Sustainability education in chemistry

Sakari Tolppanen

Education for sustainable development (ESD), or sustainability education, should be an important part of education, especially chemistry education. However, sustainability education presents new challenges to education, as the teacher needs to find new ways to deal with multidisciplinary issues and the emotions it evokes. This article presents some of the challenges of sustainability education and gives guidelines on how to overcome these challenges. The article is based on a PhD thesis, by Sakari Tolppanen. In the thesis, students’ questions, actions and expectations for sustainability education were studied.

If everyone on the earth would consume as much resources as people living in Finland, over three planets would be needed to satisfy the needs of the global population (Global footprint network, 2016). Therefore, it is clear that humanity's consumption habits are not sustainable. Due to overconsumption, the planet is warming, oceans are acidifying and the biodiversity is decreasing (Rockström et al. 2009). In order to stop overconsumption, humans need to change the way we consume and how we see the world. Education plays a key role in achieving this goal.

The importance of Education for Sustainable Development, or Sustainability Education, has been noted and discussed for decades (Jickling & Wals, 2008; Wals, 2013). However, there is still much to develop in sustainability education. For example, recent studies show that students ask multidisciplinary questions on issues of sustainability (Tirri, Tolppanen, Aksela & Kuusisto, 2012), but teachers lack the skills to answer these multidisciplinary questions (Ratinen, 2016). Therefore, in order to improve sustainability education, educating teachers and increasing multidisciplinary teacher collaboration play a key role.

In order to advance sustainability, global issues need to be examined through multidisciplinary collaboration. For this reason, it is not enough that in schools sustainability issues are addressed only from the viewpoint of certain subjects. Rather, education needs to be holistic and cross-disciplinary. Some (of the) challenges of multidisciplinary education can be overcome through collaboration with different subject teachers, but in addition, it is important that each teacher understands some general challenges involved in sustainability education. Three of these are presented below.

Sustainability is a wicked problem

Firstly, teachers need to acknowledge the fact that no simple solutions exist to overcome sustainability issues. For this reason, sustainability issues are commonly referred to as wicked problems (Rittel & Webber, 1973). Achieving sustainability requires political will, technological
advancements, a decrease in the price of new technology, and individuals who are willing to change their consumer behaviour and lobby for environmental causes (Commoner, 1972). Oversimplifying the complex issues involved may even have negative effects on sustainability education (see Sterling, 2010). Examples of oversimplifying are seen in the discourse on recycling and on technological advancements: Schools tend to talk much about the importance of recycling, even though waste is not even among the ten biggest environmental challenges (Rockström et al., 2009). Teachers and students may also believe that technological advancements will solve humanity’s environmental problems. History, economics and social sciences, however, show that this is unlikely because as technology advances, consumptions usually also increase due to feedback loops (Hynes, 1993).

Therefore, sustainability education should encourage students to take action, but also to evaluate and develop their action (Tolppanen 2015). In his thesis, Tolppanen (2015) presents ways on how to accomplish this in schools. It is also important to remember that the so-called “low barrier” actions are important in increasing motivation (Skamp, Boyes, & Stanisstreet, 2013). However, only doing these “low barrier” actions might not have a big enough impact compared to what is needed. Therefore, examining the impact of actions is crucial.

**Environmental knowledge does not increase action**

Teachers need to be aware of the gap between environmental knowledge and action. Research shows that the majority of people are willing to take environmentally friendly action, eventhough increase in knowledge does not necessarily result in an increase in action (Kollmuss & Agyeman, 2002).

So which aspects have an effect on environmental action? Steg and Vlek (2009) have shown that actions are more likely if they do not require much time or money. Furthermore, environmentally friendly behaviour is affected by how actively one thinks of the environment (Kallgren & Wood, 1986). Therefore, students should be given opportunities to examine how environmentally friendly behaviour could be made easier and how they could be more aware of their surroundings. As an example, students could try to impact the timetables of public transportation, think of ways to reduce the time spent in warm showers and make a plan to reduce the consumption of meat, especially beef.

**Challenging topics are connected to challenging emotions**

Teachers should also take into consideration the fact that discussing environmental challenges with students, may lead to negative emotions, such as fear, sorrow, guilt, hate and hopelessness (Chhokar, Dua, Taylor, Boyes, & Stanisstreet, 2012). Teachers may also have such emotions, possibly leading to ignorance and a lack of action (Ojala 2012; Hermans 2016). This is
challenging, as teachers may feel that dealing with students’ emotions belongs to a therapist, rather than to a teacher (Pihkala 2016).

In order to lower the barrier of talking about emotions, researchers have suggested that arts and drama should be incorporated into environmental education (Lehtonen & Cantell, 2015). In addition, students should be given the opportunity to seek and share positive examples on how environmental challenges are tackled in different parts of the world (Tolppanen & Aksela, under review), and to reflect on their own environmental behaviour (Tolppanen, 2015). A recent study shows that young people already take action to solve environmental problems both in schools and at home (Vesterinen, Tolppanen & Aksela, 2016). In order to make sustainability education more relevant, education should encompass these students’ actions into education and help them develop their actions further.

Sakari Tolppanen
Ph.D. (teacher in chemistry and physics)
Lecturer of chemistry and physics (2016-2017), Päiviönsaari lower secondary school, Varkaus
sakari.tolppanen@gmail.com


References


