Teachers' Basic Knowledge of Reading Instruction: Insights from a Teacher Preparation Program

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Abstract

Effective reading instruction is essential for all students, and especially students with disabilities; however, studies have indicated that both pre-service and in-service teachers lack an adequate knowledge of reading. To ensure adequate teacher knowledge, teacher preparation reform advocates suggest purposeful alignment of teacher preparation curricula, candidate competency standards, and teaching licensure requirements. Instructors in the participating special education program have followed this recommendation by aligning the curriculum of a required developmental reading course to the state's teaching competencies for reading, and assessing the teaching and learning of these competencies through the administration of the Common Assessment of Special Education Teachers-Reading (CAST-R) across all course sections. Findings of this study show that teacher candidate performance on the CAST-R is an accurate predictor of performance on the state test of reading instruction knowledge required for teaching licensure in special education. Implications are discussed.

Effective reading instruction from knowledgeable teachers is essential because children who struggle with reading in early elementary grades are more likely to struggle throughout school (Mather, Bos, & Babur, 2001). Unfortunately, recent

National Assessment of Education Progress (NAEP) data indicate that over 60% of fourth-grade students with disabilities are reading below a basic reading level (National Center for Education Statistics, 2011). A growing body of research indicates that there is a direct relationship between teachers' knowledge and skills about effective literacy instruction and student outcomes (e.g., Darling-Hammond, 2000; McCombes-Tolis & Feinn, 2008; Piasta, Conner, Fishman, & Morrison, 2009). Research suggests that teachers influence student academic growth more than any other single factor, including families, neighborhoods, and schools (Reutzel et al., 2011; Rowan, Correnti, & Miller, 2002). Unfortunately, accumulating research indicates that both pre-service and in-service teachers lack adequate knowledge needed for effective instruction for struggling readers.

A landmark survey completed by 89 in-service teachers revealed a lack of sufficient knowledge about spoken and written language structures, a critical component for teaching struggling readers and readers with learning disabilities (Moats, 1994). Other studies have documented deficiencies in teachers' knowledge about language and literacy development and essential components of reading instruction (e.g., McCombes-Tolis & Feinn, 2008; Washburn, Joshi, & Binks-Cantrell, 2011). To illustrate, a multiple-choice assessment of essential components of reading instruction pertinent for Kindergarten through third-grade was administered to over 2,000 pre-service teachers from 99 universities (Salinger et al., 2010). Participating teachers only answered 57% of items correctly with marked weaknesses on the alphabetic subscale (i.e., information on phonemic awareness and phonics). In 2001, Mather and colleagues surveyed 293 pre-service and 131 in-service teachers about their perceptions and knowledge about teaching reading.

While in-service teachers displayed more knowledge (68%) than pre-service teachers (50%), both groups had insufficient knowledge about concepts related to English language structure, phonics terminology, and language structure terminology.

Research has shown that both pre-service and practicing teachers are often not able to accurately gauge their understanding of critical concepts related to reading instruction. Many teachers overestimate the level of their knowledge (Cunningham, Perry, Stanovich, & Stanovich, 2004; Piasta et al., 2009). Spear-Swerling, Brucker, and Alfano (2005) examined self-perceptions and disciplinary reading instruction knowledge of teachers in a graduate program in relation to their teaching experience and course preparation. Although "high-background" teachers (i.e., several years of experience, teaching credentials, considerable graduate coursework) perceived themselves as more knowledgeable and outperformed "low-background" teachers (i.e., less than a year of experience, obtaining initial licensure) on all five knowledge tasks (general knowledge, morpheme counting, graphophonemic segmentation, syllable types, irregular words), their actual performance on knowledge tasks fell well below expected levels

University Preparation of Teachers of Reading

Learning to teach reading begins with effective teacher preparation within university programs. Although teacher preparation programs are vastly different, disconcerting reports suggest a lack of relevant information in course textbooks (Joshi, Binks, Graham et al., 2009) and a lack of conceptual knowledge of language across faculty who prepare future teachers of reading (Joshi, Binks, Hougen et al., 2009). Joshi, Binks, Graham et al. (2009) conducted a review of 17 university

textbooks to determine the extent to which the texts devoted accurate and detailed components of reading instruction recommended by the National Reading Panel (NRP, 2000). Findings varied across textbooks, but in general, phonemic awareness, phonics, and fluency were given less attention than vocabulary and comprehension, which is particularly discouraging for the preparation of educators working with students with reading difficulties.

