QUALITY MATTERS

QM

qualitymatters.org

Contextualizing Academic Rigor

Part two of a three-part series

Andria Foote Schwegler

Texas A&M University – Central Texas

October 11, 2019

Table of Contents

The Context: An Overview

Locating academic rigor in the higher education landscape requires an explicit consideration and detangling of the constructs that are commonly conflated with it. Many definitions of academic rigor confound it with other variables such as curriculum and/or student learning (e.g., see the variety of definitions in Hechinger Institute, 2009).

Academic rigor is defined as intentionally crafted and sequenced learning activities and interactions that are supported by research and provide students the opportunity to create and demonstrate their own understanding or interpretation of information and support it with evidence. However, some conceptions of academic rigor may suggest that more advanced curriculum should be moved into lower-level courses to increase rigor, but this recommendation fails to acknowledge that academic content can be presented in a more or less rigorous manner. Others may

state that behaviors of students (e.g., grades, test performance) are sufficient indicators of the rigor of coursework, but these behaviors are influenced by a multitude of factors beyond the learning context including students' idiosyncratic characteristics such as self-efficacy (Honicke & Broadbent, 2016; Multon, Brown, & Lent, 1991), study-related skills (Crede & Kuncel, 2008), level of self-handicapping (Schwinger, Wirthwein, Lemmer, & Steinmayr, 2014), intrinsic motivation (Cerasoli, Nicklin, & Ford, 2014), and other psychosocial factors such as achievement motivation (Fong, Davis, Kim, Kim, Marriott, & Kim, 2017; Robbins, Lauver, Le, Davis, & Langley, 2004) that are unrelated to the academic rigor of the course.

To clarify the location of academic rigor in student learning, the learning context needs to be distinguished from related contexts (see Figure 1).
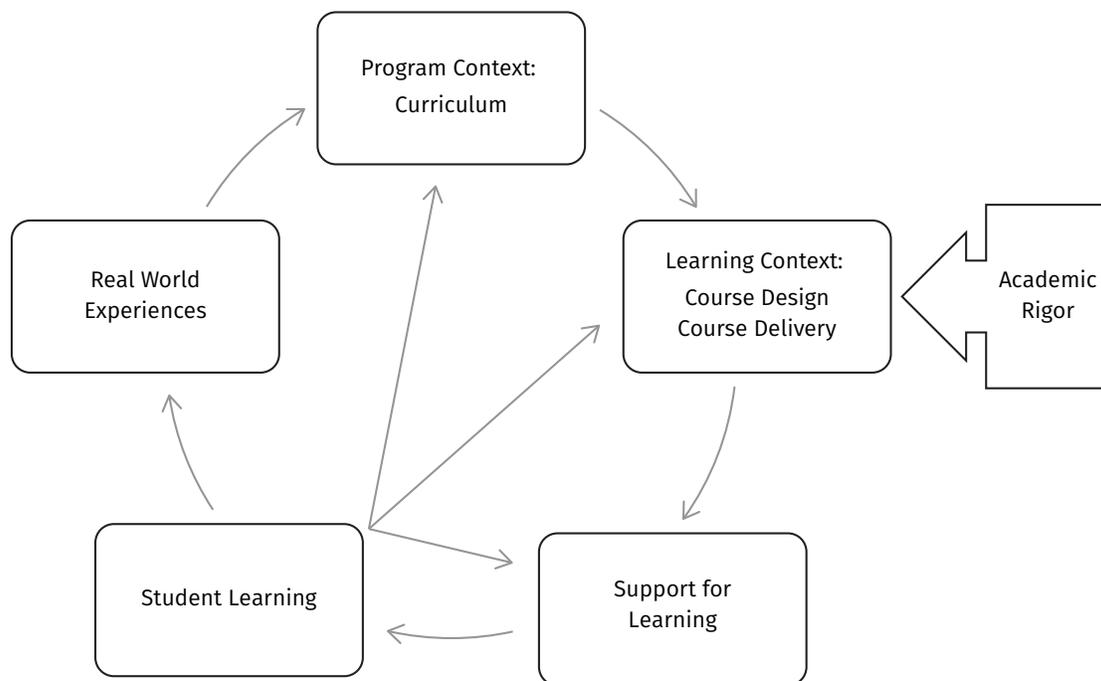
Figure 1. Location of academic rigor in the context of students' personal and professional lives in the real world and within the institutional context of programs, learning context, student support for learning, and assessments of student learning. Student learning assessments can be used internally to the institution for revisions to the program curriculum, the learning context, and support services provided for learning.

Broadly, learning is a specific activity that occurs within the environments in which the student lives and works (i.e., the student's unique experiences with the real world). These broader environments influence the opportunities available to individuals including the value and purpose of education, career options, social experiences, decisions to be made, and so on. Educational programs emerge in response to and in anticipation of changes in this real-world context, and the curriculum of these programs is delivered in discrete learning contexts. Learning contexts provide a space (physical, virtual, or a combination) for teachers and learners to interact with content and are shaped by the design of instructional materials and by how individuals interact with each other and the content. Academic rigor is located in these learning contexts to a greater or lesser extent, and these learning contexts are reinforced to a varying degree by academic support services provided by the institution. Learning contexts provide opportunities for students to demonstrate their learning, which can be utilized by teachers to inform the curriculum and their educational practices, and the learning students obtain is taken back into their real-world contexts and, ideally, applied in meaningful ways.

The Real World

The real world each student occupies enables a host of choices including decisions regarding contributing as a citizen and obtaining education and employment. Part of this context includes perceptions of the purpose of a higher education and beliefs regarding its value, which shape the higher education options students pursue. The learning students obtain via higher education is then brought to bear on this context, and a meaningful education helps students navigate the challenges they encounter.

