

## **Redesigning the iNACOL Standards for K-12 Online Course Design**

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The research presented created a revised K-12 online course design rubric based off the iNACOL *National Standards for Quality Online Courses*. The redesign was completed in three distinct phases, beginning with a literature review of the iNACOL standards that compared current K-12, higher education, and other related literature to each element found in the standards to test for content validity. Results of phase one showed that the iNACOL standards did match up to current literature. Phase two consisted of an expert panel review of the standards, along with phase one suggestions, over three rounds. Viewing the standards through the specific lens of K-12 online course design, the experts combined, revised, deleted, or kept individual elements. The end result was a revised rubric based off the original iNACOL standards. This revised rubric was field tested against current K-12 online courses in phase three. Four groups of two reviewers used the revised rubric to test the inter-rater reliability. While the overall results of the revised rubric did not meet the reliability threshold for percentages, specific elements did. Future research should consider why certain elements were successful (i.e., phrasing, type of question asked) while others were not. This study could also be replicated with other widely accepted standards to help strengthen or revise expert results.

## INTRODUCTION

For over a century, distance learning has been a factor in the world of education. Distance learning has changed with the technology of the times, shifting from postal mail to telephones to email. At the turn of the century, distance learning transformed yet again, moving the classroom into a virtual setting online. At the time of this study, all 50 states offered some form of an online or blended distance learning opportunity in K-12 (Watson, Pape, Murin, Gemin, & Vashaw, 2014), with an estimated 4.5 million enrollments in online supplemental courses (Gemin, Pape, Vashaw, & Watson, 2015). K-12 school districts continue to grow out their offerings. Both parent and student perceptions of the benefits are continually increasing, resulting in a higher demand for more programs (Project Tomorrow, 2013). This has led to an expansion of credit recovery, dual enrollment, and advanced placement courses (International Association for K-12 Online Learning [iNACOL], 2013).

When online courses were still in their infancy during the early 1990s, modifying design was not a major concern for adaptors, with limited research in the area of K-12 online learning course design (Barbour, 2013; Barbour & Adelstein, 2013a). The research was limited in scope, focusing on specific programs, such as the Electronic Classroom of Tomorrow, Virtual High School Collaborative (VHS) (Zucker & Kozma, 2003), or the Centre for Distance Learning and Innovation (CDLI) (Barbour, 2005a, 2005b, 2007). Many standards in design have come to the forefront. Larger online schools, like the VHS, have developed their own standards for course design. Smaller schools end up relying on the work of educational organizations such as the Southern Regional Education Board (SREB), Quality Matters (QM), the National Educational Association (NEA), the International Society for Technology and Education (ISTE), iNACOL and others. Notably, QM and VHS have at least minimal research published testing the validity (QM, 2005; Zucker & Kozma, 2003). The QM standards, however, are proprietary, which is why educational institutions lean towards publicly available standards, such as those provided by iNACOL. The main drawback to many of these publicly available standards, such as the iNACOL standards, is that they do not have published research supporting their reliability and validity.

The purpose of this multi-phase study was to examine the validity and/or reliability of the iNACOL *National Standards for Quality Online Courses*. In this article, we aim to provide an overview of the complete study and situate it within the larger context (as each of the phases has already been reported – see Adelstein & Barbour, 2016a, 2016b, 2017). We conclude with a summary of findings, as well as comprehensive discussions of the limitations of this study, its implications for practice, and the potential avenues for future research.

## LITERATURE REVIEW

Standards related to K-12 online course design are relatively new, and there is a limited amount of academic literature that only focus on a handful of the different sets of standards. For example, one of the first attempts to create standards comes from the VHS Collaborative. Twenty-nine internet courses or “netcourses” were offered through 27 schools across 10 states for the 1997-98 school year (Kozma, 1998). The VHS teachers were also responsible for the design of the course, which is why teachers were required to take and complete professional development known as the Teachers Learning Conference (TLC). The TLC was offered as a graduate level course that helped set standards and expectations for all instructors in course design (Zucker & Kozma, 2003). To further enforce the standards, the NetCourse Evaluation Board (NCEB) was established in 1998 by the VHS Collaborative. Thirty instructional standards grouped in six distinct areas were set to guide design. Finally, an external expert panel was created to review the content of each course. This expert panel, consisting of six individuals with a variety of educational expertise, spent nearly half a year rewriting the final review standards (Yamashiro & Zucker, 1999). These 19 course quality standards were created in 1999, which were based on the original NCEB standards from the year before (Espinoza, Dove, Zucker, & Kozma, 1999).

The MarylandOnline (MOL) (2013) consortium was established in 1999 to help higher education online programs work collaboratively with like-minded institutions. In 2003, MOL was awarded a three-year grant from the U.S. Department of Education to create a rubric for quality online course design, dubbed QM. In 2005, QM released the first draft of their post-secondary standards supported by available research literature (QM, 2005). These standards accompanied a design rubric that consisted of eight general standard areas, which included:

1. course overview and introduction,
2. learning objectives,
3. assessment and measurement,
4. resources and materials,
5. learner engagement,
6. course technology,
7. learner support, and
8. accessibility (Legon & Runyon, 2007).

Since its inception, updated standards have been continuously compared against both current literature and the Council for Higher Education Accreditation standards for distance learning (Legon, 2006; QM, 2005).

In 2010, QM, working with the FLVS, created their 6-12 rubric – that was later revised in 2013 as the *QM K-12 Secondary Rubric* (Barbour, Clark, DeBruler, & Bruno, 2014). The K-12-specific standards borrowed from those promoted by iNACOL, the Partnership for 21st Century Skills, and the SREB (QM, 2016). Regardless if the course is in the K-12 or higher education environment, for institutions using the QM process, there is a peer review process using the QM rubric that is carried out by certified QM experts after the online course has been created. The QM program continues to this day with nearly 4,000 courses certified through their rubric and review system (QM, 2014).