Compounding the lack of focus on foundational aspects of reading in texts is the lack of understanding of language concepts of reading across faculty members. In Joshi, Binks, Hougen et al.'s (2009) investigation, 78 university instructors were asked to define and apply language constructs related to reading (e.g., define *phoneme*; identify the number of speech sounds in box), and answer questions related to vocabulary, comprehension, and meta-cognition. Percentages of correct answers by instructors were low across categories: phonology 78.97%, phonics 56.47%, morphology 34.36%, and comprehension 57.5%. Although instructors scored relatively higher on phonology items, researchers noted that 54% of instructors could not recognize the definition of *phonemic awareness*. While instructors performed well in areas of counting syllables, defining some terms (e.g., *phoneme)*, and recognizing initial sounds in words, they had moderate difficulty with open/closed syllables and defining other terms (e.g., *phonemic awareness, morpheme*) and severe weaknesses in identifying speech sounds within words and identifying patterns that govern the use of the letters *c* and *k* in particular positions in a word.

Although teacher preparation and certification/licensure are the strongest correlates of student reading achievement (Darling-Hammond, 2000), there continues to be a lack of alignment of teacher preparation programs to state

certification/licensure requirements. For this reason, teacher preparation reform advocates suggest purposeful alignment of teacher preparation curricula, candidate competency standards, and licensing requirements (Moats, 1999). To accomplish this, states need to identify essential teacher competencies required for effective reading instruction. These competencies can then be assessed through licensure exams, and teacher preparation programs can systematically prepare teacher candidates to meet those competency standards (McCombes-Tolis & Feinn, 2008). In response to reports that teachers lack adequate knowledge of reading instruction, a few states (e.g., California, Massachusetts) have developed separate tests of high level, evidence-based reading instructional knowledge that teachers must pass to obtain licensure (Goodman, Arbona, & de Ramirez, 2008; Stotsky, 2009). For example, prior to obtaining licensure in Virginia, prospective elementary and special education teachers are required to pass a standardized statewide exam designed to assess whether these teachers have the knowledge skills, and abilities needed for entry into a profession where effective reading instruction is essential. This exam was the Virginia Reading Assessment for Elementary and Special Education Teachers (VRA) until July 2011, at which time there was a vendor change for administration of the assessment. A committee of stakeholders from the state with expertise in reading was formed to work with the new vendor to create a new assessment, renamed the Elementary and Special Education Reading for Virginia Educators (RVE) exam, using identical test blueprint specifications for content that had been assessed in the VRA: *Assessment and Diagnostic Teaching, Oral Language and Oral Communication, Reading Development,* and *Writing and Research*.

A Common Assessment for Special Education Teachers: Reading (CAST-R)

Since it is widely accepted that teacher knowledge and skill impacts student performance, Reutzel et al. (2011) assert, "reliable and valid tests of teacher knowledge about reading and writing instruction would assist literacy educators in determining what is most important to teach in teacher education programs and in literacy courses" (p. 206). Such an assessment of teacher knowledge of reading was investigated in the current study. Course leads (professors who oversee course curriculum) at the participating university developed a common assessment called the Common Assessment for Special Education Teachers: Reading (CAST-R). The CAST-R was administered as a final exam across all sections of the special education Language Development and Reading course. This assessment was systematically constructed with items directly targeting content related to all four domains within the state adopted blueprint of evidence-based best practices in reading instruction.

The purpose of the current study was to determine whether pre-service and in-service teachers were knowledgeable about the essential content and skills needed to teach reading effectively. To accomplish this, CAST-R cut scores were determined and used to predict student performance on the VRA. Specifically, the following research questions were evaluated:

- Does students' performance on the CAST-R predict VRA performance?
- What is the relative importance of students' performance on CAST-R domains in the prediction of VRA performance?
- What are the cutting values on CAST-R for prediction of performance on the VRA: (a) failure, (b) 50% chance for success/pass, and (c) 100% chance for success?

In addition, student CAST-R performance was used to determine if individual student characteristics put groups of teacher candidates at-risk for deficiencies in basic knowledge of reading instruction with the following research questions:

- Do student-related variables predict student performance on the CAST-R?
- Do these variables predict student performance on the CAST-R sub-domains?

