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CALL FOR PAPERS

Research & Practice in Assessment is currently soliciting articles and reviews for its Summer 2019 issue. Manuscripts submitted to RPA may be related to various higher education assessment themes, and should adopt either an assessment measurement or an assessment policy/foundations framework. Contributions are accepted at any time, but submissions received by March 1 will receive consideration for the summer issue. Manuscripts must comply with the RPA Submission Guidelines and be sent electronically to: editor@rpajournal.com

RESEARCH & PRACTICE IN ASSESSMENT

The goal of *Research & Practice in Assessment* is to serve the assessment community as an online journal focusing on higher education assessment. It is dedicated to the advancement of scholarly discussion amongst researchers and practitioners in this evolving field. The journal originated from the Board of the Virginia Assessment Group, one of the oldest continuing professional higher education assessment organizations in the United States. *Research & Practice in Assessment* is a peer-reviewed publication that uses a double-blind review process. Approximately forty percent of submissions are accepted for issues that are published twice annually. *Research & Practice in Assessment* is listed in Cabell's Directory and indexed by EBSCO, ERIC, Gale, and ProQuest.

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FROM THE EDITOR

Finishing Strong

"Finish strong" is an acclamation shared by many distance runners, and likely athletes of any sport. The words encourage the individual to complete the race (or competition or game) with tenacity and vitality. This special issue of Research & Practice in Assessment affords me a strong finish as I conclude my tenure as RPA editor.

Research & Practice in Assessment would not exist without the dedication, effort, and expertise, of many volunteers. In particular I would like to take this opportunity to thank the Editorial Staff members for their tireless efforts in producing each issue and promoting the journal to assessment and higher education professionals around the world. My sincere appreciation extends to the RPA Review Board members who share their expertise and talent to advance the scholarship of assessment and the RPA Editorial Board who provide direction and support for the journal. RPA is made possible through the support of the Virginia Assessment Group and I would also like to thank the VAG Executive Board members with whom I have had the pleasure of serving.

I am delighted to present this special issue of Research & Practice in Assessment dedicated to learning improvement. The invited articles in this issue, under the leadership of guest editor, Keston Fulcher, represent a commitment of thought, action, and reflection to improve student learning. I welcome Keston Fulcher, Executive Director of the Center for Assessment and Research Studies at James Madison University and former RPA editor, who will introduce this special issue.

Regards,

Katie Busby

University of Mississippi

LETTER TO READERS

In April 2017, James Madison University and the Center of Inquiry at Wabash College hosted higher education experts in Washington D. C. The Summit's purpose was to explore assessment's role in learning improvement. At the outset, we endeavored to provide resources for the higher education community including videos and manuscripts. With respect to manuscripts, RPA editor Katie Busby graciously partnered with us to produce this special issue on learning improvement.

In the first article Jeanne Horst and Allison Ames provide more context regarding the need for the summit, the summit events, emerging themes, and lessons learned. In the next article Charlie Blaich and Kathy Wise provide a different type of overview. They re-visit the question: Why so much data collection and so little use in higher education?

The next articles provide ideas and tools to promote learning improvement. Cynthia Crimmins and Michael Reder speak to why assessment professionals should work with faculty developers. Kristen Smith, Megan Good, and Natasha Jankowski introduce and describe a new type of higher education position: a learning improvement facilitator. Monica Stitt-Bergh, Jillian Kinzie, and I argue that higher education is accustomed to telling learning stories that emphasize assessment. We suggest a different narrative: a learning improvement story.

Finally, Diane Lending, Jeremy Ezell, Jeff May, Tom Dillon, and I share a real-life example of a high-quality learning improvement report. The piece illustrates how an educational team partnered to create a much more effective learning environment. As a result, students' interview skills improved dramatically (three standard deviations) from one year to the next.

As a concluding note, I hope this issue broadens readers' conceptualizations of assessment and improvement. I encourage readers to think more broadly than just assessment. As Megan Good once said, "Assessment is not the answer to the lack-of-learning-improvement problem." Let's start thinking about learning systems and how teams of professionals – faculty, educational developers, administrators, and assessment practitioners - can navigate and improve them.

Regards,

Keston H. Fulcher

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Abstract

In April 2017, a three-day Learning Improvement Summit, held in Washington, DC, brought together a broad array of national and international assessment stakeholders. The purpose of the summit was to empower a diverse group of faculty and assessment leaders to develop, refine, discuss, and address evidence-based learning improvement initiatives within higher education. In this short note, we provide a brief discussion of the need for the summit, the summit events, emerging themes, and lessons learned.

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Bringing Together Assessment and Learning Improvement: Dreaming Big for an Inaugural Summit

In order for assessment to be a fruitful endeavor, institutions of higher education need to move beyond simply meeting accountability demands to emphasizing student learning as the goal. This is the vision in which the inaugural summit on assessment's role in learning improvement was situated. Over the past few decades, universities have been asked to show the worth of their programs, in part for accountability reasons. One approach is through assessment, with an oft-cited definition:

> …the ongoing process of establishing clear, measurable outcomes of student learning; ensuring that students have sufficient opportunities to achieve those outcomes; systematically gathering, analyzing, and interpreting evidence to determine how well student learning matches our expectations; using the resulting information to understand and improve student learning. (Suskie, 2009, p. 4)

Suskie's definition closes with the charge to use assessment results to "understand and improve student learning." Nationally, college and university stakeholders are discussing what leaders in the field have deemed most important to the practice of assessment: improving student learning. A recent *Chronicle of Higher Education* commentary incited discussion among assessment professionals, claiming "First, it's clear that people in the assessment world have known for some time that their work was not producing results." (Gilbert, 2018, para. 6). The comments captured the view of those who question the value of assessment practices, who desire to assuage faculty members' resistance toward assessment, and who blame assessment's shortcomings on poor methodology. A flurry of responses from the assessment community included letters to the editor, asserting "…assessment offers faculty a process to understand what is happening with teaching and learning in our programs and opens a space for conversation about how to improve the learning environment" (Stitt-Bergh,

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Merrill, & Foster, 2018, para. 4). The difference between Gilbert (2018) and the response by Stitt-Bergh, Merrill, and Foster (2018) could not be more striking. Clearly, it is time to refocus assessment conversations to emphasize student learning.

Need for Focused Discussion on Learning Improvement

The assessment cycle followed by many universities typically includes a stage such as "use of results for improvement," often referred to as "closing the loop" (see an example at https://www.jmu.edu/studentaffairs/staff-resources/saac/assessment-cycle.shtml). However, it is at this point in the assessment cycle where programs often lose momentum, continuity, and direction (Blaich & Wise, 2011; Bresciani, Gardner, & Hickmott, 2009; Smith, Good, Sanchez, & Fulcher, 2015). Consequently, and despite the pervasiveness of assessment programs across the higher education landscape, there are relatively few evidence-based examples that publicly document use of assessment results to improve student learning at the academic program level (Baker, Jankowski, Provezis & Kinzie, 2012; Banta & Blaich, 2011; Blaich & Wise, 2011; Fulcher, Good, Coleman, & Smith, 2014). In fact, a systematic study evaluating 146 assessment programs identified that only six percent of the programs evaluated showed evidence of student learning (Banta, Jones, & Black, 2009).

In order for assessment to be a fruitful endeavor, institutions of higher education need to move beyond simply meeting accountability demands to emphasizing student learning as the goal. This is the vision in which the inaugural summit on assessment's role in learning improvement was situated.

Despite the limited evidence, it is important to emphasize that we do believe that student learning is happening. Moreover, we firmly believe that faculty members want their students to learn. What is not happening, however, is widespread improvement of student learning at the academic degree program or institutional levels that is directly connected to assessment results. One way in which the field of assessment can move forward is to make a concerted effort toward understanding and defining what it means to use assessment results to improve student learning.

During the 2015-2016 academic year, we began wondering whether, where, and with whom there were conversations happening that involved assessment and improved student learning. As a result, the need for intentional, focused conversation among a broad array of national stakeholders was identified. The idea for a learning improvement summit was solidified by the observation that, at the time of planning, it was rare for higher education conferences to include presentations focused upon learning improvement. At that time, even within assessment conferences, only a very small portion of the presentations were dedicated to assessment's role in improvement. For instance, the 2015 Assessment Institute (Indiana University–Purdue University Indianapolis, 2015) included only one presentation on learning improvement, representing 1% of the total presentations[1]. Similarly, the Association for the Assessment of Learning in Higher Education conference (2015) had only five (approximately 8% of the total) presentations with a focus on student learning. The American Educational Research Association's 2015 proceedings returned over 500 presentations when "assessment" was searched but only three of those (less than 1% of the total) also contained "learning improvement." The lack of coverage at national assessment conferences clearly called for a focused discussion on improved student learning. This led to the inaugural Learning Improvement Summit in Washington, DC in April 2017.

Learning Improvement Summit

The purpose of the three-day Learning Improvement Summit was to provide a space for conversation specifically focused on use of assessment results in the learning improvement process. Through collaboration between faculty at James Madison University and the *Center of Inquiry at Wabash College* directors, participants who represent the broad spectrum of the higher education landscape were invited to attend. The number of participants included in the inaugural summit was limited due to venue space and the desire to create a space that would promote focused conversation and collaboration. We intentionally included voices representative of a diverse array of stakeholders, including those of higher education practitioners, pioneers in the field of assessment, accrediting agencies, testing companies,

[1] The dream is spreading. A learning improvement track was included in the 2018 conference.

national higher education associations, government agencies, and representatives from one international country. We dreamt big. And, to our delight, the invited participants came and engaged in a spirited discussion.

Throughout the three-day summit, participants were tasked with discussing and addressing issues regarding learning improvement initiatives. The objectives for the summit were to:

1. Empower the higher education community by moving the assessment needle beyond meeting accountability demands to emphasizing student learning as the goal.
2. Develop or refine working definitions of *learning improvement* that include the role of assessment at the university *program level*.
3. Develop a community of, and dialogue among, higher education professionals focused on assessment's role in promoting evidence of student learning at the *program level*.
4. Discuss and address issues, such as how to embed learning improvement efforts into institutional/organizational cultures.
5. Strategize about how to most effectively disseminate learning improvement efforts to the broad higher education community, so that all can benefit.

Keynote speakers and invited presentations laid the groundwork on the first day[2]. Specifically, Trudy Banta and Peter Ewell discussed *Thirty-Five Years of Assessment: Past, Present, and Future*. Keston Fulcher and Cara Meixner outlined a learning improvement framework that promotes collaboration between assessment professionals and faculty developers – *Foundations of Learning Improvement*. Charles Blaich and Kathy Wise discussed a realistic view of assessment in *Walking the Assessment Beat on the Mean Streets of Higher Education*. Following the keynote addresses were a series of nine invited seven-minute presentations, illustrating applied examples of learning improvement. The remaining two days of the summit consisted of working sessions, group discussions, and breakout teams.

Emerging Themes and Areas of Future Collaboration

Dreams

The lack of coverage at national assessment conferences clearly called for a focused discussion on improved student learning.

A variety of themes emerged from the summit. Undergirding the themes was the desire for continued communication and the need for a shared language surrounding the concept of learning improvement. Although we felt it important to include a diverse group of stakeholders, doing so necessitated granting participants the opportunity to clearly articulate their own perspective. As the variety of ideas were laid on the table, it was immediately apparent that we hold diverse perspectives on the definition of learning improvement. We realized that we had dreamt big in regard to the second summit objective to "Develop or refine working definitions of *learning improvement* that include the role of assessment at the university *program level*." Additional discussion beyond the initial three-day summit would be necessary in order to meet the objective of a refined definition of learning improvement. Fortunately, the majority of participants expressed a desire to continue the conversation.

Another big theme that emerged: where, or how, does accreditation fit? Certainly, assessment's role in accreditation and accountability cannot be abandoned. Ewell (2009) reminds us that there can be tension between an institution's emphases on accountability versus student learning. Accreditation demands should partially shape the emerging definition of learning improvement. Relatedly, the existing infrastructure in higher education should be considered. The learning improvement work must be fully integrated into the life of an

[2] Video-tapes of keynote addresses and learning improvement examples may be found at https://www.jmu.edu/assessment/featuredStories/2017/LearningSummit.shtml

institution, joining the forces of assessment professionals, faculty development, and classroom teaching. This means, too, that more people must be included in the conversation—admission offices, budget directors, students, and institutional research. They all view student learning differently, and bring important perspectives.

