

Research Article

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Development and Validation of a Student Self-efficacy Scale

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Abstract

The study was designed to address the reliability and validity evidence that supports the Student Self-Efficacy scale. The scale measures student self-efficacy related to didactic course work. Face and content validity were measured by expert educators and researchers with the feedback that the questionnaire was clear and addressed the skills needed to measure student self-efficacy in the classroom. The scale was administered to 65 nursing students in two courses, one sophomore level and one junior level. The Student Self-Efficacy (SSE) Scale was compared to the well established General Self-Efficacy (GSE) Scale to assess the concurrent criterion-related validity. A highly significant correlation of $r = 0.70$ was found between the two scales. The scores of both questionnaires were also compared with demographic variables and no correlation or significant difference was found with the exception of lower student self-efficacy in male students. A Principal Component Analysis of GSE and SSE and a comparison with a larger U.S. sample on GSE delivered first indication of a one-dimensional construct. The findings indicate the SSE does in fact measure the construct under study and is a reliable and valid scale. Implications for further research and fields of applications are discussed.

Keywords: Self-efficacy; Questionnaires; Principal component analysis

Introduction

Nurse educators often encounter the phenomenon that one student is much more successful than another though their abilities appear to be much the same. Student comments can be “I feel like I can learn the material in your class but I don’t in another” or even “I don’t think I can learn this material”. The belief that one can successfully meet demands is what Bandura calls self-efficacy beliefs. Self-efficacy beliefs are defined as the belief a person has about his or her capabilities to produce the desired level of performance [1]. In nursing, for instance, there is a lot of learning to be accomplished, including didactic knowledge and clinical skills. How students subjectively perceive their ability to master all this, is often met with fear and frustration, thus decreasing their academic success. Bandura [1] explains that there are three main ways self-efficacy contributes to academic success. They are:

“(…) students’ beliefs in their efficacy to master different academic subjects; teachers’ beliefs in their personal efficacy to motivate, and promote learning in their students; and faculties’ collective sense of efficacy that their schools can accomplish significant academic progress.” (Bandura, 1997, p. 214) [1].

Bandura [1] also states self-efficacy beliefs affect how consistently and effectively students apply what they know and they are a much better predictor of intellectual performance than skills alone. Thus, it is vital that nurse educators begin to understand the influence student self-efficacy has on academic success; and the influence that they themselves have on student self-efficacy.

The purpose of this study was to address the reliability and validity evidence to support the Student Self-Efficacy scale. The scale measures student self-efficacy related to didactic course work. An instrument of perceived student self-efficacy that can be used to help educators learn about their students’ self-efficacy beliefs is needed. The instrument assesses the student’s self-efficacy as it relates to classroom and didactic learning in a university setting. The four main areas of students’ academic challenges are; namely academic performance, skill and knowledge development, social interaction with faculty, and coping with academic stress. These academic challenges are different than challenges people face in everyday life. Thus, for educators, there is a need to understand how to help students meet these challenges.

Nursing students need to meet the challenges of classroom learning in order to apply this knowledge to provide safe patient care. The scale, of course, can also be used for comparisons with other instruments or constructs and to measure changes over time.

Conceptual Framework

Bandura’s [2] social learning theory provides the framework for this study. It describes humans as being capable of self-regulation, planning (alternative) strategies, and exercising active control over responses and actions. Translated into academic life this allows students to learn from their experiences and influence their future behaviors and it also emphasizes the power of self-belief on behaviors. According to the theory there is a triadic reciprocal causation [2]. Human action is a result of reciprocal interaction among environment, behavior, and person. The ‘person’ includes the gender, social position, physical attractiveness but especially the cognitive factors such as thought, memory, judgment, and so on. The influence of behavior, environment, and person depends on which of the triadic forces is the strongest at a particular moment.