Method

Setting

This study took place in a university special education program in Virginia consisting of approximately 700 students. Students take traditional on-campus courses (graduate or undergraduate students) or off-campus cohort courses. Cohort students include practicing special education teachers (often with provisional teaching licenses), general education teachers, instructional assistants, or other educators seeking special education licensure. Established off-campus cohorts consist of students employed in surrounding school districts and tend to have larger class sizes to accommodate the needs of the participating school systems. Both on-campus and off-campus courses are provided with the same curriculum and required hours of instruction; however, semester length varies from 5 to 8 weeks in summer, and 10 to 15 weeks in academic semesters. All students in the special education licensure program are required to take the Language Development and Reading course (that addresses critical content knowledge for teaching reading) and pass the VRA prior to applying for their teaching internship.

Participants

Participants were 267 students enrolled in undergraduate (n = 24) or graduate (n = 243) sections of the course. Course sections were on-campus undergraduate or graduate levels (40.4%), or graduate level off-campus (59.6%). Over half of on-campus students and 97% of off-campus students were employed in public schools; however, about three-fourths had less than three years of educational experience. Average class size of on-campus sections was 16.75 (range 8 to 32) and off-campus sections was 20 (range 8 to 33), and classes were taught by full-time (67%) or part-time (33%) instructors. Average age of participants was 30.48 years (range 20 to 65). Participants were predominantly female (79.8%) and ethnicities of participants were: Caucasian (79%), African-American (8.2%), Hispanic (2.6%), Native-American (2.2%), Asian-American (2.2%), or other ethnicities (8.2%). See Table 1 for additional descriptive information.

Measures

VRA. The VRA was a test of basic competency in teaching reading that was administered and scored by the state of Virginia during the period of data collection. Elementary and special education teachers were required to take and pass this test (with a score ≥235) before acquiring a teaching license. Four broad domains were assessed: (a) Domain I: Assessment and Diagnostic Teaching (19-20% of items), (b) Domain II: Oral Language and Oral Communication (19-20% of items), (c) Domain III: Reading Development (39-40% of items), and (d) Domain IV: Writing and Research (17-20% of items). The format for the 3-hour test was approximately 80% multiple-choice (90 items) and 20% constructed-response (four prompts) items.

Multiple-choice items (1 point each) required the test-taker to recall factual information, to think critically, evaluate, and to apply knowledge to scenarios. Constructed-response items (3 points each) measured the extent to which the test-taker demonstrated knowledge and skills important for delivering effective reading instruction within each domain.

CAST-R. The CAST-R had the same domains, percentage of items in each domain, question formatting, and scoring criteria as the VRA. The test was administered as a common assessment in all sections of the course as a final exam beginning in spring 2010. It had 88 multiple-choice and four constructed-response items that addressed VRA content (i.e., state blueprint of minimum competencies for teaching reading). The test was designed to be completed within a 3-hour time frame. For the sample data in this study, Cronbach's alpha estimate of internal consistency reliability was .78.

The CAST-R was collaboratively developed by three researchers with doctoral degrees in special education with an average of 6 years of university teaching experience and who collectively had expertise in elementary and secondary reading and language development. CAST-R items, proportionate to the number of VRA items within each domain, were created using VRA test blueprint guide (www.va.nesinc.com/PDFS/VE_fld001_**testblueprint**.pdf*)*. Specifically, one researcher developed an initial draft of a research question, and then the other two researchers evaluated whether the content of the developed item was important for the entry level teacher, that the question was clearly written, and that there was a single best answer to the question. If an item did not meet these criteria, the researchers revised the item to ensure validity of each question for addressing the

intended sub-domain on the state blueprint.

Background information. Participants self-reported information related to demographics (e.g., age, gender, ethnicity), teaching credentials and experiences (e.g., licensure, years teaching), and educational level (e.g., undergraduate, graduate).

Procedures

Data collection. Prior to CAST-R administration, students were asked to give consent and to provide background information. Researchers obtained student VRA scores reported to the university by the state. Students in all sections of the course took the CAST-R as their final exam. Depending on the availability of computers at the class location, the CAST-R was administered either online or in a paper/pencil format.

Scoring. Tests were scored using SPSS syntax (online exams) or a scantron machine (paper exams). Two independent researchers scored each constructed response using the same 3-point scale rubric for the VRA, and the mean was calculated as the final score.

