5.3.E requires programs to "provide an index, cross-tab, curriculum map, or other form of summary clearly relating Course Learning Outcomes to Program Learning Outcomes and, further, to the Student Learning Outcomes (American Council for Construction Education, 2016). A curriculum map was provided that mapped each Building Science class to the 20 ACCE SLO's. It further detailed where the SLO was introduced, reinforced, mastered and assessed. Figure 2 shows the quality of assessment rubric with the evaluation identified by a tick mark.



QUALITY OF ASSESSMENT RUBRIC

	Beginning	Developing	Mature	Exemplary
Student Learning Outcomes: Clearly articulated and widely communicated statements describing all of the specific knowledge, skills, and abilities that all students completing an educational program should achieve.				
1. <i>Specificity of Outcomes</i>	No student learning outcomes provided.	Some student learning outcomes include precise learning verbs and articulate the specific content, skills, and abilities students should achieve.	Most student learning outcomes include precise learning verbs and articulate the specific content, skills, and abilities students should achieve.	All student learning outcomes include precise learning verbs and articulate the specific content, skills, and abilities students should achieve. ✓
2. <i>Comprehensive Outcomes</i>	No description of whether the list of student learning outcomes is comprehensive.	A brief narrative notes that the list of student learning outcomes is not currently comprehensive (i.e., outcomes presented reflect a sample).	A brief narrative notes that the list of student learning outcomes is comprehensive.	A brief narrative notes that the list of student learning outcomes is comprehensive AND provides a rationale for comprehension (e.g., alignment with disciplinary standards, faculty consensus). ✓
3. <i>Communicating Outcomes</i>	No evidence that outcomes have been communicated to program faculty and students.	Student learning outcomes are made public (e.g., by posting them online); however, it does not appear that outcomes are directly disseminated to program faculty or students.	Student learning outcomes are directly communicated with program faculty (e.g., faculty meeting, e-mail).	Student learning outcomes are directly communicated with program faculty AND students (e.g., student orientation, advising). ✓
Curriculum Map: A matrix that represents visually the alignment between program student learning outcomes and required courses/experiences.				
4. <i>Curriculum Map</i>	No curriculum map provided.	Curriculum map is provided; however, at least one student learning outcome does not have a required course/ experience aligned with it.	Curriculum map is provided, and every student learning outcome is aligned with at least one required course/experience.	Curriculum map is provided, and every outcome is aligned with at least one required course/ experience, AND program conveys the extent to which each outcome is developed in particular courses (e.g., 1=introduced, 2=reinforced, 3=emphasized). ✓

Figure 2: Rubric for evaluating student learning outcome specificity and comprehensiveness

The next series of criteria on the rubric address the methodology used for outcome assessment. The program currently assesses all of the outcomes indirectly through a student exit survey. Currently four of the twenty ACCE SLO's are assessed using direct measures. Table 1. Sets out the current direct assessment methods used. Currently all the four SLO's assessed using a direct measure are evaluated in Building Science 4990 – Thesis. All graduating seniors are required to take this class, this is between 90 and 120 students per academic year. Data for both direct and indirect measures are collected each semester. Grading rubrics for each of the SLO's directly assessed in Building Science 4990 are completed by the faculty grading each student thesis individually and collated by the school head.

Table 1

Current SLO Direct Assessment Methods

Outcome	Description of Assessment Measure	Data Collection
Create a construction project safety plan	Site specific safety plan for selected project	8 Criteria Grading Rubric - 5% of 4990 Final Grade
Create construction project cost estimates	Cost estimate for selected project	5 Criteria Grading Rubric - 15% of 4990 Final Grade
Understand the basic principles of structural behavior	Conceptual assessment of the structural systems of selected project	5 Criteria Grading Rubric - 5% of 4990 Final Grade
Understand the basic principles of sustainable construction	Assessment of project building to demonstrate understanding basic principles of sustainable construction	7 Criteria Grading Rubric - 5% of 4990 Final Grade

The peer evaluation for assessment methodology shown in figure 3, reflects the fact that the program is currently only directly assessing 20% of the programs SLO's. Feedback from the peer evaluation indicates that the current assessment measures align well with the SLO's and that the program should continue to develop assessment

measures of similar quality. The program plans to directly assess between 7 and 8 SLO's during the 2016/17 academic year and be assessing all 20 SLO's by the time of the next ACCE accreditation cycle.


