STANDARDIZED PREDICTIVE TESTING: PRACTICES, POLICIES, AND OUTCOMES

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The aims of this study were to describe current policy practice related to the use of the HESI™ Exit Exam in schools of nursing and to determine which policies result in higher HESI Exit Scores. Deans and directors of nursing schools that administered Elsevier HESI Exit Exam to students during the 2010 academic year were queried. Data were collected regarding students' HESI Exit Exam results, national nursing licensure examination outcomes, and the schools' standardized testing policies. A stratified random sample of schools and a total of 5438 student records were obtained, 3084 from Associate Degree (AD) and 2354 from Baccalaureate Degree (BD) programs. NCLEX®-RN outcomes were known for all but 316 (5.8%) students. Four standardized exam policy components were related to higher HESI Exit Exam scores. The study confirmed the robust predictive accuracy of the HESI Exit Exam. A national United States sample of BD and AD nursing programs has demonstrated that standardized end of program assessment results are related to faculty implementation strategies and certain policy components. Evidence-based policy strategies should be evaluated longitudinally to support policy decisions.

Keywords: *standardized testing, testing policies, education, NCLEX-RN, HESI Exit Exam, nursing education, nursing, student success*

Nurse educators are using standardized testing, curricular standards and guidelines, as well as the evidence, to guide their educational practice. Helping students remediate in content areas of weakness is one strategy that assists students to succeed. Standardized testing that accurately predicts student success while identifying weak content has become commonplace. Nine previous studies have confirmed that Elsevier's HESI™ Exit Exam remains a highly accurate predictor (96.36 to 99.16%) of NCLEX®-RN success (Adamson & Britt, 2009; Langford & Young, 2013; Launcher, Newman, & Britt, 1999; Lewis, 2005; Newman, Britt, & Launchner, 2000; Nibert & Young, 2001; Nibert, Young, & Adamson, 2002; Young & Willson, 2012; Zweighaft, 2013). Other studies have demonstrated that certain progression policies are associated with exam success. Lauer and Yoho (2013) found that students, in programs with consequences for not achieving the benchmark outcome, scored higher on the HESI Exit Exam. Additionally, they found that students in programs that required remediation also scored higher. Schroeder (2013) found that creating and implementing a testing policy that included a standardized exam resulted in a significantly higher NCLEX-RN pass rate in a group of AD students. Little is known, however, about the effectiveness of policies regarding preparation, remediation, consequences, and retesting in nursing educational programs in regards to outcomes on standardized tests. The purposes of this study were: (a) to describe current policy practice related to the use of the HESI Exit Exam in schools of nursing; (b) to determine if students who attended nursing programs with selected standardized testing policy components scored better on the HESI Exit Exam than students who attend nursing programs without selected standardized testing policy components; and (c) to confirm the predictive accuracy of the HESI Exit Exam.

CONCEPTUAL FRAMEWORK

Standardized testing is a tool that nurse educators use to move students toward goal attainment. Eun, Knotek, and Heining-Boynton's (2008) reconceptualization of Vygotsky's theory of goal attainment is the lens through which the phenomenon of standardized testing is viewed for this study. According to Vygotsky (1978), a learner develops in the zone of proximal development. This zone is the distance between where the learner is initially and where they are once the learning objective has occurred. In the zone, movement from the entry point to the desired development occurs in collaboration with others who are also in the zone and who have the same learning objectives. Vygotsky theorized that the zone of proximal development contains two voices. The first voice comes from the more experienced participant, and the second voice emanates from the less experienced participant (Vygotsky, 1978). Eun and colleague's reconceptualized zone of proximal development includes a third voice. When the learning goal is compatible, the third voice exerts influence through authority to enhance progression through the learning zone towards goal attainment. The process of standardized testing, delivered through nursing faculty, can be used as the third voice in the zone of proximal development to assist faculty in moving students toward achieving basic competence in nursing science. Providing evidence that the use of policy to support standardized testing in order to move nursing students towards success is the focus of this study.

