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The Effect of Informational Characteristics and Faculty Knowledge and Beliefs on the Use of Assessment

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Abstract Increasing the use of learning outcome assessments to inform educational decisions is a major challenge in higher education. For this study we used a sense-making theoretical perspective to guide an analysis of the relationship of information characteristics and faculty assessment knowledge and beliefs with the use of general education assessment information at

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three research institutions with similar organizational contexts. Study findings indicate that the likelihood of using assessment information increases when assessment evidence is action oriented and viewed as of high quality and when faculty members are knowledgeable, have positive dispositions toward assessment, and have a perception of institutional support for engagement in assessment activities.

Keywords Use of Assessment · Faculty Knowledge · Student Outcomes Assessment · Beliefs

The purpose of assessment in higher education is to gather evidence of student learning in order to improve teaching and learning (New Leadership Alliance for Student Learning and Accountability 2012). Although engagement in outcomes assessment in higher education has increased (Kuh and Ikenberry 2009; Kuh et al. 2014), studies have found few instances of actual change as a result of the information gathered (Banta and Blaich 2011; Blaich and Wise 2011). For example, a relatively recent, large-scale, multi-institutional, longitudinal study found that, despite a significant amount of credible data, only 40% of institutions had shared results with campus constituencies and that only about 25% took any action to improve programs based on the data (Blaich and Wise 2011).

The use of student learning evidence for improvement is often referred to as "closing the loop" (Banta and Blaich 2011; Banta et al. 2009; Maki 2010). More specifically, "closing the loop" is the final step of an assessment cycle that includes planning, gathering, interpreting, and using learning evidence to inform decision-making about improving educational programs (Maki 2010; Palomba and Banta 1999). The realization of this goal is one of the most important and unaddressed challenges of assessment (Banta and Blaich 2011; Kuh and Ikenberry 2009).

The increase of learning outcomes assessment in higher education in the U.S. is accompanied by an increase in the perceived legitimacy of assessment, decreases in faculty resistance, and a shift in relative emphasis between the two main conceptual paradigms of assessment (Ewell 2009). The *accountability paradigm* reflects the external impetus from state governments and accreditation agencies for institutions to demonstrate compliance with standards of performance and expectations for return on investments by documenting student learning through standardized measures and comparisons across institutions. The *improvement paradigm* reflects the internal impetus to foster engagement and a culture of evidence by establishing multiple feedback loops for the continuous use of assessment findings to improve teaching and learning. Recently, Kuh et al. (2015a) introduced the term "*consequential assessment*" to represent the effective use of learning evidence by institutions and their programs to improve the educational experiences of students rather than as a means of complying with external demands. With increases in the perceived legitimacy of assessment and decreases in faculty resistance, the dichotomy between these conceptual paradigms has lessened (Ewell 2009). However, persistent concerns about the lack of use of assessment evidence for programmatic improvement has led to calls for studying the effects of outcomes

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assessment on academic decision-making (Banta 2010; Blaich and Wise 2011; Ewell 2009, 2010; Kuh and Ikenberry 2009; Kuh et al. 2014; Spencer Foundation 2010).

The Role of Institutional Support

The role of institutional support in the use of student assessment information in academic decision-making has been the focus of several national surveys of public and private postsecondary institutions. In an early survey (1,393 institutions responded), Peterson et al. (1999) found both "a relatively low level of institutional use of student assessment information in institutional decision-making and the very limited attempts by institutions to monitor assessment impacts" (p. 251). Research institutions were less likely than Associate of Arts, Baccalaureate, Master's, and Doctoral institutions to report assessment influences on educational decisions (Peterson and Augustine 2000a, b).

Ten years later another national study by the National Institute for Learning Outcomes Assessment (NILOA) (1,518 institutions responded) found that the planning and gathering steps of the assessment cycle were commonly implemented by about three-quarters of the institutions but that closing the loop with the use of assessment data to make decisions about the effectiveness of educational programs and services was not common (Kuh and Ikenberry 2009). The findings suggested that, although campus-wide assessment is likely to be undertaken in response to accountability expectations, program level assessments focused on improvement are "more likely to be actionable, to get the attention of faculty, and to point to specific improvement needs and opportunities in teaching and learning" (Kuh and Ikenberry 2009, p. 26).

