

## PAPER 3

## Techno-moral-vignettes in socio-scientific issues-based education on synthetic biology

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Synthetic biology (Synbio) is a new high-profile area of research in biology that develops rapidly and entails both promises and perils. Future applications of Synbio will have an impact on society and our personal lives and it is important that students are able to form an opinion on Synbio-related socio-scientific issues (SSIs). Essential requirements for informed opinion-forming and decision-making in SSI-based education are that, next to scientific knowledge, self-knowledge and societal knowledge (i.e. being aware of your values, beliefs, and assumptions and those of others as well as knowledge about the motives and strategies of influential stakeholders) should inform the decision-making process (Waarlo, 2014). Moreover, Roeser (2006) suggests to start from emotions in discussing risky technologies, since emotions serve as warnings to make clear which values are at stake. A promising way of introducing Synbio-related SSIs in biology education are techno-moralvignettes, which are future scenarios in which possible applications, implications and moral dilemmas are being introduced in an imaginative and empathetic way. In this study we explore the classroom interaction around techno-moral-vignettes in terms of opening up personal frames and fostering dialogue, in two upper-secondary biology classes (n=17, 15 years old; n=25, 16 years old). Students were asked to read the vignette and to write down their initial thoughts and feelings, after which they clarified in pairs their initial reactions and questions. Next, a dialogue in small groups of three to four students was initiated to further explore and articulate their own values and beliefs and those of others. Classroom observations were made, students worksheets collected, small group discussions audiotaped, and semi-structured 10-minute interviews with the teacher and two students per class were conducted. Results indicated that the vignette evoked a diversity of initial emotions and feelings. Sharing and inquiring these initial thoughts in small groups of peers uncovered a wide range of values and beliefs, indicating that students' mental frameworks are activated and reflected on, which is an essential and promising first step in the decision-making process in SSI-based biology education.