METHODS

Design

An ex post facto nonexperimental design was used to compare NCLEX outcomes and HESI Exit Exam scores of students who attended nursing programs with certain standardized exam policies with students who attended nursing programs without certain standardized exam policies. To describe the basic features of the policy data, frequency tables were generated using SPSS Version 18. Levine's test for Equality of Variances was used with the Independent Samples T-Test in SPSS Version 18 to answer the research question. A Welch's T-test was also used to account for any possibility of unequal variances.

Sample and Participant Selection

After Elsevier's Privacy Officer approval and the university's Institutional Review Board approval was obtained, participating schools of nursing reported school practices, policies, and de-identified student outcomes for the NCLEX-RN. The population consisted of schools that used the HESI Exit Exam as part of their curriculum between September 1, 2009 and August 31, 2010. A random stratified sample was drawn from an enumerated list of all HESI Assessments' Exit Exam customers (i.e., nursing departments/nursing programs), and the list was sorted by the stratifications of baccalaureate degree (BD), associate degree (AD), and Diploma programs. During the same timeframe, the NCLEX-RN reported that 55,414 BD and 81,618 AD sat the licensure exam, and 89% and 87% of the candidates respectively passed (National Council of State Boards of Nursing [NCSBN], 2010). Forty percent of the NCLEX-RN candidates were from BD programs, 59% were AD, and 1% was from Diploma programs.

Deans and directors from 471 randomly selected schools of nursing were invited to participate in the study. The sample design included stratification of schools by the three program types (i.e., BD, AD, Diploma). This matched the distribution of candidates from each program type who took the NCLEX-RN during the study period. A reminder e-mail was sent to non-responders at about two week's post initial invitation to ensure that the information was received. Of the 471 randomly selected programs, deans and directors from 99 (21%) agreed to participate in the study. Of the 99 schools, 64 completed the policy questionnaire and 67 completed the NCLEX-RN outcomes questionnaire, for a program response rate of 65% and 68% respectively. Only 21 diploma programs responded to the policy questionnaire. Because response fell below 30 programs, diploma programs were excluded from the sample. From these 99 schools, 5,438 individual student NCLEX outcomes and HESI Exit Exam Scores were obtained. There were 3,084 students from Associate Degree (AD) programs and 2,354 from Baccalaureate Degree (BD) programs.

The policy data were obtained at the school level, and the success data (HESI Exit Exam Scores and NCLEX-RN results) were obtained at the student level. The students are part of the schools, which were grouped into one of the two categories (with the policy or without the policy). Therefore, not only are the schools independent of each

other, the students within them are as well. The study was not interested in the effect of applying a specific policy to an individual case at an individual school, but rather the global effect of simply having certain policies in place or not. The conceptual framework supports this stance in that it is the voice of authority, in this case policy, which moves the learner through the zone of proximal development, not necessarily the actual experience of the specified consequences for not achieving the learning goal.

Assessments and Measures

Three electronic instruments were used to collect the data: the HESI Exit Exam, the Testing Policy and Practices Questionnaire, and the Licensure Outcomes Questionnaire. Elsevier produced the HESI Exit Exam, and Elsevier's HESI Operating System generated the Licensure Outcomes Questionnaire. The researchers designed the Testing Policy and Practices Questionnaire.

HESI Exit Exam. The HESI Exit Exam is a 160-item comprehensive exam with 10 non-scoring pilot items that do not contribute to the students' scores. The standardized exam is purchased by nursing programs and delivered electronically via a secure server to program computer labs or to testing centers across the United States. The HESI Exit Exam test blueprint mirrors the NCLEX-RN test plan. Questions on the HESI Exit Exam are reflective of the test item formats used by the NCSBN during the study period and include multiple-choice, multiple-response, fill-in-the-blank, hot spot, chart/exhibit, and drag-and-drop (NCSBN, 2010 April). Standard item discrimination data are obtained on each item each time it is used in an exam. No test item is used unless it has a difficulty level of at least 40% and an average discrimination index of at least 0.15 (Langford and Young, 2013). Scores range from 0 to about 1,800 with the 2010 national mean of 823. Internal consistency for the HESI Exit Exam has been examined for each of the previous nine studies and has proved highly stable, with reported KR20 ranging from 0.84 to 0.92. The ability of the HESI exam to predict NCLEX-RN scores has been consistently reported at greater than 90% (Nibert & Morrison, 2013).