Bandura defines perceived self-efficacy as an individual’s beliefs about his or her capabilities to produce the desired outcomes they want. A student’s perceived self-efficacy is believed to be influential on the student’s level of performance, choice of tasks, and the amount of effort put into performing those tasks. It also determines how people feel, think, motivate themselves and behave [1]. The term self-efficacy is often used interchangeably with self-concept and self-confidence. Especially for psychometric measurement it is important to distinguish clearly between them. According to Choi [3], the difference between self-efficacy and self-concept is that *self-efficacy* is the prospective appraisal of capabilities to perform, based upon past experience, whereas *self-concept* is the description of one’s attributes and the evaluation of those

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attributes in comparison with others. *Self-confidence* is the degree to which an individual believes that he or she will be successful but does not define the abilities or skills that this belief is about [1]. Thus, self-efficacy is characterized by being prospective, specific (for certain abilities of the person) and always related to a certain action. Self-efficacy combines the level of attainment with the belief that the desired outcome will be reached. The students' heavy work load requires strong self-efficacy beliefs to achieve the sustained effort to reach their desired results.

Bandura [1] suggests a strong sense of self-efficacy enhances the sense of accomplishment and well-being in many ways. A person reporting high levels of self-efficacy looks at difficult tasks as challenges to be mastered, rather than threats to be avoided, which would inflict stress on the person. This positive outlook and absence of stress foster intrinsic interest and deep engrossment in activities, and thus also successful action.

Sources of self-efficacy

Four sources of self-efficacy have been identified [1]. The first and strongest source of self-efficacy is the experience of mastery. Bandura suggests that in order to develop resilient self-efficacy beliefs, one must be experienced in overcoming obstacles by investing enough effort. Individuals become stronger with perseverance despite adversity. To experience mastery it is vital to meet tasks that are demanding but not overstraining to a person's abilities. Thus, educators can strive for a good fit between task complexity and students' abilities.

The second source of self-efficacy is social modeling [1]. Observing (or imagining) someone who is successfully achieving something the person likes to achieve her- or himself can lead to an increase of self-efficacy by means of comparison. But self-efficacy is only influenced on the condition that the person considers her- or himself similar to the model with respect to skills and capabilities necessary for this achievement. Nurse educators as well as other students can serve as such models for a student. A third source of self-efficacy is social persuasion. Social persuasion occurs when people are convinced by others that they have the capability to master the given activity. Bandura [1] suggests that it is more difficult to instill high beliefs than it is to undermine them. If educators are to be successful at cultivating student self-efficacy, they need not only be able to give positive appraisals, but also structure activities in ways that lead to encourage student success. Social persuasion, when used by the educator, can bolster students' beliefs that they have the ability to master course content and to be successful in the course. Bandura emphasizes, however, that such encouraging comments of significant persons have to be convincing and well-grounded to unfold any effect on self-efficacy.

The fourth and final source of self-efficacy is perception of emotional and physical reactions [1]. It is not the intensity of the emotional and physical reactions but rather how they are perceived and interpreted that influences the development of self-efficacy; dry throat and bumping heart e.g. indicate a lack of ability or skill in a given situation, thus self-efficacy decreases, success becomes less probable. As a person faces challenges that are subjectively perceived as difficult and is able to overcome these challenges her or his self-efficacy increases as the challenges are met. Thus, a classroom climate that is conducive to learning and incorporates these four sources of self-efficacy can influence student self-efficacy enormously. This increased self-efficacy helps students feel they can meet the academic challenges they face.

Literature Review

Nursing education research has examined self-efficacy in

relationship to the utilization of simulation [4-10] to increase confidence in the performance of nursing skills. Other areas of research have been computer based clinical conferencing [11] and clinical performance [12]. Self-efficacy has also been studied in connection with clinical reasoning, decision-making, mathematical achievement, and successful drug dosage calculations. There has been little research looking at the role the educator has on the self-efficacy of students.

Few studies were identified that related to classroom education and only those that related to classroom learning are included in this review. The relationship of self-efficacy to academic success and teacher behavior has been studied in nursing education: When students perceive higher levels of support from the teacher they are more likely to have higher levels of self-efficacy [13,14]. Harvey and McMurray [15] determined the lower the academic self-efficacy was, the more likely the student was to withdraw from the course. Another study found the students' perception of their language and reading ability had influenced their self-efficacy [16].

