

Developing a Culturally Relevant Instructional Approach Self-efficacy Scale

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Abstract: An online professional development program for STEM was designed to support faculty in acquiring knowledge and skill for implementing culturally relevant instructional approaches in STEM courses. Following Bandura's theory of self-efficacy an instrument was developed to assess faculty members skills, knowledge, and belief statements about culturally relevant instructional approaches. In this paper, the development of the new instrument titled *Culturally Relevant Instructional Approach: Self-Efficacy Scale* (CRIA: SE) is described. Items from the instrument are provided.

Keywords: STEM faculty, CRIA, Professional Development, Online Training, Self-efficacy

Introduction

Federal funding and research calls have spotlighted the need to increase racial and ethnic representation in STEM education, disciplines, and ultimately the STEM workforce. Specifically, programs have been developed to attract certain races or ethnicities such as the Hispanic Serving Institution (HSI) program. The National Science Foundation (NSF), Education and Human Resources (EHR) HSI program, developed in 2017 exists to broaden participation, promote retention, and increase graduation rates for undergraduate students in STEM. One way to aid learner success is to support faculty to adopt culturally relevant instructional approaches that engage Hispanic Latino/a/x learners.

Our recently funded NSF project created online professional development for STEM faculty to introduce them to simple but effective research-based strategies that recognize the assets that learners bring to their own education. However, we quickly realized that there were few if any assessments that could measure different aspects of faculty's use of culturally relevant instructional approaches (e.g., knowledge, practice, or self-efficacy) or their intentions to adopt such approaches. In a prior publication, we described the process to develop a new instrument and shared some items included in the *Planned Behavior Scale of Culturally Relevant Instructional Approach* (Campbell et al., 2021).

The present paper describes the development of an instrument that can be utilized before and after a STEM

professional development to garner the level of self-efficacy faculty have for the culturally relevant instructional approaches. Likewise, it can be utilized in a program or department to gauge. In this paper, we will describe the *Culturally-Relevant Instructional Approach: Self-Efficacy Scale* (CRIA: SE). The scale was informed by Bandura's (1994) theory of self-efficacy (Bandura, 1994; 2006).

Literature

Self-Efficacy

Bandura (1977) described self-efficacy as a person's belief in their own abilities to complete a task or execute a behavior. Further he noted self-efficacy is situational and personal. Self-efficacy is reported by an individual not observed by others. There are four ways self-efficacy can be developed (see Figure 1). The development of one's self-efficacy occurs by: (a) practicing and receiving positive regard for completing the task or behavior appropriately, (b) observing others successfully completing the task or behavior, (c) listening and acting on others' encouragement about personal capabilities, and (d) being intentional about practicing positive emotional, physical, and physiological states of mind (Bandura, 1977; 2008). In this present study, one's self-efficacy to teach using culturally relevant instructional approaches will affect how they apply principles learned about culturally relevant instructional approaches.

Figure 1

Ways to develop Self-Efficacy



The Project: Professional Development

Our federally funded project offers online professional development for higher education STEM faculty. The project seeks to make STEM teaching and learning relevant and responsive through an assets-based approach. Key components of the workshop included: (a) highlighting the importance of bridging gaps, (b) validating students'

funds of knowledge, (c) employing culturally-based disciplinary scenarios, (d) discussing an assets-based inclusive language approach through people first language, and (e) providing a broader swath of role models that are representative of other cultures (see Figure 2). To assess the effect of the professional development training, we reviewed the existing instruments designed to assess faculty knowledge, practices, and perceptions. The design of the instrument is presented in the next section.

Figure 2

Scientists: Role Models in STEM

	Name	Country	Scientific Contribution	Quote
	Santiago Ramón y Cajal (1852 - 1934)	Spain	Founded modern neurobiology, demonstrating that the nervous system is made up of individual cells (later termed neurons)	"All outstanding work, in art as well as in science, results from immense zeal applied to a great idea."
	Barbara McClintock (1902 - 1992)	USA	Pioneered some of the earliest explorations in the field of cytogenetics, expanding our understanding of chromosomes	"If you know you are on the right track, if you have this inner knowledge, then nobody can turn you off... no matter what they say."