Given the rapid rate of change in technology, the nature of work, and the global economy, students need abilities to communicate, solve new problems, and critically consider information in addition to work-related skills that are immediately useful but may soon be obsolete. As such, a higher education has the potential to equip students on multiple fronts when learning is applicable not only to the world of work but to other contexts including decision making and contributing to society. When seen from this broader context, a higher education is not merely a credential to be exchanged for a job (Labaree, 1997); it is an accumulation of intentionally crafted learning experiences guided by subject matter experts so that the knowledge obtained can be applied across contexts to address personal, social, and work challenges.

When learning experiences are delivered in a manner that is removed from the real world, educational lessons are valuable only in the learning context and are not likely to inform decisions in the real world. Students may bemoan the futility of such lessons when describing end-of-semester "brain dumps" in which all information studied in the course is immediately forgotten because it is not useful for any problems outside the course. But, unlike closed-book multiple choice exams or fill-in-the-blank vocabulary tests, which are rare phenomena in the real world, collaborative experiences such as high impact practices (Association of American Colleges & Universities, n.d.) and other authentic tasks are common in the real world and provide opportunities for students to work on projects that have relevance beyond the immediate learning context, improving their retention, transfer, and application of the material (Billing, 2007). Learning experiences that are intentionally connected to the real world have the power to make learning meaningful in the broader context of students' lives instead of merely compartmentalizing learning in isolated spaces that bear little resemblance to other contexts in which the information could be useful.

Program Context

The educational programs that students select are influenced by their experiences in the real world, and programs are shaped by this broader context. Articulating the curriculum and its sequence within a program are essential prerequisites to creating an academically rigorous learning context, but specifying curriculum is not synonymous with setting the conditions for rigor.

Decisions regarding curriculum are the responsibility of faculty members as described in the Statement on Government of Colleges and Universities, "When an educational goal has been established, it becomes the responsibility primarily of the faculty to determine the appropriate curriculum and procedures of student instruction" (American Association of University Professors, American Council on Education, & Association of Governing Boards of Universities and Colleges, 1990).

The Statement of Principles on Academic Freedom and Tenure acknowledges that "institutions of higher education are conducted for the common good and not to further the interest of either the individual teacher or the institution as a whole" (American Association of University Professors & Association of American Colleges and Universities, 1970, p. 14). Within this context, academic freedom, which protects faculty members from censorship and interference in their work, is provided for teaching and research. Regarding teaching, faculty members are free to discuss their subject and should not introduce controversial material that is not related to their subject. The intent is to protect "the rights of the teacher in teaching and of the student to freedom in learning. It carries with it duties correlative with rights" (p. 14). The duties have been interpreted in the Statement on Professional Ethics to include, among other expectations, the "obligation to exercise critical self-discipline and judgment in using, extending, and transmitting knowledge," and "as members of an academic institution, professors seek above all

to be effective teachers and scholars" (American Association of University Professors, 2009). These statements acknowledge the responsibilities of teachers to select and create curriculum and deploy strategies to most effectively facilitate students' understanding of it. These statements do not imply that faculty members are free to teach the academic content of a course or program in a manner that neglects student learning of it; as Cain (2014) pointed out, "academic freedom has never meant 'anything goes'" (p. 13).

But, Arum and Roksa (2011) noted "there is often little evidence that faculty have come together to ensure that coursework is appropriately demanding and requires significant reading, writing, and critical thinking. Faculty share a collective responsibility to address this issue" (p. 129). These claims were based, in part, on their findings that a large portion of students in their study reported few courses with lengthy reading and writing requirements, activities that were associated with increases in learning. They argued that "it is incumbent on higher-education institutions to take seriously their responsibility to monitor and enhance the academic requirements of courses" (p. 129). Collaborative work among faculty to specify and align curriculum and learning activities across courses at the program level may reduce self-serving tendencies to reduce workload and/or grading requirements in which assignments that are more difficult to implement and grade are replaced with less work- and time-intensive ones to the detriment of student learning (e.g., lack of implementation fidelity as noted in Mathers, Finney, & Hathcoat, 2018; lowered expectations as noted in Schnee, 2009). Though program faculty members are responsible for specifying the curriculum, which may also be shaped by program accreditation and other requirements, the individual course instructor is responsible for creating and enforcing a learning context to support academic rigor.

The Learning Context

Learning contexts are not limited to physical classrooms as they were in the past. Today, learning can occur in online, face-to-face, or blended contexts with synchronous and/or asynchronous interaction among students and teachers. The learning context includes all interactions and activities put in place to promote learning in the physical and/or virtual spaces teachers and learners occupy.

COURSE DESIGN

Broadly, the learning context can be distinguished into static features that can be planned in advance and recreated across iterations (i.e., course design) and dynamic features that may be unique to each iteration as it unfolds (i.e., course delivery). The design of the materials, resources, activities, and assessments that are implemented to support student learning have been clearly articulated and recognized as influential for student learning (Quality Matters, 2019).

Course elements should be directly aligned to support the stated curriculum and corresponding objectives and may be included in the learning context by individuals other than the teacher of the course. Specifically, some course design elements (e.g., a research paper assignment, required readings) may be included in the course based on program faculty decisions that extend to all sections of a course, and the specific course instructor may not be responsible for having included these elements. As such, course design is one element of the learning context that can be utilized to gauge the academic rigor of the course, but, in isolation, it is insufficient to provide an assessment of rigor. For example, though the number of pages read or written stated on a course syllabus can be examined from a course design perspective, these static requirements do not indicate how they are implemented in relation to other course content, the type of cognitive processing that is actually credited, the level of content mastery that is demonstrated, and other factors that impact student learning. These factors are specified as the course is delivered to students and should be considered in conjunction with course delivery.

