

Investigating prerequisite knowledge and skills for engineering dynamics

ABSTRACT

CONTEXT

Dynamics is a branch of mechanics usually taught to engineering students in their first or second year of study. A group of lecturers from three universities met to discuss the commonalities and differences in our approaches to teaching dynamics. Since students generally find dynamics courses challenging, a shared concern is whether students have sufficient mastery of prerequisite knowledge and skills to properly grasp fundamental dynamics concepts. If so, this would suggest that we need to be more explicit about the foundational concepts on which dynamics knowledge builds and better articulate the relevant prerequisite knowledge and skills in our teaching of dynamics.

PURPOSE

To better understand why students struggle to grasp dynamics concepts by investigating prerequisite knowledge and skills in three different university contexts.

APPROACH

The group of lecturers independently brainstormed dynamics concepts which, in their experience, students find difficult. The results of this process were examined in order to collectively 'flesh out' specific details of the assumptions underpinning these concepts to focus on the relevant prerequisite knowledge and skills. Each university team then identified a particular concept and it was agreed that each would develop a prototype resource targeted at reinforcing the relevant conceptual understanding and also keep a journal recording instances during the teaching where prerequisite knowledge was specifically recognised and addressed.

RESULTS

From the initial engagement between the lecturers, a structured list of prerequisite concepts has been identified. A key result of this work-in-progress will be the development of prototype resources (podcasts, videos, infosheets, etc) to reinforce knowledge and skills from prior courses, to assist students in productively engaging with the course material. Data from lecturer journals will be analysed, and will be used to define the next phases of this collaboration.

CONCLUSIONS

The process of articulating and sharing, across university contexts, our perceptions of the dynamics concepts that students struggle with has been illuminating. The teaching resources which we develop will improve student learning.

KEYWORDS: Dynamics, prerequisite, concept