The SREB was originally formed in 1948 by a joint group of multiple southern states. Their goal of advancing public education began to focus on the online environment in 2006 with the *Standards for Quality Online Courses* report. Working with experts from the 16 SREB states, the standards were created to give guidance in the areas of course content, instructional design, student assessment, technology, and course evaluation and management (SREB, 2006a). Each standard included multiple elements with possible indicators. This coincided with the *Checklist for Evaluating Online Courses* (SREB, 2006b). The checklist used a basic three-point scale (i.e., 1 = meets criteria, 2 = partially meets criteria, and 3 = does not meet criteria) to determine if the course met each element. These two documents would become the basis for the next major non-proprietary set of standards.

The iNACOL *National Standards for Quality Online Courses* is one of the most popular sets of standards currently in use today (Barbour et al., 2014). First released in 2007, iNACOL and their team of experts reviewed the existing online course design standards and chose to base their own standards off the SREB standards from 2006 (iNACOL, 2007); with an addition due to iNACOL's involvement with the Partnership for 21st Century Skills initiative (Berge & Clark, 2009). Since 2007 iNACOL has incorporated feedback, based on reviews from multiple organizations including the California Learning Resource Network and the Texas Agency's Texas Virtual School Network (Smith, Bridges, & Lewis, 2013), to update its existing standards in 2011 (iNACOL, 2011a). The standards – both the original and the updated versions – were used to create a 0-4 rating scale (i.e., absent, unsatisfactory, somewhat satisfactory, satisfactory, and very satisfactory) rubric in five areas of content (i.e., instructional design, student assessment, technology, and course evaluation and support). The current standards have been adopted by a variety of jurisdictions across the country. For example, the State of Michigan uses the standards to review courses offered in a statewide virtual schooling catalogue (Michigan Virtual University, 2016). In a similar fashion, the California Learning Resource Network has used the iNACOL standards as a part of their online course review to determine whether courses meet specific requirements for the University of California (Barbour et al., 2014).

The four organizations described above are certainly not the only players when it comes to online course design standards. However, as described above, not all standards are equally useful to scholars or practitioners. Both the *VHS Course Standards Rubric (Revised)* and the QM standards were developed using various research processes to ensure the validity and reliability of their standards. Further, the QM standards are proprietary – meaning there would be a monetary cost and required formal training if an online course designer wished to use their material. It is therefore not surprising to see K-12 online course designers, schools, districts, and even states look towards the free, non-proprietary standards of iNACOL when considering the adoption of standards for online course design. At present, the list of jurisdictions that have adopted the iNACOL *National Standards for Quality Online Courses* includes Florida, Ohio, Texas, Michigan, and California (Barbour et al., 2014). Yet even with the popularity of the current iNACOL standards, to date there has been no research published that has examined the validity and/or reliability of the standards, or the associated rubric connected to those standards.

## METHODOLOGY

The purpose of this study was to examine the validity and reliability of the iNACOL *National Standards for Quality Online Courses*. When looking to examine the validity and reliability of instruments used to review standards, a variety of studies have generally followed a multi-phase approach that consisted of a literature review, expert review, and field test in real-world situations (Stellmack, Konhein-Kalkstein, Manor, Massey, & Schmitz, 2009; Thaler, Kazemi, & Huscher, 2009). For example, Aladwani and Palvia (2002) began with a review of the literature, followed by an expert review of the rubric elements to test the content validity of their instrument to measure the user-perceived quality of web-based interfaces and applications. In this example, the authors were interested in measuring construct validity and reliability during the field test of the rubric in step two, and finally concluded using a multi-trait/multi-method matrix approach by comparing different rubric user groups. Additionally, Dray, Lowenthal, Miskiewicz, Ruiz-Primo, and Marczynski (2011) used a similar method for testing their survey instrument to assess student readiness to learning in an online environment. The instrument was initially based off a review of literature to test content validity. Next, a survey was given to a panel of experts for review to test content and face validity of the instrument. It was further field tested by participants on both a small and large scale to test translation and criterion-referenced validity. In another example, Walker and Fraser's (2005) development of an instrument to assess distance education learning environments in higher education also utilized a literature review, expert panel, and field testing.

As suggested above, the type of validity and reliability tested varied by study. For example, when examining the validity of the *International Quality of Life Assessment (IQOLA)*, numerous tests were implemented (Gandek & Ware, 1998). These tests included reviewing content validity by testing the IQOLA against previous standards, construct validity using convergent and discriminant validity in a multi-trait/multi-method approach, and criterion validity by comparing the IQOLA against a previously validated instrument that studied the same concepts. Further, to review the *Online Educator Self-Efficacy Scale*, Yang, Hung, and Blomeyer (2013) examined the content validity (i.e., research-based creation of the tool), construct validity (i.e., use of the principle components analysis), concurrent validity (i.e., correlating with other proven instruments), and reliability (i.e., internal consistency). The common theme amongst the studies mentioned was a need to test for both the validity and reliability. The type just depended on what route made sense to the researchers. For this particular study, the researchers undertook three phases consisting of a literature review, expert review, and a field test of the revised rubric.

### Phase One

Phase one tested the content validity of the iNACOL *National Standards for Quality Online Courses* by comparing each element to current literature (see Adelstein & Barbour, 2016a). The process was completed through a basic literature review, a process that Ferdig, Cavanaugh, DiPietro, Black, and Dawson (2009) undertook with the iNACOL (2011b) *National Standards for Quality Online Teaching*. Using the Wayne State University's library and subscribed databases, over a year was spent compiling research from 1996 to 2015. The data was broken into the five main sections of the iNACOL standards, with each of the 52 elements from all subsections listed and compared to the existing research and literature. While K-12 literature was primarily used, higher education and other relevant literature were also applied when K-12 online learning literature did not exist.

