Challenge-Based Learning and Constructive Alignment: A Challenge for Computer Science Practitioners

João Moreira[a], Wallace Ugulino[a], Marcos R. Machado[b], Luís Ferreia Pires[a]

[a] *University of Twente, Semantics, Cybersecurity & Services (SCS) group, AE Enschede, 7500, Netherlands*
[b] *University of Twente, Department of Industrial Engineering and Business Information Systems, AE Enschede, 7500, Netherlands*

Abstract

Challenge-Based Learning (CBL) is an emerging approach to the design of education known for its benefits in fostering greater student engagement and, consequently, positively affecting their learning outcomes. For the teacher, the '*challenge in the challenge*' is to guarantee that the CBL-based education design follows certain regulations, like ensuring proper curriculum coverage through Constructive Alignment. This challenge (for the teacher) becomes particularly tricky in Computer Science (CS) courses where multiple guidelines can be followed to solve the same problem, especially when the curriculum of the course focuses on a subset of those practices (so that the study programme, as a whole, covers them all). This paper targets two central questions for the teachers willing to use CBL while keeping Constructive Alignment in their course design: (1) How to ensure that a student's defined challenge successfully covers the course's Learning Objectives? (2) How to use students' defined challenges as evidence of learning and as an assessment component? We discuss our experience and lessons learned in the design and execution of a CS course using CBL while ensuring proper curriculum coverage and Constructive Alignment.

Keywords: Challenge-Based Learning, Project-Based Learning, Interdisciplinarity, Learning Experience, Smart Industry Systems, People and Technology

1. Introduction

The University of Twente's (UT) mission is to empower society with sustainable solutions in order to put people first [1]. UT seeks to achieve excellence in connecting people and technology