Broadening the conversation and creating a working definition should lead to more and more examples of learning improvement. Documenting what has worked, and what hasn't, is crucial. We need concrete accounts of the conditions that led up to the learning improvement, a "What Works" of learning improvement in higher education.

Thoughts for Those who Dream

As we move forward, there are several lessons learned that we would like to share. First, if we want to move forward productively, *a working definition and shared language surrounding learning improvement is necessary*. We realize that this definition is likely not a simple one, given that it needs to encompass and respect a variety of world views. Perhaps the definition could better be described as a set of guiding principles for defining what constitutes learning improvement. Second, if considering a short three-day summit with a broad array of voices in the conversation, it might be helpful to *provide a means for expressing viewpoints prior to the summit*. We disseminated a pre-summit questionnaire, asking people to offer examples of learning improvement at their institution/organization and to voice specific questions they had about evidencing learning improvement. However, we did not use the information, other than for inclusion in the event program. In retrospect, careful coding and summarizing of participants' incoming views may have facilitated momentum towards a definition of learning improvement.

First, if we want to move forward productively, *a working definition and shared language surrounding learning improvement is necessary*.

Those wishing to engage in a learning improvement discussion at their own institution, or across institutions, are encouraged to conduct preliminary groundwork that enables participants' voices to be heard, but in a manner that facilitates movement toward a common conversation. Third, inaugural summit participants clearly expressed the desire to engage in the creation of workshops and other training materials. *Sharing the work with the broad assessment community is key*. Fourth, and finally, we encourage future summit planners to *dream big*. We are influencing the learning of generations of students to come.

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The More Things Change, the More They Stay the Same: New Challenges to Using Evidence to Improve Student Learning

"Why so much collection—but so little utilization—of data?" (Blaich & Wise, 2011). This was the question we grappled with five years into the Wabash National Study. We created the Wabash National Study in the early 2000s as a response to increasing pressure for institutions to get serious about assessment. The Wabash National Study was a multimillion dollar, 40-plus-institution, longitudinal research and assessment project that measured liberal learning outcomes and the good practices that promoted the development of those outcomes.

The study assessed students at three points: when they entered college, at the end of their first year, and at the end of their fourth year. In addition to sending detailed summary reports and analyses to institutions after each assessment, we offered to combine, at no cost, data from the study with additional student data from institutions so that researchers at the institutions could learn more about what factors promoted learning for their students. We also held workshops and visited participating institutions, at no cost, with a focus on using data from the study for assessment.

We thought of the Wabash National Study as an "assessment test kitchen." We thought that people resisted assessment because they didn't understand what they could learn about their students from high-quality data. We hoped that providing institutions with such data would demonstrate the potential of assessment for improving student learning. By research standards the Wabash National Study was a success. The study led to hundreds of presentations and journal articles, and many theses and dissertations. But as a model of high-quality assessment the Wabash National Study was a bust.

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We learned early on that few people at participating institutions were downloading and reading our carefully-crafted reports. And when we visited institutions, bringing what we thought were useful insights from our analyses, we often found that similar insights had already been identified in a report from an earlier project—a report that had, in many cases, come and gone without note. From a research standpoint this was good news. We were confirming findings of earlier institutional research. But from an assessment standpoint it was bad news. Most of the institutions were not using data from the study, or their own data, to drive improvements in student learning. And thus, our question, "Why so much collection—but so little utilization—of data?"

When does data make a difference?

A few institutions in the study countered this trend. What differentiated these institutions from the institutions that were only "assessment curious"? The lessons we learned from these more active institutions are simple and remain true. Assessment evidence on its own doesn't lead to improvement. For assessment evidence to make a difference it has to address compelling questions that people have about student learning. Institutions that leveraged the Wabash National Study to improve student learning were institutions where data from the study addressed issues about student learning that faculty, staff, and academic leaders cared about. These issues, whether they were about academic challenge or critical thinking, were "in the air" at these institutions. Moreover, influential people were willing to commit their time, energy, and political capital to use data from the study to advance work on these issues.

Those instances in which we discovered data that people on campus already knew, but had ignored, were also instructive. These ignored findings were usually the result of routine data collection that was not driven by any compelling question. For example, one Wabash Study campus we worked with routinely collected data on the proportion of students who were employed on and off campus and another administered the same first-year student survey every year for over 30 years. In each case, someone would write a memo summarizing the results, distribute the memo, and that was the end of the story. The act of writing and distributing the data summary wasn't connected to relevant conversations on campus. We often see the same thing with assessment today. Sometimes such data are collected routinely for compliance reasons, other times they are collected out of habit. We work with institutions that administer four different student surveys on a four-year cycle. The results are written up, distributed, and filed. When we ask people why they do this they reply that even though these kinds of routinely collected data aren't connected with any urgent questions they can serve as a "dashboard warning light" to ensure that nothing is amiss. In other words, they help keep an eye on things.

Most of the institutions were not using data from the study, or their own data, to drive improvements in student learning. And thus, our question, "Why so much collection—but so little utilization—of data?"

What is the goal of assessment?

Consider the following departmental assessment plan. To ensure that its majors have acquired sufficient knowledge in the discipline, a biology department requires a sample of its graduating seniors to take a nationally administered, standardized exam (the ETS Major Field Test) on general biology. The department's goal is that, on average, students in the sample will score at the 75th percentile on the test; as long as they do, the department takes no action. If students' average score dips below the 75th percentile, the department will consider next steps.

This assessment plan is designed to keep an eye on things and make sure they are okay. However, it is designed in a way that can easily lead to improvements in student learning. Dips in Major Field Test scores might prompt inquiry into what's behind those declines, and that inquiry might lead to changes that benefit student learning. On the other hand, dips in exam scores might also lead to conversations about whether a different test would be a better measure, whether this year's cohort was a "bad class," whether it would be prudent to test a few more cohorts to make sure the trend holds, or whether it's time to rethink the 75th percentile criterion. Such responses to falling short of the standard might even be called "closing the loop" in an assessment report.

Sometimes "keeping an eye on it" assessment is done so that a program can focus on other ways of improving student learning. But sometimes it's all that programs do. At some institutions, the need to fill up accreditation reports can exceed the patience and support necessary to ensure that programs engage in assessment that's designed to improve student learning. For example, at a recent conference we heard an assessment director say that she appeals to programs that ignored requests for assessment reports by saying, "All I want from you is something I can aggregate and roll up into our overall reports." While this may be a useful strategy for gathering information for accreditation, it removes student learning from the process, thereby making assessment less relevant for faculty and staff who care about what and how their students are learning.

We think using rubrics to evaluate student work shows great promise as a form of assessment that can improve student learning. But we've also seen rubrics used for assessment in ways that barely make the keeping an eye on it standard. At a recent conference we heard a presentation about a rubric-based general education assessment process that asked faculty in general education courses to 1.) choose, on their own, a general education outcome they thought their course contributed to; 2.) select at least 2–5 pieces of student work from their course where students demonstrated that outcome; 3.) evaluate those artifacts on a four-point, one-dimension scale for the outcome ("does not meet" to "exceeds standards"); and 4.) submit those scores to the assessment director. The assessment director then summarized scores by outcome and posted them on the institution's website.

Sometimes such data are collected routinely for compliance reasons, other times they are collected out of habit.

Why this approach? Assessment leaders at this institution wanted to use rubrics and student work because they thought it would engage faculty. They also had no resources for faculty training, norming sessions, or other work that might improve the value of this process. Finally, they were gearing up for accreditation and needed to implement a general education assessment process as soon as possible. Admittedly, anything that gets faculty to think about how students engage their assignments is a good thing. But without more developed rubrics, norming, a better process for looking at the alignment between assignments and outcomes, or systematic plans for engaging faculty in sustained conversations and responses to the findings, this approach has little chance of systematically improving what students are learning in their general education courses.

Of course, a better designed and resourced use of rubrics can also result in keeping an eye on it assessment. A recent post on an assessment listserv described a project to assess the impact of experiential learning programs for an institution's upcoming accreditation. Students in these programs were required to complete pre- and post-program reflective essays. A stratified random sample of these essays was collected and scored by a team using one of the AAC&U VALUE rubrics.

At some institutions, the need to fill up accreditation reports can exceed the patience and support necessary to ensure that programs engage in assessment that's designed to improve student learning.

This assessment was not designed to help program leaders improve the impact of their programs. It was designed to answer the question, "Overall, is experiential learning making a difference?" This is the kind of keeping an eye on it question that accreditors want answered. But improvements in student learning come from changes in what students encounter in specific courses, experiences, or programs—not from courses, experiences, and programs in general. In addition, this experiential learning assessment process doesn't provide information that people can readily use to either assess or improve student learning in their particular programs.

Interestingly, at the end of this post, the author reported that they had also implemented a fidelity survey to ask students what they experienced and learned in their specific programs. The author stated, "We figured that this indirect measure would be both helpful to us to see whether what we think we're doing is actually taking place, and *it might also provide useful information to the faculty and staff who are involved in offering high-quality ELOs*." (emphasis added) So, despite the care and effort that went into the rubric work, a survey was the measure that was seen as providing useful information to faculty and staff.

Conclusion

We have no quarrel with using assessment to make sure that things are okay. But it's worth considering how often people use the term assessment to refer to processes of collecting, making sense of, and acting on data related to student learning, and then testing to learn whether those actions had the intended effect, or whether they are referring to keeping an eye on it data collection.

If many assessment programs are aimed at monitoring rather than improving student learning, the lack of broad evidence indicating that assessment improves learning should not be surprising.

Fulcher, Good, Coleman, and Smith (2014), and Brown and Knight (1994), have correctly pointed out that learning doesn't get better just because you measure it; and assessment that's designed to keep an eye on it is assessment that focuses on measuring things. So even though there's more assessment happening now than ever before (Jankowski et al., 2018), our work with institutions today sometimes feels like déjà vu all over again, with so much data collection, but so little of it done in a way that's structured to readily improve student learning.

Perhaps this is what's behind the frustration about assessment that has bubbled up recently in *The New York Times*, *The Chronicle of Higher Education*, and *Inside Higher Education*. As Molly Worthen (2018) put it in her editorial, "All this assessing requires a lot of labor, time and cash. Yet even its proponents have struggled to produce much evidence—beyond occasional anecdotes—that it improves student learning."

If many assessment programs are aimed at monitoring rather than improving student learning, the lack of broad evidence indicating that assessment improves learning should not be surprising. Nor should it be surprising that faculty and staff, many of whom believe their classes, departments, and programs are doing well, might find assessment aimed at keeping an eye on it to be pointless. We're not arguing that all courses, departments, and programs are accomplishing their goals for students. But if we're selling assessment on its potential for improving student learning, it's probably time to consider the extent to which we're overpromising and underperforming, and what we can do to diminish that gap.

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Abstract

At institutions of higher education, assessment findings should inform decisions about where to target curricular improvements, course (re) design, academic support resources, and effective teaching practices. In order for the data gathered by many assessment offices or institutional researchers to have an impact on student learning, faculty members must be involved. Centers or programs for faculty teaching and learning can connect assessment professionals to faculty members already concerned with improving student learning. Together they can support and guide faculty in their efforts, helping to shape assessment questions that are meaningful and use the assessment findings to inform improvement efforts.

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Why Assessment and Faculty Development Need Each Other: Notes on Using Evidence to Improve Student Learning

Colleges and universities collect a great deal of data about student learning and experiences but many do very little with it. At best, the data is shared with administrators and faculty. At worst, it sits on a dusty bookshelf or hidden in electronic folders in an assessment office. But, chances are it's not being used as evidence to inform the changes that lead to improved student learning. In a recent survey of institutional leaders the top reported needs and supports for student learning outcomes assessment are 1.) more faculty using the results of the student learning assessment and 2.) more professional development for faculty and staff (Janowski, Timmer, Kinzie, & Kuh, 2018).

Assessment Efforts Aimed at Improvement Need Faculty and Faculty Development

Faculty members are the crucial element to improving student learning and experiences; and faculty programs for teaching and learning are ideally situated to connect faculty members already concerned about improving student learning with assessment efforts. Educational developers (a.k.a. faculty developers or faculty who run programs focused on improving teaching and learning) understand how to structure discussions and workshops that engage faculty members with evidence and help them improve their teaching and, ultimately, student learning.