### Phase Two

Phase two included three rounds of expert review to further test the content validity of the revised rubric (see Adelstein & Barbour, 2017). McNamara (1996) suggested that experts should be used to develop, determine and test the rubric (as cited by Allen & Knight, 2000). Eight experts in various areas of online education were selected. These individuals made up two separate panels, each of which consisted of a researcher, administrator, designer and teacher – all of whom were directly involved with K-12 online learning. The expert reviews took place over three rounds.

The first round presented the results of phase one and suggestions in rubric form via e-mail. Experts rated each element and phase one suggestion on a 1-3 Likert scale as it pertained to course design. The experts also wrote comments or suggestions of their own. Round two showed the experts the average rating for each element across all panelist, as well as their comments and suggestions. For the elements that were rated poorly during the first round, experts were asked to mark as (K)eep, (D)elete, (C)ombine, or (R)evise. The third round of expert review was conducted via *Google Hangouts* with both expert panels. During this round all of the experts' suggestions, comments and ratings were discussed on elements that had not reached consensus. Finally, the comments and suggestions from the experts were used to create a newly revised rubric specifically for K-12 online course design.

### Phase Three

Phase three saw a rubric based on the revised standards field tested with current online K-12 courses to determine its reliability (see Adelstein & Barbour, 2016b). As Fowler (2009) noted, "reliability ensures that an instrument provides consistent results across comparable situations" (as cited by Dray et al., 2011, p. 32). Four pairs of K-12 online educators were recruited to review the rubric against current K-12 online courses. A sample course and examples were sent to each reviewer. *Google Hangouts* were conducted with the pairs to discuss their sample course rubric ratings and to give reviewers a better sense of direction. Each pair was then assigned five online courses from two different content providers, which were reviewed individually. If the results showed a significant level of agreement, then the rubric would be considered well-designed.

## RESULTS

As this study was conducted in three distinct phases, in the subsections that follow, we describe a literature review that compares the original iNACOL *National Standards for Quality Online Courses* to the existing literature and research (i.e., phase one), followed by a discussion of the three rounds of expert review to create the revised rubric for K-12 online course design (i.e., phase two), and ending with an overview of the field test to measure the inter-rater reliability of the revised rubric (see Appendix A for a copy of the instrument) using current K-12 online courses (i.e., phase three).

## Phase One

Phase one was designed to examine content validity of the iNACOL *National Standards for Quality Online Courses* through a systematic review of the literature through the lens of the existing standards. The results of the literature review showed that the elements were either fully or partially supported by research and literature. Certain standards that described common or broad themes in education, such as stating measurable goals and objectives clearly (i.e., Section A), were discussed in a wide range of K-12 and online literature. Additionally, standards that checked for specific or newer themes – Family Educational Rights and Privacy Act, for example (i.e., Section D) – had to be supported through more traditional K-12 or online higher education literature. It should be noted that the literature review aimed to solely use K-12 online learning literature and research. However, this is still a developing area for K-12 studies and was limited during the review. The use of online learning literature related to adult populations was supplemented in where needed and appropriate. In fact, much of the K-12 literature was focused on a limited number of specific investigations (e.g., evaluations of the VHS, investigations into course with the CDLI and the Illinois Virtual High School, and the development of the ‘Instructional Design Elements of High School Online Courses’ rubric).

While Sections B through E were mainly supported by limited K-12 literature, Section A was supported by a mixture of K-12 and higher education literature. As a process of conducting the review, it became clear that there was redundancy found across certain elements in the standards, as such, certain standards could be consolidated. Additionally, based on the examination of the literature, there were mentions of the relationship found between student motivation, support, and satisfaction. Interestingly, the standards also speak directly about support, both from a technology standpoint or course content, but not in an isolated manner. However, student motivation and satisfaction were implied in certain elements, but neither was a clear focus of any individual standard. Regardless of redundancies and possible omissions, the standards were generally supported by the literature, offering future designers and researchers an adequate starting point.

## Phase Two

Phase two was designed to test content validity through expert review. Sections A and B were highly regarded by the experts, which was not surprising considering the importance given to content and design. Rewording and condensing elements was the main challenge for the experts here. For example, one element originally stated communication to determine student engagement should take place around the first week of the course. The experts weighed in by changing the time frame to “multiple intervals

throughout the course.” Similarly, two other elements, which both focused on items for the instructor, were combined to read, “online instructor resources (e.g., assessment, assignment answers and explanations, notes) are included. Pedagogy behind the resources are shared with instructors.” Section C, faced a similar response. The experts were supportive of the elements, but revisions to the language were required to satisfy the entire group. For example, an element included vague wording, implying that instructors can choose whether to share rubrics with students. Experts took note and change the wording to a definitive “will share.”

However, unlike the earlier sections, Sections D and E were the focus of the greatest amount of discussion, as experts tried to determine what truly fit under the concept of course design. Section D elements on technology were eventually accepted, with only a few minor deletions and revisions. For example, one element dealt with multiple course calendars. Since the experts figured modules designed for a course could be manipulated to fit any type of calendar, an element specifically mentioning this was deemed unnecessary. Section E saw the most revision from the experts. The group fully agreed that the elements pertaining to course evaluation and professional development were important. All the experts agreed, for example, that teachers should be certified as highly qualified as defined by their individual state’s certification process. Yet, it was eventually determined that the majority of the section simply did not pertain to the narrow scope of K-12 online course design. Finally, Section F – which was added based on phase one – asked the experts to consider four additional elements and two revisions based off the findings in the literature review. Three of the elements were moved into appropriate sections (e.g., plan of work and student interests were moved to Section B, technology use was moved to Section D), while the fourth was eliminated. Further, one of the proposed revisions was accepted, while the other was declined.

