INTRODUCTION
In order to provide patients with optimal fit and function of fabricated devices, prosthetics students must learn to palpate the bony landmarks of residual limbs and to use proper technique when taking molds. Part-task trainers have been used successfully in other healthcare fields (Scalese et al., 2007) and serve as surrogates to allow standardized exposure to “patients” for students. The goal of this project is to create a silicone model of a transtibial residual limb, which will address issues with difficulties in providing access to patient models for Orthotic and Prosthetic (O&P) students.

Based on success in other training settings, students should be able to enhance psychomotor skills such as palpating and casting through guided exposure to part-task trainers before working with patients. In addition, providing part-task trainers to students is a safe and reliable way to expose them to situations normally only encountered in a clinical setting; however, the degree of lifelike reality offered by existing artificial models is less than satisfactory.

This collaborative and non-traditional research project will create a model of a transtibial residual limb, from deep to superficial tissue layers, with an unprecedented degree of functional biomimesis.

METHOD
The transtibial model must achieve dimensional accuracy and include precise placement of anatomical structures, while matching skin, muscle, and bone durometers as closely as possible. The choice between having a realistic articulated joint versus a stable and anatomically correct structure will determine the procedure used for creating the model.

The first obstacle is to mimic the shape and dimensions of the femur, tibia, fibula, and patella. The selection of material similar to the strength and durometer of bone will be considered. Upon completing these tasks, attention will be focused on tissues superficial to the bone. The intermediate layer durometer most accurately matching that of muscle tissue will be used to surround the bone and support the bones in anatomically correct positions. Another challenge is to match the elasticity and strength properties of tendons and ligaments.

Using the appropriate silicone for superficial skin layers and creating an aesthetically lifelike model is the final step in creating the part-task trainer.

RESULTS
Being able to palpate the final model is vitally important to the educational effectiveness of this part-task trainer. In particular, anatomical landmarks and correct durometers of skin, muscles, tendons, and bones will be highlighted when using the model.

Further plans to research the efficacy of this project in teaching and training in prosthetic and surgical fields will reinforce the utility of this device.

DISCUSSION
The demonstrated viability of certain aspects of this project has already catalyzed collaborations with other programs. In one instance, a fellowship proposal focused on assessing the part-task trainer’s effectiveness in preparing future practitioners for residual limb evaluation and molding has been submitted and accepted.

CLINICAL APPLICATIONS
The transtibial model will improve confidence in clinical decision-making and mold acquisition for O&P graduates by providing an outlet for performing clinical tasks in preparation for human-patient model interactions.

REFERENCES