Licensure Outcomes Questionnaire. The Licensure Outcomes Questionnaire listed HESI Exit Scores by cohorts at nursing programs and was delivered via password protected e-mail to deans and directors where they noted student outcomes of NCLEX-RN testing (i.e., Pass, Fail, and Unknown). The deans and directors removed student identifying information and returned the questionnaire to the HESI Research Department where a de-identified dataset was built.

Testing Policy and Practices Questionnaire. The Testing Policy and Practices Questionnaire was an investigator-designed instrument covering preparation, consequences, remediation, and re-testing practices. A Survey Monkey platform was utilized and faculty accessed the web-based questionnaire using a private link that was password protected. This 28 item multiple-choice questionnaire with 2 open-ended comment boxes, took approximately 30 minutes to complete.

FINDINGS

The findings of this study indicate that nursing faculty are designing and implementing many different policies for the use of the HESI Exit Exam. Several of these policy components were related to better HESI Exit Exam Scores as well as NCLEX-RN success.

Descriptive Findings

Exit exam policies may contain several common components to assist educators in implementing the exam in a manner that produces the best outcomes for both the student and the program (Lauer & Yoho, 2013; Schroeder, 2013). The details that surround the policy components have evolved over time as educators continue to fine-tune policies surrounding these important assessments. Policies concerning preparation, use as a part of course assessment, use of a benchmark, re-testing, remediation, and consequences were described by the schools in the sample. Fifty-four schools in the study (84.4%) had an exam policy. Of those 54 schools, 37 (68.5%) used 850, and 10 (18.5%) used 900 as the exit exam benchmark. The remaining 13% used a variety of benchmarks from 700 through 950. Achievement of the benchmark was mandatory in 24 (44.4%) of the 54 schools. Thirty-seven (68.5%) schools required students to retest if the benchmark was not met. The number of retests allowed ranged from 1 to 5 (1 time = 15; 2 times = 9; 3

times = 11; 4 times = 1). Retesting occurred anywhere from one day to greater than two months; 26 of the 37 schools required retesting within 2 to 6 weeks of the initial exam. The exit exam was a part of a course requirement in 46 schools (68.7%). Of these, 11 required the exam for course completion, 11 used a pass/fail criterion for the exam, 11 counted the exam as 5-10% of the course grade, 10 counted the exam as 20-30% of the grade, and 3 counted it as greater than 30 % of the course grade.

Preparation plan. Preparation practices are an important aspect of student success for standardized tests in nursing (Frith, Sewell, & Clark, 2005). Standardized exam designers promote exit exam preparation plans. The content of such preparation as well as the policy that surrounds the implementation of the policy is not well defined in the literature. In the study sample, 61% of the schools provided students with an exit exam preparation plan. Of these, 85% required that the students participate in the preparation plan. There were many schools (82%) that planned for a 6-week timeframe for exit exam preparation. Many types of preparation plans were described in the study sample, with self-guided review as the most common policy (see Table 1).

Table 1

Types of Preparation

Types of Preparation (Multiple components used)	Frequency	Percent (N = 39) *
Self-guided review (eg., case studies, study guide, NCLEX type items)	33	85
Faculty guided group review	22	56
Faculty guided individual review	18	46
Formal review (eg., HESI, ATI, Kaplan)	17	44
Peer/mentor tutoring	13	33
Self-guided formal review course (online)	5	13

Note. The total percent exceeds 100% as respondents were permitted to select more than one choice.

Exit exam as course requirement. In the recent literature, there is evidence that faculty are writing policy that includes the use of exit exam scores as part of the curriculum embedded within a required course, usually in a final or capstone course. In the study sample, 67% of the respondent schools used the HESI Exit Exam as a course requirement. Variations in the policies included using the exam for course completion (24%), pass/fail criteria within a course (24%), and with application of conversion score as 5-30% of the course grade (46%) as the most popular policy. Some schools (7%) used the conversion score to represent greater than 30% of the course grade.