Results

Prediction of VRA Performance

A simple linear regression analysis was used to determine whether student performance on the CAST-R predicted performance on the VRA. Results indicated that the prediction of VRA scores from CAST-R scores was statistically significant, $F(1, 87) = 107.62$, $p < .001$. The coefficient of multiple determination in this prediction ($R^2 = 0.553$) indicates that 55.3% of the variance in VRA scores was

accounted for by the variance in CAST-R scores.

Next, a multiple linear regression analysis was conducted with VRA scores as the dependent variable and four independent variables represented by CAST-R domains. Under this regression model, the prediction of VRA scores was statistically significant, F (4, 84) =27.09, p<.001. The coefficient of multiple determination (R^2=0.563) indicates that 56.3% of the variance in VRA scores was accounted for by variance in scores for all four CAST-R domains. However, a statistically significant unique contribution to the prediction of VRA scores (.05 level of significance) was found only for *Reading Development* (p<.001). Specifically, the squared part-correlation between VRA scores and *Reading Development*, $(0.319)^2$=0.1018, indicates that 10.18% of the variance in VRA scores is uniquely explained by *Reading Development* scores, controlling for the prediction contribution of the other three subscales.

CAST-R Cut Scores

CAST-R cut scores for prediction of failure on the VRA were determined by computing CAST-R scores for which the conditional distributions of VRA scores in their prediction from CAST-R scores for (a) failing, (b) 50% chance of passing, and (c) passing. The regression equation for prediction of VRA from CAST-R is $\widehat{VRA}$=1.797(CAST-R) +120.675, with standard error of estimate equal to 13.103. The three conditional distributions at the targeted cutting scores are depicted in Figure 1, with their range determined by taking three times the standard error of estimate (3 x 13.103 = 39.309) above and below the predicted VRA values. For example, for students with CAST-R=42, the predicted VRA scores is 196, with their

actual scores ranging from 157-235, as obtained from 196, ±39.309. Table 2 provides the distribution of predicted levels VRA success across demographic variables.

Student Level Variables that Influence CAST-R Performance

To determine whether student-related variables predict student performance on the CAST-R, five multiple regression analyses were used with the dependent variable being the student score on the CAST-R and its four domains, respectively, and the independent variables being four demographic variables: class size, gender, ethnicity, and location. Additional demographic variables were initially considered as potential independent variables, but they were not used as their correlations with the dependent variables were not statistically significant, namely: age, certification, public school teaching experience, years teaching, general curriculum, course section, course length, and instructor.

The results from the five multiple regression analyses are summarized in Table 3. Class size, gender, ethnicity, and location provided statistically significant prediction for each of the five dependent variables—the student scores on the CAST-R and its four domains ($p<.001$)— explaining 21.3%, 13.2%, 10.4%, 18.9%, and 16.4% of the respective variance of these dependent variables. Statistically significant unique contributions to the predictions were provided by (a) *class size* and *gender* to the prediction of CAST-R scores and each of its four domains, (b) *ethnicity* to the prediction of CAST-R scores and two domains: Domain 1 and Domain 3, and (c) *location* to the prediction of Domain 1. The magnitude of these unique contributions to the prediction can be obtained by squaring the respective part-correlations reported in Table 3. For example, the squared part correlation between class size and total score on CAST-R, $(0.326)^2=0.1063$, indicates that 10.63% of the variance in CAST-

R scores is uniquely explained by class size (i.e., controlling for gender, ethnicity, and location). Clearly, class size is the relatively most important predictor, with the largest part-correlations with CAST-R scores and each of its four domains.

The positive regression coefficient for gender (in all five regression analyses) shows that females exceed males in predicted CAST-R scores and its four domains. Negative regression coefficients for ethnicity show that White students exceed the other ethnic groups in predicted scores on CAST-R and two domains: Domain 1 and Domain 3. Positive regression coefficients for class size in all five regression analyses suggest that predicted CAST-R scores and its four domains increase with the increase of class size, controlling for gender, ethnicity, and location. While this may contradict the common view that "the smaller the class size, the better," it should be noted that the magnitudes of the increase in the respective predicted CAST-R scores and its domains related to class size are relatively small and, one can say, practically negligible. Furthermore, classes that were school based were also consistently larger in size. Finally, the statistically significant positive regression coefficient for location in the prediction of Domain 1 indicates that, controlling for all other predictors, students taking the course in school based settings outperformed on-campus in predicted Domain 1 scores.

