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The University of California's Use of the iNACOL Standards for Online Classes

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The iNACOL standards for online courses are widely used by educational institutions across the world, including the University of California (UC), which uses them in its formula for determining whether or not a high school course can be used to meet minimum eligibility requirements for admission to the University. To date, however, there has been little research into the quality of the iNACOL standards. Although the developers of the 52 iNACOL standards never prioritized one standard over another, UC has independently determined that 15 of the standards are more important than the remaining 37. This study asked online teachers to rank the 52 iNACOL standards, and results were compared to UC's prioritized list. Results were mixed. Overall, teachers were more likely to endorse UC's 15 "power standards" as being among the most important within different instructional domains than they were to endorse the 37 non-power standards. However, that pattern did not always hold true when each domain was considered separately. Additionally, there were a number of instances of online teachers selecting non-power standards as being more important than power standards. Recommendations for policy improvements appear in the conclusion, based upon the quantitative and qualitative results.

INTRODUCTION

The growth in popularity of online course-taking compels certifying or authorizing organizations to evaluate the quality of online courses to determine the extent to which they compare in rigor and quality to traditional, face-to-face courses. Because of the rapid increase in popularity of online courses, the processes that higher education institutions have used for setting admissions standards have also been somewhat hurried, which was the case in California. If any California student wants to take online high school courses to meet University of California (UC) or California State University (CSU) admission requirements, those courses must meet three criteria, established in 2012 by the UC Board of Admissions and Relations with Schools (BOARS):

1. The course must meet 80% of the 52 iNACOL standards,
2. The course must meet the 15 iNACOL standards that BOARS deemed "power standards," and
3. The course must meet at least 27 of the remaining iNACOL standards.

However, neither the iNACOL standards nor the 15 power standards have been well-validated or examined. BOARS identifies, but does not define, "power standards," and this study assumes that BOARS believes their 15 power standards are the most important of the 52 iNACOL standards. To date, there has been just one scholarly peer-reviewed article that addresses the issue of standard validation for online high school classes (Adelstein & Babour, 2016). Adelstein and Barbour (2016) note that there simply has been no published research regarding the validity of the 52 iNACOL standards. As a first step in addressing this gap, the authors conducted a thorough literature review, attempting to match each of the 52 iNACOL standards to research that would support its validity. The pool of online education literature was so small, however, that they resorted to supplementing their literature review with literature from the fields of face-to-face K-12 classroom pedagogy and adult learner theory. In their conclusion, Adelstein and Barbour note, "The elements [standards] were aligned to current literature in an attempt to begin the process of validating these standards – a process that has never been undertaken, even though the standards have been widely adopted by schools, districts, and even several states" (p. 66).

This study was a response to the gap described by Adelstein and Barbour (2016). Specifically, this study sought to identify the degree to which online high school teachers agree with the primacy of UC's 15 power stan-

dards over the 37 non-power standards, guided by the following research question: To what extent do online high school teachers agree that of the 52 iNACOL standards, UC's 15 power standards are the most important?

LITERATURE REVIEW

This study was concerned with attempting to identify the characteristics of online classes that create high-quality online learning environments and outcomes. One of the most influential theoretical frameworks in this field is the Community of Inquiry (CoI) framework. The CoI framework is based on three *presences* that proponents (Garrison, Anderson, & Archer, 2000) argue high-quality online education is both based on and requires. The three presences of CoI support and overlap to some extent with the 52 iNACOL standards. They note, "While those who are leading the development of this new medium [online education] are convinced of its potential, its effects on the quality of the learning process and its outcomes have not been well studied" (Garrison, Anderson, and Archer, 2000, p. 87). According to Garrison and colleagues, an effective online learning environment, though similar in some regards to an in-person learning environment, is uniquely characterized by three presences: cognitive, social, and teaching. Cognitive presence is encouraged and characterized by the degree to which participants in a non-face-to-face learning environment can establish meaning via ongoing interactions, such as in chat rooms and on discussion boards. Social presence is the degree to which participants in the course are able to convey elements of their own personalities to the learning community. Finally, teaching presence brings cognitive and social presence together. The overlap and interaction among all three elements together constitute the overall educational experience of the learner. These three elements comprise a dynamic process and helps to explain the educational experience as an ever-evolving process (Akyol & Garrison, 2014).

Multiple Types of Standards

A unified approach to education evaluation and assessment and a system by which to judge effectiveness appear almost universally desired. However, multiple types of standards are used throughout education, including content standards, performance standards, program quality standards, and opportunity to learn standards (Smith & O'Day, 1990). Content

standards "…outline the scope and sequence of the academic content a student is expected to learn at each grade level", while performance standards indicate "…a student's progress toward learning that content" (Phillips & Garcia, 2015, p. 2). Program quality standards "…create a framework of clear expectations and a shared vision of quality among multiple stakeholders" (California Department of Education, 2014, p. 5). Finally, McDonnell (1995), cites the Goals 2000: Education America Act, which defines Opportunity to Learn (OTL) standards as

> "…the criteria for, and the basis of, assessing the sufficiency or quality of the resources, practices, and conditions necessary at each level of the education system (schools, local educational agencies, and States) to provide all students with an opportunity to learn the material in voluntary national content standards or State content standards" (p. 312).

