

# Measuring Students' Beliefs about Physics in Saudi Arabia

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**Abstract.** Over the last decade, science education researchers in the US have studied students' beliefs about science and learning science and measured how these beliefs change in response to classroom instruction in science. In this paper, we present an Arabic version of the Colorado Learning Attitudes about Science Survey (CLASS) which was developed to measure students' beliefs about physics at King Saud University (KSU) in Riyadh, Saudi Arabia. We describe the translation process, which included review by four experts in physics and science education and ten student interviews to ensure that the statements remained valid after translation. We have administered the Arabic CLASS to over 300 students in introductory physics courses at KSU's men's and women's campuses. We present a summary of students' beliefs about physics at KSU and compare these results to similar students in the US.

**Keywords:** Beliefs, Attitude, CLASS, Science education, Learning, Undergraduate research, Physics.

**PACS:** 01.40.-d, 01.40.Fk.

## INTRODUCTION

In recent years, students' belief studies have gained considerable interest in physics education research. Several studies have looked at how various populations of undergraduate students view physics as they enroll in their first course in college and how they change their attitude and beliefs afterwards [1, 2, 3]. Research studies in the US have shown that most undergraduate students in their introductory physics courses have relatively novice-like views regarding physics and learning physics and that students enrolled in algebra-based physics courses are more novice on average than those enrolled in calculus-based courses [3, 4, 5].

Such studies are important as research has shown that key educational outcomes, such as interest in physics, choice of major, and science learning correlate with students' beliefs and attitudes [3, 4, 6]. Furthermore, instructional methods and in-class activities can have a role in improving [7, 8] or regressing students' views [3, 4]. The ability to probe students' views, to identify where students are particularly novice-like, and to compare across populations or track changes provides valuable guidance to faculty wanting to implement teaching practices that support improvement towards expert-like beliefs and to measure key educational decisions like choice of major and interest in science [6].

The Colorado Learning Attitudes about Science Survey (CLASS) is an instrument that has been developed and validated at the University of Colorado, Boulder (CU) over the past several years [3, 9]. It consists of forty two statements that cover various categories, such as real world connection, problem solving and conceptual understanding. In this work, an Arabic version of CLASS was developed to probe students' beliefs about physics at King Saud University (KSU) in Riyadh, Saudi Arabia. Here, we report on the translation process and present results from students entering the introductory courses at KSU. We compare these results to the results from two US populations.

## TRANSLATION PROCESS

The English language is used to some degree in science classes at KSU, and some students seem to have a relatively good background in English, particularly those majoring in engineering and health sciences. However, when the English-version of the CLASS was administered to 40 freshmen engineering students, most students had difficulty answering its statements without help. This experience highlighted the need to translate the CLASS into the Arabic language. A critical feature of the CLASS is that the statements be as clear as possible to students and in language they commonly use so students don't struggle interpreting the statement.