In 2013, NILOA re-administered the survey (1,202 institutions responded) and found that common learning goals for all of their students were reported by 84% of institutions (up from 75% in 2009). Meeting accreditation expectations remained the primary use of assessment evidence, but the perceived potential utility for internal purposes was growing and considered more important than use for external purposes. The kinds of assessment approaches that mattered most to provosts were those that "yield meaningful, nuanced information that can both document student accomplishment and inform decision-making at all levels" (Kuh et al. 2014, p. 4). The reports suggested that faculty involvement in assessment must increase as institutions evolve from a culture of compliance to a culture of evidenced-based decision-making if the use of assessment findings to improve teaching and learning is to become more common.

Need for Theory Driven Research

Recently, Kezar (2013) critiqued the research that points to the importance of internal factors of organizational culture, leadership, and policies in shaping the implementation of student learning outcomes assessment. She argued that our understanding of these internal factors is superficial and that we need to enhance research, both conceptually and methodologically, in order to understand how we can harness these processes to support implementation. Her research recommendations included 1) undertaking more complex case studies [i.e. not just a single case study], 2) moving beyond descriptive to analytic studies, and 3) comparing the impact of assessment initiatives with other approaches to improving student learning (e.g. pedagogy). Kezar (2013) advocated for the inclusion of theoretical perspectives to inform research and identified three promising such perspectives: *organizational learning theories,* *distributed leadership, and sense-making*. These approaches can be intertwined with the recognition that changes are more likely to occur within organizations when the leadership encourages shared decision-making and provides members with opportunities to make sense of information and the implications for practices.

Academic Decision-making As a Sense-making Process

The theoretical framework of academic decision-making as *sense-making* expands the efforts to identify the factors and processes associated with use of student assessment findings for educational decision-making and program improvement beyond the organizational characteristics (Andrade 2011; Kezar 2013; Peterson and Augustine 2000a). More specifically, a sense-making approach calls attention to participants' assessment knowledge and beliefs and the characteristics of assessment findings and processes. We adopted sense-making as the theoretical perspective for this project because research in decision making has for some time viewed "the construction of meaning as both an input and an output of decision making" (March 1999, p. 25). The sense-making perspective focuses on "meaning" as the central cognitive and psychological process to be targeted to effect a change in behavior. In our study, the behavior was the actual use of assessment findings to improve educational practices and student learning.

The current intense interest in assessment for both accountability and improvement of learning is based on the underlying assumption that information is valuable for decision-making and that information use is a rational process (Ewell 1989). Obtaining valid information and using the information appropriately to inform decisions are, however, neither simple nor entirely rational processes (Hutchings et al. 2015). Sense-making theorists have argued that "information becomes meaningful and prompts action when decision-makers socially construct it—when they grapple with the meaning of the evidence and its implications for action" (Honig and Coburn 2008, p. 592). Decision-making as a sense-making process involves the social processes of framing, interpretation, argumentation, and persuasion (Coburn et al. 2009). Through social interactions people construct meaning and make interpretations about evidence by placing new information into their pre-existing beliefs, practices, and working knowledge (Honig and Coburn 2008).

Assessment Knowledge and Beliefs

Faculty engagement has long been recognized as essential to closing the loop (Banta and Blaich 2011; Ewell 2009; Kuh and Ikenberry 2009; Kuh et al. 2014; Maki 2010). Barriers to faculty engagement include negative perceptions about the purpose and value of assessment, doubts about the utility of information gathered, and lack of realistic expectations of what it takes to move from collecting evidence to making changes (Banta and Blaich 2011). Lack of expertise in assessment also contributes to lack of faculty participation (Cain and Hutchings 2015). Correspondingly, research has indicated that faculty involvement in and use of student assessment findings in educational decisions were related to the extent of professional development offered to faculty members, staff, and administrators (Grunwald and Peterson 2003; Peterson and Augustine 2000a). In addition, Rodgers and colleagues (2013) examined practices of academic programs that improved the quality of their assessment processes and the potential for use of that information; and they found that access to resources, including consultation and best practices, contributed to these improved assessment processes and to the use of evidence for decision-making. The availability of these resources demonstrated institutional support, fostered a positive assessment culture, and contributed to higher quality assessment processes.