COURSE DELIVERY

Course delivery includes the manner in which the course is carried out and the expectations and requirements the teacher enforces. Course delivery that does not include an explicit consideration of the evidence to support rigor may fall short of conveying the goals of the stated curriculum and design of the course. Though program faculty may have specified curriculum, learning activities, and embedded assessments across courses in a program, these requirements do not imply that they will be taught by individual faculty members to the level intended.

Mathers et al. (2018) noted that "implementation fidelity" may vary across faculty members and may underlie why some students who have successfully completed a course do not show learning gains on a test of the content. Implementation fidelity refers to "whether the curriculum aligned with the objectives and test is actually taught and received in the intended manner" (p. 1224). It involves a consideration of how well individual faculty members are following through on facilitating understanding of the curriculum in their courses and upholding expectations of student work that are stated for the course. Mathers et al. (2018) called for assessment of teaching to verify that faculty members are implementing the curriculum appropriately and to identify weaknesses that may be contributing to diminished student learning so that training can be provided to strengthen these areas. Similarly, the importance of course delivery, and its interaction with program-specific requirements, to foster rigor was noted by Arum and Roksa (2011) in their conclusion, "Our findings suggest that high expectations for students and increased academic requirements in syllabi, if coupled with rigorous grading standards that encourage students to spend more time studying, might potentially yield significant payoffs in terms of undergraduate learning outcomes" (p. 130). These conclusions reference the central role that decisions regarding course delivery play in promoting academic rigor.

MODE OF DELIVERY

The medium through which the learning context is delivered (i.e., online, blended, face-to-face) does not indicate the rigor of a course; instead, the decisions the teacher makes in delivering the content in the learning context (e.g., selection of materials, time spent on learning tasks) reflects the level of academic rigor of the course and the subsequent learning students obtain from it.

The importance of course delivery was acknowledged in a study by Duncan, Range, and Hvidston (2013) in graduate students' comments regarding academic rigor in blended courses, "the format of the class, whether blended, online, or face-to-face, was immaterial to rigor; rather, the quality of instruction was the most important component" (p. 19). These reports corroborated the results of a meta-analysis sponsored by the U.S. Department of Education that examined research comparing student learning on assessments (not students' perceptions of learning) in online, blended, and face-to-face contexts (Means, Toyama, Murphy, Bakia, & Jones, 2010). Results indicated that learners in both online and blended contexts outperformed students in face-to-face contexts, but the small effect sizes were attributable to differences in the learning context that were associated with student learning (e.g., learners in the online and blended contexts spent more time learning than those in the face-to-face contexts). Had the studies used equivalent conditions, no significant differences would have emerged among the delivery modes (see also "No Significant Difference," 2010).

However, faculty perceptions that online instruction cannot achieve the same student learning outcomes as face-to-face instruction persists. In their 2016 survey of faculty attitudes, Jaschik and Lederman reported that, overall, only 19% of faculty members agreed that online courses can achieve the same student learning outcomes as in-person courses; whereas 55% of faculty members surveyed disagreed with this statement. Not surprisingly, faculty members with experience teaching online courses were more likely to agree that student learning can be comparable across these delivery modes than those with no online teaching experience (32% vs. 13%), and fewer with experience teaching online disagreed with the item than those with no experience (43% vs. 61%). Clearly, faculty attitudes regarding the quality of student learning in online contexts is not consistent with the research evidence on actual student learning. This discrepancy illustrates the need for faculty members to utilize research evidence regarding student learning and the need to clarify the distinction between delivery mode and course delivery. The delivery mode (i.e., online, blended, face-to-face) does not imply that students will learn less from the learning context. Instead, the decisions that faculty members make regarding the teaching techniques they employ affect student learning. If faculty members are concerned that the teaching decisions they make in an online learning context are not best facilitating student learning, they can turn to the research literature in online learning to gain strategies to rectify these concerns.

Evidence-based information and strategies to foster the academic rigor in the learning context are available from the vast array of discipline-specific research studies on teaching, research on delivery in face-to-face, blended, and/or online learning contexts, and research on human learning (e.g., desirable difficulties noted by Bjork & Bjork, 2011). In addition, faculty members can leverage their unique experiences with teaching and learning to develop research projects to test their anecdotal observations about specific techniques that support learning. Hutchings, Huber, and Ciccone (2011) encouraged teachers to utilize their discipline-specific research strategies to evaluate the impact of their teaching strategies on student learning in their courses. Such tests can be constructed from a research-based perspective, some of which may accommodate random assignment of students to conditions to control for the host of extraneous variables that can affect student learning beyond the conditions provided in the learning context, to advance research on the scholarship of teaching and learning and expand teaching practices across learning contexts.

RESPONSIBILITIES OF TEACHERS AND STUDENTS

Defining academic rigor in a way that it can be evaluated and revised through a continuous improvement process requires that the teacher's choices and actions in crafting the learning context can be assessed separately of the students' choices and actions.

Though the teacher's implementation of academic rigor should directly promote students' ability to learn (i.e., a causal relationship is expected), these are distinct variables to be measured. As such, the definition of academic rigor proposed in this series locates the responsibility for creating and upholding an academically rigorous learning context with the teacher or trainer, not with the student, though it acknowledges the critical role that students must play in taking responsibility for learning. As such, instead of conceptualizing academic rigor as a process that occurs in a student's mental space, it is defined as evidence and rationale in the learning environment that can be observed, assessed, and improved based on its impact on student learning. These qualities are critical because self-reports of what has been learned and/or what is rigorous are subject to unintentional memory biases (e.g., Kruger & Dunning, 1999) and intentional distortions (e.g., Schnee, 2008). Notably, though the responsibility for leveraging techniques to support academic rigor belongs to the teacher, these activities do not occur in a "teaching context." Teachers bring academic rigor to bear in a "learning context" because the goal of this space is to create opportunities for student learning, not for demonstrations of teaching techniques that fail to consider student learning.