### **Phase Three**

Phase three was designed to test the inter-rater reliability of the revised rubric. The results of exact matches across all reviewers was at 62.9%, which is below the acceptable percentage for reliability (Neuendorf, 2002). Still, there were lessons to take away. There were individual elements that could be considered reliable, with others that can be improved upon. For example, one element that discussed posting copyrighted materials had a perfect match across all reviewers. Overall, the elements that had an exact match or were only off by one score (i.e., 25%) outweighed elements that differed by two (i.e., 12.1%). The total of exact and off by one elements combined was 87.9%, which would have met an acceptable percentage for reliability.

Interestingly, a number of the elements that had a difference of two scores were not necessarily subjective, but questioned whether the course contained specific items. For example, one element examined the course to determine if “all course materials are available to students at course start,” which the reviewers’ determinations varied wildly. The implication here was that poor course design led to the large discrepancy. For example, one element, which looked for a complete syllabus, all had a low consensus from the reviewers. Elements with some of the highest exact match scores referred to the use of multimedia. For example, elements about the use of rich media or technology helping with self-efficacy had strong exact match numbers amongst the reviewers. It appeared that the visual nature of the topic apparently made it relatively easy for a reviewer to determine the appropriateness of the multimedia used.

## DISCUSSION

Research often has a difficult time reaching classroom teachers for a variety of reasons. While isolation in the class or lack of time are significant factors, it often comes down to the presentation of the material (Parish, 2005). When done in a negative manner or in a way that does not promote the advantages, teachers tend not to act on or adopt research-based practices. However, as Reeves (1995, 1997) noted, researchers at publicly funded institutions have a social responsibility to conduct research into issues that could improve the quality of life or education for individuals. One of the ways in which researchers can seek to ensure their research is socially responsible is to communicate the results of their research directly to practitioners.

As a starting point for educators and designers, the original iNACOL standards are still acceptable to consider using given the alternatives. The elements were generally supported by current literature (Barbour, 2013; Barbour & Adelstein, 2013a), although due to a lack of research in K-12 course design the review used a mix of both K-12 and higher education (Adelstein & Barbour, 2011). One of the issues with the original standards was that not all the elements pertained to design. This can certainly be confusing for a novice course designer or educator looking to improve their course, and for K-12 online learning organizations looking for a way to gauge the quality of their online courses.

A design rubric that has been tested for validity and reliability, and is also strictly based on design, would be beneficial to all stakeholders (Barbour et al., 2014). The revised rubric should also be helpful for those with experience, as it is based on the highly utilized iNACOL standards (iNACOL, 2011a). Finally, if districts and/or K-12 online learning programs are able

to design their own courses, they can potentially avoid the need –and often considerable cost – to lease online content (Barbour et al., 2009). While the leasing model is much easier, it can also be quite costly in the long run and generally prevents teachers from customizing the content to their own contexts and approaches to teaching (Barbour et al., 2014).

## CONCLUSIONS

While Adelstein and Barbour (2016a, 2016b, 2017) provide a summary of the results of each particular phase of the study, as well as implications for practice and suggestions for future research based on the outcomes of that phase, it is also important to consider these aspects from the perspective of the overall study. Phase one compared the iNACOL (2011a) *National Standards for Quality Online Courses* with the current literature in K-12 online education. Since this specific body of literature was limited, literature focused on online learning in higher education and with other relevant populations was used to supplement the literature review. This process showed that the iNACOL standards were indeed aligned with existing literature, although not necessarily with research – and specifically not research into K-12 online learning.

Phase two utilized an expert panel to revise the standards based on the existing document, as well as the results of the literature review from phase one, through the specific lens of online course design over the course of three rounds. For round one, the experts rated and commented on each element, while round two had the experts combining, revising, deleting, or keeping elements based off the round one results. Round three was a final review of the elements conducted electronically through *Google Hangouts*. The experts were thorough across the three rounds of review, forcing much debate over each element. It was challenging coordinating a synchronous session for the final round with each of the expert's personal schedules, but the third round proved to be the most fruitful – with the experts able to openly discuss the elements face-to-face.

The final phase tested the revised rubric against current K-12 online courses. National recruitment for reviewers turned out to be a difficult proposition, as requirements and schedules eliminated many volunteers. After an initial training to standardize the reviewers to using the rubric utilizing a sample online course, the reviewers were organized into groups of two and tasked with independently reviewing five courses with the revised rubric. The reviewers eventually generated online course reviews that allowed the researcher to examine the inter-rater reliability of the revised rubric by comparing differences in scores for each element within the group and across all groups. While the overall results did not meet the reliability threshold

for percentages, many of the individual elements were found to be reliable. This study was a positive first step for research into creating a set of validated standards – and associated rubric – for K-12 online course design.

### LIMITATIONS OF THE STUDY

In phase one, the literature review of the iNACOL (2011a) *National Standards for Quality Online Courses*, the lack of K-12 online course design research quickly became a challenging factor. To supplement, more generalized K-12 online learning literature (i.e., non-research-based) and higher education literature was used. It is important to note that much of the more generalized K-12 online learning literature was produced by ideological proponents of K-12 online learning, and – as such – leaves a lot to be desired in terms of a true measure of content validity. Further, while there are many similarities between teaching and learning with adults and teaching and learning with adolescent and child learners, there are many differences in the two populations in terms of their development and ability to learn (i.e., supports for learning required) – as such, the higher education focus was fairly limited. As a result, the content validity or “support” for numerous elements is somewhat questionable. For example, these questionably supported elements included items that looked to rigor, the use of multiple learning resources, and the inclusion of assessment answers.

Phase two, or the expert review, was limited by time and volunteers. While eight participants meant the suggestions and revisions were done on a smaller scale, the number of experts also made the process of trying to coordinate an online synchronous meeting difficult. The refinement that occurred during the *Google Hangout* was vital to the process. However, it appeared that the 60-90 minute time for this session limited the potential to really drill into and refine some of the elements.