Policy-makers' content knowledge, beliefs about the nature of the problem, beliefs about the nature of evidence, and disciplinary perspectives and skills have been found to influence the use of findings in K-12 education (Coburn et al. 2009) as well as higher education (Hutchings et al. 2015). How a problem is framed in turn influences how evidence is used. Frames are interpretative devices, a way to understand a problem or situation (Honig and Coburn 2008). As noted by Hutchings and colleagues (2015), "what counts as evidence is something contested, with the value and utility of data depending on where ones stands – literally and metaphorically. What one person sees as persuasive, another sees as anecdotal" (p. 28).

Assessment Information and Processes

One can argue that an essential factor in use of assessment findings is whether the evidence is actionable. That is, does the evidence reveal patterns of strengths and weaknesses in performance so as to inform faculty members and decision-makers about how to change practices to improve learning (Ewell 1989; Kuh et.al. 2015a)? Empirical evidence indicates that information characteristics do indeed affect decision-making (Kuh et. al. 2015b). For example, in one study decision-makers were presented with government research reports and asked to indicate the characteristics they used in judging the usefulness of the reports (Weiss and Bucuvalas 1980). Research quality was the most important factor accounting for 39% of the variance in the ratings of likelihood of use, followed by conformity with the user's beliefs and agency policy (18%), the extent to which the report findings were relevant (15%) and action-oriented (12%). In practice, the two dimensions of information characteristics and faculty knowledge and beliefs interact. Faculty members often express concerns about the validity of measures and the ways in which the findings will be used, or possibly misused (Cain and Hutchings 2015). Furthermore, beliefs differ as to what constitutes evidence, when and where to obtain it, and how it should be used.

A Culture of Evidence-based Decision-Making

With the recent shift in emphasis from an accountability paradigm to an improvement paradigm (Ewell 2009), there also has been "a cultural shift among faculty from questioning the purposes of assessment to questioning how it can best be done" (Cain and Hutchings 2015, p. 101). With this shift, faculty members may be more receptive to engaging in assessment of student learning as essential:

> It ties assessment to classroom practice, underscores [the] faculty's central role in assuring the quality of the educational experience, and thus has the potential to shift campus culture so that it supports and values the collection and use of evidence of learning (Cain and Hutchings 2015, p. 95)

One of the premises of utilization-focused evaluation is that assessment of student learning should be designed from the outset with a consideration of how each step will impact the intended use of the evidence (Patton 2008). To increase the use of such evidence, the faculty must be engaged in the process of formulating the assessment questions, methods, and the intended use of the evidence. In addition to providing faculty development opportunities around assessment, structural mechanisms must be established so as to ensure that assessment findings are widely discussed and that examples are provided of how assessment findings enabled programs/departments to "close-the loop" by taking meaningful action to improve student learning. In sum, as postsecondary institutions evolve from a culture of compliance to a culture of evidenced-based decision-making, Kuh et al. (2015a) argued that making consequential assessment a pervasive reality requires actionable information; should address the needs and interests of end users; and must be a natural part of the teaching and learning process, understandable, customized, and supported by leadership.

The Study

Purpose

Following Kezar's recommendations (2013) to go beyond descriptive studies, the purpose of our study was to undertake methodologically sophisticated, analytic research guided by sense-making theory of the factors and processes that influence the use of assessment findings to improve teaching and learning at three research institutions. Two research questions guided this study.

- What is the organizational context for institutional support of student assessment at three research institutions?
- What is the relationship of information characteristics and faculty assessment knowledge and beliefs with the use of general education student assessment evidence for educational decision-making?

The genesis for this project was the call for proposals for the Spencer Foundation's initiative on *Data Use and Educational Improvement*. Because previous evidence indicated that research universities were the least likely of undergraduate institutions to use assessment findings (Peterson and Augustine 2000a), we limited our project to research universities and sought to include both private and state institutions in different regions of the country to increase the generalizability of our research. We also decided to focus on institutions that had already adopted undergraduate general education learning objectives. The University of Kansas, The University of Nebraska –Lincoln, and Duke University had previously participated in a collaborative project involving 13 research universities supported by a grant from the Spencer Foundation and the Teagle Foundation. That grant was entitled "Fostering a Culture of Experimentation and Evidence for Undergraduate Education at Research Universities," and the three institutions agreed to collaborate on a new project in response to this Spencer Foundation initiative. Institutional Review Board approval for this study had been obtained at each institution.