Discussion

Teacher preparation reform advocates have recommended that states create blueprints of effective reading practices and require that teacher licensure exams assess this knowledge, and that teacher preparation programs specifically address the content of the developed blueprints (e.g., McCombes-Tolis & Feinn, 2008). In

isolation, neither recommendation guarantees that demonstrated teacher knowledge will result in effective teaching and sustained use of evidence-based practices in the classroom. However, research has shown that, through teacher preparation, both general and special education teachers can increase knowledge of pedagogy which is necessary if effective instruction for students who struggle in reading is to be provided (Bos, Mather, Dickson, Podhajski, & Chard, 2001; McCutchen & Berninger, 1999).

Therefore, developing minimum competency standards for teaching reading and providing corresponding instruction within teacher preparation programs to address these standards are important steps in this process. Lead instructors in the participating special education program have not only aligned the curriculum of the reading development course with reading competencies in state blueprints and state licensure requirements in Virginia, but they are also assessing the teaching and learning of these competencies through the administration of the CAST-R across all sections of the course.

Teacher Knowledge of Reading Instruction

Some states are beginning to require that teachers not only pass tests of basic competency, but also tests that specifically measure their knowledge of reading instruction (Stotsky, 2009). An assessment during teacher preparation coursework that predicts later performance on the state exam of knowledge of reading instruction is important because it gives an indication of the likelihood that teacher candidates are prepared to fulfill basic teaching licensure requirements. More importantly, this type of assessment is a good benchmark for how teacher candidates and practicing

teachers working towards licensure are progressing toward meeting minimum competencies of knowledge needed to teach reading.

Without specific knowledge of reading instruction, teachers may "misinterpret assessments, choose inappropriate examples of words for instruction, provide unintentionally confusing instruction, or give inappropriate feedback to children's errors" (Spear-Swearling et al., 2005, pp. 267-268). As such, knowledge of literacy concepts is an essential pre-requisite for effective teaching in practicum experiences and employment (Moats, 1999; Piasta et al., 2009). Spear-Swearling and colleagues (2005) have suggested that assessing literacy related disciplinary knowledge as part of pre-service and in-service teacher preparation is an important step in addressing gaps in teachers' knowledge about reading instruction. Findings in the current study show that university student performance on a common assessment is an accurate predictor of performance on a state test of reading instruction knowledge required for teaching licensure.

Evaluating teacher candidate knowledge is not sufficient. This data must also be *used* to improve teacher preparation to teach reading. Because the CAST-R was administered as a common assessment across all sections of the developmental reading course, information obtained has provided lead instructors of the course with important information related to course improvement. After reviewing study outcomes, instructors have used information about student performance overall and on specific sub-domains to make specific improvements to the course such as: revising the custom course textbook, creating online learning modules to accompany the course, and targeting professional development activities for part-time instructors. For example, a series of four online training modules were developed to

reinforce content included in the oral language and oral communication domain of the state reading assessment. Teacher educators use these materials to support their class lectures and/or assign them to be reviewed by students outside of class. Faculty provided all instructors with access to these curriculum supports via Blackboard®, a learning management system. In addition, given that undergraduate students performed slightly lower than their graduate level counterparts, those teacher educators who provide instruction for the undergraduate sections of the course (i.e., PhD students) were targeted for support. Prior to teaching independently, the PhD student instructor would complete a co-teaching experience in order to understand how to structure and sequence a course, prepare students for the state reading exam, evaluate student learning, and effectively use the Blackboard® organization tool. This approach is more targeted and systematic than previous attempts to support instructors of the course, because decisions are directly informed by student performance.

Helping Teachers Accurately Gauge their Knowledge

In addition to providing quality teacher preparation courses, instructors need to make efforts to help teacher candidates accurately gauge their knowledge of critical concepts related to reading instruction. Research has shown that both pre-service and practicing teachers are not accurate in their perceptions about their instructional knowledge (Spear-Swerling et al., 2005; Washburn et al., 2011). Such perceptions can impact efforts towards seeking out and attaining knowledge related to reading instruction. For example, teachers who perceive themselves as more knowledgeable about a topic are less likely to seek out and attain knowledge on that topic (Spear-Swearling et al., 2005). Clearly, this is a problem when teacher perceptions about

their own knowledge are inaccurate. Unfortunately, researchers (e.g., Cunningham et al., 2004) have found that less-experienced, less-credentialed teachers inaccurately viewed themselves as more knowledgeable than more experienced, fully credentialed teachers. This suggests that teachers who lack sufficient knowledge are not likely to recognize it. Therefore, providing teachers with accurate information about their actual knowledge is important for helping teachers be more meta-cognitively aware of what they know and what they do not know.