While the different types of standards are related to each other, they are distinct, and although there is ample research on content standards (Andrews, Evans, Rose, Hu, Taylor & Whiting, 2015; DeBoer, Ho, Stump & Barlow, 2014; Terrazas-Arellanes, Knox, Strycker & Walden, 2016), there is very little research on OTL standards. Indeed, McDonnell (1995) notes, "Opportunity to learn (OTL) is rare among the many concepts that education researchers use to depict the complexity of the schooling process" (p. 305).

Despite the apparent rarity of OTL standards, there is evidence that they are especially beneficial when viewed through an equity lens. Porter (1995) reports that his interest in OTL standards has to do with "…quality-of-life basics…" (p. 25) and that OTL standards are concerned with "…the direct antecedents of learning…" (p. 25) or the circumstances that must be in place before high-quality learning can take place. This research effort responds to Porter's (1995) warning that OTL standards need to be backed by research, and not just policymaker opinion.

Although this project focuses on iNACOL's OTL standards, the majority of the research cited in the literature reviewed below is gleaned from content standards. The distinction is confounded by the fact that Ainsworth's (2003, 2013) notions of Power Standards – the prioritization of a sub-set of a larger group of standards – were developed in response to the explosion in growth of content standards, while BOARS has applied the Power Standards concept to OTL standards. There is evidence to support the position that certain content standards can be prioritized over others, but there is little evidence to either support or refute the notion that OTL standards can be prioritized.

Power Standards

Even before the explosion in popularity of online education, and a decade before BOARS adopted a power standards model for online education, traditional brick-and-mortar schools across the United States were increasingly faced with the challenge of trying to fit student learning outcomes aligned with more and more standards into the school year. In response to this phenomenon, Larry Ainsworth's (2003) *Power Standards* describes the origin of power standards, and provides a theoretical model for schools and districts to emulate and adapt to their particular needs. Faced with an ever-rising number of educational objectives and content standards to meet, teachers found themselves picking and choosing which standards to emphasize, and sometimes sacrificing activities that would result in deeper understanding for their students, in favor of addressing all standards, if only briefly. There is strong evidence supporting the position that the prioritization of standards is preferable to addressing all standards at a shallow level (Carr, Bennett, & Strobel, 2012; Jacobs, 1997; Popham, 2003 & 2009; Reeves, 2001). Ainsworth defines power standards as:

> ...*prioritized* standards which are derived from a systematic and balanced approach to distinguishing which standards are absolutely essential for student success from those that are "nice to know." Power Standards are a *subset* of the complete list of standards for each grade and for each subject. They represent the "safety net" of standards each teacher needs to make sure that every student learns prior to leaving the current grade. Students who acquire this "safety net" of knowledge and skills will thus exit one grade better prepared for the next grade. (p. 2)

These standards necessarily involve making choices about which concepts are the most crucial to learn, and which are of second-order importance. When Ainsworth conducts workshops for schools or districts, he poses this question:

> If you only had two weeks left in the school year to teach students who had just transferred into your class, which would have more long-term value, leverage, and practicality for those students – knowing how to find the area and perimeter of rectangles and triangles or memorizing the formula for finding the area of a rhombus, parallelogram, or trapezoid? (p. 10)

He suggests that knowing how to calculate these values for squares and triangles is more important, and therefore would be a better choice to be considered power standards.

In the decade after *Power Standards* was first published, the Common Core State Standards were implemented, and in working with school districts across the United States, it became clear that the term *priority standards* was more accurate and a more easily understood term than *power standards*. Each standard in a set of standards would be classified either as a priority standard or a supporting standard in the Power/Priority Standards model (Ainsworth, 2013).

Some educational analysts argue that prioritization of standards provides much-needed clarity around which standards deserve the most attention. Referencing the American Library Association's work on Information Literacy standards, Hofer, Townsend, and Brunetti (2013) present a cogent argument for standard prioritization, noting a major flaw in recent revisions to standards in Information Literacy is that standards prioritization was expected to address: "...the [previous] revision plan glosses over a key problem with the current document: It does not fulfill the basic function of providing guidance to instructors in prioritizing what to teach" (p. 110). They highlight the common problem of overload caused by too many standards, and advocate for an approach that identifies and prioritizes

> ...the meaningful, difficult concepts that underlie seemingly straightforward content. They take care of the Goldilocks problem by placing our instructional content in its proper order: Details naturally fall into place underneath threshold concepts in a way that highlights how they are interrelated. (p. 110)

One of the benefits of prioritization efforts is that "...the content of information literacy will provide essential support for efforts in curriculum mapping and the development of credit courses" (p. 113). They conclude with the observation that their proposed revisions prioritize the standards in a way that the current system does not.