General Education Learning and Assessment

Each institution had established general education programs with specified learning objectives and multiple approaches to assessing learning at the level of the course. Each institution also had established processes for reporting and evaluating assessment findings, from the level of the course to the department/ program level to the college/institutional level, and using assessment findings to improve educational practices/policies and learning. From 2011 to 2014, each institution had a particular focus with regard to assessment of its general education objectives that served as the context for the current study at that institution. In all three cases, course-embedded student work was evaluated in the assessment process. The level and methodology of that evaluation differed with two institutions using a shared rubric to analyze student work from different departments with conclusions about student learning discussed at the program-level. At the third institution, evaluation methods were allowed to vary for each learning objective and department, which included the use of rubrics as well as standardized tests score arriving at conclusions about student learning at a department-level.

Participants

This study engaged participants at each of the three institutions in a common protocol that involved *sense-making* workshops about general education assessment evidence and completing survey measures. Participants included faculty members who teach courses that address general education learning objectives, decision-makers from programs and departments, and members of institution level committees charged with oversight of the general education learning objectives. Institutional assessment directors and specialists led the workshops. The nature, number, and timing of the sense-making workshops varied on each campus but employed a common rationale and engaged the participants in one or more of elements designed to scaffold sense-making: framing the assessment questions to be asked; considering appropriate assessment methods; identifying the intended uses, expected findings, and the consequences of different courses of action in response to the findings; interpretation of findings; and formulation of recommendations. The workshops provided faculty members with opportunities to "grapple with the meaning of the evidence and its implications for action" (Honig and Coburn 2008, p. 592).

The study occurred over three years (2011-2014) during which faculty members participated in workshops and completed study surveys.[1] One administrator from each university completed an organizational context measure, and the faculty completed the other three measures: information characteristics, faculty assessment knowledge and beliefs, and use of assessment findings. The surveys measured two independent variables, information characteristics and faculty members' assessment knowledge and beliefs. The dependent variable was use of assessment evidence for academic decisions. Of the 136 faculty members invited to take the survey, a total of 91 faculty members completed three study surveys, a 67% response rate. Faculty participants collected assessment evidence at the course-level to determine how well the course contributed to institutional-level general educational learning outcomes. Therefore, the survey responses reflect the context of course-level efforts as well as institutional objectives. Participants completed all three surveys in a single session. Of the 91 faculty who completed the survey in year one, 20 also completed the surveys in year three for different general education courses. Thus, the final number of complete survey responses was 110 for information characteristics and 111 for faculty assessment knowledge and beliefs. Responses from across the three institutions

[1] A previously reported study of a subsample at one participating institution employed the *Information Characteristics and Faculty Assessment Knowledge and Beliefs* measures and findings of the factor analyses (Guetterman and Mitchell 2016).

ranged from 23 to 44 respondents. Faculty members received incentives in the form of $500 in professional development funds for participating in the project.

Measures

To assess *organizational context* one academic administrator at each institution completed the Inventory for Institutional Support for Student Assessment (IISSA) (Peterson and Augustine 2000a; Peterson et al. 1999). The administrator was the individual responsible for and most familiar with assessment for the institution. The inventory is comprised of questions organized along three dimensions: 1) institutional approach to assessment, 2) support for assessment, and 3) academic management policies and practices.

Information Characteristics were assessed through the 26-item measure developed by Weiss and Bucuvalas (1980) that yields scores on four factors: Research Quality (statistically sophisticated, valid findings, recommendations supported by data), Conformity with User Expectations (compatible with previous knowledge and users ideas and values), Action Orientation (explicit, targeted, applicable recommendations), and Challenge to The Status Quo (existing assumptions or practices). Faculty members rated the extent to which each item describes a characteristic of the learning information that was available using a 5-point scale (from "to a great extent" to "not at all").

Faculty assessment knowledge and beliefs were measured with 31-item survey that the authors developed for this study. Faculty members rated their level of agreement on a 5-point scale (from "to a great extent" to "not at all") with items along five dimensions: content knowledge regarding the purpose and methods of assessment and the general education learning objectives at their institutions, beliefs about assessment, beliefs regarding assessment practices at their institutions, extent of personal incorporation of assessment practices, and beliefs about the usefulness of assessment for different purposes (Very useful – Not useful).

Use of student assessment information was measured with an adapted version of the IISSA educational decision factor to assess use of student assessment information (Peterson and Augustine 2000a): Faculty members rated the extent to which the use of student assessment information influenced modifications to out-of-class learning experiences, student assessment plans, and teaching methods. A four-point scale was used for responses that reflect closing-the-loop actions: 1) no action or influence unknown; 2) action taken, data not influential; 3) action taken, data somewhat influential; 4) action taken, data very influential. These responses were recoded into a dichotomous indicator of influence to represent circumstances where an action taken and data were influential (responses 3 and 4) or a circumstance where no action was taken or an action was taken but data were not influential (responses 1 and 2). These responses were recoded to achieve adequate power to detect effects on the influence of data.

