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Gender and technology

Sally Filtness
Senior Head of Butters House
Design and Technology teacher

About the Author

Sally Filtness is a Senior Head of House for Butters and has been a senior pastoral carer at Barker College since 2002. She has a Master's Degree in Technology Teaching and is a Nationally Accredited Highly Accomplished Teacher. She has been a member of the ISTAA Experienced and Highly Accomplished Teacher Assessment Panels and she has written three textbooks on Design and Technology for Stages 4, 5 and 6. Sally is a member of the College of Teachers and is currently finishing off her Doctorate in Education based on Online Learning Resources in the Design and Technology classroom. She also lectures, writes and marks for Technology teaching degrees at Southern Cross University, NSW. When not doing all of the above she enjoys playing with her five year old identical twin girls, Zara and Chloe.

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Abstract

Two reasons prompted the author to write this piece for the Barker Institute Journal. Firstly, Design and Technology teachers are planning and disseminating the new mandatory Technology Syllabus (NESA 2017) in 2019 and 2020. Secondly, Barker is transitioning to full coeducation by 2022. It is imperative to conduct a literature review on gender and technology. Cai, Fan & Du (2017) discuss a gender attitudinal gap, but then go on to state that when the general attitude was broken down to different dimensions of attitude, it showed a reduction of gender difference in the dimension of self-efficacy and belief. We, as a Design and Technology Department, hope to disseminate and implement design projects and activities to decrease the 'gender attitudinal gap' and 'increase self-efficacy and belief' in both genders.

Key Terms

Constructivism

Constructivism is a learning theory found in psychology which explains how people might acquire knowledge and learn. It therefore has direct application to education. The theory suggests that humans construct knowledge and meaning from their experiences. Constructivism is not a specific pedagogy. Piaget's Theory of Constructivist Learning has had wide ranging impact on learning theories and teaching methods in education and is an underlying theme of many education reform movements (University of Sydney 2019).

Dissemination

To provide lecturers with information, involvement and support with as many of the essential and important factors as possible from a list identified in an earlier project (McBeath 1996).

Self-efficacy

Personal judgments of one's capabilities to organise and execute courses of action to attain designated goals. Strength of perceived efficacy is measured by the amount of one's certainty about performing a given task (Zimmerman 2000).

Technology

Refers to methods, systems and devices which are the result of scientific knowledge being used for practical purposes (Collins 2019).

Tinkering

A socio-technical, material and cultural practice; a curious investigative D-I-Y (Do-It-Yourself) approach to invention that is often compared with the practice of hacking, making or modifying (ACLA 2019).

Body

Gender differences are the focus of much of the research which deals with children's technological abilities (Cai, Fan & Du 2017; Gipps & Murphy (2003); Barnes, Barnes, Morley, Morley & Sayers 2002; Fleer 1996; Greenberg 1986; Pickford 1992; Rogers 1997; Ryan 1993; Zarins 1996). The perspective provided by technology is especially suited to the study of gender (Jenkins 2000). According to Totten & Pedersen (2012), two of the most significant areas for research in science and technological education in the 21st Century were constructivism and gender. In the early years of schooling, gender appears to be a contested issue. For example, Faruqui, Hassan & Sandri (1991) argue that gender differences in science and technology are most evident in primary schools. The effects of unequal treatment and gender-role stereotyping is already evident when children enter primary school (Eccles 1999). On the other hand, Fine (2005) believes that gender differences are not very visible in the early years.

OECD (2015) states that much of the gender research has focused on girls' social contexts by examining the way in which science and technology is portrayed through the media, school practices and textbooks and by surveying the relative proportions of males and females in various educational programs and types of employment. The paper from NSW Parliamentary Research Service (Gotsis 2017) on gender and technology, although targeted mainly at a secondary teacher audience, contains valuable insights into a range of classroom gender issues which are equally applicable to the early years of schooling. It has been argued that gender differences to do with technology are already visible by Kindergarten (Hallström, Elvstrand & Hellberg 2014). Some of the topics included in the paper are the male dominance in access to classroom resources; male images portrayed through textbooks and resource materials; preferred learning styles for girls; types of assessment methods used (competitive or non-competitive); socio economic class; and, cultural and racial differences.

For some students, their lack of experience with some areas of technology may need to be addressed through the implementation of special measures that are sometimes referred to as affirmative actions (McInnis 2006). It has been claimed that girls do not seem to have the same chance to develop understandings of technological concepts that boys learn through their tinkering and playing with construction sets and mechanical toys (Browne 1999). It would seem that girls do not have the same opportunity to develop some of the understandings of systems and machines that boys learn through playing and tinkering with mechanical toys (Rogers 1997). Yet boys are more likely to have had prior experience with constructional toys and using tools and resistant materials to make models and objects (Bindon & Cole 2016). They play more intensively with construction toys than girls (Blakemore 2005). Also, boys tend to be more interested in the physical and technological aspects of the world, while girls appear to be more interested in the human and natural aspects (Kohl III 2013).

Because many girls initially appear to be less adept than boys at construction activities, Wyn (2009) suggests that they need to be provided with additional catch-up time to enable them to gain confidence and self-efficacy and to feel comfortable to freely express their ideas. This notion is supported by Claire (2002) who believes that girls need a lot more teacher support in construction activities and project-based learning. Special measures may also be needed for boys who may be unfamiliar with technology associated with textiles and food preparation (Rennie 2001). These special intervention measures (or affirmative actions) need to be supported on a whole school basis (Rogers 1997).

The issue of gender inclusive curriculum materials has been addressed in a case study about the development of technology materials (Kinnear, Treagust & Rennie 2007). The study found that an awareness of gender bias needs to be present from the earliest stages of developing inclusive technology curriculum materials. Technology teaching materials need to be attractive and effective for both girls and boys. The fact that different students have different interests and all students possess existing knowledge are important considerations when planning technology courses (Jones & Carr 2002). NESA (2017) states that all students during their compulsory years of schooling must engage in design and technology activities requiring the use of a range of materials that encompass Design and Production, Agriculture and Food Technologies, Digital Technologies, Engineered Systems, Digital Technologies and Material Technologies. The use of such a broad range of mediums should help overcome some of the restrictive traditional views about which aspects of technology are appropriate for boys and which are for girls (Bindon & Cole 2016).

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