In much the same way, phase three was limited by the number of reviewers and the number of courses to be reviewed. The small number of groups and course providers meant a limited number of courses in select content areas and grade levels were reviewed. This hampered the ability to calculate inter-rater reliability through kappa and other statistical procedures. With a limited number of courses being reviewed by each reviewer, as well as only using two course providers for the research, there was a high chance that an element was going to receive the same score across all courses. As such, there was an expectation that courses from the same provider would be similar, especially with elements that measured a legally required item. For example, if one course from a particular provider mentioned compliance with Family Educational Rights and Privacy Act, then every course from that same provider was likely to receive a three, or ‘fully applied,’ for

that specific element. This turns the individual rater into a constant, making the use of kappa impossible. Using percentages was appropriate, but it became more challenging to determine bias and chance (i.e., something that the kappa procedure takes into account, but simple percentages do not). This challenge could potentially be mitigated with the review of additional online courses per each reviewer. The use of additional courses would mean an increase in the number of values per reviewer, along with the added benefit of the reviewers becoming more comfortable with the overall review process and the application of the revised rubric. It should also be noted that phase three was limited by the access to the courses that were supplied. For example, the reviewers did not have access to elementary courses, and were limited to a specific pool of subjects and grades. The small sample of online courses used was not representative of the entire realm of K-12 online learning. A broader range of grade levels and subject areas – as well as simply more online courses – would allow for more data and, ultimately, help overcome some phase three limitations.

### IMPLICATIONS FOR PRACTICE

K-12 online course design research has been shown to be both minimal and limited (Barbour & Adelstein, 2013b). The research that does exist has mainly examined the course design process at specific schools or institutions (Barbour et al., 2014; Friend & Johnston, 2005; Zucker & Kozma, 2003). Therefore, the testing of content validity in both phase one and phase two of the iNACOL (2011a) *National Standards for Quality Online Courses* was the next important step to take. Further, phase three gave future researchers and designers a revised rubric from which to work on and focus solely on online course design.

The work completed has additional benefits for educators, institutions, and researchers involved in K-12 online learning. These benefits range from additional support for individuals designing K-12 online courses to those tasked with reviewing online courses before they are deployed in a K-12 online learning program to researchers who seek a validated set of standards and rubric that is specifically aimed at online course design for K-12 students. The review of the iNACOL standards in phase one implied that each element is tied to current K-12 or related online education literature, giving more credence to the overall standards. By narrowing the focus of the elements in phase two, the revised rubric gave K-12 online course designers and educators a stronger platform to build from. Phase three strengthened the rubric further, with numerous elements showing high levels of inter-rater reliability. Ultimately, the research into the revised rubric gave all stakeholders a new starting point for course design, and with it the hope of improving student achievement.

Looking at specific stakeholders, state programs and educational institutions could take advantage of the focused revised rubric. As online course enrollments rise (Gemin et al., 2015), and laws continue to require states to offer online courses (Michigan Department of Education & Michigan Virtual University, 2015), there is an increased need for online design standards that are both reliable and valid. The revised rubric could provide institutions a more streamlined guide specific to online course design, which would allow for the development and/or review of a quality online course design in a shorter time frame.

Also of note, online K-12 educators want to make sure they are working within the best learning environment for their students. While the iNACOL *National Standards for Quality Online Courses* are generally accepted standards to use for overall course creation (Adelstein & Barbour, 2016a), the use of such broad elements can be difficult for educators to wrap their heads around and pinpoint specific design elements. A smaller revised rubric that was based specifically around agreed-upon design standards would give K-12 educators a more streamlined checklist for their online courses (e.g., Barbour, 2007; DiPietro, Ferdig, Black, & Preston, 2008). This would also allow K-12 teachers to judge their online course design, giving them a clearer direction for possible revisions before the online class begins.

Finally, it is important to look at the intangible implications of the revised rubric. The streamlined design could have time saving benefits for online institutions. Fewer hours spent on design could translate to lower overall costs. In the classroom, a course designed with reliable and valid elements should have a positive impact on student engagement, as the entire point of the design standards is to improve the online environment. With higher engagement levels, it would not be surprising to see an increase in student learning comprehension. For educators, a focused rubric can promote the importance of design, an aspect of online education that, until recently, has been generally ignored. The revised rubric should bring an understanding to a vital part of online student success.

### SUGGESTIONS FOR FUTURE RESEARCH

The current research presented behind the revised rubric can be improved. The review of the iNACOL *National Standards for Quality Online Courses* in phase one supplemented in adult population literature where appropriate and needed. The standards could use a more comprehensive review with solely K-12 literature. This review could be done one section at a time to avoid the length constraints imposed by journals and other publications. This more lengthy review would also allow for the research to have a narrow focus, as reviewing all five sections at once was overwhelming at times.

A repeat of the phase two expert review could benefit from multiple synchronous opportunities to discuss each element in greater detail. While the first two rounds via email were insightful by allowing the experts to gain an understanding of the elements, the face-to-face third round seemingly had a larger overall impact on element revision. However, due to time constraints, the video conference was limited. It appears that the entire process would have been dramatically improved if this synchronous meeting could have occurred multiple times, with each meeting focusing on a single section or a further refinement of the standards.

The revised rubric still needs to be used in a more robust field test across multiple topics and grade levels. The rubric was created to give directions to new online course designers, while still feeling familiar to the experienced reviewer. One possible suggestion to help ensure real-world success would be to create a design team to use the revised rubric to create K-12 online courses. A team approach has worked well for other institutions (Barbour & Reeves, 2009), as educators, support staff and designers worked in tandem to create the overall course. This would give new K-12 online course designers another level of support when using the revised rubric, as the team environment provides a nature cadre of informed colleagues (Barbour, Morrison, & Adelstein, 2014).

