

IPED: Interdisciplinary perspectives on equality and diversity
Vol. 1, Issue 1



Book Review

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Motivation-The gender perspective of young people's images of science, engineering and technology (SET)
Felizitas Sagebiel (editor)
Burdich UniPress Ltd,
Opladen, Berlin 2013
ISBN 978-940755-81-0 (Paperback)

This book is a collection of edited papers from a conference linked to a European Commission project to promote positive images of science, engineering and technology (SET) in young people utilising a gender perspective to help address the shortfall in young women entering science subjects at university.

The first section of two papers includes a comprehensive outline of the project and the exchange of information between different European countries of individual and societal factors that influence the image of SET subjects and the effect this has on gender occupational choices in Austria, France, Germany, Netherlands, Slovakia, Spain and Sweden. The aim of the project was to better understand the dynamics of social and individual causes that seem to suggest that young people often cling to outdated gender images of science and science careers. While this chapter is informative it is a dense academic read but it does help to introduce areas that are explored in more detail in part one and two of the book's collected papers. The following chapter by Vazquez-Cupeiro's on the primary socialisation into gender roles also helps to indicate how differences occur in how SET is viewed. Part one includes a focus on gender images while the role of the media and other influential actors is analysed in part two. The third and final collection of papers are more about evaluation and describing interventions to help encourage more young women to enter science and engineering.

Sagebiel argues that the accuracy of science gendered stereotypes needs to be challenged within the education process and this requires teachers to be gender aware at all levels of education as schools' teaching can help reinforce or breakdown some elements of these gender stereotypes. The findings offer a range of suggestion to help challenge gender stereotypes focusing on young girls at primary level schools all the way to HEI level. This includes Endepohls- Ulpe and Ebach's chapter which explores how the portrayal of ideal engineers reflects gender stereotypes but for engineering students this stereotype is more accurately closer to their self-image than other students, who have rejected engineering as a choice. The discussion does seem self-evident in some aspects, but the claim for a more modern feminine image of engineering is well-made and balances Kessels' previous discussion about the misfit between how girls and young women see themselves and how they see science. Marschalek, Moser and Strasser address the point that there is an increasing demand for engineers and scientists through expanding SET to include nanotechnologies a new but growing area of scientific knowledge and careers. They advocate that rather than getting girls to fit with science, science needs to be more inclusive by focusing on its epistemic roots. The recommendation is that institutions need to consider how they themselves describe SET subjects.

Kessel offers two solutions to either narrow the perception gap by altering girls' ideas about their own self-image. Or altering the image of science by assessing how the use of masculine and feminine words reinforce gender divisions and having more female role models. Kessel seems to be advocating a separation of girls and boys to help facilitate this. This is a hotly contested area of education and more acknowledgement of this debate would be welcome.

Grable, in the next chapter picks up on the second point about scientific images by arguing that she wants teachers to take more responsibility to help students deal with uncertainty in planning science careers while schools could help ensure pupils are better informed about SET subjects, however this seemed to lack detail about how this should be conducted. A more useful recommendation Grable made was for HEI to offer summer schools and internships and she argued for more emotional support but left the reader wanting to know how this could be offered. Perhaps an area for future research?

Part two focuses on the media, peers and schools influence within attitudes to science. Godfroy outlines the influence of school science education and unconscious stereotyping which makes girls less confident to study SET. Godfroy claims that an elitist approach to teaching science to girls is not particularly helpful in promoting greater engagement with girls while Langfeldt and Griffiths argue for greater gender awareness in teaching. Gras-Velazquez, Joyce and Gras-Marti are disturbed about the lack of accurate information about STEM careers and the lack of suitable female role models despite highlighting how girls actually use ICT technology more within social networking and for creative purposes than boys, but this is not automatically transposed into career directions. I think this is an area that needs further exploration as social media is an area of growing demand for workers.

For me the third part was the most engaging section as it was discussing outcomes of interventions to change gender attitudes to SET, the exception being the Becker section, which seemed to be more related to identifying the problem, which is the focus of part one. The chapters in this section built well on each other although I found the chapter by Neuhauser-Metternich and Krummacher about the use of mentoring and video to make changes in attitudes needed more development in signposting its argument. But read in conjunction with Roth's chapter it led nicely into a more detailed analysis by Lammerhirt and Leicht-Scholten and Hartjen and Leicht-Scholten about the evaluation of interventions such as mentoring and collaboration with other partners in Germany to help change attitudes and stereotyping of young female students.

Overall this book gave me an insight into the problem of encouraging more girls and young women to engage with SET subjects and ultimately careers. It is very much written from a European perspective and overall I think the insight it generates would have benefited from being reviewed from other international perspectives to balance the European focus. As there are researchers tackling similar questions in countries such as Mauritius (Naugah and Watts 2013) and Kenya (Chetcuti and Kioko 2012) indicating it is a worldwide concern. However, if you are interested in the future of young women in science and want to address the lack of recognition for women's involvement in science from Ada Lovelace onwards then this book will add to your knowledge.

On a practical level if you are a practitioner concerned about gender imbalance in your particular academic institution then this book too would offer you some insight. I would suggest that if practitioners are wanting to be informed of outcomes in respect

of gender attitudes and stereotyping I would suggest reading the last chapter first as it summarises these and then part three rather than wading through all the papers interesting as they are.

References

Chetcuti. DA, and Kioko. B, (2012) 'Girls' Attitudes Towards Science in Kenya', *International Journal of Science Education* 34:10 1571-1589

Naugah. J, and Watts. M, (2013) 'Girls and science education in Mauritius: a study of science class practices and their effects on girls,' *Research in Science and Technological Education* 31:3 252-268

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