Chapter 4
Martial Arts and Physics: A Multidisciplinary Approach to Increase Student Engagement and Interest in the Sciences

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EXECUTIVE SUMMARY

Many students perceive physics to be a difficult subject without any practical applications to their daily lives. Without the appropriate guidance, students will continue to lose interest in the sciences and will be hesitant to explore possible careers in the science disciplines. Accordingly, this research project examined the use of an annual physics day to promote active engagement amongst high school and college students in the study of physics, in addition to the success of the novel teaching of physics 100 classes through the martial arts. Both activities yielded high success rates that also proved that multidisciplinary teaching techniques could aid in raising the interest of students in physics.

INTRODUCTION

When students enter a physics class, they commonly have preconceived ideas of what they will be taught. For a majority of the students, their ideas are based on misconceptions of what learning physics constitutes. The failure to recognize the extent to which physics can be applied in an individual's daily life is undoubtedly a reason why many students refrain from entering the field. Accordingly, this work was established to improve students' interest in physics, whilst explicating the con-

nections of the field to their daily life circumstances. The aim was to show students the reasons why they should develop a career in physics.

In 2012, the United States (U.S.) dropped from being the 21st to the 24th in a ranking of top countries in science with Shanghai-China remaining the 1st (Weisenthal, 2013). If the U.S. is to move up in these charts, students within the nation need to be motivated to learn science and establish a future career in the discipline. Accordingly, what should be sought is a rigorous educational framework that places a spotlight on the teaching of science in a manner that focuses on the applicability of the field to individuals' daily lives.

Take for instance, when toddlers are being taught the alphabet, they are commonly shown a letter with a picture that begins with the letter that is being shown. Accordingly, this ensures that the toddlers can associate the letter with a known item, which helps them to learn the alphabet and understand how to apply it in their lives. In the same manner, when a student is learning a new subject in high school or college, abstract knowledge can be difficult to comprehend and apply. This is why the technique of multidisciplinary research is imperative in learning subjects such as physics. In this work, multidisciplinary refers to the inclusion of two or more fields to learn, teach, or discuss one specific discipline. Learning physics for the first time is comparable to learning a new language. Without a basis upon which novel information can be developed and ideas can be formed, it can be challenging to thoroughly grasp a new concept. Many students entering physics classes are faced with difficulties in recognizing the feasibility of applying concepts from the class to their daily lives. This inability to recognize the direct links between physics and one's life could also be a reason why students refrain from entering the science field.

There is also common misperception that when one enters a field, such as physics, career choices become limited to working in labs or being professors. While these career choices are certainly abundant, many students do not recognize the wide array of jobs that become attainable upon entering the science domain. Unless more experts and teachers/professors in the field of physics express that learning physics does not limit career opportunities to professions that are not entirely deemed exciting, it would not be possible to improve the number of students entering the field. In any science course, students should be exposed to not only scientific concepts and theories, but also to the links of their personal lives and the subject. Multidisciplinary research is the key to moving forward in the world and showing students that there is much more to physics and science than what meets the eye.

This chapter elaborates on the cumulative results of three surveys that were conducted to display the usefulness of the application of martial arts as a means of teaching physics. The analyses here explicate the ways in which one can utilize multidisciplinary means of teaching subjects to raise interest among students whilst also fostering an in-depth understanding of the topic at-hand. The work here explores