Analysis

To gather evidence of construct validity of the instruments, we conducted factor analysis for two surveys employed in this study. We calculated internal consistency reliability using Cronbach's alpha. The survey of *information characteristics* was an existing instrument with a reported factor structure (Weiss and Bucuvalas 1980), so confirmatory factor analysis was used. The *faculty assessment knowledge and beliefs* survey had been newly developed by the authors. It was subsequently subjected to exploratory factor analysis. The criterion for factors was a standardized loading of .3 or greater (Tabachnick and Fidell 2013).

We used logistic regression analysis to examine the relationship between each factor assessed through the *information characteristics* and *faculty assessment knowledge and beliefs* survey and the categorical dependent variable of influence using an α of .05 for statistical significance. The six factor scores calculated using the mean across items within the factor were used as continuous independent variables. The dependent variable of influence was a dichotomous categorical variable: 1) an action was taken and data were influential or 2) no action was taken or an action was taken but data was not influential. For all analyses, we collapsed the data across the three institutions because examination of responses from the organizational characteristics from the three institutions did not yield any substantial differences. Model fit was assessed through likelihood ratio test of -2 log likelihood improvement of including predictors over the intercept only model. In addition, we examined each independent variable using the Wald criterion and odds ratio estimates with a Bonferroni correction of $\alpha/3$ to account for multiple comparisons of the three factors within each survey.

Results

Institutional Support of Student Assessment

In terms of the institutional approach to assessment, an administrator at each of the three institutions reported that their regional accreditation review required undergraduate student assessment, evidence that a student assessment plan or process be in place, and evidence of intended institutional uses of student assessment information. However, they reported that evidence of actual institutional use of student assessment information was not a regional accreditation requirement. Each institution reported multiple *purposes* of assessment and rated *preparing institutional self-study for accreditation* as very important. Two institutions rated *guiding undergraduate academic program improvement* and *improving the achievement of undergraduate students* as very important, and one of those two institutions also rated *meeting state reporting requirements* and *improving faculty instructional performance* as very important. Furthermore, all three institutions reported undertaking s*tudies of the relationship of student performance with student course-taking patterns* and other aspects of academic and student life.

The three institutions reported having the support of their Boards, academic administrators, faculty members, and students. They also reported having *a formally adopted institutional plan or policy* requiring all academic units or programs to develop their own undergraduate student assessment plan, an *institution-wide group* that is primarily responsible for *ongoing planning and policy setting* for undergraduate student assessment, and an office that provides *faculty consultation in using student assessment for instructional improvement or curriculum development.* With regard to management policies and practices, all institutions reported having an *explicit operating budget* to support student assessment; funds for faculty members to participate in professional conferences on student assessment; and offering workshops, seminars, or consultative services for faculty members on the use of student assessment in course design or instruction.

Information Characteristics and Assessment Knowledge and Beliefs

Based on reliability analysis of the 26 items from the Information Characteristics scale, we examined items with the lowest corrected item-total correlations (< .7). An independent review of these items by the researchers revealed that nine of those items were more appropriate for the research context in which the scale was originally used by Weiss and Bucuvalas (1980) and less relevant for the assessment context of this study. For example, three of those items asked about the generalizability of the results for equivalent populations, statistical sophistication of the results, and the technical quality of the research. Therefore, we dropped those responses prior to the confirmatory factor analysis. The independent review found that the remaining two of the 11 items with low item-total correlations were redundant with other items on the scale. Dropping those items resulted in a final scale of 15 items. A confirmatory factor analysis yielded scores on three factors: a) assessment quality, b) compatibility with expectations and practices, and c) action orientation. Internal consistency reliability analysis yielded a coefficient alpha of .86 for the assessment quality scale, .69 for the compatibility scale, and .86 for the action orientation scale. Standardized factor loadings ranging from .57 to .85 for the final set of 15 items.