Faculty ultimately have influence over the educational experiences of students both on a micro level (assignment and course design, approaches to teaching) as well as on a more global level (the design of majors and the overall curriculum, how students are advised and supported, influence over how an institution's educational resources are allocated). Simply put, in order for the data that many assessment offices or institutional researchers gather to have an effect on a school's education, faculty members need to be involved. Working

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together, educational developers and assessment professionals can support and guide faculty in their efforts, helping to shape assessment questions that are meaningful and use the findings to inform improvement efforts.

Ideally, as a school considers assessment and data-gathering efforts, faculty members will be involved from the start. Because faculty have the most intimate knowledge of curriculum, courses, assignments, teaching, and learning, they should help design assessments that best target the needs of an institution. Assessment findings should inform decisions about where to target curricular improvements, course re-designs, academic support resources, and more effective teaching approaches. Additionally, faculty input about such initiatives is likely to increase their ownership of assessment efforts, with both the gathering of assessment evidence and, hopefully, the eventual learning improvement informed by that evidence. Faculty involvement allows those who are most directly impacting student learning to feel more confident helping in the assessment process, enabling them to better make sense of the data and use it as evidence, as well as to think more clearly about how to align resources and improvement efforts.

Faculty members are the crucial element to improving student learning and experiences; and faculty programs for teaching and learning are ideally situated to connect faculty members already concerned about improving student learning with assessment efforts.

Faculty Development Benefits from a Strong Partnership with Assessment Professionals

Perhaps now more than ever, educational development emphasizes evidence-informed practices based on research (e.g., see Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010; Beach, Sorcinelli, Austin, & Rivard, 2016)[1]. But faculty members may wonder: "What about the significance of these ideas for our students? In our institutional context? What are my own students' experiences?" Local evidence—and the stories it tells about our students and their experiences—can be extremely compelling for faculty members. Institutional assessment data has the potential to provide that powerful evidence. Some of the teaching and learning questions that local assessment evidence can help answer include:

- Are our students learning XXXX?
- How do our students experience our classrooms? Our curriculum? Our campus?
- Do all of our students feel well supported?
- What type of students struggle where?
- What factors influence student success, retention, and completion?
- Who chooses what majors and programs and why?
- What are the unintentional roadblocks in a major or our overall curriculum?
- How many and which students engage in the various educational high-impact experiences that an institution has to offer? Are these experiences high quality and equitably distributed?
- How does our institution compare with peer institutions in terms of student engagement and experiences that lead to student learning?

[1] To inform and improve their own work educational developers have drawn upon the neuropsychology of learning (including a better understanding of growth mindset and the role of metacognition in learning), theories about the affective and sociological aspects of learning (including theories of motivation, approaches to mitigating stereotype threat, and removing unintentional roadblocks in learning), and evidence from national studies (such as the National Survey of Student Engagement and the Wabash National Study) about best teaching practices. Such evidence informs much of the programming that faculty centers for teaching and learning offer; and while many faculty find these evidence-informed practices persuasive they often lack a local institutional significance.

Some of the most compelling evidence on both of our campuses has come from extensive focus groups with students. Ironically, even at successful faculty centers for teaching and learning faculty members too rarely sit down with students and talk openly about learning and what happens in our classrooms, labs, and studios.

The opportunities for faculty development programs to incorporate data gathered by the assessment or institutional research office is tremendous—and that information can inform individual faculty practice related to course design and teaching, as well the overall design of the curriculum, targeting academic support, a school's overall strategic priorities, and the allocation of resources in general. A coordinated effort between the assessment and faculty development offices will allow institutions to triangulate assessment findings, student learning, and faculty practices.

Faculty involvement allows those who are most directly impacting student learning to feel more confident helping in the assessment process, enabling them to better make sense of the data and use it as evidence, as well as to think more clearly about how to align resources and improvement efforts.

Overcoming Potential Barriers to a Partnership between Assessment Efforts and Faculty Teaching & Learning

While the proposition to connect assessment and faculty development seems relatively simple, some obstacles to faculty development/assessment partnerships may need to be overcome. Assessment leaders and faculty developers often think of assessment in different ways, perhaps even as having different purposes. Institutional researchers may focus on how assessment is documented and used for accountability or they haven't enough teaching experience to fully empathize with just how messy teaching, learning, and assessing can be. Furthermore, many assessment professionals have no training in curriculum, pedagogy, or group facilitation.

Faculty developers, on the other hand, may not understand the exigencies or intricacies of assessment and data, particularly in regard to documenting for accountability. In addition, they are less likely to have training in research design, measurement, and statistics. Faculty and faculty developers may see assessment as a necessary and ongoing piece of improving teaching and learning but may not document it in a designated format for an outside audience. Beyond overcoming the challenge of separate spaces and administrative units that may hinder holding frequent conversations, we strongly believe that the key players need to reach out and learn more about what each group has to offer the other.

Data is just a collection of information—it cannot serve as evidence until faculty and administrators create a narrative about its significance.

If colleges endeavor to form a tighter relationship between assessment and faculty development in the spirit of improvement, we offer these three broad suggestions:

1. Talk with Each Other

Take your assessment professional or institutional researcher or the person in charge of faculty development out to lunch. Begin to open a dialogue. A few questions to get you started include:

For faculty developers to ask assessment and institutional research professionals:

- What data about student learning and experiences do you have that you find most interesting?
- Based on our college's data, what areas do you see for potential improvement? What are we doing well? What areas do you see for further exploration with faculty?
- How can I help share our data with the people who should be seeing it, and how can we help them make sense of that data?

For assessment and institutional researchers to ask faculty developers:

- What are your current initiatives? What is your programming focusing on? What events or discussions do you have upcoming this term?

- What areas are of most concern to you and the faculty members with whom you work?
- Based on your perspective, what are we doing well and what areas do you see for potential improvement in student learning and experiences?
- How can I help you advance your agenda and initiatives?
- Schedule regular get-togethers for informal discussions between assessment and faculty development leaders. For example, regularly share a coffee or take a walk together.
- At the conclusion of each semester make a date to examine assessment data jointly. Make note of links between institutional-level data, student use of academic support resources, and academic program findings, as well as how these trends correlate with the topics faculty say they find most challenging about student learning.

2. Co-Sponsor Events that Engage Faculty with Evidence You Already Have

- Never simply share reports. Data requires a process of "collective meaning making." It is the starting point for "a process of inquiry" (Reder, 2014). Data is just a collection of information—it cannot serve as evidence until faculty and administrators create a narrative about its significance. Only then can an institution take evidence-informed actions that can begin to improve student learning.
- Take every opportunity to share possible interpretations with faculty and co-facilitate discussions to help faculty to make meaning of the assessment findings. For example, share the National Survey of Student Engagement snapshot reports at departmental and faculty senate committee meetings or hold brown bag forums in each academic building. Ask faculty: *What do you think about this data? How does it connect with your experiences and findings? What questions do you have about our students' experiences? What would you like to know more about? What actions might we take in response to this data?*
- Co-sponsor faculty development workshops that incorporate an opportunity to examine and discuss selected data. Work data into sessions about assignment design, converting courses to online formats, or developing flipped classrooms. Invite the tutoring center staff to these workshops so they can target their academic support resources to the needs revealed by the data and faculty.
- Formally showcase examples of successful teaching and learning projects in a Scholarship of Teaching and Learning format. For example, co-sponsor a newsletter, website, poster session, or panel discussion that includes the assessment findings as part of the narrative.

3. Form Intentional Partnerships and Begin to Collaborate More Widely

- Collaborate with faculty leaders to select and co-sponsor evidence-informed learning improvement projects that are easily embedded into existing or upcoming teaching and learning initiatives. For example, co-sponsor a faculty learning community, retreat, or community of inquiry around such projects.
- Before a faculty development event takes place, contact your assessment professionals to see if they have any data that will lend insight into the topic being discussed.

- During assessment training sessions build in time to discuss teaching and learning. For example, informally showcase and discuss successful teaching approaches on your campus and foster a discussion around how to address teaching challenges.
- Co-sponsor learning improvement grants to provide resources for designing new curriculum, course design, and teaching approaches where they are most needed.

Partnership between assessment and faculty development is not simply an enhancement to each of these efforts—it is essential for developing actions that will truly succeed in improving student learning where it is most needed. Improved student learning depends upon it.

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Considerations and Resources for the Learning Improvement Facilitator

A long-standing purpose of assessment is to help faculty improve student learning; unfortunately, evidence of improved learning is rare (Banta, Jones, & Black, 2009; Banta & Blaich, 2011; Jankowski, Timmer, Kinzie, & Kuh, 2018). Learning improvement evidence in its most simple form requires practitioners to *assess, intervene,* and *re-assess* a student learning outcome (Fulcher, Good, Coleman, & Smith, 2014). Of course, achieving evidence of learning improvement is not so simple. Technically, assessment expertise is needed to assist with the assess and re-assess components of the model and pedagogical and curricular expertise is needed for the intervene part (Fulcher et al., 2014). Besides this expertise, faculty involvement in a learning improvement project is critical; indeed, Fulcher, Smith, Sanchez, Ames, and Meixner (2017) define exemplary faculty involvement as "Clear evidence of 90–100% of faculty involvement through every aspect of the learning improvement initiative" (p. 15).

Involvement, however, is not limited to faculty within a program, department, area, unit, etc. Other stakeholders and leaders are often involved, such as department heads and other administrators, assessment practitioners, educational developers, industry experts, students, alumni, etc. Coordinating such a diverse group towards a common improvement goal requires a new type of skillset. A practitioner who develops this skillset is considered a "Learning Improvement Facilitator" (LIF). A LIF may or may not have expertise in assessment and/or educational development and thus must be willing to partner with colleagues who do. LIFs possess excellent facilitation skills and are attuned to group dynamics, organizational nuances, and interpersonal communication. That is, the LIF analyzes and accounts for "situational factors" related to learning improvement projects.

Situational factors are variables that influence one's environment (e.g., the environment in which a learning improvement project is being implemented). Fink (2013) discusses situational factors as the first step of "integrated course design" (p. 68). Based

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on Fink's work, we explore organizational culture, leadership, and faculty experiences—as situational factors—related to learning improvement projects. LIFs consider such situational factors prior to facilitating learning improvement projects.

Organizational Culture Situational Factors

When LIFs engage in learning improvement projects they are seeking change (i.e., in student learning; in departmental/organizational practices; in faculty perceptions of assessment, teaching, and learning). Institutional change can be hard to achieve and there is no "one size fits all" approach (Kezar & Eckel, 2002). Thus, LIFs study the organizational culture (i.e., environment, mission, socialization, information, strategy, faculty and student subcultures, social attitudes, and leadership) and create tailored strategies to implement changes (Kuh & Whitt, 1988; Tierney, 1988). Learning improvement initiatives typically involve multiple courses, sections, and learning pathways; likewise, each project will include different stakeholder groups. Therefore, LIFs enter microcultures within the organization (e.g., program, department, area, unit) each time they engage in a learning improvement effort. LIFs analyze each situation and create strategies to optimize a project's success. We recommend LIFs consider the following organizational structure situational factors:

- What is the mission of the program, department, area, or unit? Is teaching and learning emphasized, respected, and/or rewarded within the organizational culture?
- Do the faculty meet regularly? Are the meetings productive and collegial?
- Are there pressing factors that the program, department, area, or unit is facing (e.g., pending closure, budgetary changes, new student populations, external mandates) that may divert attention away from or direct attention toward a learning improvement project?
- Are there philosophical or disciplinary fissures that could affect the learning improvement project?

Leadership Situational Factors

Higher education governance structures typically include formal leaders (e.g., department heads/chairs) and these leaders are key players in a learning improvement project. Such leaders have a complex job; they provide resources and adjust workloads to stimulate scholarship, research, professional development, and other activities for faculty members relative to priorities (Bryman, 2007).

A LIF may or may not have expertise in assessment and/or educational development and thus must be willing to partner with colleagues who do. LIFs possess excellent facilitation skills and are attuned to group dynamics, organizational nuances, and interpersonal communication.

LIFs are cognizant of differences in leadership styles. For instance, Leader A may serve as a group facilitator promoting consensus building across faculty. Alternatively, Leader B may employ an authoritarian style where she/he is the primary decision maker. The LIF should approach the learning improvement project differently if working with Leader A versus Leader B.