This perspective differs from definitions of rigor that have been previously proposed. For example, Whitaker (2016) argued that academic rigor occurs within students' Zones of Proximal Development (ZPD) as postulated by Vygotsky in which rigor occurs when students are engaged with content at a level that they can understand with assistance but that they cannot understand without assistance. While this level of content engagement and teacher support

may represent an ideal context for learning, this type of engagement is not objectively verifiable. Students' self-reports may not accurately reflect their ability to understand, and students may be motivated to intentionally manipulate perceptions of what they understand to negotiate lower expectations for their performance as noted in Schnee (2008). This perspective also implies that a well-crafted learning context that provides multiple lines of evidence to support claims of academic rigor still would not be considered rigorous if all students were not engaged with the content at their idiosyncratic ZPD. Negatively evaluating the teacher's work in crafting an academically rigorous learning context based on the failure of individual students to engage with the context is conflating a teacher's responsibility with a student's responsibility.

Students cannot be forced to learn; students choose to learn. Though the goal of creating an academically rigorous learning context is to promote student learning, the learning students acquire from it is determined by each student. Institutions of higher education, and faculty members more specifically, cannot control whether students will mentally engage with the content in the learning context. Students choose how they engage with the materials and activities in the learning context, the subsequent learning they acquire, and how they utilize this learning in the real world. As such, some students will learn a great deal whereas others will learn significantly less in the same learning context. While students are responsible for these choices, the teacher's responsibility is to craft a learning context to stimulate, guide, and support students' decisions to learn, but teachers cannot be held responsible for students making this choice.

Academically rigorous contexts set conditions that make it difficult for students not to learn (i.e., students will not be successful in the course if activities are not completed that have been designed to support learning), but the extent that students take advantage of these learning opportunities is not a quality of the learning context that can be controlled by the teacher. Teachers can affect student-related variables such as effort, motivation

to engage, and self-beliefs regarding efficacy only to a certain degree (e.g., by requiring spaced assignments to keep students interacting with the content, by making the content interesting and clarifying how it will be utilized in future decision making, by encouraging students to try again and point out areas of success). As such, students bear the responsibility for learning, but teachers and institutions bear the responsibility for engaging with them in their efforts and setting the conditions for learning to occur.

Distinguishing between the teachers' and students' responsibilities and areas of influence should not be misinterpreted to imply that the proposed definition of academic rigor is teaching-focused instead of learning-focused or that teaching and learning are unrelated. Instead, this definition of academic rigor makes student learning a priority because the goal of teaching is to promote student learning. Considering teaching in the absence of how it supports student learning is not a consideration of teaching. Such a discussion may involve personal philosophies or idiosyncratic beliefs about behavior, but it does not describe teaching which involves acts that cannot be dissociated from the goal of student learning.

Support for Learning

When the learning context incorporates elements that promote and protect student learning, students will be hard pressed to succeed without engaging with the content in ways that help them learn it. Though some students will be prepared for the workload, some students will need assistance with learning how to learn, with prerequisite information and skills, and/or with creating their own understanding or interpretation of the content. The need for assistance is so essential that some argue academic rigor cannot be achieved without it (Graham & Essex, 2001; Schnee, 2008; Whitaker, 2016). Beyond facilitation provided by faculty members in the learning context, students may need additional supports for learning.

REMEDIAL COURSEWORK

One way to support student learning is to provide remedial courses to address gaps in students' academic preparation, but the efficacy of such coursework on students' outcomes is mixed, and the effectiveness with which it is carried out lacks systematic investigation.

Remedial coursework appears to be "widespread, affecting both disadvantaged and advantaged populations" (Chen, 2016, p. vi). Using data from the National Postsecondary Student Aid Study (i.e., a "nationally representative survey of all postsecondary students enrolled in Title IV institutions," pp. 1-2), Sparks and Malkus (2013) stated that 19% and 20% of first-year undergraduate students self-reported enrolling in remedial courses in the 2003-2004 and 2007-2008 academic years, respectively.

A much larger estimate of enrollment in remedial courses was obtained by Chen (2016) who examined the 2004/2009 Beginning Postsecondary Students Longitudinal Study and the 2009 Postsecondary Education Transcript Study. These studies "followed a nationally representative sample of first-time college students who began postsecondary education in 2003-04" and were followed through 2009 (p. 10). Chen (2016) reported that of students who began college in the 2003-2004 academic year, 68% who entered public two-year colleges took at least one remedial course and 40% who entered public four-year institutions did so at some point between enrollment and the six-year follow up. When examining the characteristics of students who took remedial courses, Chen (2016) pointed out "the common perception that remedial coursework is strictly the domain of students with weak academic skills is not accurate" (p. 16). In the sample, 25% of students in two-year institutions and 23% of students enrolled in four-year institutions who had weak prior academic preparation did not take any remedial courses whereas 48% of two-year and 18% of four-year students with strong preparation did. Chen (2016) reported that students who completed

all the remedial courses they attempted had better college outcomes and were more likely to complete a degree than students who enrolled but did not complete remedial coursework, but these effects were moderated by level of academic preparation. The positive benefits of remedial coursework were evident only for those with weak prior academic preparation. As such, remedial coursework was not associated with successful college outcomes for students with moderate to strong academic preparation.

In their analysis of the same data sets, Shields and O'Dwyer (2017) noted that students underreported their enrollment in remedial courses by 50% when comparing interview responses to transcripts, which may have contributed to the lower self-report rate noted by Sparks and Malkus (2013), so students' transcript data was analyzed. Though taking remedial courses was not related to persistence or obtaining an associate degree, Shields and O'Dwyer (2017) found that students who took remedial courses were less likely to complete a bachelor's degree than students who did not take these courses even after controlling for other variables. The authors concluded, "For 4-year college students, this study did not reveal evidence that remedial education fulfills its purpose of preparing lower-skilled students to succeed" (p. 104). Shields and O'Dwyer (2017) noted that the research did not consider what happens in the learning context and warned that the data does not provide justification to eliminate remedial education. Instead, they argued that "well-designed courses that take less time, use more effective teaching methods, and align more closely with required college skills, could lead to better outcomes" (p. 104).