Interestingly, power standards were originally intended to be used for specific *learning objectives*, on a grade by grade basis. It appears the BOARS committee adapted the power standards concept for *teaching principles* as well. This innovative use of the power standards concept has not yet been evaluated, and it remains unclear whether commonly accepted principles of teaching best practice can be prioritized in the same way that, say, grade level-specific content standards can be prioritized. This concern leads us to a discussion of the challenges around establishing the quality of the standards.

STUDY DESIGN AND METHODS

To better understand online teacher perception of the prudence of prioritizing certain iNACOL standards over others, we designed and administered a survey that required participants to rank the iNACOL standards. In this section of the article, we discuss our procedures for creating and administering the survey, our method for analyzing the data, and provide simple descriptive statistics for the sample set.

Survey Procedure

The main section of the administered survey presented online teachers with the full set of standards in two of the five domains—Content, Instructional Design, Student Assessment, Technology, and Course Evaluation and Support (iNACOL, 2011). The two domains were randomized across participants so that each domain was addressed by roughly the same number of respondents. It would not have been realistic to ask each respondent to address all five domains. Within each domain, each respondent was asked to select the two standards that they considered most important. They were asked to select an additional two standards to create a "top four" list; each of the five domains has between two and four standards designated as power standards. Finally, respondents were asked to slate two standards as the "bottom two" standards, which they consider the least important. Respondents were not required to sort within these broad categories; that is, they did not need to pick which of the top two standards was the single most important. This design was meant to reduce burden on respondents. The Qualtrics logic was was set up to present a respondent with the questions from only two randomly selected domains out of the five possible domains.

An additional section of the survey requested background information on participants. Background information included data related to years of teaching experience (total), years of teaching experience in online settings specifically, subjects they teach (Math, English Language Arts, etc.), ethnicity, and gender. Finally, survey respondents were asked about their thoughts on the legitimacy of ranking iNACOL standards. Respondents were not informed that the iNACOL standards were never intended to be prioritized; this question was intended to obtain unbiased opinions from respondents regarding the BOARS Power Standards selection process, paralleled by the ranking exercise the respondents themselves just participated in.

The survey was distributed via Qualtrics, and the results were imported into Stata/IC 14.2 for analysis.

Measures

Once data was collected, three dichotomous variables (0/1) were created, which indicated whether an individual ranked each standard in the top two, top four, or bottom two. Next, a dichotomous measure (0/1) was created, indicating whether each standard is a BOARS power standard or not. Using Stata/IC 14.2, t-tests were used to determine the likelihood that a power standard is ranked in the top two, top four, or bottom two, compared to the likelihood for non-power standards.

Data Analysis

A series of t-tests were used to determine whether survey respondents ranked BOARS Power Standards as the most important standards across the entire set of standards and within each of the five domains. T-tests are functionally equivalent to bivariate regressions with dichotomous predictor variables, so the procedure performed can be expressed $TopTwo_{is} = \alpha + \beta PowerSt_s + \varepsilon_{is}$ where the *TopTwo* denotes whether respondent *i* reported that they considered standard *s* one of the two most important in its domain. Then β, the coefficient on *PowerSt*, was used to determine whether Power Standards are more (or less) likely to be ranked as one of the two most important in their domains relative to non-Power Standards. If Power Standards were significantly and positively associated with a top-two rank, this would suggest that teachers' views support the BOARS' power standards model. If there was no relationship, this would call into question whether the BOARS model accurately reflects the standards that teachers consider most important. Conversely, if Power Standards are less likely to be rated in the top two/top four (or more likely to be rated in the bottom two) than non-Power Standards, this would call BOARS' decisions into question more seriously.

Then, within each domain (Content, Instructional Design, Student Assessment, Technology, and Course Evaluation and Support), similar t-tests were conducted. This analysis indicated whether the BOARS formula is better-aligned with expert opinion in some domains than in others.

Sample Description

Of the 176 respondents, many elected not to answer some of the demographic questions. Of those who did respond, however, the majority appear to be white, female online teachers who work in high schools. Almost 70% of respondents were either completely unfamiliar or not very familiar with the iNACOL standards. Overall, respondents tended to have more years of experience teaching face to face than teaching online. The two most common teaching credentials amongst respondents were English and math. The majority of respondents neither worked, lived, nor had students in California.

Finally, all respondents were asked which of the five domains they considered most important, and almost 46% identified Instructional Design. Unexpectedly, just one respondent identified Technology as being the most important of the five domains.

RESULTS

Differences in Ratings of Power vs. Non-Power Standards across All Domains

The Research Question asked, "To what extent do online high school teachers agree that of the 52 iNACOL standards, UC's 15 power standards are the most important?" In order to answer that question, respondents were presented with two of the five domains of iNACOL standards. Two of the five domains were randomly selected for the participant, and the order of each list of standards within a domain was randomized for each respondent. Each respondent was asked to identify which two standards in the domain were the most important (operationalized as *top2*), which two standards were the next most important (operationalized as *top4*), and which two standards were least important (operationalized as *least2*). Respondent selections for top2, top4, and least2 were analyzed using Stata/IC 14.2 in order to determine the likelihood of power standards vs. non-power standards being identified by respondents as top2, top4, or least2. After analyzing the data, it was determined that top4 did not help to further explain teacher perception of the relative importance of the standards, so this result does not appear in the tables that follow. In this section, explanations follow each table. Throughout this study, * is significant at .05, ** is significant at .005, and *** is significant at .001.

