Final ID Brief

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Problem Analysis

I have been a robotics mentor in Monterey County since 2016. I believe there is a need to create better training materials for new robotics students so they are not thrown into the fire of a robotics season with little or no support from anyone but their teammates, who are themselves busy designing, fabricating, and programming a complicated robot. I have watched several students interested in robotics quit teams simply because the learning curve was too steep or there weren't team resources available to help them get started. The same is true for mentors who have gotten involved with FRC teams on a volunteer basis and for whom mentoring students and learning the terminology of robotics has been too much. A typical FRC team has fabricators, designers, programmers, and students acting as multimedia experts, grant writers, and business development team members. The team needs to be funded, often in amounts as high as $35,000 per year, for a successful season, and there are awards for teams that excel in safety, outreach, and other fields. These students, who will never write a line of code or turn a wrench, are just as vital to the team's success and need to know the basics of robotics terminology and configuration. As a result, this training would stand in as a resource to help retain many students who would otherwise be on their own to figure out the basics of a robot.

The main driver for this training to be done asynchronously is twofold. The first reason is that not everyone joins robotics at the same time during the season. Some people join during the offseason, and others join at the start of the robotics season in January. Others join at various times throughout the season when there is little time to devote man-hours to training newcomers and novices. All of these participants need to be trained on the basics of how the robot works, and an asynchronous training program allows students and mentors to learn the basics while not

taking anyone away from any sort of time-critical tasks given the short length of time that teams have to build competition-ready robots. Additionally, an asynchronous training module could be useful as a standalone artifact that students can use to refresh themselves on the basics of robotics.

Target Analysis

There are two intended audiences for this training. The first audience is the novice robotics student who needs to learn the terms and configurations of a robotics control board quickly. These are students with an immediate need to know the vocabulary and inner workings of the robot to contribute to a successful season and the rapid completion of a robot in a tight deadline of typically no more than three months. These will be students from 13-18 in middle school or high school. The group is racially and gender diverse and consists of mainly average to above-average students. The initial training at Chartwell School will also feature a large number of students with learning differences such as ADHD, dyslexia, and autism spectrum disorder (ASD).

The second audience is the novice mentor who may or may not have some sort of engineering or robotics background but is unfamiliar with the individual components of the control system. This is a primarily adult group with their own internal motivations for starting to help mentor, but it is hard to project what this group would look like given that mentors can turn over from year to year and are often secured through personal connections. The initial group at Chartwell School all have bachelor's degrees or better, and in some sort of technical subject and have needed little to no training to pick up the material quickly. There is no guarantee that the group of mentors next year will be the same, however.

Learning Objectives

After completing the module, students should be able to:

1. Given a list of components, identify the components by name and function with 90% accuracy as measured by the instructor on a formative assessment.
2. Given a list of components, compare and contrast the functions of two components with 90% accuracy as measured by the instructor on a formative assessment.
3. Given a picture of a component, identify the component and its function with 90% accuracy as measured by the instructor on a formative assessment.

Assessment

Students will be asked to do a pre-assessment of the board's components, assessing their prior knowledge. Throughout the lesson, students will answer a variety of multiple-choice, matching, and true/false style assessment questions and some short answer questions. Students will also be asked to write short reflections on key concepts learned, challenges encountered, and problem-solving approaches. Finally, there will be a summative post-assessment to determine the extent of student learning.

Instructional Strategies

According to Zhu (2008), e-learning is both a transmissive and a constructive process. As a result, my instructional practices will be rooted in constructivist learning principles. Students will construct knowledge through a series of interactive lessons and activities. Due to the neurodiverse nature of my target audience, the training will necessarily be multimodal to account

for students with dyslexia and ADHD, which will also lend itself to constructivist principles (Zhu, 2008). For this same reason, I will be using cognitive load theory and the redundancy principle, which should benefit my learners by reducing the cognitive load (Morrison & Anglin, 2005). I will also be using Merrill's First Principles of Instruction as an instructional framework to inform the design of the content that I will be creating and teaching. As this is extremely problem-centered, Merril (2002) is highly applicable to my instructional goals.

Resources

To create this module, I will have several needs. For hardware, I will need some parts from a robot to be able to demonstrate the parts and some limited functionality. I will also need filming equipment like an iPhone, lights, and a microphone to record parts in operation. I will also need a microphone to record video narration. For software, I will be using Camtasia for video editing and various websites like Pixabay for media assets. I will be creating the training in either Captivate or Articulate Rise, depending on the complexity of the projected final product. I am unsure of how I am planning on hosting the final product at this point, but I will likely use a GitHub repository.

References

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