An important outcome of the work in the current study is that explicit feedback about performance on the CAST-R can now be provided to students enrolled in the Language Development and Reading Course which can give teacher candidates an accurate gauge of their knowledge of the basic concepts needed to teach reading. In the current study, CAST-R cut scores were calculated to indicate a student's chance of passing the VRA. This information was then used to develop a guide to help students interpret their performance and identify strategies for increasing knowledge in critical areas. This guide is now shared with students after taking the CAST-R exam. This feedback allows teacher candidates to make decisions about their preparedness to take the state licensure exam and/or their need for additional coursework. More importantly, it provides them with information about the specific areas where they need to continue to gain knowledge about important reading instruction concepts.

Additional Considerations

Findings of the current study showed that ethnicity, gender, and class size and location, were predictors of students' overall performance on the CAST-R or at least

one of the sub-domains. Findings related to ethnicity might be explained in part by the inclusion of international students within the "other ethnicities" group. In many instances, these students are in the process of learning English and it is unclear how this may have influenced the results. Future investigations should collect additional demographic information about participating teacher candidates so that further explanations of findings might be determined.

Our finding that students performed better in larger classes is misleading. In the participating program, larger class sizes are found in cohort sections where educators are employed in cooperating school districts. Two-thirds of students in both on-campus and off-campus course sections have less than three years teaching experience and all students complete a field-based assignment within the course. However, teacher candidates who are currently employed in school based settings are much more likely to observe and/or apply concepts of reading learned in the course because they are in the classroom every day. Knowledge attainment differences are consistent with research (e.g., Al Otaiba & Lake, 2009) that reports an increase in content learning with fieldwork experiences. It would be logical to infer that increased field experience opportunities may be a factor in the increased knowledge attainment by these individuals.

Implications for Practice

Current study findings have potential implications for other teacher preparation programs that might consider the use of common assessments to improve course instruction and student outcomes in teacher preparation programs. While these results have direct implications for institutions of higher education in states that have

state exam requirements for reading, this process also has the potential for generalization to content in other areas of licensure as well. First, institutions of higher education can identify critical content required by the state for licensure and ensure that courses adequately address this content. Then, a common assessment of critical content of teacher knowledge can be used to provide feedback to teachers that can help them more accurately gauge their knowledge. In addition, information can help lead instructors in providing targeted course improvements including supporting part-time instructors. Such efforts are particularly important in programs that rely heavily on part-time instructors and adjuncts.

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Table 1. *Participant Characteristics*

	On-Campus (*n*=107)	Off-Campus (*n*=160)
Program Characteristics		
Licensure Program	58%	69%
with Master's Degree	73%	93%
Undergraduate Minor	13%	0
Certificate Program	7%	3%
Elective Course	7%	0
Class Characteristics		
Classes with <20	75%	44%
Full-time Instructors	50%	67%
Participant Characteristics		
Hold Teaching License	19%	27%
Seeking Teaching Licensure	64%	69%
Teaching Experience		
Public School Employment	50%	97%
Instructional Assistant	18%	27%
<3 Years Educational Experience	75%	74%
Experience with Students with Mild Disabilities	20%	54%
Interest in working with Students with Mild Disabilities	64%	63%

Table 2. *VRA Success predicted by CAST-R by Demographic Variables*

Demographic	0-50% Chance of Pass *n* (%)	50-100% Chance of Pass *n* (%)	100% Chance of Pass *n* (%)
Gender			
Male	5 (11%)	36 (80%)	4 (9%)
Female	6 (4%)	132 (79%)	29 (17%)
Ethnicity			
White	4 (2%)	136 (80%)	31 (18%)
Other	7 (17%)	32 (78%)	2 (5%)
Instructor			
Full-time	6 (5%)	94 (73%)	28 (22%)
Part-time	5 (6%)	74 (88%)	5 (6%)
Location			
On-campus	6 (7%)	73 (81%)	11 (12%)
Off-campus	5 (4%)	95 (78%)	22 (18%)
Level			
Undergraduate	2 (9%)	12 (77%)	3 (14%)
Graduate	9 (5%)	151 (79%)	30 (16%)
Semester			
Traditional	7 (6%)	85 (76%)	19 (17%)
Alternative	4 (4%)	83 (82%)	14 (14%)
Certification			
Yes	1 (2%)	37 (77%)	10 (21%)
No	10 (6%)	130 (80%)	22 (14%)
Experience			
0-2 years	7 (5%)	112 (81%)	19 (14%)
>2 years	4 (6.8%)	44 (74.6%)	11 (18.6%)