Table 1
Overall t-test results for means and p-values

	(1)	(2)	(3)
Outcome	power mean	non-power mean	p-value
Share ranked as			
Top two	0.312	0.184	.000***
Bottom two	0.141	0.195	.005**

Note: Power and non-power means represent the share of power standards and non-power standards ranked as within the top two (most important) and bottom two (least important) standards in their domain. N=1878 responses (collected from 176 respondents).

Table 1, above, presents results of analysis that determines whether power standards are more likely to be identified as being among the top two most important, and whether power standards are more likely to be identified as being among the two least important. Each observation represents whether a given respondent selected a given standard as being in the top two most important or bottom two least important categories. The means in Table 1 indicate the proportion of time that power standards (Column 1) or non-power standards (Column 2) were ranked as among the top two (most important) or bottom two (least important) by respondents. Column 3 gives p-values associated with a t-test of whether power standards and non-power standards are differentially ranked as being among the top two or least two important standards as described in the equation above.

Power standards were selected by respondents as being among the top two most important standards approximately 31% of the time, while non-power standards were selected by respondents as being among the top two most important standards approximately 18% of the time. This difference was highly significant ($p<0.001$). The converse was true as well: respondents were significantly more likely to rank non-power standards as among the least important (19.5% of the time) compared to power standards (14.1% of the time, p-value for difference<0.01). The overall pattern of results suggests that online teachers tend to generally agree that the power standards are more important than the non-power standards.

These results, however, are based on the initial analysis that did not account for clustered standard errors. If respondents are presented with ten choices and they pick two, they are not picking one out of ten each time; their second choice is picking one out of nine. To account for clustered stan-

dard errors, regressions were run using Stata. For the most part, the degree of significance does not change, but in a few cases it does. The results of the regression analysis are reported as footnotes.

Agreement With Power Standards Across Domains

Table 1 above provides overall results for all 52 iNACOL standards, but as the iNACOL standards are divided into five distinct domains, it seemed important to know if the overall findings matched the individual domain findings. That is, although the overall results showed that respondents were significantly more likely to identify power standards as being in the top two (most important) and non-power standards as being in the bottom two (least important) categories, it was unknown if that finding was universal across all five domains. In the following sections, each iNACOL domain (and its accompanying power standards) is examined in light of the overall findings from Table 1.

Finally, in the following tables, the results for the bottom two (least important) standards are omitted to allow for a more parsimonious presentation of results.

Content domain standards.

Table 2

Content standard results for means and p-values

Content Domain	power mean	non-power mean	p-value
Share ranked as			
Top two	0.222	0.142	0.058
N	n=99	n=330	

Note: Power and non-power means represent the share of power standards and non-power standards ranked as within the top two (most important) standards in the domain.[1]

When examining the Content Standards only (Table 2), respondents were more likely to identify power standards as being among the top two (22% vs. 14%). Although this pattern of results aligned with the overall findings (Table 1), the Content Standard differences were not statistically

[1] p-value with clustered standard error: 0.106.

significant at conventional levels; the difference approached marginal significance at a less conservative level ($p<0.10$). In the following table (Table 3), each individual standard in the Content Standards domain is examined.

Table 3

Individual Content Standard means sorted by top two mean

Standard	Top two mean
The course content and assignments are of sufficient rigor, depth and breadth to teach the standards being addressed.	0.485
The course content and assignments are aligned with the state's content standards, common core curriculum or other accepted content standards set for Advanced Placement courses, technology, computer science or other courses whose content is not included in the state standards.	0.424
Information is provided to students, parents and mentors on how to communicate with the online instructor and course provider.	0.242
Course requirements are consistent with course goals, are representative of the scope of the course and are clearly stated.	0.182
The goals and objectives clearly state what the participants will know or be able to do at the end of the course. The goals and objectives are measurable in multiple ways.	0.152
A clear, complete course overview and syllabus are included in the course.	0.152
Multiple learning resources and materials to increase student success are available to students before the course begins.	0.121
The course reflects multi-cultural education and the content is accurate, current and free of bias or advertising.	0.091
Assessment and assignment answers and explanations are included.	0.091
Information literacy and communication skills are incorporated and taught as an integral part of the curriculum.	0.061
Expectations for academic integrity, use of copyrighted materials, plagiarism and netiquette (Internet etiquette) regarding lesson activities, discussions and e-mail communications are clearly stated.	0.030
Privacy policies are clearly stated.	0.030
Online instructor resources and notes are included.	0.030

Note: Top two mean represents the share of respondents ranking each standard as within the top two (most important) standards in the domain.

In Table 3 (above), each Content Standard is reported, along with the share of respondents ranking the standard among the top two most important. Standards are listed by the frequency of endorsements within the domain. The standards most frequently ranked in the top two are listed first.