Their conclusion was similar to concerns regarding credit recovery courses offered for high school students to bolster graduation rates. According to DePaoli, Balfanz, Atwell, and Bridgeland (2018), "although credit recovery courses allowed students to recover credits, content recovery – how much knowledge was gained – was likely minimal" (p. 35). Given the lack of systematic examination of remedial coursework at both the secondary and postsecondary levels, research is critically needed to determine how these courses are designed, how the learning

context is delivered, and what the long-term gains are in student learning. Though this type of academic support is widely utilized, its effects on student learning are not clear. Both the learning context and the impact on student learning are in need of empirical investigation.

ACADEMIC SUPPORT SERVICES

An alternative to remedial coursework is academic support services provided to students outside of their courses; however, most students do not utilize these services. Defining academic rigor as research-based characteristics of the learning context instead of as elite qualities of students (e.g., admitting only the best prepared) demands that these services be destigmatized and aligned with the curriculum and learning contexts so students utilize the resources they need.

To assess the nature and scope of academic support services, Truschel and Reedy (2009) performed a survey of the types of experiences that were provided to students as part of learning centers in a sample of 142 institutions. The majority of participating institutions indicated that they offered students tutoring and academic coaching (88%), workshops (65%) which included preparation for tasks related to academic work (e.g., reading speed, test-taking strategies) and self-improvement (e.g., managing stress, career preparation), and courses or workshops directly targeting academic improvement (65%). Less frequently reported but endorsed by more than a third of respondents were support services for at-risk students (41.5%), disability services (41.5%), and academic advising (36%). The emphasis on academic support was reflected in the mission statements of the centers as posted on their webpages; the majority of centers indicated they served to help students reach their academic potential in a supportive learning environment. The authors concluded that the focus of learning centers is supporting learning though "uniformity in what a learning center is or what services it provides is not evident in the survey" (p. 18). The authors also noted that the "de-stigmatization of students who seek assistance at the learning center or tutoring center" needs to be addressed (p. 17).

Negative perceptions regarding utilizing academic support services such as enrolling in remedial coursework or participating in tutoring was described by Bachman (2013). Students in the study had utilized these services and reported that initially they were embarrassed or upset about the need for remedial work. However, most students' perceptions changed after experience with it and as students were able to interpret their need for remediation in terms of a "normal" college experience to receive assistance that others also utilized when their prior educational experiences failed them. Students indicated that when they interacted with people who genuinely wanted to help them and when they engaged in challenging work that was neither so easy to be perceived as a waste of time nor so difficult as to be frustrating that their perceptions became more positive.

The perception that academic support services were not needed by students was documented by Cheatle and Bullerjahn (2015) regarding utilizing writing center services. The majority of students in their sample (86%) perceived that the writing center was a valuable resource, but only 35% of the sample reported ever using it. Though writing centers are typically intended for all students to improve skills, students in their sample perceived that these services were meant for first-year students or international students, not students like themselves. When asked why students did not use the writing center, participants indicated that they did not have a need for the service (51%), they sought academic help from other sources (23%), or they had few writing courses or assignments (12%). That students did not perceive a need for assistance with writing might imply that most students' writing was at such a high level that it does not need to be improved, but, more likely, it implied that students lack experiences to realize that their writing could be improved and/or that their discipline-specific knowledge could be improved through writing. These issues—lack of awareness that writing can be continuously improved (learning to write) and can foster content knowledge (writing to learn; see Moon, Gere, & Shultz, 2018) in addition to having few writing

assignments—are not consistent with practices to promote student learning (see Arum & Roksa, 2011).

Taken together, these results suggest the need for a collaborative relationship between those creating the learning context and those providing services outside this context to support learning. Coordination of activities across learning contexts and academic support services may clarify the nature of services that students need and are provided and normalize the use of such services instead of creating the perception that their use is isolated to specific learners.

Given the prevalence of nontraditional students in higher education today who are less likely to complete a degree than traditional students (Choy, 2002), providing effective academic support both within the learning context and through academic support services may improve student success. With expanded definitions of academic rigor that no longer demand selection of only the most highly qualified students, Keller (2018) argued that institutions must shift focus from administrative structures and policies to student learning "to place students and their learning as the central priority for institutional decision-making" (p. 92). This shift in priorities would facilitate redesigning procedures to remove obstacles that are not directly related to student learning and enable the provision of resources to support the learning context. As Keller (2018) argued, "Entrenched beliefs regarding quality and prestige will not easily be replaced by a new model" (p. 95). But, when academic rigor is no longer defined as excluding all but the most highly qualified of potential students and is based, instead, on creating an equitable context for all students that facilitates and demands learning, institutions can no longer assume that students entering college are well prepared for rigorous course demands (see also Schnee, 2008). With increased access to a college education, institutions must identify how to make academic support services more effective and resolve why students are not utilizing them to facilitate learning.

Student Learning

Because the cognitive processes underlying learning cannot be directly observed, student learning must be inferred based on assessment information. Indirect measures cannot substitute for direct measures, which are subject to the same validity and reliability concerns as other types of assessment. Faculty-designed assessment artifacts can be leveraged beyond grades to inform revisions to the curriculum, learning context, and academic support services.