Table 3

Regression of CAST-R Scores on Demographic Variables

Independent Variables	Total Score		Domain 1		Domain 2		Domain 3		Domain 4	
	B (SE)	Part-correlation	B (SE)	Part-correlation	B (SE)	Part-correlation	B (SE)	Part-correlation	B (SE)	Part-correlation
Class size	0.310*** (0.058)	0.326	0.046** (0.016)	0.191	0.047** (0.017)	0.176	0.135*** (0.027)	0.315	0.083*** (0.016)	0.331
Gender (1=Male; 2=Female)	4.007*** (1.214)	0.202	0.810* (0.325)	0.160	1.214*** (0.363)	0.219	**1.127*** (0.552)	0.127	0.856** (.327)	0.165
Ethnicity (1=White; 2=Other)	-4.244*** (1.238)	-0.210	-0.906** (0.331)	-0.176	-0.443 (.370)	-0.078	-2.460*** (0.563)	-0.272	-0.434 (0.333)	-0.082
Location (1=On-campus; 2=Off-campus)	1.582 (0.998)	0.097	0.670* (0.267)	0.161	0.478 (0.298)	1.05	-0.003 (0.454)	0.000	0.436 (0.269)	0.102
	R^2=.213		R^2=.132		R^2=.104		R^2=.189		R^2=.164	
	F=14.18***		F=7.97***		F=6.07***		F=12.229***		F=10.32***	

Note. Statistically significant regression coefficients are in bold.
*p<.05. **p<.01. ***p<.001.

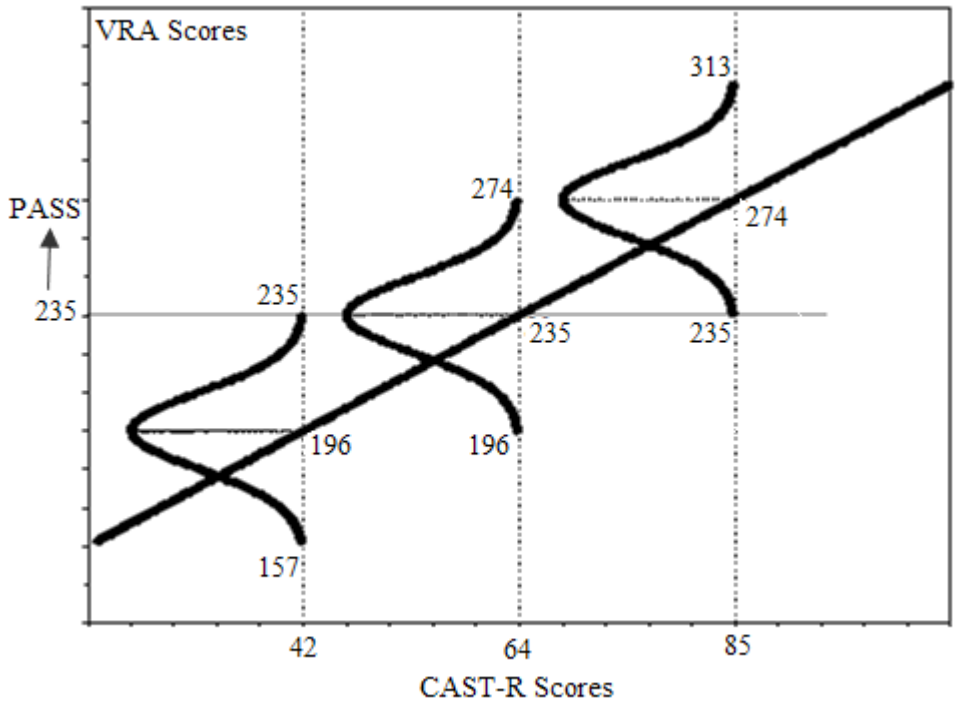

Figure 1. Conditional distributions of VRA scores