The three power standards identified by BOARS appear in **bold type**. The most highly ranked standard ("The course content and assignments are of sufficient rigor, depth and breadth to teach the standards being addressed.") was ranked among the top two approximately 49% of the time, suggesting relatively strong alignment between BOARS and respondent endorsement of that specific standard as being important. However, the two remaining power standards ("The course reflects multi-cultural education and the content is accurate, current and free of bias or advertising," and "Assessment and assignment answers and explanations are included.") were only ranked among the top two by respondents approximately 9% of the time each. There are six non-power standards that were more likely to be identified by respondents as being among the top two than the two low-ranked power standards. There are, however, four more non-power standards that were ranked lower than the low-ranked power standards.

In attempting to determine online teacher motivations for selecting standards that differed from those BOARS committee selections, a few hypotheses seem plausible. Regarding the respondents' second-ranked standard ("The course content and assignments are aligned with the state's content standards, common core curriculum or other accepted content standards set for Advanced Placement courses, technology, computer science or other courses whose content is not included in the state standards."), it is potentially useful to observe that the voting BOARS committee members are all faculty members who enjoy the academic freedom that comes with tenure at the University. By contrast, K-12 teachers are held to external state standards, perhaps making those standards more salient for K-12 teachers. Further, university professors are only tangentially affected by the relatively new Common Core State Standards in that the professors eventually have students in their classes who were taught (ostensibly) by teachers attempting to implement the Common Core State Standards. Online teachers, however, are most likely keenly aware of the importance of the Common Core State Standards.

Respondents' third most important standard ("Information is provided to students, parents and mentors on how to communicate with the online instructor and course provider.") seems well-aligned with the experiences of those working with minors; every K-12 teacher deals not just with students on a daily basis, but with parents too. Parents play a much larger role in their minor child's education in high school than they do in their adult child's education at University. If the BOARS committee was considering the standards from their daily experience of generally not needing to email and call a student's parents on a daily basis, perhaps that is one explanation

as to why online teachers prioritized that standard higher than the BOARS committee.

The BOARS committee may have selected "The course reflects multicultural education and the content is accurate, current and free of bias or advertising" as a power standard because of the high value placed on multiculturalism and diversity at the University. This is not to say that multiculturalism and diversity are not valued at the K-12 level, but University students tend to do an excellent job of highlighting the importance of multiculturalism and diversity on UC campuses, which may have brought those topics to the forefront of the BOARS committee's lived experiences on their campuses.

Instructional design domain standards.

Table 4

Instructional Design standard results for means and p-values

Instructional Design	power mean	non-power mean	p-value
Share ranked as			
Top two	0.269	0.223	0.287
N	n=156	n=273	

Note: Power and non-power means represent the share of power standards and non-power standards ranked as within the top two (most important) standards in the domain.[2]

In Table 4 (above), results for the Instructional Design Standards are reported. In this domain, respondents were more likely to identify power standards as being among the top two (27% vs. 22%). The direction of these findings aligns with the overall findings, but the differences were not statistically significant. The individual standards within the Instructional Design domain are considered in Table 5 (below).

[2] One concern is that these standard errors are not technically independent of each other; there is some dependency within individuals for what they are ranking. To check on if that made a difference, I went back and ran regressions with clustered standard errors. For the Instructional Design Standards, the p-value became 0.281.

Table 5

Individual Instructional Design standards sorted by top two mean

Standard	Top two mean
The course provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways.	0.410
The course is organized by units and lessons that fall into a logical sequence. Each unit and lesson includes an overview describing objectives, activities, assignments, assessments and resources to provide multiple learning opportunities for students to master the content.	0.359
The course instruction includes activities that engage students in active learning.	0.359
The course design provides opportunities for appropriate instructor-student interaction, including opportunities for timely and frequent feedback about student progress.	0.282
Course design reflects a clear understanding of all students' needs and incorporates varied ways to learn and master the curriculum.	0.256
Readability levels, written language assignments and mathematical requirements are appropriate for the course content and grade-level expectations.	0.256
The course provides opportunities for appropriate instructor-student and student-student interaction to foster mastery and application of the material.	0.179
The course provides options for the instructor to adapt learning activities to accommodate students' needs.	0.154
The course design includes explicit communication/activities (both before and during the first week of the course) that confirm whether students are engaged and are progressing through the course. The instructor will follow program guidelines to address non-responsive students.	0.154
The course and course instructor provide students with multiple learning paths, based on student needs that engage students in a variety of ways.	0.128
Students have access to resources that enrich the course content.	0.103

Note: Top two mean represents the share of respondents ranking each standard as within the top two (most important) standards in the domain. Table sums to more than 200% due to some respondents selecting more than two standards as being among the top 2 most important standards.

In Table 5 (above), means for the two most important standards are reported for each individual standard in the Instructional Design domain. Power standards are identified by **bold type**. The first power standard in

this domain ("The course provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways.") was the standard most highly-ranked by respondents (41%). The second power standard in the Instructional Design domain ("The course instruction includes activities that engage students in active learning.") was ranked equally with a non-power standard (36% vs. 36%). There were three non-power standards ranked higher than the next power standard (28%, 27%, and 27% vs. 18%), and the last power standard is ranked next-to-last, at 13%. There is one non-power standard ranked lower (10%). Generally, although BOARS and respondents seem to agree on the top power standard, there seems to be little agreement about the rest of the power standards in this domain.