On the other hand there are several studies from the education discipline that address student self-efficacy and academic performance. Interestingly, Prat-Sala and Redford [17] found that students with a high self-efficacy pertaining their reading and writing abilities were more likely to adopt a deep or strategic approach to studying in general whereas those with a low self-efficacy (reading and writing) were more likely to adopt a surface approach. Klomegh [18] found in the college setting that high school grade point average and student self-efficacy were strongly correlated with academic performance measured by course grades; with self-efficacy having the strongest predictive power. Several researchers [19-22] have shown a strong positive relationship between academic self-efficacy and academic performance. Ramos-Sanchez and Nicols [23] reported students with a high self-efficacy adjusted better to college. Self-efficacy has also been studied with constructs such as perfectionism and academic achievement goals. Within the field of education there is evidence of a strong positive relationship between student self-efficacy and academic performance but a general scale for students still needed to be developed.

Despite this strong relationship identified in education, there is very little research that addresses student self-efficacy in the nursing classroom. Becoming a nurse brings about two different challenges: Students must not only learn didactic content in the classroom, but also its' practical application in the hospital setting. Understanding and fostering student self-efficacy is critical for optimizing the nurse educator's effectiveness in the classroom. The development and utilization of an instrument that measures perceived student self-efficacy will add to the body of knowledge and understanding of teaching and student learning.

Method

Scale development

The Teacher Self-Efficacy Scale (TSE) developed by Schmitz and Schwarzer [24] was used as the basis for the development of the Student Self-Efficacy Scale (SSE). Permission was granted from the authors to adapt their tool. The ten-item TSE instrument measures self-efficacy related to four major areas of teacher job skills. The four main areas are: a) job accomplishment, b) skill development, c) social interactions with students and colleagues, d) coping with job stress. These major areas are vital for successful teaching to occur. The scale is answered on a four-point response format: not at all true (1); hardly true (2); moderately true (3); exactly true (4). The resulting scores range from 10-40 with higher scores representing higher teacher self-efficacy. An initial pool

of 27 questions was given to over 300 German teachers in a longitudinal field study. The authors wanted to extract a parsimonious instrument that would assess efficacy beliefs within those four areas. The primary focus during the reduction was on optimizing the validity of the instrument rather than maximizing the internal consistency. Thus, Cronbach's alpha of the final ten item scale was found to be between $\alpha = 0.76$ and $\alpha = 0.82$ in different samples.

Using the TSE questionnaire Schwarzer and Hallum [25] found that younger teachers and teachers with lower self-efficacy reported more job stress and burnout. They reported Cronbach's alphas of 0.80 (German teachers) and 0.81 (Syrian teachers). The Student Self-Efficacy Scale (SSE) was developed by adapting the TSE scale to reflect the role of a student instead of the teacher's role. The four areas addressed by the scale are: a) academic performance, b) skill and knowledge development, c) social interaction with faculty, and d) coping with academic stress. For example, the TSE item "I am convinced that I am able to successfully teach all relevant subject content to even the most difficult students" was changed to "I am convinced that I am able to successfully learn all relevant subject content even if it is difficult". These changes reflect the students' role and skills necessary to be successful in the classroom. This new ten-item scale uses the same four-point response format. Therefore scores also ranged from 10-40 with higher scores representing higher student self-efficacy.

When developing a new scale, construct validity or the degree to which the instrument measures the construct it is intended to measure needs to be addressed [26]. First indicators on psychometric soundness and validity of the instrument were found by looking at face and content validity, respectively, as well as concurrent criterion-related validity. To address face and content validity, respectively, expert educators as well as the authors of the teacher self-efficacy instrument reviewed the scale for content. Their feedback indicated the questions were reflective of the student role, the skills needed to be successful in the classroom, and student self-efficacy. Another method to address validity is concurrent criterion-related validity. Validity is confirmed when scores on a scale are strongly correlated to a related criterion or scale at the same point in time [26]. The criterion used for comparison in this study was the General Self-Efficacy Scale (GSE) [27]. This ten-point scale also uses the before mentioned four-point response format. Scores again ranged from 10-40 with higher scores representing higher self-efficacy. Construct validity of the GSE has been documented in numerous studies on hundreds of samples world-wide (e.g. [28-31]). The GSE is the most frequently used and thoroughly validated scale to assess general self-efficacy in the world. Validation, however, is a never-ending process. So far, mainly construct validity has been established by convergent and discriminant validation procedures. Typical criterion measures have included optimism, self-concept of ability and resilience. A high predictive validity over a period of one year ($r_{1t} = 0.74$ and $r_{2t} = 0.78$)