 AUBURN UNIVERSITY		QUALITY OF ASSESSMENT RUBRIC		
	Beginning	Developing	Mature	Exemplary
Methodology: Systematic measurement of extent to which student learning outcomes are being achieved, making use of direct measures and sound reasoning.				
5. Outcome-Measure Alignment	No measures provided OR absence of outcome-measure alignment.	Some outcomes have at least one measure aligned with them.	Most outcomes have at least one measure aligned with them. ✓	All outcomes have at least one measure aligned with them. ✓
6. Direct Measures	No direct measures used to measure the extent of student learning.	Some student learning outcomes evaluated using at least one direct measure. ✓	Most student learning outcomes evaluated using at least one direct measure. ✓	All student learning outcomes evaluated using at least one direct measure. ✓
7. Data Collection	No information regarding data collection is provided.	Information provided on some aspects of data collection; however, there is not enough information to evaluate the soundness of the data collection process.	Information provided on how data were collected (e.g., course embedded) and who provided data (e.g., all seniors); however, methodological flaws are present (e.g., misrepresentative sampling). ✓	Information provided on how data were collected, who provided data, AND the process appears to be methodologically sound. ✓

Figure 3: Rubric for evaluating assessment methodology

The final set of criteria cover the reporting, interpreting, communication and use of the results of assessment. All the SLO's currently being assessed use grading rubrics to evaluate student performance. The completed individual rubrics are collated by the school head and the results summarized on a semester basis. The results show the total number of students who achieved a particular score on a 5-point grading scale and the average student performance for each grading criteria. Further interpretation of the results identifies the percentage of students who achieved above 60%, 70%, 80% and 90% on the assessment. The criteria for each rubric on which the lowest average score is reported is also identified. A copy of the draft Building Science Degree Program Assessment Plan and Report, which includes the results of the SLO assessment is provided to all program faculty in electronic format several days before an annual quality improvement meeting held in early May each year. The Building Science Degree Program Assessment Plan and Report follows the format suggested by ACCE Document 103 and the Data for Assessment of Student Learning Outcomes Reported to the Auburn University Director of Academic Assessment is provided as an appendix to this report and follows the format of the quality of assessment rubric. This document is used to stimulate discussion and encourage recommendations for quality improvement. A visual summary of the results of the SLO assessment is also provided to members of the school's industry advisory council. At the annual quality improvement meeting, past quality improvement recommendations are discussed and following discussion on the results in the report, recommendations are made for improving the program.


 AUBURN UNIVERSITY		QUALITY OF ASSESSMENT RUBRIC		
	Beginning	Developing	Mature	Exemplary
Results: Assessment results reported and interpreted in relation to the student learning outcomes and communicated with program faculty.				
8. Reporting Results	No results reported.	Results are reported; however, it is unclear how they relate to the student learning outcomes.	Results are reported and are clearly aligned with the student learning outcomes.	Results are reported, clearly aligned with the student learning outcomes, AND related to previous findings to reveal trends. ✓
9. Interpreting Results	No interpretation of results provided.	Interpretation of results provided; however, it is unclear how the interpretation relates to the student learning outcomes.	Interpretation of results is provided and is clearly aligned with the student learning outcomes. ✓	Interpretation of results is provided and is clearly aligned with the student learning, AND the interpretation considers factors (e.g., capabilities of a particular cohort, innovative curricular changes) that may have affected the results.
10. Communicating Results	No communication of results provided.	Results are communicated with some, but not all program faculty.	Results are communicated with all program faculty.	Results are communicated with all program faculty, AND there is dedicated time (e.g., at a faculty retreat) for faculty to discuss the results. ✓
Use of Results: Evidence that assessment results have been discussed and acted upon, as appropriate.				
11. Purposeful Reflection and Action Plan	No evidence of purposeful dialogue among program faculty about the use of results.	Evidence of purposeful dialogue among program faculty on assessment results; however, no plan has been formulated to improve student learning.	Evidence of purposeful dialogue among program faculty on assessment results and a plan has been developed to improve at least one student learning outcome.	Evidence of purposeful dialogue among program faculty on assessment results, a plan has been developed to improve at least one student learning outcome, AND the faculty are implementing the plan. ✓