As existing research reveals, student learning is measured in a variety of ways, each with its own limitations because any assessment of learning is a proxy measure for cognitive processes that cannot be directly observed. Assessments of learning currently reported in the literature include both indirect and direct measures. Indirect measures of student learning are those that assess some aspect of the curriculum and/or learning context that do not require students to demonstrate any level of mastery of the curriculum. Such measures may include an examination of stated learning outcomes in the absence of any student-produced artifacts and/or tasks that students must complete which are assumed to promote learning but are not measures of actual learning. For example, students' self-reports of the number of lengthy papers written in a course or the number of pages read each week imply that students should be learning from these activities, but these reports do not provide any information on what students learned from the activities. These types of indicators are used in surveys such as the NSSE ("About NSSE," 2019) and the Academic Rigor Index, which assesses the type of coursework students completed in high school (Wyatt, Wiley, Camara, & Proestler, 2010). These indices serve as efficient assessments of the types of learning experiences students have, but they cannot be assumed to reveal exactly what students have learned from the experiences.

Indirect measures also include assessments of students' perceptions of their own learning which is commonly requested on students' evaluations of

teaching; however, reporting these perceptions does not require students to demonstrate any content mastery, and these reports are not an accurate gauge of the actual learning that has occurred. For example, students may feel frustrated, confused, or stalled in the short-term when the learning context involves techniques that are known to support long-term learning (e.g., desirable difficulties described by Bjork & Bjork, 2011), and perceptions based on such experiences are not likely to reflect the recognition of learning that is taking place. In a meta-analysis of research that examined the correlation between self-assessments of learning and actual learning, Sitzmann, Ely, Brown, and Bauer (2010) found that self-assessments of learning are more strongly correlated with affective evaluations (i.e., confidence, satisfaction, and striving) than with cognitive learning (i.e., factual and skill-based knowledge). These authors concluded that "self-assessed knowledge is generally more useful as an indicator of how learners feel about a course than as an indicator of how much they learned from it" (p. 180). Nonetheless, Sitzmann et al. (2010) discovered that a large number of studies across many disciplines interpreted self-assessment ratings as indicators of learning, which fails to acknowledge their moderate correlation with learning and their larger correlations with self-efficacy, reactions, and motivation. In sum, indirect measures such as perceptions are not a substitute for demonstrations of one's knowledge of content and/or process when measuring learning.

Direct measures of learning include artifacts and activities that allow students to produce a product or engage in a process that enables others to infer the information students obtained from the curriculum (i.e., an inference can be made about student learning that is directly supported by what the student is able to do with the content). Direct measures of learning may include students' grades on assignments, test scores, portfolios, demonstrations, and engagement in behaviors gained from the learning context such as those observed in practicum or internship experiences. These direct indicators require students to engage with the curriculum and demonstrate what

they are able to do with it as a result, in part, of having participated in the learning context. However, even these so-called direct measures of student learning are proxy measures that are based on students' behavior as it pertains to the curriculum and the nature of the assessment. Because the neural changes associated with learning cannot (yet) be directly observed at scale, even direct measures of learning involve inferences and are subject to measurement errors associated with the operational definitions used to assess the construct.

Considering direct measures of student learning from a basic research methods perspective makes clear that the operational definitions employed to measure student learning should be critically considered regarding their validity (i.e., how well the measure actually assesses learning) and their reliability (i.e., how much error variance is involved in the measure to cloud the actual learning assessed and how multiple measures may strengthen assessment by reducing error variance). Considering assessment of student learning from this perspective, measures of learning should be explicitly aligned with the intended learning goal of the curriculum and the experiences provided in the learning context (i.e., to address validity of assessment), and multiple measures of learning should be utilized that stem from a variety of operational definitions of learning (i.e., to address reliability of assessment). Reliance on few assessments or a single type of assessment reduces the ability to accurately measure student learning even when direct measures that require students to demonstrate their understanding of the curriculum are used.

When assessing claims of student learning, it is important to distinguish the types of measures utilized. Indirect measures are not equivalent to direct measures, and multiple types of direct measures are needed to support conclusions regarding what students have learned. Because students will be expected to apply their learning to decisions and tasks in the real world (e.g., as citizens and employees), direct measures of their learning that allow them to practice application of the content to real world scenarios are more likely to promote

transfer than measures that are relevant only in the learning context that students will not experience in the real world (Billing, 2007; Wiggins, 1990). Pan and Rickard (2018) noted that "future studies should further investigate testing and transfer in the actual classroom and other learning environments," a call for assessment of learning that is further described below (p. 749).

In addition to being taken into the real world and applied to solve work and life problems, student learning as demonstrated by assessment artifacts can also be used to inform institutional processes including program curriculum revisions, course/ training revisions in the learning context, and improvements in support services for learning. This use of assessment data is advocated by Kuh et al. (2015) who argued,

> evidence of student learning is essential to strengthen the impact of courses, programs, and collegiate experiences; to ensure that students acquire the intended knowledge, proficiencies, and dispositions; to continuously improve teaching and learning; and to document the value of higher education to individuals and society. (p. x)

This perspective frames the assessment of student learning as an essential, internal process driven by faculty members instead of as a mandatory, external process imposed by accreditors or other agencies external to the institution. This framing of assessment decisions by locating them in the context of faculty leadership, participation, and expertise as part of their ongoing job duties assuages concerns regarding the potential for assessment to infringe upon academic freedom (Cain, 2014). Faculty members are already engaged in the assessment of student learning on an ongoing and routine basis, but the use of this information merely to determine an assignment or course grade falls far short of the value this information can provide.

In addition to informing student performance in the immediate learning context, student learning artifacts can reveal revisions that may be needed

to the curriculum at the program level such as strengthening weak prerequisite skills. Mathers et al. (2018) argued that faculty need to define what appropriate standards for student learning are and compare these expectations to student performance. They stated that "Without interpretable gains to compare to expectations, faculty may be unlikely to engage in curriculum enhancement to improve student learning" (p. 1225). Collectively crafting effective assessments and utilizing student learning data in the context of subsequent curriculum discussions can prompt revisions to improve learning.