An exploratory factor analysis of the responses to the 31 item scale measuring faculty assessment knowledge and beliefs resulted in 3 factors: a) knowledge about assessment, b) personal dispositions about assessment, and c) institutional encouragement of faculty engagement and use of assessment. Internal consistency reliability analysis yielded a coefficient alpha of .88 for the knowledge about assessment scale, .92 for the personal dispositions about assessment scale and, and .81 for the institutional encouragement scale. The exploratory factor analysis standardized loadings ranged from .38 to .87 with one item showing moderate cross-loading.

Assessment Use

To increase understanding of the factors related to the influence of assessment findings on actions taken, we used logistic regression analysis to examine the relationship between each of the six continuous independent variables from the information characteristics and faculty assessment knowledge and beliefs measures and the categorical dependent variable of influence. Actions taken when data were influential was more common for modifications of assessment plans and teaching methods than for modification of out-of-class learning experiences. Approximately half of respondents reported influential data on action taken to modify assessment plans and teaching methods (52.7% modified assessment plans and 49.6% modified teaching methods), while only slightly more than a quarter of respondents (28.1%) reported influential data on action taken to modify out-of-class learning experiences. We collapsed data across the three institutions for analysis because the examination of responses regarding the organizational context of the three institutions did not yield any substantial differences. Sample sizes were not large enough to run a multilevel model, so separate analyses were conducted for each of the six factors.

There was a significant relationship between five of the six independent variables and the reported influence of assessment on actions taken. For each point increase in the faculty variables, the odds of higher influence of assessment evidence on the actions taken increased 4 times for knowledge about assessment, 2.5 times for personal dispositions about assessment, and 3 times for institutional encouragement of use and engagement. For each point increase in two of the information characteristics variables, the odds of higher influence of assessment evidence on the actions taken increased 2.5 times when assessment information was action oriented and 2 times when viewed assessments as of high quality (See Table 1). There was no significant relationship between the influence of assessment evidence and compatibility with expectations of assessment information.

Table 1 The Relationship of Information Characteristics and Faculty Assessment Knowledge and Beliefs with the Influence of Assessment Evidence on Instruction

Factors	Data Influential Mean	Data Not Influential Mean	Influence Odds Ratio
Faculty Assessment Knowledge and Beliefs			
Knowledge about assessment	3.53	2.97	3.95 ($p < .001$)
Personal dispositions about assessment	3.44	2.96	2.50 ($p = .016$)
Institutional Encouragement of Faculty Use and Engagement	2.35	1.87	3.00 ($p = .004$)
Information Characteristics			
Action Orientation	2.83	2.27	2.42 ($p = .002$)
Compatibility with Expectations	2.83	2.36	2.15 ($p = .026$)
Assessment Quality	2.75	2.27	2.06 ($p = .006$)

Note: Odds ratio reported for significant relationships only.

Discussion

One contribution of this study lies in characterizing the organizational context of three research institutions in terms of the extent to which support, management policies, and practices for assessment of student learning have become part of their culture of undergraduate education. Two of the institutions in this study are midwestern, state-supported institutions accredited by the North Central Association of Colleges and Schools; and the third is a private institution in the Southeast accredited by the Southern Association of Colleges and Schools. We anticipated that these three research institutions would differ in organizational context with regard to student assessment. However, the findings indicate a high degree of similarity. Each institution viewed accreditation agency requirements as a key reason for initiating and having increased its involvement in undergraduate student assessment. Moreover, each institution reported best practices previously identified (Cain and Hutchings 2015; Kuh et al. 2014; Peterson and Augustine 2000a), i.e., the number of assessment studies being conducted and professional development opportunities available to faculty, staff, and administrators. All three institutions have undertaken studies of the relationship of student performance with other aspects of student experiences and performance; allocated funds for faculty members to participate in assessment conferences; and offered workshops, seminars, or consultative services for faculty members on the use of student assessment in course design or instruction.

In accordance with the recent recommendations for theoretically driven, analytic level research (Kezar 2013), the primary aim of our study was to employ a sense-making theoretical framework to examine the relationship of information characteristics and faculty assessment knowledge and beliefs to the use of assessment findings in educational decision making. Of the three information characteristics factors identified and in support of previous scholarship, *Action Orientation* and *Assessment Quality* were significantly related to use (Kuh et. al. 2015b; Rodgers et. al. 2013). The third factor, *Compatibility with Expectations* was not significantly related to use. All three of the faculty factors, *Personal Disposition about Assessment, Institutional Encouragement of Faculty Use and Engagement,* and *Knowledge about Assessment and Use* were related to reported influence of assessment on actions taken again supporting previous scholarship regarding these factors (Andrade 2011; Cain and Hutchings 2015; Kezar 2013; Kuh et al. 2015b; Rodgers et al.