Figure 4: Rubric for the reporting, interpreting, communication and use of the results of assessment.

The peer evaluation for reporting, interpreting, communication and use of the results of assessment shown in figure 4, recognize that the program is doing a good job with the results of assessment. Feedback suggested continuing to report additional outcomes in a similar manner but also to consider other factors such as cohort GPA when interpreting results prior to making recommendations for improvement.

Discussion

Prior to being involved in developing and using a quality of assessment rubric, the program had mainly relied on the information provided in ACCE accreditation documents for preparing assessment materials. During the process of developing the quality of assessment rubric, program leadership was exposed to best practices in academic assessment previously not identified. For example, communicating the SLO's and the results of the assessment process beyond the faculty to students and industry advisory council members. The input and guidance from assessment professionals has been key to identifying and incorporating best assessment practices into the rubric and ultimately into the assessment plan and report. Many ACCE and ABET accredited programs are located at institutions that employ people with expertise in the assessment of SLO's and the authors would recommend seeking out their council as programs prepare and refine assessment plans. Finally, the process of going through the academic assessment review allows the program to demonstrate that it has complied with standard 9.1.4.4 in Document 103 that "after each comprehensive assessment cycle, the entire process is being reviewed and updated with plans for improvement including any revisions to the degree program's assessment plan (American Council for Construction Education, 2016)."

Future research should consider the cost-benefit issues associated with the approach advocated in this paper. Further development of assessments for learning outcomes and the evaluation of those results will involve considerable costs. As such, a tendency exists to minimize the information gathered in any assessment. Such approaches may limit the impact on learner-centered improvement. If overall goals of higher levels of construction management graduates are to be realized, continued effort to evaluate and improve assessment will be needed.

References

- American Council for Construction Education (2016). *Document 103: Standards and Criteria for Accreditation of Post-Secondary Construction Education Degree Programs*. Retrieved from: http://www.acce-hq.org/images/uploads/Doc_103_OBS_final_0118162.pdf
- Auburn University (2016). Quality of Assessment Rubric from <http://wp.auburn.edu/academicassessment/wp-content/uploads/2016-Rubric-sheet-revised-6-20161.pdf>
- Fulcher, K. (2015.). JMU Revised APT Rubric. Retrieved from http://www.jmu.edu/assessment/_files/APT_Rubric_sp2015.pdf
- Fulcher, K., Swain, M., & Orem, C. (2012). Expectations for Assessment reports: A descriptive analysis. *Assessment Update*, 24(1): 1-16.
- Huba, M. E., & Freed, J. E. (2000). *Learner-centered assessment on college campuses: shifting the focus from teaching to learning*. Boston: Allyn and Bacon.
- Ory, J.C., (1992). Meta-assessment: Evaluating assessment activities. *Research in Higher Education*, 33(4). 467-481.
- Smith, K. L., Good, M. R., & Sanchez, E. H., Fulcher, K.H., (2015) Communication is Key: Unpacking “Use of Assessment Results to Improve Student Learning”. *RESEARCH & PRACTICE IN ASSESSMENT*, 15- 29.