two years ($r_{1t} = 0.64$) was shown [32]. Typical internal consistencies of the GSE range from $\alpha = 0.75$ to $\alpha = 0.91$. A current study of results from 25 countries ($n = 19,120$) reported $\alpha = 0.86$ [28]. The authors state this scale is "configurally equivalent across cultures and suggest globality of the underlying construct" (p. 242).

Participants

Data were collected at a public mid-western university School of Nursing. Of the students who completed the questionnaires, 31% were first semester sophomores, 29% second semester sophomores, 34% first semester juniors, and 6% second semester juniors. Students' average age was 21.42, ranging from 18 to 39 years, with 89% female and 11% male students. The students were predominately Caucasian (72%), with 14% being African American, 9% Asian, 3% Hispanic, and 2% other ethnic groups.

Measures

In addition to the GSE and the SSE scales the participants were asked for their age, gender, and the ethnic group they belong to. Furthermore they were asked to state if they hold an academic degree already. They also wrote down their year in program (sophomore or junior) and the course they were taking.

Procedure

After obtaining Internal Review Board approval, faculty members from the school of nursing were contacted and asked if they would allow the researcher to attend their class and recruit students. None of the classes were taught by the researcher. The researcher then attended two nursing classes, explained the study, and asked students to fill out both the General Self-Efficacy (GSE) and the Student Self-Efficacy (SSE) questionnaires. One class was a sophomore level course that consisted of both first and second semester sophomores and the other class was a junior level course consisting of first and second semester juniors. The students were told that if they did not want to participate, they could return a blank survey. Those that agreed to participate gave consent by filling out the questionnaire. They were encouraged to answer all survey questions and answer the questions in relation to the class they were in at that moment. All filled in questionnaires contained no missing data.

Results

Psychometric properties of the new instrument

The psychometric properties of all ten items of the SSE scale are shown in table 1. The items showed moderately high correlations with the scale, which points out that there are neither redundant items nor items with a weak consistency. Moderate correlations also indicate that the scale really mirrors the broad range of the construct and consistency

	Items	r_{it}	M	SD
1.	I am convinced that I am able to successfully learn all relevant subject content even if it is difficult.	0.52	3.46	0.50
2.	I know that I can maintain a positive attitude toward this course even when tensions arise.	0.52	3.35	0.62
3.	When I try really hard, I am able to learn even the most difficult content.	0.55	3.48	0.59
4.	I am convinced that, as time goes by, I will continue to become more and more capable of learning the content of this course.	0.60	3.74	0.44
5.	Even if I get distracted in class, I am confident that I can continue to learn well.	0.43	3.12	0.72
6.	I am confident in my ability to learn, even if I am having a bad day.	0.57	2.89	0.83
7.	If I try hard enough, I can obtain the academic goals I desire.	0.63	3.83	0.38
8.	I am convinced that I can develop creative ways to cope with the stress that may occur while taking this course.	0.62	3.26	0.71
9.	I know that I can stay motivated to participate in the course.	0.63	3.54	0.50
10.	I know that I can finish the assigned projects and earn the grade I want, even when others think I can't.	0.52	3.74	0.48

Table 1: Psychometric properties of Student Self-Efficacy SSE ($N = 65$, $\alpha = 0.84$).

of the SSE scale. This was also reflected by the internal consistency of $\alpha = 0.84$ in the sample of $N = 65$. In line with this the analysis also showed that excluding items would not lead to an increase in internal consistency. The item means were found to be rather high, indicating that the item degree of difficulty was not too high. The lowest score reached was 25, the highest was 40, with a resulting range of 15. Scale mean was found to be 34.23, median and mode both equaled 34, and a standard deviation of 3.80.