Evidence of student learning can also be utilized to revise the learning context. Hutchings et al. (2011) argued that faculty members can capitalize on their opportunity to

> treat their classrooms and programs as a source of interesting questions about learning; find ways to explore and shed light on these questions; use this evidence in designing and refining new activities, assignments, and assessments; and share what they've found with colleagues who can comment, critique, and build on new insights. (p. 2)

Explicitly articulating qualities of the learning context allows teachers to craft assessments to examine whether their efforts improve student learning are effective and subsequently leverage the results to make further improvements to the learning context.

This approach does not promote a particular teaching technique, instead fostering habits of systematic inquiry and communication of findings to objectively examine any approach. As such, teacher-crafted assessments of student learning are not synonymous with externally imposed requirements or standardized testing. Instead, this approach fosters open dialogue and identifies new areas of research to improve student learning. With this in mind, teachers can design assessments that will provide useful feedback not only to inform student learning in the immediate context but also to enable course revision for upcoming iterations. For example, assessment artifacts that reflect the process through which they were created may be more informative than those that merely assess what students know as a static snapshot of content mastery.

The lessons that can be learned from student performance on assessment artifacts may also be useful for informing revisions to student support services for learning. Though these services may collect their own data to inform program revisions, student learning artifacts from the learning context may also provide valuable information for improvement. In addition, the potential application of these direct assessments of learning for informing support services should be considered in discussions that extend beyond considerations of curriculum to those that can help align the co-curriculum to support student success.

Conclusion

Considering the broader context in which rigor is situated, this perspective distinguishes academic rigor from other related constructs and allows documentation and assessment of academic rigor that is independent from decisions that are outside of a faculty member's control.

Though student learning is an expected outcome of rigor, it is also affected by student characteristics that are distally or unrelated to the learning context.

Therefore, a definition of academic rigor that is distinct from student learning allows additional information to be leveraged to evaluate the degree rigor is present in the learning context. Support for rigor can come from multiple sources in addition to student artifacts including research-based teaching practices, an examination of course design elements when coupled with an examination of their implementation, and assessment artifacts and their relationship to real world applications of content.

While students are responsible for their learning, faculty members, and institutions more generally, are responsible for the curriculum of their programs and its relationship with the real world, the academic rigor of the learning context in their courses, the assessment of student learning, and how the information obtained from assessing student learning is utilized. Locating academic rigor in the learning context separates it from discussions of mutually negotiated curriculum, enabling faculty members to make choices regarding instructional techniques in the learning context and reducing concerns related to academic freedom. This framework may also provide a context for more intentionally aligning academic support services with the curriculum and activities and interactions in the learning context. Further, it may help supervisors monitor implementation fidelity of the curriculum and assist faculty members in strengthening their learning contexts for the benefit of student learning, the goal of higher education.

Locating academic rigor in the learning context provides teachers the opportunity to examine, revise, and document their work in multiple ways. Teachers can support their techniques with research evidence from the existing literature; survey students on their learning-related activities, perceptions, and attitudes to supplement instruction on an ongoing basis; and most importantly, evaluate the impact that intentional alterations of the learning context have on student learning to improve their techniques. Though some students may choose not to fully engage with the learning context, many will, and best practices in research design can be brought to bear to minimize extraneous variance due to individual differences. Multiple lines of evidence to support teaching-related decisions in support of academic rigor can improve teaching, its assessment, and, ultimately, student learning.

References

About NSSE. (2019, March 15). Retrieved from http://nsse.indiana.edu/html/about.cfm

American Association of University Professors. (2009). *Statement on professional ethics.* Retrieved from the American Association of University Professors website: https://www.aaup.org/report/statement-professional-ethics

American Association of University Professors, American Council on Education, & Association of Governing Boards of Universities and Colleges. (1990). *Statement of government of colleges and universities.* Retrieved from the American Association of University Professors website: https://www.aaup.org/report/statement-government-colleges-and-universities

American Association of University Professors, & Association of American Colleges and Universities. (1970). *1940 statement of principles on academic freedom and tenure with 1970 interpretive comments.* Retrieved from the American Association of University Professors website: https://www.aaup.org/report/1940-statement-principles-academic-freedom-and-tenure

Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses.* Chicago, IL: University of Chicago Press.

Association of American Colleges & Universities. (n.d.). High-impact educational practices: A brief overview. Retrieved September 12, 2019, from aacu.org/leap/hips

Bachman, R. M. (2013). Shifts in attitudes: A qualitative exploration of student attitudes towards efforts of remediation. *Research & Teaching in Developmental Education, 29(2),* 14-29.

Billing, D. (2007). Teaching for transfer of core/key skills in higher education: Cognitive skills. *Higher Education, 53,* 483-516. doi 10.1007/s10734-005-5628-5

Bjork, E. L., & Bjork, R. A. (2011). Making things hard on yourself, but in a good way: Creating desirable difficulties to enhance learning. In M. A. Gernsbacher, R. W. Pew, L. M. Hough, & J. R. Pomerantz (Eds.) *Psychology and the real world: Essays illustrating fundamental contributions to society* (pp. 56-64). New York, NY: Worth.

Cain, T. R. (2014, November). *Assessment and academic freedom: In concert, not conflict.* (Occasional Paper #22). Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment. Retrieved from http://www.learningoutcomesassessment.org/documents/OP2211-17-14.pdf

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin, 140*(4), 980-1008.

Cheatle, J., & Bullerjahn, M. (2015). Undergraduate student perceptions and the writing center. *Writing Lab Newsletter, 40,* 19-26.