The LIF strategizes with leaders regarding resources. For example, once the learning improvement project launches, leaders could provide stipends for faculty to redesign their courses, give course-release time to create and implement an assessment data collection plan, or provide meals during events associated with the project (e.g., a day spent evaluating baseline learning data or a workshop on a teaching strategy). Leaders can also provide special recognition for faculty contributing to the learning improvement project.

As with any relationship, communication is key. Ideally, the leader facilitates open communication across the program, department, area, or unit about the learning improvement project and allows the LIF to access communication channels (e.g., meetings, monthly emails, shared drives). We recommend LIFs consider the following:

- Is there a leader present in the program, department, area, or unit? Does this person have positive rapport with faculty members?
- Does the leader perceive the learning improvement initiative aligns with the larger interest or focus of the program, department, area, or unit?
- Is the leader actively supportive of the learning improvement project?
- Does the leader promote open communication about teaching, learning, assessment, pedagogy, and curricular issues?

Faculty Situational Factors

The faculty champion will likely be the LIF's main point of contact for the project and will shepherd the project through to completion. Faculty champions have sufficient social capital within their program, department, area, or unit to impact change.

In addition to formal leaders, a "faculty champion" is critical to successful learning improvement projects. The faculty champion will likely be the LIF's main point of contact for the project and will shepherd the project through to completion. Faculty champions have sufficient social capital within their program, department, area, or unit to impact change. Such faculty tend to be more senior, having successfully worked with a variety of faculty on other projects and already earned the respect of their colleagues. Faculty champions have established teaching and/or industry expertise. As a bonus, they may also have previous experiences in educational research or assessment practices (e.g., served as an assessment coordinator).

Most importantly, the faculty champion is equipped to serve as a social change agent (Bess & Dee, 2008; Whitchurch, 2009). Change agents:

- motivate faculty around the project,
- make executive decisions when necessary,
- prevent the project from going off-course,
- incorporate faculty feedback in a constructive way,
- effectively communicate initiative goals and results to their fellow faculty members, and
- demonstrate sustained fervor for the initiative.

With that in mind, we recommend LIFs consider the following:

- Is there a faculty champion willing to invest in the learning improvement project?
- Does this faculty champion have social and cultural capital within the boundaries of the learning improvement project?
- Does this faculty champion have expertise in teaching, learning, pedagogy, and/or industry connections or experiences?

Faculty members, adjuncts, and graduate teaching assistants (GTAs) not serving in leadership roles (i.e., not necessarily faculty champions) are still central to successful learning improvement projects. They will carry out the pedagogical and curricular changes intended to improve students' learning. Unfortunately, cultures and procedures can make GTAs and part-time faculty feel underappreciated and undervalued (Muzaka, 2009). Nonetheless, the LIF must be inclusive of all relevant parties when engaging in a learning improvement project, even if some people will not be involved for a sustained period of time (e.g., GTAs who will graduate).

LIFs are prepared for personnel instability. Indeed, high faculty turnover rates are common in higher education (Nagowski, 2006) and can halt or delay improvement endeavors. Therefore, it is possible that faculty will receive training related to the learning improvement project and then leave before the project is complete. Given faculty turnover is inevitable,

LIFs must create sustainable support structures. For example, the LIF could encourage a training session be integrated into new faculty orientations or the department head could build in dedicated time at departmental retreats to discuss the learning improvement effort.

Teaching is a vulnerable activity; it can be tied to a faculty member's self-identity. The LIF, therefore, is responsible for creating an environment where the isolated instructor becomes part of a communicative learning improvement team. Within the team, the LIF ensures that individual faculty feel safe sharing and helps them embrace the uncertainties of self-exposure. Engaging with a learning improvement project requires faculty to make visible their teaching, which is often hidden from colleagues. If instructors do not understand what their colleagues are doing in their respective classrooms the learning improvement initiative will falter. Related to faculty situational factors, we recommend the LIF consider:

Teaching is a vulnerable activity; it can be tied to a faculty member's self-identity. The LIF, therefore, is responsible for creating an environment where the isolated instructor becomes part of a communicative learning improvement team.

- Do the faculty, adjuncts, and GTAs have productive working relationships with one another? If there are rifts among groups what are the causes? Can they be addressed?
- Are all instructors in the unit included in discussions/meetings (including GTAs, part-time faculty)?
- Is there projected high faculty turnover (e.g., are there impending retirements on the horizon)?
- Do all instructors regularly engage in detailed conversations about their teaching, program improvement, and student learning? If not, how do they feel about having such conversations?

Resources

Focusing on improvement may imply something is broken. On the contrary, we view improvement as a healthy opportunity to grow and develop. LIFs take on roles that require facilitation skills, a keen awareness of human factors and group dynamics, in addition to a general knowledge of assessment and educational development. We believe assessment professionals, in particular, are well situated to grow into this new role (although assessment expertise in not a requirement for the LIF). Resources are available for those who aspire to become LIFs.

Professional Development

The LIF must have excellent facilitation skills. We recommend that future LIFs complete at least one workshop on facilitation. A variety of facilitation training modules are available at Lynda.com and other online professional development websites such as the Association of College and University Educators (ACUE). In addition, we recommend attending the Professional Organizational Development (POD) Network's annual conference. POD participants are exposed to a range of facilitation styles. Additionally, POD sessions review a variety of faculty issues that a LIF must be familiar with. Finally, because conflict can arise in conversations related to learning improvement, we recommend considering workshops related to conflict resolution, such as those offered by the National Conflict Resolution Center: http://www.ncrconline.com/mediation-conflict-resolution/training-services/available-workshops.

Implementing successful learning improvement projects requires a distinct skillset—what we have defined as a Learning Improvement Facilitator.

Strategy

Given learning improvement projects are resource intensive, it behooves the LIF to be selective in the first group they work with on their campus. We recommend selecting a group that has the highest likelihood of success and then use their success as a "proof of concept" for scaling up future learning improvement efforts. We found success in implementing a request for proposals (RFP). With a RFP groups self-identify their interest in engaging in learning improvement work. The RFPs are typically submitted by faculty champions in collaboration with leadership. LIFs can begin analyzing situational factors

through questions they ask in the RFP. At Auburn University elements are included in the RFP that prompt an initial exploration of situational factors (see Appendix). In addition, the Auburn submission process requires a one-hour consultation with the LIF, which allows the LIF to begin unpacking and understanding situational factors prior to deciding with which group to initially invest their resources.

Conclusion

Implementing successful learning improvement projects requires a distinct skillset—what we have defined as a Learning Improvement Facilitator. The LIF is an adept facilitator, prepared to meet the challenges associated with various situational factors (e.g., organizational culture, leadership, faculty). The proliferation of learning improvement projects engenders new research questions worth investigating. For example, a LIF may empirically explore:

- What are the most common factors that draw attention to or divert attention away from learning improvement projects? How do practitioners either leverage or overcome such factors?
- What is the relationship between the amount of leadership support and success of learning improvement projects?
- Does focusing on a new student learning outcome versus improving an existing learning outcome affect the success of a learning improvement project?

As more examples of improved student learning are shared we hope to see more individuals identifying as LIFs. Ultimately, LIFs are an important catalyst in improving the quality of higher education.

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Appendix

One Element of Auburn University's Learning Improvement Request for Proposals (RFP)

Element	Questions	Rationale for Inclusion
Program Characteristics	Describe the attitude toward learning improvement in your department, program, organization, or area (e.g., attitude toward teaching/learning/improvement, collegiality)	Here we are exploring the organizational environment related to teaching and learning. This is especially important given that this institution has a high focus on research productivity.
	Describe the communication/collaboration channels among faculty currently (e.g., how frequently the faculty meet and work together)	Here we are exploring the situational factor related to faculty collegiality and general department, program, organization, or area culture.

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Refining an Approach to Assessment for Learning Improvement

Assessment of student learning is typically undertaken with at least two goals in mind, accountability and improvement. This dichotomy of purpose has dogged assessment from the outset (Ewell, 2009) and contributed to conflicted or incomplete ends. As Banta and Palomba (2015) concluded, assessment undertaken primarily to comply with accountability demands does not usually result in campus improvements. Although the accountability aim of assessment is self-evident, the improvement goal is more elusive. What sort of improvement does assessment facilitate? Does any action on assessment results qualify as achieving the improvement goal? More to the point, do we have good evidence of learning improvements from assessment? It is well established that the greatest challenge in the assessment cycle is in "closing the loop," or taking action on assessment results and then measuring the difference on the intended outcome (Banta & Blaich, 2011; Kuh, et al., 2015). Moreover, opinion pieces have questioned whether assessment activities make any difference to student learning at all (e.g., Gilbert, 2018).

Although we concede that there is limited evidence of improved student learning as a result of assessment, evidence exists that assessment has informed changes in colleges and universities. In a nationwide survey of assessment practice about two thirds of provosts (64%) provided examples of changes made in policies, programs, or practice informed by assessment results (Jankowski, Timmer, Kinzie, & Kuh, 2018). In addition, most accreditation self-studies, annual assessment reports, and volumes of case studies on assessment practice document that assessment results inform course, program, and institutional changes. Yet, these documented changes do not necessarily equate to evidence of improvement in student learning.

In this article we take up a particular aspect of assessment for improvement by asserting the need for greater attention to the strategies for realizing and documenting learning improvement. By *learning improvement*, we mean evidence from indirect and

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direct measures and reassessment that supports substantive student learning improvement due to program modifications (Fulcher, Good, Coleman, & Smith, 2014). Student learning improvement can be declared only after reassessment demonstrates a positive effect on student learning. The closing-the-loop change—the action taken by faculty or other stakeholders—can be considered an improvement only if it had a positive effect on student learning. We address these points by suggesting a structure for discussing change and student learning improvement.

The Need to Distinguish Assessment for Learning Improvement

Although the accountability aim of assessment is self-evident, the improvement goal is more elusive. What sort of improvement does assessment facilitate?

How do we find ourselves needing this distinction about assessment for learning improvement? First, the typical assessment model foregrounds methodological process above almost all other aspects of the assessment cycle. Attention to data collection methods and obtaining sufficient response can overshadow using findings for improvement. To be clear, we all support methodological soundness. Nevertheless, practitioners can fail to see the action and improvement forest from the methodological trees. Second, many assessment models indicate that any changes made by faculty and other stakeholders qualify as closing the loop. There are several, overlapping reasons that likely led us here. The typical assessment report and cycle are structured so that change and improvement are positioned last.

- Extensive scholarship and training in testing and measurement have privileged a focus on methodological design.
- Assessment practitioners may believe that their responsibility ends with disseminating assessment findings.
- Faith that once armed with evidence, faculty or other stakeholders will automatically use assessment findings for improvement—or for any change at all.
- Assessment continues to be solely equated with an evaluation of student performance instead of viewing that evaluation as one part of an assessment-for-improvement process.

Elements of Assessment for Learning Improvement

In this article we take up a particular aspect of assessment for improvement by asserting the need for greater attention to the strategies for realizing and documenting learning improvement.

With these realities as a backdrop, we propose a scheme that foregrounds the student learning improvement dimension of learning outcomes assessment. We intentionally describe this as a "scheme" to build on the idea that it outlines a systematic plan or arrangement for putting a particular idea into effect. Akin to theories of backward design in curriculum development and evaluation theory that asserts the importance of beginning with the end in mind (Patton, 2014), assessment should begin with a focus on shedding light on a vexing issue and a commitment to using evidence to address student and institutional needs and questions (Kuh, et al., 2015). Assessment for learning improvement sets an intention for improvement in student learning from the outset. With the intention of assessment for improvement established, the faculty or the group responsible for making changes aimed at learning improvement, ideally in collaboration with an assessment practitioner, must address the following:

1. Aspect of student learning targeted for improvement
2. Scope of the learning improvement initiative (e.g., course, program, university)
3. Changes in curriculum and/or pedagogy, or experience meant to cause learning improvement
4. Measures and multiple forms of evidence from at least two points in time to evaluate improvement
5. Evaluation and interpretation of improvement evidence

Next, we briefly describe these five elements and provide illustrative examples.

Student learning targeted for improvement

This element is common in a traditional assessment process. In essence, the target should be one well-articulated intended student learning outcome (e.g., an outcome in the area of critical thinking, information literacy, ethical reasoning, or discipline-specific skill, knowledge, or attitude).

Assessment for learning improvement sets an intention for improvement in student learning from the outset.

