

## **Interactive lectures – linking theory to practice – Helping students pass the threshold when learning two-terminal equivalents in electrical engineering education**

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Keywords: Variation theory, Threshold concepts, Key concepts, Learning of a complex concept

Earlier research in electrical engineering education has suggested a limited number of threshold concepts in electrical engineering education (Scott and Harlow, 2012, Foley 2012). We have earlier presented work on one of these, transient response, and will now proceed with Thevenin's theorem or more generally two-terminal equivalents (which includes as well Thevenin's as Norton's theorems)

In engineering the student is often "faced with contrasting representations or models" (Entwistle et al. 2005, p.9), which Entwistle explores as "ways of thinking and practising" (ibid). These contrasting representations are in electric circuits for example: graphs, mathematical models, drawings of circuits and the real circuits. In our research we have found that exploring the relationships - links - between these different representations, as well in the theory/model domain as in the object/event domain (Tiberghien, 2002) is of uttermost importance.

In this paper we will explore how the learning of two-terminal equivalents may be facilitated by integration of small practical tasks within a lecture setting. We have developed a series of interactive lectures that builds on a series of interactive lectures that Ryegård (2004) developed, but they are refined according to Variation theory (Marton et al., 2004) and only those dealing with two-terminal equivalents are presented in this paper.

We are videorecording students' interactions during these integrated tasks within the setting of the lectures and will analyse these by using the tool for investigating of "learning of a complex concept" which we described in Carstensen and Bernhard (2008). The paper will consist of the analysis of the students' interactions during these interactive lectures.

## References

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