Despite the lack of complete agreement between the BOARS committee selections and respondent selections in this domain, the differences do not seem particularly stark. For instance, the power standard "The course provides opportunities for appropriate instructor-student interaction and student-student interaction" (17.9% top-two endorsement) seems quite close in purpose to a highly ranked non-power standard "The course design provides opportunities for appropriate instructor-student interaction" (28.2%), except that the former incorporates a peer element missing in the latter. Likewise, the low-ranked power standard "The course and course instructor provide students with multiple learning paths, based on student needs that engage students in a variety of ways" (12.8% endorsement) seems quite similar to another highly-ranked non-power standard "Course design reflects a clear understanding of all students' needs and incorporates varied ways to learn and master the curriculum" (25.6% endorsement). Thus, to some extent, the disagreement between BOARS and survey respondents may simply reflect the overlapping nature of some of the standards.

Interestingly, however, none of the power standards really address the sequencing of course materials emphasized by the top-ranked non-power standard ("The course is organized by units and lessons that fall into a logical sequence" (ranked second with 35.9% endorsement). This may be an item for BOARS to consider if it revises its policy.

Student assessment domain standards.

Table 6

Student Assessment standards results for means and p-values

Student Assessment	power mean	non-power mean	p-value
Share ranked as			
Top two	0.386	0.256	0.014*
N	n=132	n=176	

Note: Power and non-power means represent the share of power standards and non-power standards ranked as within the top two (most important) standards in the domain.[3]

In Table 6 (above), findings are reported for the Student Assessment domain standards. Respondents were significantly more likely to identify power standards as being among the top two most important standards in the domain (39% vs. 26%). These findings align with the overall findings (Table 1, above). The results of individual Student Assessment standards are examined in Table 7 (below).

Table 7

Student Assessment standards sorted by top two mean

Standard	Top two mean
Ongoing, varied, and frequent assessments are conducted throughout the course to inform instruction.	0.432
The course structure includes adequate and appropriate methods and procedures to assess students' mastery of content.	0.386
Assessment strategies and tools make the student continuously aware of his/her progress in class and mastery of the content.	0.341
Assessment materials provide the instructor with the flexibility to assess students in a variety of ways.	0.341
Student evaluation strategies are consistent with course goals and objectives are representative of the scope of the course and are clearly stated.	0.295
The grading policy and practices are easy to understand.	0.273
Grading rubrics are provided to the instructor and may be shared with students.	0.114

Note: Top two mean represents the share of respondents ranking each standard as within the top two (most important) standards in the domain.

[3] p-value with clustered standard error: 0.018.

In Table 7 (above), the individual standards in the Student Assessment domain are ranked according to respondent identification of standards judged to be among the two most important. The top three standards in this domain are all power standards, suggesting strong alignment between BOARS and respondent perception of relative importance of the power standards. Notably, however, one power standard ("Assessment strategies and tools make the student continuously aware of his/her progress in class and mastery of the content") was ranked as highly as a non-power standard (34% vs. 34%). Three non-power standards were ranked lower than the lowest-ranked power standard. Overall, however, there appears to be strong alignment between BOARS and respondents.

Technology domain standards.

Table 8

Technology standard results for means and p-values

Technology	**power mean**	**non-power mean**	**p-value**
Share ranked as			
Top two	0.396	0.137	.000***
N	n=96	n=256	

Note: Power and non-power means represent the share of power standards and non-power standards ranked as within the top two (most important) standards in the domain.[4]

In Table 8 (above), results for the comparison of means for standards in the Technology domain are reported. Respondents were significantly more likely to identify power standards as being among the top two most important. These findings parallel the overall findings (Table 1, above). Table 9 (below) considers the Technology Standards individually.

4 p-value with clustered standard error: 0.000.

Table 9

Technology standards sorted by top two mean

Standard	Top two mean
Course materials and activities are designed to provide appropriate access to all students. The course, developed with universal design principles in mind, conforms to the U.S. Section 504 and Section 508 provisions for electronic and information technology as well as the W3C's Web Content Accessibility Guidelines (WCAG 2.0).	0.500
Clear and consistent navigation is present throughout the course.	0.469
Rich media are provided in multiple formats for ease of use and access in order to address diverse student needs.	0.469
The course architecture permits the online instructor to add content, activities and assessments to extend learning opportunities.	0.250
Student information remains confidential, as required by the Family Educational Rights and Privacy Act (FERPA).	0.219
The course accommodates multiple school calendars; e.g., block, 4X4 and traditional schedules.	0.094
The course uses content-specific tools and software appropriately.	0.094
Copyright and licensing status, including permission to share where applicable, is clearly stated and easily found.	0.094
All technology requirements (including hardware, browser, software, etc.) are specified.	0.031
Prerequisite skills in the use of technology are identified.	0.031
The course is designed to meet internationally recognized interoperability standards.	0.031

Note: Top two mean represents the share of respondents ranking each standard as within the top two (most important) standards in the domain. Totals do not add up to 200%, as some respondents selected fewer than two standards and some selected more than two standards.