Scope of the learning improvement initiative

Scope is the level at which student learning improvement is intended. Here are common examples of scope, from smallest to largest:

- Individual Student
- Individual Course Section (i.e., findings are aggregated for the students in a section)
- Course (i.e., findings are aggregated for the students in a course's sections)
- Program (i.e., findings are aggregated for the students or a sample of students in a program)
- College or unit
- Institution, or campus

In all cases the intent is to improve all students' learning within a particular scope. For example, if someone claims an "institution-level" learning improvement effort then the intent is to improve knowledge/skills/attitudes for all their undergraduate or graduate students.

Changes in curriculum and/or pedagogy

For student learning to change or improve, something must be altered in the learning environment. In this element, practitioners identify the strategy(ies) employed to improve learning and state how the strategy(ies) is different from what had been done before. These strategies may include such things as adding scaffolded activities to assignment guidelines, increasing timely feedback to students, incorporating high impact practices, expanding formal faculty-student interactions, and so on.

Measures and multiple forms of evidence

To conclude that student learning improvement occurred, those involved must know learning evaluation results from two points in time, before and after a change designed for learning improvement. Multiple measures, including direct and indirect, and multiple forms of evidence, including quantitative and qualitative, are strongly recommended. Given the focus on improvement, it is important to consider baseline measures, pre-post approaches, and descriptions of initial and modified practices that will lend insight into evaluating the change in student learning or educational processes.

Evaluation and interpretation of evidence

This element refers to the practitioner and faculty (or other stakeholder group) collaboratively evaluating the assessment evidence and reaching a conclusion on whether the strategy(ies) applied led to or contributed to student learning change/improvement. This involves examining the counterfactual and creating a well-reasoned explanation of the relationship between the intended improvement, the changes made, and the evidence collected.

Telling an Improvement Story

The following short examples condense multi-year, multi-phased projects and illustrate the five elements in learning improvement projects.

Example #1 Program-Level Scope for Improvement

The first example highlights improvement of learning regarding a particular learning outcome in Computer Information Systems (CIS). The CIS outcome of *requirements elicitation* is a process of interviewing CIS clients to accurately understand clients' needs with respect to a desired computer system (e.g., a database). In 2014, upon receiving feedback from employers, the CIS faculty began expressing doubt about their students' skills in this important area. The following year they worked with their institution's assessment and faculty development experts. The first step was to carefully define requirements elicitation, which was done in coordination with the creation of a rubric. The rubric included criteria such as the interview opening, visualization, and teamwork. The next step was to collect baseline data; how good were CIS graduating students with respect to requirements elicitation? At the end of the spring 2015 semester the majority of graduating seniors were video recorded in a mock requirements elicitation. On the rubric's five point scale where 1 is beginning; 2, developing; 3, competent; 4, excellent; and 5, experienced professional; the typical elicitation interview was rated as a 2, or developing overall. The beauty of capturing this data via video was that the majority of faculty could see exactly how students (under)performed.

From the start CIS faculty intended to improve students' requirements elicitation skills. However, now they shared a tighter understanding of the construct and students' current skill level. A few months later several faculty members spent a week working with a faculty developer. They looked at the CIS existing curriculum, examined what was currently in place for requirements elicitation, and made massive reforms. In fact, seven courses were modified to have significant requirements elicitation exercises. All students were affected by this new curriculum—each spending tens of hours per semester working on tightly designed assignments with relevant feedback.

In spring 2016 the next cohort was assessed; they had received a year of the new curriculum. The difference between their videos and those of the 2015 cohort were striking. They averaged a 3 on the rubric, or competent, which was statistically significant and the effect size was a Cohen's $d > 3$ (extremely large). The faculty attributed the large gain to the program redesign.

Example #2: Program-Level/Institution Scope for Improvement

For student learning to change or improve, something must be altered in the learning environment. In this element, practitioners identify the strategy(ies) employed to improve learning and state how the strategy(ies) is different from what had been done before.

An institution's writing program (average three courses, 80 total sections, 1,600 students annually) targeted its student learning outcome, "compose an argument that makes use of source material that is relevant and credible and that is integrated in accordance with an appropriate style guide." A group of course instructors generated a scoring rubric to evaluate papers in which students demonstrated information literacy competency. The assessment practitioner assisted with selecting a sample of students, training the faculty scorers, evaluating the scoring process (including scorer reflections), and summarizing the findings. The baseline finding was 21% of students were "not prepared" for future writing tasks involving information literacy. The department chairpersons and program coordinators of the courses led the meeting at which faculty discussed findings and developed strategies to improve student performance. Subsequent changes included the following: (a) frequent communications by the chairpersons regarding the intended learning outcome and available resources; (b) stronger partnership with librarians and more library workshops offered and attended by students; (c) a recognition by course instructors that students need scaffolded, frequent practice. Reevaluations occurred one year and one and a half years later; findings showed fewer students in the not prepared category: 10% compared to the baseline 21%. The interpretation by involved faculty was that library workshops and more information literacy practice led to the improved findings.

Example #3 Institution-Level Scope for Improvement

The first-year seminar, required of all students and a fixture of the general education program, seeks to provide a vital transition experience and help students cultivate the knowledge, skills, and habits of mind necessary for liberal learning through the in-depth study of a topic in a seminar setting. The seminar had been functioning well on these dimensions but new assessment evidence about the quality of student-faculty interaction, levels of academic challenge, and extent to which students felt the seminar provided an opportunity to engage their interests, revealed room for improvement.

With guidance from a first-year seminar task force, the institution outlined a plan to improve the seminar in the following ways: (a) strengthen the connection among students and between students and faculty, (b) amplify the academic intensity of the seminars, and (c) engage students' passions early by enriching the link between assignments and students' interests. To achieve these ends, task force members worked with faculty and peer leaders to create intentional learning experiences to foster interaction, to enhance seminar assignments by adding elements to tap students' passions, and to introduce rigor in writing through the use of a written communication rubric and student reflection exercises. A year following these improvements, the institution's baseline scores for first-year students on the National Survey of Student Engagement (NSSE)—in particular scores for student-faculty interaction and quality of interaction among students and faculty—had increased. In addition, data from an open ended question posed to all students near the end of the seminar, which invited them to describe "What has been most satisfying about your interaction with seminar faculty and classmates, and what has been most disappointing?" revealed specific interaction experiences. To assess the extent to which students engaged their passions in seminar, faculty reviewed student work from an assignment that invited students to express their passion in the context of the seminar topic. Faculty also used a rubric to assess written communication outcomes in this assignment and students were required to reflect on the demands of the assignment and their performance.

Given the focus on improvement, it is important to consider baseline measures, pre-post approaches, and descriptions of initial and modified practices that will lend insight into evaluating the change in student learning or educational processes.

The combination of results suggested that the changes made in the seminar were making the intended difference. The strongest indirect evidence was demonstrated in NSSE scores on student-faculty interaction and quality of interactions, which were higher than in past administrations, and the qualitative data, which indicated that students valued the intentional interaction opportunities in- and out-of-the classroom. Faculty members' review of students' performance on the assignment revealed that students were making relatively superficial connections between the course topic and their passion, at low levels of intensity of effort. Yet, rubric evidence demonstrated that students were developing essential habits for first-year student writing. Faculty and administrators interpreted these results to be solid early indicators that the revisions to first-year seminar instructional design and assignments were contributing to the delivery of an enhanced first-year seminar, but that additional work was needed to strengthen the connection to engaging students' passions and academic intensity.

Highlights of the Improvement Story

The five elements and these short illustrations of improvement suggest a structure for strengthening the assessment for improvement goal. The approach begins with a laser focus on what is to be improved; it is followed by greater attention to capturing the actions that are intended to influence the outcome and the assessment evidence that demonstrates whether the changes had the intended effect on the targeted learning outcome. Data collection is important but it is not sufficient in this assessment model. Rather, this structure relies on the assembling of multiple forms of evidence for triangulation—and at its best includes measures from at least two points in time—to evaluate if improvement has occurred. The approaches are also chosen for their alignment with the improvement goal and are designed to detect improvement based on the changes made. Instrument quality matters but it is based on alignment with the intended improvement and suitability for detecting improvement.

Data alone tell us little; what matters is assessment findings considered among colleagues and in light of the context, and changes believed to lead to improvement. Educators involved with making these changes must consider assessment findings and interpret them based on action taken. Most importantly, the explication of the elements of assessment for improvement provides an approach to addressing the persistent misguided belief that simply providing assessment findings should be sufficient to result in some action for improvement. Improvement goals must be foregrounded in the assessment process and reevaluated.

Advancing Improvement Elements in Assessment Practice

The explication of the five elements of assessment for improvement is meant to advance assessment practice to more fully realize its dual purpose. Animating the improvement elements of assessment is essential to distinguishing if a change is actually associated with an improvement in student learning. Documenting improvement of student learning in colleges and universities is also important to responding to critiques of the value of assessment.

A change is only an improvement through the demonstration of its positive effect on student learning.

Although the five elements of the assessment for improvement model may suggest a linear process, it is more likely to play out as a recursive spiral. Sometimes assessment data might be collected ahead of the identification of the target for improvement, or the changes in curriculum might have been initiated first. What is important to connecting assessment and improvement is to ensure that all five elements are addressed and documented. Telling the full assessment for improvement story requires narrative on all five elements. Toward this end, the elements could be used in two ways: a checklist or an outline for assessment reporting. Using the elements as a checklist could help guide action, pin down facts and eliminate areas of concern, and lead to intentional improvements. Another use of the elements is to consider them as a framework for reporting assessment activities. Imagine an assessment report that demands an account of these five elements. Assessment reports could be framed as stories like the examples shared earlier. Ensuring action on and the accounting of all five elements in assessment helps distinguish between change and improvement. A change is only an improvement through the demonstration of its positive effect on student learning.

Assessment success stories at the national and institutional levels help communicate the value of assessment. We need more focused accounts of assessment that result in real improvements in student learning. To begin building a repository of learning improvement stories, we will be soliciting learning improvement examples. When the call is sent, we encourage you to contribute your learning improvement story and help us elevate the assessment for learning improvement conversation.

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Abstract

Few examples of demonstrable program learning improvement projects exist. To provide guidance for those seeking to report program learning improvement, we offer a real example of an implemented learning improvement project for a Computer Information Systems major curriculum. The example follows a six-criteria model and the subsequent standards for assessment outlined in the literature. The six-criteria model includes faculty involvement, readiness for improvement, baseline data, investigating existing curriculum and diagnosing issues, learning intervention, and reassessment. The learning improvement report is written by the faculty in the program. The report is then reviewed and assessed by the university's office of assessment, who provides critical feedback using an assessment rubric. The example learning improvement program provides sample critical traits, curriculum maps, and content tables for before and after the implementation of the intervention, and the modifications made to each course in the curriculum to improve learning.

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Example of a Program-Level Learning Improvement Report

To evidence learning improvement a program must assess students, effectively change curriculum and/or pedagogy, and then reassess to affirm the changes resulted in better learning (Fulcher, Good, Coleman, & Smith, 2014). Such learning improvement in higher education is exceedingly rare (Banta & Blaich, 2011; Blaich & Wise, 2011). To provide more specificity with respect to how learning improvement can be achieved and reported, Fulcher, Smith, Sanchez, Ames, and Meixner (2017) created a rubric outlining the criteria of a successful learning improvement project. The 2017 paper also includes a hypothetical report that would receive the rubric's top marks. This paper moves the improvement conversation from hypothetical to actual by providing a real-life example. Before delving into the example, we provide brief historical context.

In 2011 James Madison University's (JMU) assessment office noticed a trend. While the quality of assessment was getting better across the university, examples of programs using results and evidencing improvement was virtually non-existent. This finding—that high-quality assessment was not leading to better learning—was concerning (Fulcher & Bashkov, 2012). At about the same time, JMU's faculty development office was looking to have a bigger impact. Their teaching and learning initiatives were aimed primarily at individual faculty teaching their individual courses. While helping faculty at this level is a worthwhile endeavor, it has less impact than interventions designed to affect many faculty and many courses. Representatives from both offices had an idea: Together they could provide a service aimed at improving student learning at the program level—they only needed to identify the right academic programs to partner with.

In the fall of 2014 the two offices created a request for proposals (RFP). The RFP (available at http://www.jmu.edu/learningimprovement/learning-improvement-by-design/learning-improvement-rfp.shtml) was shared with a select group of academic degree programs that had a record of strong assessment and an interest in improving teaching

and learning. The purpose of the RFP was to identify the programs that were ready for improvement (Fulcher et al., 2014). In other words, the assessment and faculty development offices believed these programs would have a high probability of success.