Benchmark and re-testing. Previous HESI Exit Exam validity studies (Langford & Young, 2013; Lauer & Yoho, 2013; Young & Willson, 2012) have shown evidence that supports the use of a benchmark score to insure a high probability of student success on NCLEX. In this study, a majority (84%) of schools had a benchmark score in the exit exam policy. The majority of school policies (68.5%) used the 850 score as the benchmark, while 18.5% used the most reliable benchmark of 900. The range of benchmark scores used by schools in the sample was 700-950. While the majority of schools had a benchmark score as part of the HESI Exit Exam policy, few had policy that required students to meet the benchmark (38%). Failure to meet the benchmark was followed by re-testing in 58% of the schools with a benchmark policy. Where re-testing was part of the policy, most schools required students to re-test one time (41%). The range of re-testing attempts that were included in the policies was 1-4 attempts.

Remediation. Remediation plans for students who fail to meet the benchmark may be useful in improving student outcomes (Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003: DiBartolo & Seldomridge, 2005). In the study sample, 64% of the schools required remediation after initial failure to meet the benchmark. Of these, 37% had policy that required proof of participation in remediation. Several types of remediation were identified including formal review courses, self-guided review, and peer/mentor tutoring. Of these, more than 50% used self-guided remediation policies (see Table 2). Many school policies included multiple remediation strategies.

Table 2

Remediation Strategies

Types of Preparation (Multiple components used)	Frequency	Percent (N = 39) *
Self-guided review (e.g., case studies, study guide, NCLEX items)	22	53.7
Tailored self-guided review based on results	20	48.8
Formal review course (e.g., HESI, ATI, Kaplan)	14	34.1
Faculty Guided individual review	14	34.1
Faculty Guided group review	11	26.8
Peer/mentor tutoring	8	19.5
Remediation Course	6	14.6
Self-guided formal review course (online)	5	12.2
Repeat applicable course(s)	2	4.9

Consequences. One of the most difficult aspects of writing exit exam policy is assigning consequences that encourage goal attainment while supporting the learners, the faculty, and administration. In the study sample, more than half of the schools (56%) that had set a benchmark also set consequences for not meeting that benchmark. The top three consequences in order of prevalence were course failure (50%), delay in NCLEX candidacy (24%), and graduation delay (17%). Most schools described the use of more than one consequence (e.g., delay in NCLEX candidacy and graduation). Other consequences that were set in policy included: repeating the applicable course, auditing applicable course, and being removed from the program.

HESI E2 Validity Findings

Nine previous studies have illustrated the predictive ability of the HESI Exit exam by demonstrating that students who score a 900 are highly likely to pass NCLEX-RN. Of the 5,038 students represented in this study, 2,084 (41.4%) scored 900 and above on the HESI Exit exam. Of these, 37 failed the NCLEX-RN, yielding a predictive accuracy of 98.26%, which is consistent with the findings from previous HESI Exit exam validity studies. The predictive accuracy for students attaining a score of 850 remained high at 95.13% (see Table 3).

Table 3

Predictive Accuracy of HESI Exit Exam with NCLEX-RN Exam Results

HESI Exit Exam Score	Student NCLEX Outcome		Predicted Accuracy
	Passed	Failed	
900 and above	2084	37	98.26
850-899	879	45	95.13
800-849	585	48	92.43
700-799	780	127	86.00
699 or less	323	130	71.30
TOTAL	4651	387	92.32

Comparison Findings: Testing Policy and Practices with HESI Exit Score

The effective use of HESI Exit Exams requires evidences to support what should be included in the policy that guides standardized test implementation. Policy should promote teaching and learning outcomes. For undergraduate nursing programs, the NCLEX-RN pass rate is a very desirable outcome that can be predicted from HESI Exit Exam scores. Student HESI Exit Exam scores were compared with the policy components identified in the study using an Independent Samples T-test. Several policy components were related to the exit exam scores. Primarily, programs that had certain exit exam policies in place had students that scored higher on the HESI Exit Exam. The significant policies were (a) a mandatory benchmark score, (b) required participation in a preparation plan, (c) re-testing requirement, and (d) required remediation if the benchmark score was not met (see Table 4). Levine's test for Equality of Variances was used with the Independent Samples T-Test in SPSS. When Levine's was significant the adjusted T-test value was reported. For reassurance a Welch's T-test, which is for unequal variances, was also performed. The results were identical to Levine's at two decimal places. A Cohen's d measurement was performed to evaluate the effect size. In the significant policies, the effect size was medium to large. The normal distribution for each T-test and each group was verified with individual Q-Q plots.