In Table 9 (above), the individual Technology Standards are sorted according to the likelihood that respondents would rank them as being among the top two. The most highly-ranked standard for survey respondents (50% endorsement) is also a power standard. There is a tie for the second most highly-ranked standard, but one of them is a power standard and the other is not (47% vs. 47%). The third power standard ("Student information remains confidential, as required by the Family Educational Rights and Privacy Act (FERPA)") was ranked lower than a second non-power standard (22% vs. 25%). Six non-power standards were ranked lower than the lowest-ranked

power standard. There appears to be moderate alignment between BOARS and respondent opinion regarding the importance of the Technology domain standards.

Respondents ranked "Clear and consistent navigation is present throughout the course" as one of the most important standards; 46.9% of respondents identified it as one of the two most important standards. BOARS, however, did not select it as a power standard. One possible explanation is that the BOARS committee members typically do not teach online, while respondents were specifically targeted because they teach online. We might expect online teachers to be more familiar with common pitfalls in online education than those who do not work in online education, and it could be that online teachers have seen the negative effects of unclear and inconsistent navigation on their students – effects that face-to-face professors might be unlikely to experience first-hand.

Course evaluation domain standards.

Table 10

Course Evaluation and Support standard results for means and p-values

Course Evaluation	power mean	non-power mean	p-value
Share ranked as			
Top two	0.278	0.194	0.122
N	n=72	n=288	

Note: Power and non-power means represent the share of power standards and non-power standards ranked as within the top two (most important) standards in the domain.[5]

In Table 10 (above) respondents had a propensity to identify power standards as being among the top two, although this difference was not statistically significant. In Table 11 (below), the individual standards in the Course Evaluation and Support domain are examined.

5 p-value with clustered standard error: 0.195.

Table 11

Course Evaluation and Support standards sorted by top two means

Standard	Top two mean
Course instructors, whether face-to- face or virtual, receive instructor professional development, which includes the support and use of a variety of communication modes to stimulate student engagement online.	0.361
The course is updated periodically and re-reviewed every three years to ensure that the content is current.	0.306
Course instructors, whether face-to- face or virtual, are certificated and "highly qualified." The online course teacher possesses a teaching credential from a state-licensing agency and is "highly qualified" as defined under ESEA.	0.306
The provider assures that course instructors, whether face-to-face or virtual, are provided support, as needed, to ensure their effectiveness and success in meeting the needs of online students.	0.306
Students are offered an orientation for taking an online course before starting the coursework.	0.250
The course is evaluated using a continuous improvement cycle for effectiveness and the findings used as a basis for improvement.	0.222
The course provider uses multiple ways of assessing course effectiveness.	0.139
Course instructors, whether face-to- face or virtual, have been provided professional development in the behavioral, social, and when necessary, emotional aspects of the learning environment.	0.111
Professional development about the online course delivery system is offered by the provider to assure effective use of the courseware and various instructional media available.	0.083
The course provider offers technical support and course management assistance to students, the course instructor and the school coordinator.	0.027

Note: Top two mean represents the share of respondents ranking each standard as within the top two (most important) standards in the domain.

In Table 11 (above), the individual standards in the Course Evaluation and Support domain are examined. The most highly-ranked standard is a non-power standard (36%). The next three standards are tied (31%), but only one of them is a power standard. In the middle of the pack (behind four other standards) is the last power standard ("Students are offered an orientation for taking an online course before starting the coursework."), at 25% endorsement. There are five non-power standards ranked lower than the lowest-ranked power standard. There appears to be moderate alignment between BOARS and respondent ranking of power standards in the Course Evaluation and Support domain.

Respondents identified a standard related to professional development as being the most important standard, while BOARS did not consider it to be a power standard. One explanation might be that online teachers are more attuned to the importance of ongoing professional development than traditional University professors.

Summary

Overall in Research Question 1, power standards are more likely than non-power standards to be endorsed as being among the top two most important within their domains, and less likely than non-power standards to be among the two least important within their domains. However, this varies across domains and specific standards, with stronger support for the power standards in the Student Assessment and Technology domains than the other domains.

SURVEY DESIGN LIMITATIONS

One concern in using this survey to guide policy is that the survey design does not precisely reflect the BOARS committee's original task. That is, the BOARS committee's mission required the consideration of all 52 standards, whereas the survey asked teachers to rank the top two and top four within a given domain, considering only two domains at a time. Additionally, the nature of a survey is very different than a deliberative, consensus-oriented decision-making process; a survey respondent expects to spend up to approximately ten minutes working in solitude, while the BOARS committee members expected to spend hours at a time together, with weeks of breaks between meetings, discussing and debating their choices. So, while the survey design attempted to mimic the BOARS process to some degree, it may be that the differences between the survey design and the actual BOARS process are so great that comparison is improbable, if not outright impossible. While this survey can perhaps inform a future revision of the standards, then, BOARS should clearly consider other sources of information in a revision as well.