The Computer Information Systems (CIS) program emerged as one of two programs chosen as pilots. CIS was noteworthy in that it valued teaching and learning, had faculty willing to work together, and had an internal champion (the first author, Lending) who had experience working with both the assessment and faculty development offices. What follows is a description of this program and their successful learning improvement effort.

Description of the CIS Program

The Computer Information Systems and Business Analytics academic unit is part of the College of Business at James Madison University (JMU). In the 2016–2017 academic year, 131 students graduated with a Computer Information Systems (CIS) degree and 48 graduated with a minor in CIS.

The CIS major at JMU prepares business students for careers that focus on the design, development, implementation, and management of information systems. Students use the latest computer-based technology and work on significant problems in organizing, representing, manipulating, and presenting data, information, and knowledge. The major develops CIS professionals who can analyze business problems, then design and build solutions to those problems leveraging information technology. Most of the program's graduates are hired as information technology consultants or systems analysts, where it is necessary to gather and understand business and computer system needs. The CIS faculty use a variety of teaching methods including lectures, case studies, programming projects, and business simulations to prepare graduates with technical, analytical, and problem-solving skills; effective communication and presentation skills; hands-on experience; and the ability to work effectively in individual and team-oriented environments.

The CIS program at JMU is heavily invested in continuous improvement as attested by its double accreditation: as an Information Systems program by ABET (formerly known as the Accreditation Board for Engineering and Technology) and as part of the College of Business accredited by the Association to Advance Collegiate Schools of Business (AACSB.) As such, the CIS faculty were eager to participate in a program that would improve student learning in an important objective of the program.

At the time, the CIS program at JMU had 13 full-time faculty teaching in the program, 11 of whom taught the courses targeted for the improvement initiative. The program consists of nine required courses and two electives (chosen from multiple options). Initially, seven of the required courses were included and eight faculty were directly involved in the learning improvement project.

Example Learning Improvement Report

The next part of this paper consists of an example learning improvement report that describes the learning improvement project undertaken by the CIS program at JMU. The report consists of five sections. In the first section, we discuss Requirements Elicitation, the student learning outcome (SLO) that was chosen for improvement, and why it was chosen. We next discuss baseline data collection, specifically our development of a metric to assess the quality of requirements elicitation, data collection, and measurement. In the third section, we describe our investigation of the curriculum before the learning improvement and diagnose why student performance was unsatisfactory. The fourth section describes our learning intervention, the timeline for intervention, and how the intervention was implemented. Finally, we reassess learning on this SLO and discuss the improvements in student learning.

This example is annotated throughout showing the relationship between our narrative and Fulcher et al.'s rubric (2017). The rubric itself includes six criteria, which are further broken down into 17 standards. Each challenging standard is evaluated on a five-point scale ranging from 0 = absent, 1 = beginning, 2 = developing, 3 = good, and 4 = exemplary. The standards are outlined here:

A. Faculty Involvement

B. Readiness for Improvement

    1. SLO selected
    2. SLO elaborated in detail
    3. Assessment instruments match with SLO

C. Baseline data

    1. Data collection timing and sampling
    2. Psychometrics

D. Investigate existing curriculum and diagnose issues

    1. Program-level curriculum relative to SLO
    2. Individual course-level coverage of SLO content
    3. Insights regarding why efforts are not as effective as intended

E. Learning Intervention

    1. Percentage of students in program affected
    2. Program-level intervention
    3. Course-level intervention
    4. Faculty development for intervention
    5. Intervention timeline
    6. Intervention implementation and fidelity

F. Re-assess

    1. Re-assessment of SLO
    2. Magnitude of student learning improvement

COMMENTED

Provided good evidence of faculty involvement (Standard A.1.) The vast majority of relevant program faculty participated, most of them at every stage of the assessment process. Recall that this annotation and the ones that follow relate to the learning improvement standards rubric introduced by Fulcher et al. (2017).

Faculty Involvement

There was broad agreement among the participating faculty and the departmental leadership that program learning improvement is a collaborative activity supported by heavy faculty involvement "buy-in" to the assessment process. To achieve success in this program-level learning objective, the faculty were committed to program-wide changes including changes to individual courses. Eight faculty from the department were initially involved in the learning improvement project; by the end of the project 12 of the 13 faculty members had been involved.

Readiness for Improvement: Requirements Elicitation

The CIS program endeavors to produce students who can determine the requirements for an information system. This goal is articulated through one of the program's curriculum objectives, Program Objective 1e: "Analyze an Information Systems problem and **identify and define the computing requirements appropriate to its solution**."

A requirement is a statement of what an information system must do. In the typical approach to systems development, information systems analysts interview business clients about what they need from their new system. Typically, both current system users and potential future users of the problem-solving new system are interviewed by the analyst. Once the requirements are elicited and identified they are analyzed, and the information system is afterward designed and built. While eliciting and gathering requirements is arguably the most important phase of developing a system, it is typically done poorly, and the process needs to be improved (Browne & Ramesh, 2002).

Over half of all information system failures are due to problems with requirements elicitation (Dennis, Wixom, & Tegarden, 2015.) Poor communication skills have been identified as a major obstacle in determining requirements (Havelka, 2003). "Success of interviews is highly dependent on the systems analyst's human relations skills" (Whitten & Bentley, 2008, p. 166) The problem we have identified in our program is that while we teach students the basics of requirements elicitation (RE), presentation and discussion alone is not enough for developing competent skills. That is, students need practice doing it to be successful at it.

The idea for this learning improvement first arose when student teams in a CIS class were assigned projects to develop systems for nonprofit organizations. One of the student teams was assigned to develop a system for someone who is also a CIS professor. After the student teams met with him to determine requirements, he commented to other departmental faculty that the students appeared to have no concept of what questions to ask or how to ask them. He asked where concepts regarding the requirements-gathering process were typically taught in the curriculum. The answer was that the concepts were presented abstractly in a course titled "Systems Analysis and Design" but that students never had the opportunity to practice or perform the actual requirements-gathering activity during their course of studies. In fact, in most courses within the curriculum the requirements are already given to students in written form. The students examine the requirements, analyze them, and develop their solutions based upon the written document. In these courses, the students do not have to practice how to elicit requirements.

In the "Systems Analysis and Design" course students develop requirement elicitation questions for interviews, but they do not actually interview someone to determine the requirements, and they get answers regardless of whether they ask the right question or not. In a second class, the program capstone course, students interview a user to develop a system. However, students receive no feedback on their interviewing techniques. Thus, students have no opportunity to learn from their mistakes and improve. While one chance to determine requirements is better than none, the program faculty believe that students should be given more opportunity to learn the interviewing and communication skills involved in learning how to gather and determine requirements.

Further evidence of this problem occurred at a College of Business Executive Advisory Board meeting where stakeholders provide feedback on the performance of recent graduates. A member of the board commented that his recently hired graduates cannot determine the requirements or come to a common understanding of what the user truly wants for a system. Obviously, a program that has an objective that clearly states the importance of identifying and defining requirements should not have such a gap in what has been identified as the most critical phase in the development of information systems.

COMMENTED

Provided *developing to good* collection of baseline data (Standard C.1). CIS uses a direct measure (a rubric), collects data before the intervention, and has motivated students. CIS does not reach exemplary in this area because the sample is about 50% of the target population and not randomly selected.

Baseline Data to Support our Learning Improvement Initiative

Data collection. Data were collected preintervention (Spring 2015) in two sections of "Systems Analysis and Design." At the end of the semester students working in groups were assigned a homework assignment to elicit requirements from a client and to develop a design prototype. Baseline data was collected from 13 groups, each comprising three to five students, which represented approximately 50% of the 2015 graduating class. In practice, RE is best done by teams; therefore, that is why we collected data at this level. Students generally gave good effort for this assessment given that it counted toward a course grade.

Requirements were identified by the students through interviewing a faculty member who role-played a client. The interviews were video recorded for assessing RE techniques. It should also be noted that these particular students were taught RE using our past presentation and discussion-based techniques.

Rubric development. To carry out the baseline assessment the CIS faculty first needed to develop an assessment rubric. Development of the rubric began with a small team consisting of two CIS faculty members (who had conducted RE interviews professionally), the director of JMU's Center for Assessment and Research Studies (CARS), the director of JMU's Center for Faculty Innovation (CFI), and a doctoral student affiliated with both CARS and CFI. This five-person team began the rubric development with two content analysis processes. In our content analysis methodology we took a grounded approach and let concepts emerge from the data.

For the first content analysis members of the research team interviewed two experts at requirements determination, both of whom worked in the for-profit sector. In our second content analysis approach we used actual student performance to drive the construction of the rubric (Ezell, Lending, Kruck, Dillon, & May, 2016). The faculty member who role-played the client in the student interviews led this process. First, she was debriefed by two CIS faculty members about the interviews. Second, she identified two RE interviews that all team members should watch.

After that, the team met to define the criteria based upon the themes that they thought had emerged from these independent content analyses. Once the criteria had been defined, two members of the team produced a draft for competency levels which was then revised and approved by the remainder of the team. The proficiency levels for each trait were 1= beginner, 2 = developing, 3 = competent, 4 = excellent, and 5 = outstanding experienced professional. The goal was that student teams would be rated competent when they graduated.

COMMENTED

***Exemplary* on SLO elaboration and alignment with assessment measure (B.2 & B.3). The CIS program simultaneously unpacked their SLO on requirement elicitation and developed a behaviorally elaborated SLO and its match with the rubric were confirmed by experts internal and external to the program.**

Two other CIS faculty members then joined the team. They watched the same two videos and rated them using the rubric. Minor changes to the rubric were made for usability and then the rubric was "frozen."

As shown in Table 1, the rubric identified eight critical traits that a successful RE interview should have. Descriptions of behavior were written for every trait (8) at every proficiency level (5) for a total of 40 behavioral anchors.

Table 1: Critical Traits of Requirements Elicitation (RE)

A	**Overview:** Provides an organizational frame for the client, agenda, purpose, what hope to accomplish in the interview
B	**Analyze Current State (As Is):** Understand the current situation (e.g., *process, system, data, artifact)*. Asks what is good and what's bad about the current situation, process, system, or artifacts as appropriate
C	**Design the To-Be System**: Design the To-Be system with the client as part of the interview
D	**Visualization** (when applicable)**:** Uses appropriate visuals such as wireframe diagrams, interface structure, process models, current or to-be reports, visual mapping, etc. to aid relevant aspects of meeting. Use visuals to understand scope. Effectively integrates visuals into discussion
E	**Closing:** Recap, plans next step, final questions
F	**Relationship Building:** Appropriate greeting (stands up, shakes hands, introduces self, asks how the other is doing), eye contact, attentive, positive affirmation
G	**Active Listening:** Pays attention, provides feedback, summarizes or paraphrases ideas, remembers past answers, asks for appropriate clarification
H	**Team Work** (when applicable): To the client, the team appears natural and appropriate. Roles and responsibilities (such as questioner and note taker) appear natural. (Roles may shift over interview and not each team member needs to ask a question.) Team members provide different points of view, leader keeps team on track, and inter-team communication aids elicitation.

Baseline measurements. To evaluate student performance a team of nine faculty members were trained on the rubric. To promote interrater reliability two videos were selected to calibrate the ratings across faculty members. After some further training each faculty member was then tasked with independently evaluating student performance using the rubric. The various faculty scores for each group were then averaged. At least two faculty members rated each video.

Table 2 shows the results of the first effort at evaluating the students' RE abilities. The mean overall rating was 1.96, which indicates that the students were rated as developing. This rating did not live up to the original goal of competence (mean overall rating of 3 or higher) and served to further validate that the past techniques of teaching RE were not effective.

Table 2: Baseline Measurements of Preintervention Students

	Trait	Spring 2015 Pre-intervention (N = 13 teams)	
		Mean	SD
	Total	**1.96**	**0.31**
A	Overview: Provide an organizational frame	1.34	0.38
B	Analyze Current State (As Is)	1.63	0.53
C	Design "To Be" System	2.81	0.38
D	Visualization techniques	1.68	0.75
E	Closing: Provides appropriate recap	1.49	0.64
F	Relationship Building	2.31	0.42
G	Active Listening	2.46	0.39
H	Team Work	1.99	0.27

Investigating the Existing Curriculum and Diagnosing Issues

To begin improving the abilities of students to elicit requirements, seven CIS faculty members committed to a week-long workshop that was held in June of 2015. The workshop was facilitated by members of the Center for Faculty Innovation (CFI) who served to mentor the CIS faculty members through the process of determining why students were not learning RE effectively and how they could intervene to improve learning.

