SYMPAB - (16406) - A SOCIAL SEMIOTIC APPROACH TO DEVELOPING STUDENT REPRESENTATIONAL COMPETENCE

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Short Abstract

In this symposium paper we adopt a social semiotic lens. Following Airey & Linder (2017) we define social semiotics as the study of the development and reproduction of specialized systems of meaning making in particular sections of society. In our work we use social semiotics to understand teaching and learning in undergraduate physics. Using this lens, and building on earlier definitions, we offer a new definition of representational competence for a discipline such as physics. Our reason for doing this is in order to provide science teachers with a practical suggestion about how student learning might be organised. For our purposes we define representational competence in terms of the ability to appropriately interpret and produce a set of accepted, disciplinary-specific representations of real-world phenomena, and link these to scientific concepts. We developed this definition because many areas of science are based on using representations to create scientific explanations of real-world observations. Combining these three aspects (real world, representations and scientific concepts) into a representational competence triangle, we argue that tasks that start with one vertex of the triangle and generate the other two will necessarily practice the desired representational competence. We demonstrate the usefulness of this definition by first performing a social semiotic audit of what it entails to become representationally competent in one particular semiotic system (graphs) for one particular area of physics (1-D kinematics). Using this audit, and our definition of representational competence, we then generated three open-ended tasks that we expected would help students develop representational competence in this area. We then went on to empirically demonstrate the potential effectiveness of the three tasks by trying them out with students. We tentatively suggest that our approach may be useful in other semiotic systems than 1-D kinematics and indeed in other areas of science than undergraduate physics.