IMPLICATIONS FOR POLICY AND PRACTICE

New Knowledge and Evidence

As Adelstein & Barbour (2016) noted, there have been no studies to date that attempted to validate the iNACOL standards. As the BOARS power standards are based on the iNACOL standards, we can conclude that no studies have attempted to validate the power standards either. This study is the first attempt to evaluate the quality of the power standards themselves, and the results strengthened the argument for some of the power standards, and also weakened the argument for other power standards. BOARS should reflect on the results of this study, consider the commissioning of further study on the subject, and discuss revising the selection of the 15 power standards.

The results suggest that the 15 power standards could profitably be re-evaluated, since there were several cases where teachers endorsed non-power standards strongly and where those non-power standards were not closely replicated by an existing power standard. But regardless of whether or not BOARS decides to revise the standards, online educators, can still apply any findings to existing and future courses, which should in turn result in improved learner outcomes for students.

Future Research

Future research on the relative importance of the iNACOL standards might take the form of examining the relationship between student grades or other learning outcomes and the degree to which specific courses satisfy the 52 iNACOL standards – or the 15 power standards. Future research should also involve the students themselves. Another set of online learning standards, from Quality Matters (QM), is similar to the iNACOL standards, and eventually, whatever methodologies are developed in pursuing these questions should be applied to the QM standards as well. Finally, future research should examine the different systems by which courses are considered to have satisfied the requirements of a specific standard. UC's current system involves scoring the degree to which a course meets a specific standards on a scale of 0-4, while Quality Matters employs an all-or-nothing system in which a course either fully satisfies the requirements of a standard or it does not. It is unknown at this point whether one method or the other results in a more efficacious course design for learners. However, considering that 46% of survey respondents identified Instructional Design as the most important

domain, and just one respondent identified Technology as the most important domain, one approach might include examining each domain in greater detail, with a focus towards identifying those domains for which online teacher and BOARS perception of standard prioritization are furthest from agreement. While more research is needed, this study offers an important first attempt to evaluate the quality of the iNACOL standards and the power standards prioritized by BOARS. The results of this study provide evidence that policymakers and practitioners can use in the service of both improving instruction in the burgeoning field of online education and providing a bulwark against ineffective online education. Policymakers should use this new evidence in light of policy reforms going forward, and practitioners should revise their practices to incorporate the insights of online teachers regarding which elements are most important in promoting online course quality. Researchers could use this model in a variety of local contexts, and the study design is flexible enough to accommodate a wide variety of site-specific needs.

CONCLUSION

Overall, online teachers were more likely to identify power standards than non-power standards as being among the most important within a given domain. However, when the 52 iNACOL standards are divided into five unique domains, and the results for each domain were independently considered, the overall pattern of power standard primacy did not hold true across all domains. Further, while online teachers more often than not agreed with the primacy of some power standards, there were many instances of online teachers identifying specific non-power standards as being more important than specific power standards.

Based on the findings of the initial research questions, it would appear that online teachers agree with the primacy of some of the power standards, but disagree with the primacy of others. Instead, online teachers identified some non-power standards that were judged to be more important than some of the power standards, suggesting that updating the list of power standards might be a reasonable next step for the BOARS committee. The assumption that prompted the first research question, that the BOARS standards may be considered by online teachers to be no more worthy of prioritization than the non-power standards, was not supported. Moreover, I found no evidence that online teacher evaluation of the primacy of the power standards would vary with years of experience. Finally, the assumption that online teachers were using the iNACOL standards in their courses was

supported, but individual teacher use of the standards was not always done consciously; that is, many teachers were implementing the iNACOL standards as best teaching practice, without necessarily knowing that the iNACOL standards even existed.

One goal of the investigation was to attempt to identify which standards were the most important, and although more research is needed, it appears that the research design domain did allow the most important standards to be identified, according to the experience and opinions of online teachers. Thus, it would be possible to recommend that the BOARS committee update the power standards to reflect online teacher experience and opinion, emphasizing the most important standards, and relegating the standards of lesser importance to non-power standard status. For example, respondents identified a non-power Content Standard ("The course content and assignments are aligned with the state's content standards, common core curriculum or other accepted content standards set for Advanced Placement courses, technology, computer science or other courses whose content is not included in the state standards") as being the second most-important standard – after a power standard, but the two other power standards in that domain were ranked eighth and ninth in importance. In the Course Evaluation and Support domain, respondents identified a non-power standard ("Course instructors, whether face-to- face or virtual, receive instructor professional development, which includes the support and use of a variety of communication modes to stimulate student engagement online") as being the most important standard.

An alternative path forward, however, might be to evaluate which standards teachers selected as being the most important and ensure that at least one power standard includes the general sentiment of the teacher-selected standards. For example, *professional development* was a recurring theme with teachers, but it might not be necessary to include all three iNACOL professional development standards in the list of power standards.

It is hoped that teachers and administrators in online programs (and their students) will consider these findings, and that future research will provide a deeper understand of the efficacy of the various iNACOL standards.

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