During the workshop, the seven faculty members first investigated how and where RE skills were explicitly taught across the curriculum. The seven faculty members present taught most of the courses in the curriculum. Each brought syllabi and course exercises to the workshop. As shown in Table 3, a curriculum map was then created and was used to show the degree to which RE interviews were explicitly covered prior to this workshop.

As shown in Table 3, three courses (shaded) explicitly addressed requirements elicitation interviews. One of these courses, "CIS 454 Systems Analysis and Design," theoretically covered how to conduct an RE interview at a major level (e.g., over a week was dedicated to presentation and discussion). A second course, "CIS 484 Information Systems

COMMENTED

Faculty development for intervention is exemplary (E.4). Many CIS faculty worked with an educational developer for a week to investigate their current curriculum and to create new interventions. Recall that the faculty had also consulted two outside experts regarding good elicitation requirement skills.

COMMENTED

The program did a *good* job investigating the program-level curriculum relative to the SLO (D.1). The program investigated how the SLO was covered across courses and discovered that there was little scaffolding. This area could have been strengthened by including students in the review process.

Table 3: CIS Curriculum Map Highlighting Courses That Explicitly Addressed RE Before the Improvement

Course/Learning Experiences	Requirements Elicitation Interview content
COB 204. Computer Information Systems	1
CIS 221. Principles of Programming	0
CIS 301. Operating Systems and Server Administration	0
CIS 304. Enterprise Architecture	0
CIS/CS 320. Computing and Telecommunications Networks	0
CIS 330. Database Design and Application	0
CIS 331. Intermediate Computer Programming	0
CIS 454. Systems Analysis and Design	3
CIS 484. Information Systems Development and Implementation	3

Development and Implementation", theoretically used RE for a major part of the course (e.g., students were expected to use their skills to conduct an interview with a client). In addition, an early course in the curriculum, COB 204, *theoretically* described the purpose of an RE interview. Via this investigation, common themes emerged amongst the faculty that included: properly eliciting requirements is an essential skill of IS professionals; the program needs to create a more cross-course strategy rather than teaching RE in a silo; and more coverage of RE techniques should be included across more of the courses in the CIS curriculum.

After discussing which courses explicitly presented and discussed RE interview topics, the faculty then debated what critical elements of the RE rubric were actually being taught in some form in each of the courses. Table 4 shows the final results of these discussions. For example, CIS 221 Principles of Programming, although not focused on RE, does teach designing "to-be" programs and uses visualization to a slight degree (items C and D from the Critical Traits presented in Table 1). Via this exercise, the faculty began to realize as a team that RE skills were being taught in some manner in various courses. However, there was no common focus on RE specifically nor any cohesiveness across courses. As a result, the faculty agreed that the problem was this lack of a common focus on RE specifically and agreed that as a team the faculty could address the issue. More specifically, creating a common language and setting common goals relating to RE across courses was determined by the team of faculty to be a worthwhile endeavor. In addition, the faculty agreed that adding more learning objectives that relate to the various critical success factors of an RE interview across the curriculum would add significant value.

COMMENTED

The program did a good to exemplary job drawing conclusions from their investigations (D.3). The faculty identified areas at the program- and individual course levels. They did this with a faculty developer who could be considered an external reviewer. Nevertheless, the insights section could have improved with student involvement.

Further highlights of the initial investigations include:

- Five of the eight critical traits needed to successfully determine requirements through an interview were addressed slightly in a few classes (i.e., Overview, Closing, Relationship Building, Active Listening, Team Work). It was clear from the assessment that simply telling students

to do these steps in an RE interview was not enough to enable them to do it effectively. Students needed to become more aware of why they needed to do these steps and see how these steps added to an interview.

- While the other three critical traits (i.e., Analyze As Is, Design To Be, Visualization) were addressed extensively in multiple classes, and students demonstrated high skills in those areas in other contexts, students did not bring these skills to the RE interview. For example, the two faculty members who taught CIS 454 were particularly puzzled since they had both used an active learning exercise on the topic of visualization the week before the interviews. In the learning exercise, students were taught and used visualization as a method of determining report requirements. Yet, only two of the 13 teams used visualization in their recorded interviews. Clearly students did not transfer the knowledge of a visualization technique to the need to use a visualization technique in an RE interview.
- The faculty team discovered that other courses that at first glance did not seem to include content necessary for RE interviews actually addressed prerequisite content that was needed for a successful requirements elicitation. The faculty decided that it should intervene to make sure that students were provided a framework that pulled together all of the skills and content from multiple courses to perform a successful RE interview. It was determined that the RE interview rubric might help provide that framework.

Learning Interventions

As a result of identifying problems in summer 2015 and agreeing that there was a need for change, eight of the nine courses shown in Table 3 were modified for the 2015–2016 academic year. Twelve of the 13[1] fulltime faculty members who taught these courses were actively involved in the changes. Given that all eight courses are required for all majors, 100% of the students in the program were affected in multiple courses. Note that each of the eight courses were modified to some degree; however, the most extensive modifications were in CIS 454 Systems Analysis and Design (see Table 5 for course coverage after the intervention). What follows is a short description of each course modification (i.e., learning intervention). A summary by course is given in Table 6.

Modification 1: Increasing Awareness of RE and the Interview Process. In most of the courses in the curriculum, we changed several assignments to more clearly frame RE and to specifically use the words from the RE rubric. For example, in COB 204, an introductory CIS class, the Access tutorial workbook was changed so that the language of the workbook coincided with the rubric. Additionally, assignments in the workbook were rephrased so that they were in response to client requirements. Similar changes were made to most courses in the CIS curriculum.

In CIS 304, the language of the class had always used the language of the RE rubric (e.g., as is, to be, visualization); however, the concepts had never been tied to the concept of RE. Requirements elicitation framing was added to every exercise, assignment, and exam question in the class. For example, in an in-class exercise that originally asked students to draw a visualization of an as-is process, the exercise was rewritten to say *"You conduct requirements elicitation interviews to understand [the client's] "as is" Buy and Sell processes. The notes you took in the interviews are shown below. Your next task is to produce a visualization of these processes using Activity Diagrams."*

COMMENTED

The program-level intervention (E.2.) is *good to exemplary* as the program shows a curriculum map, and describes how the classes scaffold students' knowledge and skills. This process was conducted with a faculty developer who could be considered an external reviewer. Nevertheless, this section could have improved with student involvement.

COMMENTED

Note the number (4), strength, and specificity of this program's learning modifications. The CIS program did an excellent job of laying out these interventions.

[1] The 13th faculty member who teaches one of these eight classes retired in May 2017 and chose not to be involved in the project. Another faculty member who taught the same course made changes to a course project which was completed by all students regardless of professor. We plan to involve the retiring faculty member's replacement in the project.

COMMENTED

The program did a *good* job investigating the course-level coverage of SLO content (D.2). Faculty investigated in more detail how particular courses interfaced with facets of the SLO. This area could have been strengthened by including students in the review process.

Table 4: Requirements Elicitation Content Covered in Prevention Courses

Course/Learning Experiences	A Overview	B Analyze "As Is"	C Design "To Be"	D Visualization	E Closing	F Relationship Building	G Active Listening	H Team Wor
COB 204. Computer Information Systems	0	1	1	1	0	0	0	0
CIS 221. Principles of Programming	0	0	1	1	0	0	0	0
CIS 301. Operating Systems and Server Administration	0	0	0	0	0	0	0	0
CIS 304. Enterprise Architecture	0	2	2	3	0	0	0	1
CIS/CS 320. Computing and Telecommunications Networks	0	0	2	1	0	0	0	1
CIS 330. Database Design and Application	0	3	3	2	0	0	1	0
CIS 331. Intermediate Computer Programming	0	0	3	3	0	0	1	1
CIS 454. Systems Analysis and Design	1	2	3	3	1	1	1	1
CIS 484. Information Systems Development and Implementation	1	2	3	2	1	1	1	1

Note. Course coverage of requirements elicitation trait prior to intervention: 0 = no coverage; 1 = slight coverage; 2 = moderate coverage; 3 = major coverage

Table 5: Requirements Elicitation Content Covered in Postintervention Courses

Course/Learning Experiences	A Overview	B Analyze "As-Is"	C Design "To-Be"	D Visualization	E Closing	F Relationship Building	G Active Listening	H Team Work
COB 204. Computer Information Systems	0	1	1	2	0	1	1	1
CIS 221. Principles of Programming	0	1	1	1	0	0	0	0
CIS 301. Operating Systems and Server Administration	0	0	0	0	0	0	0	0
CIS 304. Enterprise Architecture	0	3	2	3	0	1	2	1
CIS/CS 320. Computing and Telecommunications Networks	0	2	2	2	0	2	0	2
CIS 330. Database Design and Application	0	3	3	2	0	1	2	1
CIS 331. Intermediate Computer Programming	0	0	3	3	0	1	1	2
CIS 454. Systems Analysis and Design	3	3	3	3	1	3	3	3
CIS 484. Information Systems Development and Implementation	2	2	3	2	1	2	2	2

Note. Course coverage of requirements elicitation trait after intervention: 0 = no coverage; 1 = slight coverage; 2 = moderate coverage; 3 = major coverage

COMMENTED

The courselevel intervention (E.3) is *exemplary*. As noted earlier 11 of 12 faculty teaching these courses participated in the intervention and changed their course-level SLOs and assignments accordingly.

Table 6: Curriculum Map and Modifications

Course/Learning Experiences	Modifications Tied to Course/Learning Experiences
COB 204 (Computer Information Systems)	• Added an in-class activity about gathering requirements during an interview. Discussed the importance of requirements elicitation during an interview (with a client), and the overall process • Added two exam questions about differentiating "as-is" vs. "to-be" and identifying the "client" in a given situation • Changed the tutorial book for the course so that the entire book is framed with requirements elicitation language
CIS 221 (Principles of Programming)	• Added an assignment that gets students familiar with requirements elicitation vocabulary and as-is vs. to-be
CIS 304 (Enterprise Architecture)	• Added several course objectives relating to visualization and analyzing as-is and to-be states • Added requirements elicitation introduction in first week of course to give a frame for why we use as-is, to-be, and visualization • Revised five in-class exercises, three homework assignments, and three exam questions, to explicitly reflect requirements elicitation (e.g., clients, requirements, as-is, to-be, and visualization)
CIS 320 (Telecommunications)	• Require all students to do the ITERA Case study for the course's group project assignment. The ITERA Case study places a large demand on the student groups in performing requirements analysis and planning. Extensive work on the to-be portion of requirements elicitation is performed on the Case Study project.
CIS 330 (Database Design and Application)	• Added several dedicated discussions and learning activities in the middle of semester. Addressed the necessity and values of properly eliciting client's requirements • Added a 30-minute interactive lecture including video discussions • In our term project, students practiced requirement elicitation with a role play exercise.
CIS 331 (intermediate Computer Programming)	• Added three course objectives focused on the importance of visualization for all aspects of communication with the client, on the use of visualization to describe and plan the to-be system, and to reinforce understanding the attributes of successful teams • Added an in-class visualization group exercise to demonstrate how a visualization can reduce uncertainty and increase clarity of client needs and system implementation plans
	• Made small changes to lectures throughout semester to reinforce importance of thorough elicitation of client-system requirements in individual and group homework projects, and to reinforce importance of team dynamic in successfully accomplishing this
CIS 454 (Systems Analysis and Design)	• Added several new course objectives related to requirements elicitation • Introduced the requirements elicitation rubric in the discussion of a requirements elicitation interview • Added an in-class activity to view requirements elicitation elements and discuss the quality of each • Added a course assignment that required the students to view two 20-30 minute requirements elicitation interviews and evaluate the success of each interview with the requirements elicitation rubric • Added a team assignment of a requirements elicitation interview that required each team to elicit requirements for a report from the semester case. Student teams participated in a debrief were their elicitation was reviewed and evaluated. Positive and corrective feedback was provided during the debrief using the rubric as an evaluation tool • Added three questions to test 1 and seven questions to the final exam on requirement elicitation
CIS 484 (Capstone—Information Systems Development and Implementation)	• Added requirements elicitation for a real client for as-is and to-be systems

Modification 2: Using the Requirements Elicitation Rubric. The rubric was introduced to students in several courses. In CIS 304 and CIS 330, relevant portions of the RE rubric were shared with students. In CIS 454, the entire rubric was presented and discussed with students. In addition, as a homework assignment in CIS 454, students watched video recordings of prior students conducting RE interviews. Students then rated these interviews using the rubric. And faculty members in CIS 454 and CIS 484, evaluated actual student RE interviews using the rubric.