The overall result of the revised rubric did not meet the reliability threshold of 80% or 90% agreement (Neuendorf, 2002). However, there were numerous specific elements that did. For further studies, a complete review of all elements would be a logical next step. It is important to review why certain elements worked. Wording and types of questions (i.e., yes/no, bias based, etc.) should be taken into account. Wording of failed elements should also be under consideration, as well as what the element was testing for. Personal bias can strongly influence how a reviewer responds, which is why proper phrasing is important. This process can be done with another expert review similar to what was completed in phase two of this study, with elements being revised, combined, or kept the same. Once completed, another round of phase three activities could begin.

Another possible agenda for future research focuses on phase three, which should be expanded to include more reviewers, as well as more online courses from a wider variety of grade levels, subject areas, and providers to be included in the process. Further, percentages were an acceptable place to begin the study, but their use made it difficult to determine bias and chance. Percentages do not take chance into account, meaning that a high rate of agreement could simply be due to reviewers randomly selecting the same scores and not actually reading through the elements. Additionally, attempts at finding inter-rater reliability are important. An increase in data (i.e., more courses reviewed) would allow for statistical results utilizing

weighted kappa, which would be appropriate for this type of study (Brennan & Hays, 1992). However, it would still be a challenge, keeping in mind that if a reviewer gives a particular element across all online courses reviewed the same score (i.e., all threes), that reviewer becomes a constant and makes the use of kappa procedure impossible.

Other widely accepted standards can be used as the basis for all three phases. The iNACOL (2011a) *National Standards for Quality Online Courses* were specifically selected due to their open and non-proprietary nature. However, the use of other standards would give experts an opportunity to compare the current study with different results. QM, for example, are widely used in K-12 and would be an interesting comparison with iNACOL. It would also be appropriate to examine higher education and consider the use of the Online Learning Consortium's 'Quality Scorecard.' This process could begin with the creation of a crosswalk to understand the level of consistency between the various sets of standards. Areas where there was any level of consistency, this would provide the researcher with the opportunity to compare the specific language of the element – both from their own knowledge, but also from the literature and from the expertise of the panel(s) of experts. If used in tandem with the current study, future research could help strengthen or revise expert arguments for elements deemed vital to K-12 online course design.

Finally, after the further research noted above, the revised rubric should be used to build new courses. While testing against current courses was the logical starting point, the full impact of the revised rubric cannot be determined until it becomes a part of the creation process. A live field test will allow designers and educators to know just how effective the design elements actually are. After the creation and use of the new courses, designers and educators can be interviewed about the process. Student results from new courses can also be compared to other courses that were designed with different standards. The results can then be the basis for further studies, and revisions to the rubric, continually improving the K-12 online course design rubric.

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**APPENDIX A REVISED RUBRIC FOR K-12 ONLINE COURSE DESIGN**

<b>SECTION A: CONTENT</b>	
Element	Further Explanation
<i>Subsection: Academic Content Standards and Assessments</i>	
A1: 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.	The content and assignments for the core courses are explicitly and thoroughly aligned to the credit granting state’s academic standards, curriculum frameworks and assessments. Advanced Placement® courses must be approved with the College Board and other elective courses should be aligned to other nationally accepted content standards such as computer science, technology courses, etc.
A1 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
A2: The course content and assignments are of sufficient rigor, depth and breadth to teach the standards being addressed.	The course components (objectives, assessments, instructional strategies, content, assignments and technology) are sufficiently broad, deep and rigorous such that successful students will have the knowledge and skills required by the standards upon completion of the course.
A2 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
A3: All course materials are available to students at course start.	Before the course begins, students are provided learning resources that are utilized during the online course. These could include textbooks, instructional materials links to browser plugins, and other software, which students must install.
A3 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Course Overview and Introduction</i>	
A4: A complete course overview and syllabus, which clearly states course goals and objectives, are included. Course goals are consistent with course requirements and are measurable in multiple ways.	Within the learning management system the syllabus and overview objectives are present, explicitly stated, and can be easily found by students. The syllabus and overview objectives include: course objectives and student learning outcomes; assignments; student expectations; time requirements; required materials; the grading policy; teacher-student, teacher-parent contact policies; the intended audience; and the content scope and sequence.
A4 Rating (1 = not applied, 2 = partially applied, 3 = applied):	

<b>SECTION A: CONTENT</b>	
Element	Further Explanation
A5: Information is provided to students, parents and mentors on how to communicate with the online instructor and course provider.	Instructor information is provided to students with contact, availability, and biographical information. Information on how to contact the instructor via phone, email, and/or online messaging tools is provided within the contact information. If regular contact with the instructor is required as part of the course, clear expectations for meeting this requirement are posted within the course.
A5 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Legal and Acceptable Use Policies</i>	
A6: The course reflects multi-cultural education, and the content is accurate, current and free of bias or advertising.	The course creates equal educational opportunities for students from diverse racial, ethnic, social-class and cultural groups. The content is up to date, accurate and free of any bias.
A6 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
A7: Expectations for academic integrity, use of copyrighted materials, plagiarism and netiquette (Internet etiquette) regarding lesson activities, discussions, and e-mail communications are clearly stated.	A "Code of Conduct" including netiquette standards, copyright and academic integrity expectations is provided.
A7 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
A8: Privacy policies are clearly stated.	A policy statement is posted on the course provider's website and/or in the learning management system disclosing the organization's information gathering and dissemination practices.
A8 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Instructor Resources</i>	
A9: Online instructor resources (e.g. assessment, assignment answers and explanations, notes) are included. Pedagogy behind the resources are shared with instructors.	Resources and notes, including assessments and access to answers, explanations to aid online instructors in teaching and facilitating the course are included within the learning management system.
A9 Rating (1 = not applied, 2 = partially applied, 3 = applied):	