Significance of the study

Purpose and Aim

The purpose of this manuscript is to discuss the development of a new instrument for assessing higher education STEM faculty's self-efficacy for employing culturally relevant instruction that supports learner achievement, engagement, and degree attainment.

Methodology

After a review of the literature, it was determined that there were limited instruments assessing aspects of culturally relevant teaching and learning. These instruments were determined not to be relevant or appropriate for the needs of the aforementioned project for a variety of reasons: (a) scope, (b) context, and (c) audience.

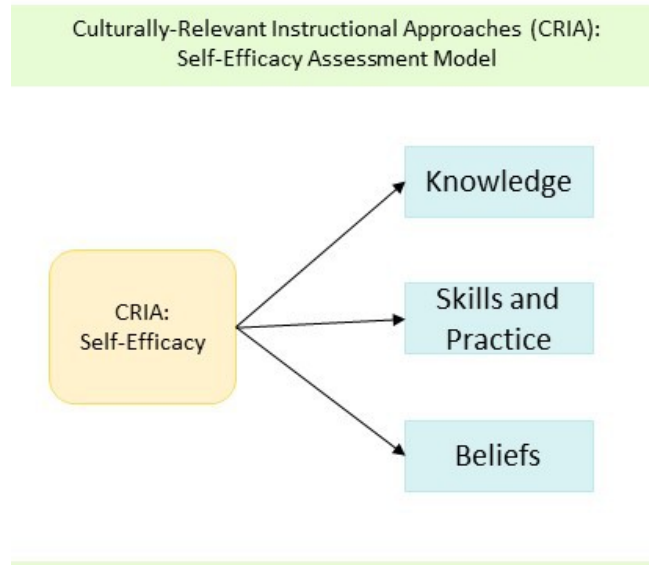
The *Culturally Responsive Teaching Self-Efficacy Scale* (CRTSE) and the *Culturally Responsive Teaching Outcome Expectancy* (CRTOE) Scale (Swiatu, 2007) were listed in STELAR <http://stelar.edc.org/search#CRTOSE> but had not been statistically validated. Furthermore, the instruments were designed for pre-service education and lacked the context of higher education. However, after reaching out to the author, it was determined that there was limited content validity.

Likewise, Heitner and Jennings (2016), built an instrument based on the principles of culturally responsive teaching, which is an assets-based approach to teaching, for online faculty. The instrument underwent content validity by faculty and former students representing ethnic, affinity, and affections cultures. The internal consistency reliability of the subscales was between .895 and .970. However, the *Culturally Responsive Teaching Knowledge and Practices of Online Faculty instrument* assessment was completed by only 47 participants, thereby a limitation was the power of the study. Ballenger and Jiang (2021) utilized the survey with 10 participants from public universities in Texas. The audience for the scale was similar, but the scope and context of the scale did not mirror our professional development project goals.

Therefore, the research team created, modified, and curated questions from the aforementioned surveys to create two new instruments. In this paper, one of the two surveys, The *Culturally Relevant Instructional Approach: Self-Efficacy Scale* (CRIA: SE) will be described and discussed. The framework for the CRIA:SE appears in Figure 3.

Figure 3

Model for *Culturally Relevant Instructional Approach: Self-Efficacy Scale*



Discussion

The new instruments have gone through several rounds of content validity and have received feedback from multiple faculty members from various institutions. The current version has a total of 28 questions. The composition of the instrument includes: knowledge (9 questions), practice and skills (13 questions), and belief statements (6 questions) relative to students about knowledge, values, and practice. Sample statements include:

1. I critically examine the curriculum I teach to determine whether it reinforces negative stereotypes from any culture.
2. I design lessons that highlight non-majority cultural groups in the disciplinary content.
3. I view cultural differences in the classroom as assets.
4. I support the learning community in my classroom by valuing diverse cultures and heritages.

Conclusion/Significance

The present brief manuscript adds to what is known about culturally relevant instructional approaches in STEM. The paper includes the items that make up the faculty's self-efficacy for incorporating culturally relevant instruction approaches in STEM disciplines assessment. The next step for the instrument development is to conduct statistical analyses to validate the instrument through an exploratory and confirmatory factor analysis. Since the initial paper was written, additional research into assets-based and strengths-based instruction has been added to the instruments to provide a more holistic instrument that considers all of the assets that a learner brings to the classroom. Further revisions and research will be forthcoming.

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