Correlative results and a first indicator of validity

To explore possible relationships between GSE and SSE respectively and age, ethnicity, gender, year in program (sophomore or junior) and Course in the first step the Pearson Product-moment correlation coefficient was used. No significant correlations were found with the only exception of gender for the student-specific SSE Scale ($r = 0.30$, $p = 0.02$). The relationship between general perceived self-efficacy, as measured by GSE, and student self-efficacy, as measured by SSE, was investigated using the Pearson Product-moment correlation coefficient again. Preliminary analyses were performed to ensure there was no violation of the assumptions of normality, linearity, and homoscedasticity. Addressing the question of content validity there was

found a strong highly significant correlation between the GSE and SSE of $r = 0.70$ ($n = 65$, $p < 0.001$), showing a strong association between general self-efficacy and student self-efficacy scales (Table 2).

Group differences

To further explore the relationship between gender and SSE independent t-tests were run. Table 3 shows the results of the comparison between GSE and SSE scores respectively, based on whether the student was female or male. Levene Test indicated homogeneity of variances in spite of the small subsample size of male students. To exclude an effect of age on the results the mean age of female and male students was examined and found to be almost identical with female mean age of 21.38 and male mean age of 21.71, with medians both 21.00. For the GSE Scale no differences between female and male students were found but for the SSE Scale a clear difference evolved. Male students judged their specific student self-efficacy clearly lower than their female fellow students (Table 3).

First indicator of factorial validity

Although a sample size of 65 is rather small for administering principal components analysis (PCA) it was decided to take a first look at factorial validity of the SSE. In addition, a PCA was also run for the GSE because the evolving coefficients could be compared to a subsample of $n = 390$ 21-25 year old US participants of the GSE world data set provided by Schwarzer for means of comparison.

Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many co-efficients of 0.30 and above. The Kaiser-Meyer-Olkin value was 0.80, exceeding the recommended value of 0.60 [33,34] and Bartlett's Test of Sphericity [35] reached statistical significance, supporting the factorability of the correlation matrix. Principal components analysis extracted two components for the SSE with eigenvalues exceeding one. It revealed the presence of one strong component, explaining 44% of the variance. The coefficients of the second component shown in table 4 were all lower with the only exception of item SSE5, thus indicating a satisfying component structure.

For the GSE the PCA extracted three components with eigenvalues exceeding one, with the first component explaining 39% of the variance. Table 4 shows that again item SSE5 is the only one with a higher load on another component. The PCA of the subsample of the world data set extracted one component explaining 48% of the variance. A

Variable	Table SSE	GSE
Age	-0.05	-0.03
Gender	0.30*	0.15
Ethnicity	0.10	0.08
Year in Program	-0.02	-0.12
Course	-0.04	-0.15
SSE	1.00	0.70**

* $p < 0.05$, ** $p < 0.001$

Table 2: Correlations Between Measures.

	<i>n</i>	<i>t</i>	<i>p</i>	Mean	Std. Deviation
SSE					
Female	58	- 2.48	0.02	34.62	3.66
Male	7			31.00	3.65
GSE					
Female	58	- 1.20	0.24	33.88	3.68
Male	7			32.14	3.02

Table 3: Independent t-tests for GSE / SSE and Gender.

	SSE Component 1 ^a	SSE Component 2 ^a		GSE Component 1 ^b	GSE Component 2 ^b	GSE Component 3 ^b	U.S. Data GSE Agegroup 21-25 Years ^c <i>n</i> = 390
SSE7	0.74		GSE5	0.80	-0.31		0.78
SSE9	0.73		GSE9	0.78			0.77
SSE4	0.72	-0.37	GSE4	0.72		-0.41	0.76
SSE8	0.72		GSE10	0.70		-0.40	0.78
SSE3	0.66		GSE8	0.66	-0.32	0.44	0.65
SSE10	0.66	-0.41	GSE7	0.61	-0.40		0.70
SSE2	0.65	-0.35	GSE3	0.80	0.32	-0.55	0.54
SSE6	0.64	0.52	GSE6	0.55	0.40	0.31	0.69
SSE1	0.62		GSE1	0.33	0.53		0.49
SSE5	0.51	0.53	GSE2	0.34	0.52	0.36	0.78

Note. Only scores above 0.30 are reported

Extraction Method: Principal Component Analysis

^a 2 components extracted

^b 3 components extracted

^c 1 component extracted

Table 4: PCA Component Matrices for SSE, GSE and GSE of a subsample of $n = 390$ U.S. participants aged 21-24 years.

comparison between the coefficients for the student sample and the US subsample revealed that only items GSE 2 and GSE 3 brought different results in the student sample at hand. These results show a rather good correspondence between student sample and US subsample.