<b>SECTION B: INSTRUCTIONAL DESIGN ELEMENTS</b>	
Element	Further Explanation
<i>Subsection: Instructional and Audience Analysis</i>	
B1: Course design reflects a clear understanding of all students' needs and incorporates varied ways to learn and master the curriculum.	A variety of instructional and assessment methods, materials and assessments are used throughout the course, which allow students to demonstrate their achievement of the goals and objectives of the course.
B1 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Modules and Resources</i>	
B2: The course is organized by modules. Course design provides students with resources (e.g. alternate assignments, multimedia, simulations) that enrich course content. Each module includes an overview of the key objectives that incorporate a variety of activities, assignments, and resources to provide multiple learning opportunities for students to master the content.	The course is organized by modules that fall into a logical sequence. At the start of each module, an overview is posted describing the activities, assignments, assessments, and resources to be used to complete the key objectives. A variety of activities, assignments, assessments, and resources are used to provide students with different paths to master the content. A wide variety of supplemental tools are clearly identified and readily available as well.
B2 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Instructional Strategies and Activities</i>	
B3: The course instruction includes activities that engage students in active learning.	The course provides multiple opportunities for students to be actively engaged in the content that includes meaningful and authentic learning experiences such as collaborative learning groups, student-led review sessions, games, analysis or reactions to videos, discussions, concept mapping, analyzing case studies, etc.
B3 Rating (1 = not applied, 2 = partially applied, 3 = applied):	

<b>SECTION B: INSTRUCTIONAL DESIGN ELEMENTS</b>	
Element	Further Explanation
<p>B4: The course provides options for instructors to adapt learning activities based on student needs, allowing for the course and instructors to offer learning paths that engage in a variety of ways.</p>	<p>Students are given a variety of activities, assignments, assessments and resources to allow them to successfully master the content. If a student is unsuccessful with mastering a particular concept or is not challenged with the current module, the course content provides the instructor with suggestions they are able to use in order to provide additional remediation activities or alternative assignments. The instructor has access to adapt the course to meet the students' needs by providing additional assignments, resources and activities for remediation or enrichments for the course.</p>
<p>B4 Rating (1 = not applied, 2 = partially applied, 3 = applied):</p>	
<p>B5: The course provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways.</p>	<p>Assignments, activities and assessments provide opportunities for students to elevate their thinking beyond knowledge and comprehension into the realm of analyzing situations, synthesizing information or evaluating an argument. Activities should include open-ended questions and encourage students to categorize and classify information. Opportunities for group work, decision-making and finding patterns should also be included in the course activities.</p>
<p>B5 Rating (1 = not applied, 2 = partially applied, 3 = applied):</p>	
<p>B6: Readability levels, written language assignments and mathematical requirements are appropriate for the course content and grade-level expectations.</p>	<p>The course content should be written at appropriate readability levels for the grade level of the student audience and the grade level should be prominently explained within the course description.</p>
<p>B6 Rating (1 = not applied, 2 = partially applied, 3 = applied):</p>	

<b>SECTION B: INSTRUCTIONAL DESIGN ELEMENTS</b>	
Element	Further Explanation
B7: The syllabus promotes a student plan of work with attainable expectations.	The syllabus provides an academic outline for students in the course, which includes academic expectations at specific intervals.
B7 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
	
B8: Activities are designed to encourage students' individual interests and goals.	The course provides activities and assignments which are broad enough to allow for student connections. The connections are real world, such as personal interests, goals, or situations.
B8 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
	
<i>Subsection: Communication and Interaction</i>	
B9: The course design provides opportunities for appropriate instructor-student interaction, including opportunities for timely and frequent feedback about student progress.	Learning activities and other opportunities are created to foster instructor-student interaction. Students receive timely and frequent feedback on their progress that emphasizes the intended learner outcomes. The feedback is highly individualized, detailed, and recommends specific, individualized improvement, and strategies to encourage continued progress toward mastery.
B9 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
	
B10: The course design includes explicit communication/activities/tools at multiple intervals throughout the course. The instructor confirms whether students are engaged and are progressing through the course. The instructor will follow program guidelines to address non-responsive students.	Instructor-student interactions begin early enough in the course to confirm active participation by all students and continue throughout the course.
B10 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
	

**SECTION B: INSTRUCTIONAL DESIGN ELEMENTS**

Element	Further Explanation
<p>B11: The course provides opportunities (e.g. student-instructor, student-student interaction, student-course content, student-LMS) for mastery and application of the material.</p>	<p>Learning activities and other learning opportunities are developed to foster student-instructor, student-student, and student-LMS interaction. The technology and course content encourage exchanges amongst the instructor and students through email, discussions, synchronous chats, simulations, lab activities and other group projects. Within the grading policy, guidelines defining student participation and expectations are provided.</p> <p>Threaded and/or synchronous discussions are available for developing community, asking and finding answers to questions about the course, and around the content. Access is available to groups or individual students based on the purpose of the activity. Rules, roles, and expectations for the discussion are clear and posted within the discussion forum.</p>

B11 Rating (1 = not applied, 2 = partially applied, 3 = applied):

**SECTION C: STUDENT ASSESSMENT ELEMENTS**

Element	Further Explanation
<i>Subsection: Evaluation Strategies</i>	
<p>C1: Student evaluation strategies are consistent with course goals and objectives, are representative of the scope of the course and are clearly stated.</p>	<p>The strategies used to assess students throughout the course are consistent with and aligned to what is presented in the course goals and objectives document posted within the course.</p>

C1 Rating (1 = not applied, 2 = partially applied, 3 = applied):

<p>C2: The course structure includes adequate and appropriate methods and procedures to assess students' mastery of content.</p>	<p>Assessment types are matched to the level of knowledge being tested. Both formative assessments (that inform and support learning) and summative assessments (that demonstrate mastery) are a part of the course structure. Student-selected assessment options, enabling learners to demonstrate mastery in different ways, are available.</p>
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C2 Rating (1 = not applied, 2 = partially applied, 3 = applied):