2013). A key finding from this study is that the odds of use of assessment findings in academic decisions increase when assessment evidence is action oriented and viewed as of high quality and when participants are knowledgeable, have positive dispositions toward assessment, and have a perception of institutional support.

These findings add to the empirical evidence in support of the role of action orientation and high quality information in effective decision-making (Weiss and Bucuvalas 1980) and also support recent observations about making assessment consequential: "Whether assessment findings can be converted into useful evidence depends on whether the data are credible, trustworthy and actionable" (Kuh et al. 2015b, p.222). However, the technical aspects of the data are not all that matters because "the results must speak to the interests and dispositions of partners and end users and suggest changes in policies and practices that can strengthen student accomplishment" (Kuh et al. 2015b, p. 222). Consequential assessment tends to be compelling and actionable when designed to generate information useful in meeting campus needs and priorities and embedded in the ongoing work of teaching and learning (Kuh et al. 2015a).

The implications of these findings are that institutions need to ensure that their assessment practices yield high quality evidence and that they provide institutional support for faculty development and engagement in order to increase the use of assessment findings in academic decision-making. Furthermore, these findings add impetus to recommendations to promote faculty engagement and ownership of student assessment. In particular, institutions can take steps by locating assessment in the ongoing commitments that faculty members already hold to teaching and learning and encouraging then to direct their inquiry skills to questions about student learning and how to improve it (Cain and Hutchings 2015). Integrating assessment into an institution's processes, governance, and reward structures is also necessary (Kuh et al. 2014). Of particular importance is institutional commitment to supporting ongoing faculty development opportunities with regard to student assessment (Cain and Hutchings 2015). Recently, findings from a single-institution case study that involved an intervention to promote inquiry demonstrated that developing faculty leaders and communities of practice to exchange ideas increased faculty engagement in meaningful assessment (Guetterman and Mitchell 2016). The necessary infrastructure already exists on most campuses (Kaplan et al. 2013) to facilitate networks or "professional learning communities" (Bernstein 2013) for both the formal and informal sharing of interests, information, and best practices. However, mere access to information does not automatically lead to better comprehension and use of the information (Blaich and Wise 2011). Effective communication practices are necessary "to develop shared understandings of the value and purpose of assessment, to allow those within the institution to work collectively to make sense of the results of assessment, and ultimately enact changes to improve student learning" (Jankowski and Cain 2015). Thus, in accordance with a shift in the conceptual paradigm from accountability to improvement (Ewell 2009), shifting from reporting to a transparent communication paradigm is also relevant (Jankowski and Cain 2015). A change in mindset is required from reporting findings to sustaining systemic and multiple processes for ascertaining and responding to the needs of intended users and involving them in the sense-making process across multiple levels of the institution.

This study had several limitations. First, selection bias may be present in that participants were faculty members who agreed to participate in the assessment processes on the three campuses. In addition, the sample size is not large enough to generalize within or beyond the three institutions involved in the study. Also, these findings arose from the context of workshops on each campus but without a control group that would have enabled an evaluation of sense-making as an intervention. Finally, the results of the study provided empirical insight into *what* factors predict the use of assessment evidence but not necessarily *how* those mechanisms occur. Future research might address that question through interventions and qualitative interviews with faculty members to understand their process of using assessment evidence.

Conclusion

The sense-making workshops not only set the context for the resulting relationships among use, information characteristics, and faculty assessment knowledge and beliefs but also revealed a need to re-conceptualize the aims of assessment from *use* to *influence* that was advocated by Kirkhart (2000). More specifically, the discussions about learning evidence appear to have had an impact beyond decision-making. The recognition of this need led to the proposal for a more inclusive model of influence, adapted from the field of evaluation, to improve how the influence of assessment on educational programs is measured and evaluated (Jonson et al. 2014). These insights about a more inclusive model of influence should be incorporated in future research that moves beyond the analytic level to the experimental level and that address both the factors that predict the use of assessment evidence and how those mechanisms occur. That is, controlled studies should devise sense-making interventions that target information characteristics and faculty assessment knowledge and beliefs and determine if there is a corresponding increase in the influence of assessment findings with regard to both academic decisions and thinking about student learning and educational practices and policies.

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