Table 4

HESI Exit Scores for Students Attending Schools With or Without Selected Testing Policies

Policy	With			Without			Significance
	N	Mean	SD	N	Mean	SD	
Achieving the HESI Exit exam benchmark score is mandatory	1,426	907.2	112.38	2,908	855.16	124.23	$t = 13.365$ $df = 4332$ $p < .0001$ $d = .46*$
Require students to participate in preparation plan	1,469	905.47	112.83	3,144	853.13	124.14	$t = 13.677$ $df = 4611$ $p < .0001$ $d = .46*$
Require students to re-test	2,429	888.76	114.80	2,184	848.98	128.47	$t = 11.107$ $df = 4611$ $p < .0001$ $d = .35*$
Require remediation after a student fails to meet the benchmark	2,618	885.18	116.99	1,995	849.91	127.89	$t = 9.742$ $df = 4611$ $p < .0001$ $d = .30*$

Note. Cohen *d* for assessing effect size

DISCUSSION AND IMPLICATIONS

The HESI Exit Exam has 10 years of predictive validity for NCLEX-RN success (Morrison, Adamson, Nibert, & Hsia, 2004; Nibert & Morrison, 2013). A score of 850 or above is a standard benchmark used in schools of nursing across the United States. Many studies have demonstrated that Exit Exam scores of 850 and higher are predictive of NCLEX-RN success. The findings from this study supported the predictive accuracy of the HESI Exit Exam scores. Implementing exit exams requires thoughtful consideration and choosing policy that promotes success may be important to utilize standardized exams effectively and fairly.

The results of this study demonstrated that developing and implementing policy to support standardized testing in schools of nursing is an integral part of student success. Policy provides a framework of action for students and

faculty. For students, it represents the third voice in the zone of proximal development. This is the voice of authority. According to Eun, Knotek, and Heining-Boynton (2008), it is likely that students will be positively influenced by the voice of authority when the learning goal is compatible. For example, if a student is aware of a policy that prevents progression in the event of a substandard standardized test score, then it is more likely that they will internalize the responsibility and urgency for test preparedness. For faculty, policy is the blueprint by which they can enable the learners to benefit from the knowers. For example, if faculty know that a preparation plan will result in greater student success, then they will internalize the responsibility for providing adequate test preparation.

There are limitations to the generalizability of the conclusions from this study. Primarily, this randomized sample was obtained from a single testing product database. Due to the retrospective non-experimental nature of the study, no effort was made by the researchers to discern or verify that the reported school policies were implemented for the sample.

Schools of nursing are designing and implementing testing policies to manage the implementation of the HESI Exit Exam. This study found that the majority of schools had policies that included preparation plans, remediation components, consequences, and retesting plans. The most frequently used preparation plan was self-guided review that included case studies, study guide, and NCLEX-RN type items. Self-guided review was also the most common remediation policy used by schools in the study. Consequences included course failure, delay in NCLEX-RN candidacy, and graduation delay. Re-testing policies were present in about a third of the schools in the study with most requiring re-testing once.

Several components within standardized testing policies were significantly related to individual scores on the Exit Exam. Four policy components proved to provide better student outcomes. Those included achievement of a mandatory benchmark score, required participation in a preparation plan, required re-testing, and require remediation after failing to meet the benchmark. Standardized testing policies need to be crafted to include certain components that are related to standardized exam success. Preparation, benchmarking, and re-testing after remediation, should be considered in policy development and then evaluated longitudinally to support policy implementation and student outcomes.

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