Discussion

The SSE Scale was developed with the intention to create a parsimonious instrument that nevertheless covers the four main areas of students' academic challenges, namely academic performance, skill and knowledge development, social interaction with faculty, and coping with academic stress. These academic challenges are different than challenges people face in everyday life. Thus, for educators, there is a need to understand how to help students meet these challenges. On this condition the internal consistency of the new scale appears to be satisfying. The same is true for the correlations between each item and the complete scale.

A first indicator of content validity was given by the reviewing experts. Furthermore, the strong correlation with general perceived self-efficacy is an encouraging first hint at concurrent-criterion related validity. The correlative results are in line with the literature on general perceived self-efficacy and teacher self-efficacy. With the exception of the interesting difference found for female and male students on the SSE Scale. First, this difference only evolved on the *specific* student related self-efficacy scale. This makes sense since self-efficacy beliefs are always specific for a certain ability of the person. Therefore, those specific beliefs are usually measured by a specific self-efficacy scale like the SSE. The GSE Scale, however, was developed as an additional instrument to access a person's beliefs how to deal with challenges of life *in general* [27] that helps researchers to compare efficacy beliefs between different studies and populations. Thus, relationships between GSE and other constructs under study are always weaker than relationships with specific self-efficacy scales. This can explain the different findings for GSE and SSE pertaining to gender.

Secondly, the male students' clearly lower self-efficacy beliefs may mirror the notion that nursing is (still) a female domain. This will be a very important finding if it can be addressed in other studies because it suggests a clearly worse precondition for male students in nursing just because of gender. This could open the possibility for educators to take action in time to provide equal preconditions for both sexes. This also emphasizes what a difference a good educators' understanding of self-efficacy can make. In spite of the small sample size, a first indicator of factorial validity could be found. Here the comparison of the component structure of GSE between the two samples "nursing students" and "US subsample" was valuable to get an idea about how the student results can be interpreted. Results indicate that the sample of the study at hand brings about very similar results like the large US subsample. Thus, the results for the SSE can be carefully judged as a first indicator for a one dimensional scale.

Implications

Development of a questionnaire to measure student self-efficacy in the classroom, which can be used in conjunction with other measures, is needed so educators can better assist students in the learning process. The SSE is a scale that can be used by educators to help understand student success. Potential applications of the scale include future research assessing the self-efficacy of nursing students from diverse backgrounds, male versus female students, accelerated nursing students, and graduate nursing students. Expanding their understanding of student self-efficacy within various populations will allow educators to tailor educational experiences in an attempt to optimize student

learning and success. In addition, understanding student self-efficacy as it relates to the classroom environment, teaching perspectives and classroom teaching methods are areas for further study. This scale can also be utilized in conjunction with other construct measures such as self-regulation and self-monitoring in order to develop a better understanding of how self-efficacy influences student success.

The academic challenge of nursing programs can be overwhelming for many students. Nurse educators need to identify teaching strategies that can help students be successful in their courses. Understanding student self-efficacy is an important step in this process. Nurse educators play a vital role in helping student develop self-efficacy. As educators understand Bandura's sources of self-efficacy: experience, social modeling, social persuasion, and emotional and physical reaction, they can implement strategies that will help students develop high self-efficacy. They do this by providing challenging experiences that are likely to result in student success, providing role models in classroom and clinical setting alike, and giving effective support and encouragement to the students. It is essential that educators create a classroom environment where positive appraisal of student work and behavior occurs and where students feel relaxed and capable of achieving success. Helping students develop their belief in their ability to be successful in the classroom is paramount to nursing education.

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