Modification 3: Practice Skills in Requirements Elicitation Interview. In all courses where it made sense, faculty added an exercise where students actually conducted RE interviews. An entire-class RE interview was added to CIS 304. In CIS 330 and CIS 454, students needed to interview the faculty member role-playing a client to determine requirements for a database and a report respectively. In CIS 484, students conducted an RE interview with a real client to determine requirements for a system.

Modification 4: Using videos about requirements elicitation as a teaching tool. We obtained permission from several student groups to use their videos to help teach other students. For example, students watched videos in CIS 330 and CIS 454 of a good RE and a bad RE and instructors led them in discussions of what worked and what did not work along with suggestions for improvement. One faculty member composed snippets of recorded student interviews that contrasted good and bad techniques and developed teaching tools that could be used in multiple courses.

Timeline for Learning Improvement Project. An overview of the timeline is provided in Table 7. Academic year 2014–2015 was devoted to establishing a baseline, understanding RE, designing a rubric, and developing course interventions in an intensive 5-day workshop. Later that summer, the seven faculty who attended the workshop shared the modifications with those faculty members who could not attend the workshop.

COMMENTED

In combination with Table 5, Table 7 presents an *exemplary* timeline (E.5). Pre- and post-assessments are laid out before and after the interventions. Time is allocated for instrument development and program/course modification relative to the SLO.Again, note that there are dramatic interventions embedded within the timeline.

Table 7: Timeline for Learning Improvement in the CIS Program

When	What was done
Fall 2014 - Spring 2015	• No courses were changed. • Students would have taken the full curriculum without intervention. • Collect baseline assessment data • Develop assessment rubric
Summer 2015	• Attend weeklong workshop to design course interventions
Fall 2015	• Include course interventions in 7 of the required courses in curriculum • Meet to discuss interventions
Spring 2016	• Include modified course interventions in 8 of the required courses in curriculum • Fidelity assessed in 4 courses • Collect assessment data • Students would have taken two semesters of courses with interventions and the rest of the major without. The most likely courses that they would have taken with changes were CIS 330, CIS 331, and CIS 454.
Summer 2016	• Attend weeklong workshop to refine course interventions • Discuss fidelity observations
Fall 2016 – Spring 2017 (planned)	• Changes were made to all required courses in the curriculum with new refinements in academic year 2016-2017. • Collect assessment data. • Students would have taken four semesters of courses with interventions. It is likely that most students would have taken changed courses for the entire curriculum except possibly COB 204 and CIS 221.

COMMENTED

Regarding, intervention implementation fidelity (E.6), the CIS program's efforts were *developing to good*. As a group they monitored the progress of the implementation. And, in a few cases, looked at courselevel implementation fidelity through auditing. Had this been done on a larger, more systematic level; and, had students been involved, this standard would have been rated *exemplary*.

In fall 2015 semester, the course interventions were implemented in seven courses. Following the semester during December 2015, the entire faculty group met to share how the course modifications had worked that semester and to discuss how to improve them. Most of the faculty were able to increase awareness of the RE interview process (Modification 1) in the required courses, but not all. Four of the faculty were able to include practice skills in RE (Modification 3) for the key courses identified by the group, and three faculty used videos as a teaching tool for RE (Modification 4). Much of the faculty discussion involved how to include new classroom exercises into an already busy semester. Those that were unsuccessful sought solutions to implement in the following spring, using the January holiday for planning.

Representatives from CARS and CFI both attended the meeting. The CFI representative discussed implementation fidelity and asked whether faculty members would consider having CFI representatives sit in on classes in the spring to assess fidelity. Several faculty members agreed and fidelity assessments were conducted in spring 2016.

At the end of spring 2016, student performance in RE was recaptured and reassessed. At this point students would have taken two semesters of changed courses. Students do not progress as a cohort, so each student would have followed their own path through the courses—but most would have taken a majority of their courses in the changed curriculum. We consider this a "partial modification" time point.

COMMENTED

Provided *good* re-assessment of the SLO (Standard F.1). CIS used the same methodology as before, including the same rubric and data collection processes. Had the sample sizes been larger (i.e., above 50-60% of student) or the case made better about the representativeness of the sample, then this standard would have been *exemplary*.

In the summer of 2016, faculty spent four days in an additional workshop to further refine the exercises for these courses and to consider the fidelity of the interventions. By the time students were given the assignments in spring 2017, all students would have taken most their curriculum post-intervention. This is considered a "full modification" (see Table 7 for details on the timeline for the intervention).

Re-Assess: Impact of Intervention

As mentioned earlier, during the spring 2015 semester we established baseline results by assigning a homework assignment in CIS 454 to elicit requirements and develop a design report. The students elicited requirements by interviewing a faculty member who role-played a client. The interviews were video recorded and were evaluated using the eight critical success factors of the rubric. The second set of data were collected from 15 groups, again each comprising three to five students, which represented approximately 60% of the 2016 graduating class. However, students who completed the course in spring 2016 were exposed to two semesters of course modifications designed to enhance SE skills. In other words, these data represented students *after* a two-semester intervention. Figure 1 and Table 8 illustrate the impacts of these modifications.

COMMENTED

Regarding magnitude of learning improvement (F.2), this example is clearly exemplary. The difference between pre and post-assessment is statistically significant and the effect (d =3) is dramatically larger than what is typically considered large (d = 0.8). Further, the difference is practically meaningful. CIS moved students from "developing" on the rubric all the way to "good."

As shown in Figure 1, a significant improvement occurred. More specifically, as shown in Table 8, 2016 students obtained an overall average of 3.10 (Competent) as compared to an overall average of 1.96 (Developing) for preintervention students. Thus, as a department, the CIS faculty were extremely satisfied with this first year result as the goal of competence was finally achieved. Additionally, this notable improvement served as a testament to department-wide hard work and inspired the CIS faculty to continue the improvement cycle.

Most of the tasks showed at least a 1-point improvement (on a 5-point scale) from 2015 to 2016. The smallest differences were on Trait C (Design "To-Be" System) and Trait G (Active Listening) which were relative strengths in 2015. The largest differences were on Trait A (Overview) and Trait D (Visualization) techniques. For the total score, the 1.13-point difference on the rubric metric translated to a gain of 3 standard deviations, an unusually large standardized effect. The 95% confidence interval around the total score difference ranged from to 0.8684 to 1.4009, indicating the positive difference between post- and pre-scores was statistically significantly different from zero ($t_{26} = 8.76$, $p < .0001$).

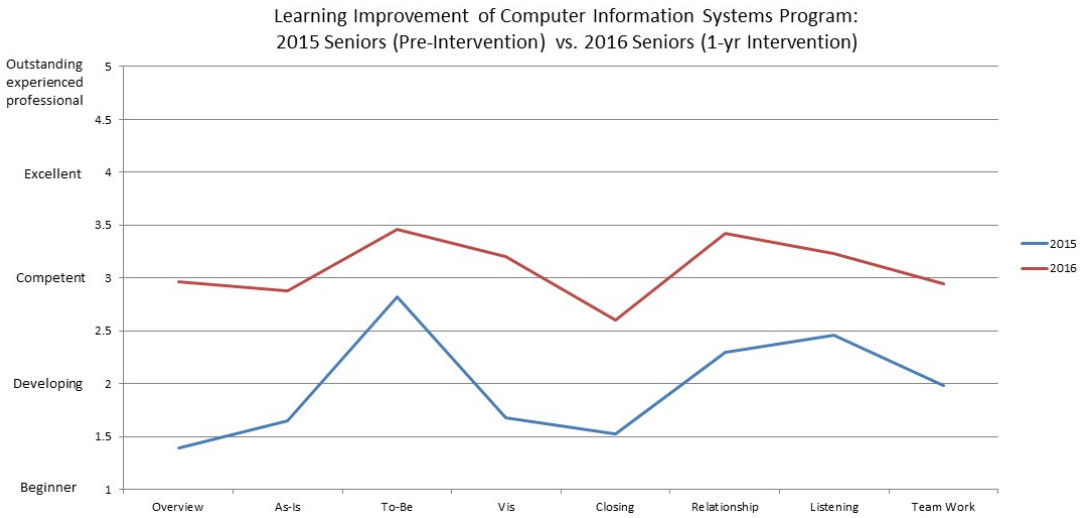

Figure 1. Impact of Course Modifications

Table 8. Impact of Course Modifications

	Trait	Spring 2015 Preintervention (N = 13)		Spring 2016 After one year of intervention (N = 15)		
		Mean	SD	Mean	SD	**Difference**
	Total	**1.96**	**0.31**	**3.10**	**0.36**	**1.13**
A	Overview: Provide an organizational frame	1.34	0.38	2.99	0.56	**1.65**
B	Analyze Current State (As Is)	1.63	0.53	2.89	0.43	**1.26**
C	Design "To Be" System	2.81	0.38	3.49	0.59	**0.69**
D	Visualization techniques	1.68	0.75	3.19	0.40	**1.51**
E	Closing: Provides appropriate recap	1.49	0.64	2.58	0.58	**1.09**
F	Relationship Building	2.31	0.42	3.43	0.43	**1.12**
G	Active Listening	2.46	0.39	3.26	0.49	**0.79**
H	Team Work	1.99	0.27	2.97	0.56	**0.98**

COMMENTED

Psychometrics (C.2) are *exemplary*. The reliability estimates – based on generalizability theory – are reasonably high. Plus, the program provided additional, supportive validity evidence.

Several additional steps were taken to ensure that the results documented in this report can be trusted and that learning improvement gains can be linked to the program-level curricular modification:

- Careful development of the RE interview rubric using inputs from experts as well as those who participated in RE interviews (content validity);
- Maintaining the same rubric throughout the entire learning improvement project;
- Training session was provided to the instructors prior to use of the rubric;
- The Phi Coefficient, an indicator of reliability obtained through generalizability analysis, was .856 when using both years of data (structural validity evidence);
- Students who had more RE intervention were scored much higher on the rubric than students who had less training (known groups/ external validity evidence); and
- More details regarding the technical analysis are available upon request.

Conclusion

In short, the CIS program assessed their outgoing seniors in 2015, planned and enacted a series of interventions aimed at improving RE skills, and then reassessed the following cohort (2016) to find much higher proficiency. That simple but compelling story masks the complexities that make learning improvement so challenging. In accordance with the learning improvement rubric introduced in Fulcher et al. (2017) the CIS example had the following exceptional characteristics:

- high percentage of faculty involvement throughout the project;
- tight focus on a particular student learning outcome;
- very specific elaboration of student learning outcome;
- deep alignment between the assessment instrument and the student learning outcome;
- collection of baseline data on a large sample of program students;
- thoroughly reviewed old curriculum to understand why students weren't meeting learning expectations;
- coordinated curricular and pedagogical changes within and across courses;
- changes affected ALL students in program;
- faculty consulted with faculty development expert to strengthen interventions and delivery;
- faculty consulted with assessment expert to strengthen the assessment process;
- the program established a reasonable timeline to plan, intervene, and reassess, and made modifications along the way;
- the program used the same instrument to re-assess; assessment scores were supported by validity evidence; and
- finally, the actual learning improvement was enormous (Cohen's d > 3).

The bulleted points reflect the longer story: CIS faculty were coordinated, persistent, and strategic in creating this learning improvement, albeit not perfect at every step. In addition, JMU provided the right environment and resources (e.g., assessment and faculty development expertise) to support the process.

Though the CIS program and faculty have reasons to be proud, the point of this article is not to be self-congratulatory. Instead, it is to provide a process and a structure for creating and reporting learning improvement for program-level learning objectives.

Having collectively visited hundreds of institutions across the nation, it is our opinion that every college has at least one program that is ready to make a program-level learning improvement. The question is whether those colleges and universities can provide the environment to support them. Sometimes a good example is a reasonable starting point, and we hope the JMU CIS learning improvement project serves that purpose.

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