<b>SECTION C: STUDENT ASSESSMENT ELEMENTS</b>	
Element	Further Explanation
<i>Subsection: Feedback</i>	
C3: Ongoing and varied quality assessments aligned with course learning outcomes are conducted throughout the course to guide student instruction.	The course provides quality and ongoing formative assessments to check for student understanding and to ensure they are prepared for the next lesson. Initial pre-tests may be provided to assess student readiness.
C3 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
C4: Assessment strategies and tools make the student continuously aware of his/her progress in class and mastery of the content.	Feedback tools and procedures are built into the course to allow students to periodically self-monitor their academic progress.
C4 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Assessment Resources and Materials</i>	
C5: Assessment materials provide the instructor with the flexibility to assess students in a variety of ways.	Multiple versions of tests, test banks and other resources that support alternative evaluation methods are available.
C5 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
C6: Suggested grading rubrics are provided to the instructor. The instructor will share a chosen grading rubric with students.	Rubrics, rationale, and/or characteristics are provided for each graded assignment. The instructor will make the final selection, which will then be shared with the students.
C6 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
C7: The grading policy and practices are easy to understand and clearly communicated to students and parents.	Grading policies and practices are easy to read and clearly defined and may include any penalties that may be assessed to grades and/or extra credit opportunities.
C7 Rating (1 = not applied, 2 = partially applied, 3 = applied):	

<b>SECTION D: TECHNOLOGY</b>	
Element	Further Explanation
<i>Subsection: Course Architecture</i>	
D1: The course architecture permits the online instructor to add content, activities and assessments to extend learning opportunities where applicable.	The instructor of record for the course has access to make additions to the content within the learning management system (LMS). Access should allow the instructor to add content, activities, and assessments, where appropriate. The content from the "original" base course is left unchanged.
D1 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: User Interface</i>	
D2: Clear and consistent navigation is present throughout the course.	The course utilizes consistent and predictable navigation methods. Students can move logically and easily between areas of the course; color, graphics and icons are used to guide the student through the course; and a consistent look and feel exist throughout the course (consistent text, colors, bullets, and heading styles). Minimal training is required to navigate the course.
D2 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
D3: Rich media are provided in multiple formats for ease of use and access in order to address diverse student needs.	Course makes maximum use of the robust capabilities of the online medium and makes these resources available by alternative means (video, CDs, podcasts).
D3 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
D4: Technology is used to help increase self-efficacy of students.	Technology used in the course does not hinder the student's ability to accomplish the academic goals set forth by the syllabus.
D4 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Technology Requirements and Interoperability</i>	
D5: All technology requirements (including hardware, browser, software, etc.) are specified.	All technology requirements (including hardware, browser, software, etc.) are identified in the course description or during the student registration process and specified to students before they begin the course.
D5 Rating (1 = not applied, 2 = partially applied, 3 = applied):	

<b>SECTION D: TECHNOLOGY</b>	
Element	Further Explanation
D6: Prerequisite skills, course tools, and course software are identified and appropriate in relation to the students and course.	All prerequisite technology skills, software, and online tools necessary for the specific class are identified in the course description or during the registration process and are shared with students before they begin the course. Tools should be appropriate, necessary for teaching and/or enriching the lesson, cross-platform and free to the student (or built into the course).
D6 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
D7: The course is designed to meet internationally recognized interoperability standards.	Interoperability technical standards allow sharing content among different learning management systems and ensure sharing of questions, assessments and results with others.
D7 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
D8: Copyright and licensing status, including permission to share where applicable, is clearly stated and easily found.	Course developers or publishers clearly state the copyright and licensing status of all content, including permission to share where applicable. Copyright and licensing information should be readily available, understandable and standardized in terms of use.
D8 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Accessibility</i>	
D9: 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).	Through the use of web accessibility evaluation tools, all web pages required for students to engage in online education (e.g., registration, library, course materials, grade retrieval) are validated to conform to accessibility standards. NIMAS is used to ensure textbooks and other instructional materials are accessible to the visually impaired.
D9 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Resources and Materials</i>	
D10: Student information remains confidential, as required by the Family Educational Rights and Privacy Act (FERPA).	Defined course procedures for reporting grade and student information complies with the Family Educational Rights and Privacy Act (FERPA) <a href="http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html">http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html</a> posted within the course.
D10 Rating (1 = not applied, 2 = partially applied, 3 = applied):	

<b>SECTION E: COURSE EVALUATION AND SUPPORT ELEMENTS</b>	
Element	Further Explanation
<i>Subsection: Accessing Course Effectiveness</i>	
E1: The course provider uses multiple ways of assessing course effectiveness.	A combination of student, instructor, content experts, instructional designer and outside reviewers may be used to evaluate the course for effectiveness. A variety of methods may be used including course evaluations, student completion rates, satisfaction surveys, peer review, teacher and student feedback, and student performance on in-course as well as state or national assessments. University researchers have been encouraged to conduct studies on the effectiveness of the course.
E1 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Course Updates</i>	
E2: The course is evaluated using a continuous improvement cycle for effectiveness. The findings are used to improve and update the course content as needed.	The provider indicates the frequency of course evaluations, whether reviews are conducted internally or externally, and how the provider uses evaluation results to improve courses. Courses should be reviewed to keep the content current, engaging, and relevant.
E2 Rating (1 = not applied, 2 = partially applied, 3 = applied):	
<i>Subsection: Instructor and Student Support</i>	
E3: Technical support and course management assistance are provided to students, the course instructor, and the school coordinator.	Online technical help and support should be available any time. If 24/7 support is not available, support hours are clearly posted within the course or on the online program's website and a maximum response time is noted. Assistance may take the form of Frequently Asked Questions, training resources, mentors, or peer support.
E3 Rating (1 = not applied, 2 = partially applied, 3 = applied):	