Chen, X. (2016). *Remedial coursetaking at U.S. public 2- and 4-year institutions: Scope, experiences, and outcomes. Statistical Analysis Report* (Report No. NCES 2016-405). Washington, DC: National Center for Education Statistics. Retrieved from https://files.eric.ed.gov/fulltext/ED568682.pdf

Choy, S. P. (2002). *Nontraditional undergraduates* (Report No. NCES 2002-012). Washington, DC: National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2002/2002012.pdf

Crede, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on Psychological Science, 3*(6), 425-453.

DePaoli, J. L., Balfanz, R., Atwell, M. N., & Bridgeland, J. (2018). *Building a grad nation: Progress and challenge in raising high school graduation rates.* Retrieved from https://files.eric.ed.gov/fulltext/ED585524.pdf

Duncan, H. E., Range, B., & Hvidston, D. (2013). Exploring student perceptions of rigor online: Toward a definition of rigorous learning. *Journal on Excellence in College Teaching, 24*(4), 5-28.

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. Y. (2017). Psychosocial factors and community college student success: A meta-analytic investigation. *Review of Educational Research, 87*(2), 388-424. doi: 10.3102/0034654316653479

Graham, C., & Essex, C. (2001). Defining and ensuring academic rigor in online and on-campus courses: Instructor perspectives. *Annual Proceedings National Convention of the Association for Educational Communications and Technology, 1-2,* 330-337.

Hechinger Institute. (2009). *Understanding and reporting on academic rigor.* Retrieved from http://hechinger. tc.columbia.edu/primers/Hechinger_Institute_Rigor_Primer.pdf

Honicke, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. *Educational Research Review, 17,* 63-84.

Hutchings, P., Huber, M. T., & Ciccone, A. (2011). *The scholarship of teaching and learning reconsidered: Institutional integration and impact.* San Francisco, CA: Jossey-Bass.

Jaschik, S., & Lederman, D. (2016). The 2016 Inside Higher Ed survey of faculty attitudes on technology: A study by Gallup and Inside Higher Ed. Retrieved from https://www.insidehighered.com/booklet/2016-survey-faculty-attitudes-technology?utm_source=link_newsv9&utm_campaign=item_197870&utm_medium=copy

Keller, C. M. (2018). Reframing rigor: Implication for institutional practice and policy. *New Directions for Higher Education, 181,* 89-96. Retrieved from https://onlinelibrary.wiley.com/doi/full/10.1002/he.20273

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77*(6), 1121-1134.

Kuh, G. D., Ikenberry, S. O., Jankowski, N. A., Cain, T. R., Ewell, P. T., Hutchings, P., & Kinzie, J. (2015). *Using evidence of student learning to improve higher education.* San Francisco, CA: Jossey-Bass.

Labaree, D. F. (1997). Public goods, private goods: The American struggle over educational goals. *American Educational Research Journal, 34*(1), 39-81.

Mathers, C. E., Finney, S. J., & Hathcoat, J. D. (2018). Student learning in higher education: A longitudinal analysis and faculty discussion. *Assessment & Evaluation in Higher Education, 43*(8), 1211-1227.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* Retrieved from the U.S. Department of Education Office of Planning, Evaluation, and Policy Development https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Moon, A., Gere, A. R., & Shultz, G. V. (2018). Writing in the STEM classroom: Faculty conceptions of writing and its role in the undergraduate classroom. *Science Studies and Science Education, 102,* 1007-1028. doi: 10.1002/sce.21454

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology, 39*(1), 30-38.

No significant difference. (2010). Retrieved from http://www.nosignificantdifference.org/

Pan, S. C., & Rickard, T. C. (2018). Transfer of test-enhanced learning: Meta-analytic review and synthesis. *Psychological Bulletin, 144*(7), 710-756. doi: 10.1037/bul0000151

Quality Matters (2019). *QM Rubrics & Standards.* Retrieved from the Quality Matters website: https://www.qualitymatters.org/qa-resources/rubric-standards

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin, 130*(2), 261-288.

Schnee, E. (2008). "In the real world no one drops their standards for you": Academic rigor in a college worker education program. *Equity & Excellence in Education, 41*(1), 62-80. doi: 10.1080/10665680701764502

Schwinger, M., Wirthwein, L., Lemmer, G., & Steinmayr, R. (2014). Academic self-handicapping and achievement: A meta-analysis. *Journal of Educational Psychology, 106*(3), 744-761.

Shields, K. A., & O'Dwyer, L. M. (2017). Remedial education and completing college: Exploring differences by credential and institutional level. *Journal of Higher Education, 88*(1), 85-109. http://dx.doi.org/10.1080/00221546.2016.1243943

Sitzmann, T., Ely, K., Brown, K. G., & Bauer, K. N. (2010). Self-assessment of knowledge: A cognitive learning or affective measure? *Academy of Management Learning & Education, 9*(2), 169-191.

Sparks, D., & Malkus, N. (2013). *First-year undergraduate remedial coursetaking: 1999-2000, 2003-2004, 2007-2008* (Report No. NCES 2013-013). Washington, DC: National Center for Educational Statistics. Retrieved from https://files.eric.ed.gov/fulltext/ED538339.pdf

Truschel, J., & Reedy, D. L. (2009). National survey - What is a learning center in the 21st century? *Learning Assistance Review, 14*(1), 9-22. Retrieved from http://eric.ed.gov/?id=EJ839147

Whitaker, M. (2016). (Re)defining academic rigor: From theory to praxis in college classrooms. *Currents in Teaching & Learning, 8*(1), 4-17.

Wiggins, G. (1990). *The case for authentic assessment* (ERIC Digests ED328611). ERIC Clearinghouse on Tests Measurement and Evaluation. Washington, DC: American Institutes for Research.

Wyatt, J. N., Wiley, A., Camara, W. J., & Proestler, N. (2012). *The development of an index of academic rigor for college readiness* (Report No. 2011-11). New York, NY: College Board. Retrieved from https://eric.ed.gov/?id=ED561023