Robotics has been used in education since the late 1900s (Eguchi, 2014). Research into robotic construction kits for children started in the 1960s (Martin et al. 2000). This research looked into whether children could be the creators of their own technology and active participants in their learning as opposed to using devices that are premade for them. One of the early developments in this area was the Logo programming language (Papert, 1980). A version of this language called Lego Logo was later used in the first widely available robotic construction kit (Martin et al. 2000). The Lego/Logo device allowed children to practice two different design areas, traditional lego building (with some new advanced Lego also) as well as assigning behaviour to the device with the Logo programming language (Martin et al. 2000). Through designing and programming the behavior of their own devices, children acquire a greater appreciation and more thorough understanding of many scientific concepts (Martin et al. 2000). Through the lego robot kits children apply concepts they are already familiar with and learn new concepts in a natural way (Martin et al. 2000). According to Martin et al. (2000) the robot kits bridge the gap between science and technology. These early Lego robots and Papert’s research became the basis for the development of the Lego Mindstorm devices which have been used in primary, secondary and higher education (Martin et al. 2000).

According to Eguchi, a transdisciplinary approach is needed for teaching STEM in order to increase the size of the STEM workforce (2014). As robotics integrates the fields of computer science and engineering it is ideal for this purpose (Eguchi, 2014). Introducing robotics into the classroom could be used as a way to balance the gender difference of those going into STEM as boys and girls seem to engage with robotics equally (Peixoto et al. 2018). Educational robotics can also be used to enrich other non STEM areas of study in the classroom such as dance, art, literacy, music and social studies (Eguchi, 2014). As a consequence of its “hands-on” nature, educational robotics provides students with an exciting and engaging learning experience (Eguchi, 2014). The “hands-on” style is referred to as constructivism by Piaget, and means that students try to create meaning as they seek to comprehend the world around them (Alimisis and Kynigos, 2009).This engaging learning experience drives students to acquire new skills to complete their projects (Eguchi, 2014). The control of robots after they have been built is also a part of the learning environment that robotics provides (Alimisis and Kynigos, 2009). Robotic technology alone in the classroom is not enough to facilitate learning, as curriculum development and learning environment are also important factors (Alimisis and Kynigos, 2009).

One challenge that teachers faced adopting robotics into their curriculums according to Mataric was that there were not many age appropriate robotics learning materials or robotics lesson plans (2004). This lack of resources has since been addressed. One such age appropriate curriculum which is now available is WaterBiotics (Eguchi, 2014). The WaterBiotics program increases students' awareness of and interest in STEM related careers (Eguchi, 2014). In the program students are divided into small groups as they design, construct, test and redesign their underwater robots (Eguchi, 2014). These robots are made from LEGO Mindstorms NXT kits as well as other components (Eguchi, 2014). There has not been much use of robotics in special education although through qualitative studies it has been recognized that there are several benefits that education through robotics could bring to special education such as collaboration, self confidence and spatial understanding (Karna-Lin et al. 2006).

Robotics can also be taught to students in environments outside of the classroom, such as camps and competitions (Eguchi, 2014). One such camp, RoboParty, is organized at the University of Minho in Portugal (Eguchi, 2014). This camp is a three day event in which students learn electronics, mechanical engineering and programming through robotics (Eguchi, 2014). It is also possible for robotics to be a module in a camp which has a broader focus. A camp of this nature is the University of Limerick’s Cybercamp, which is an ICT camp where students try out many different activities including game programming, music production, electronics and robotics (UL Cybercamp 2019 - Modules, 2020). Similar to the WaterBiotics program, the robotics module of Cybercamp also uses LEGO Mindstorms. Competitions such as RoboCupJunior are another way for young people to engage with STEM subjects through robotics (Eguchi, 2014). RoboCupJunior is a worldwide robotics competition for childen up to 19 years of age, which focuses on education rather than pure competition (Eguchi, 2014). RoboCupJunior aims to simulate real world engineering by focusing on team based challenges and collaboration (Eguchi, 2014). The goal of RoboCup and RoboCupJunior is to stimulate robotics and artificial intelligence research by providing participants with a standard problem where many different technologies can be used (Martin et al. 2000). Although competitions are motivating and enjoyable for some students they are not for everyone. According to Martin et al. (2000) exhibitions offer an alternative way for students to engage with robotics outside of any competition. Exhibitions provide young people with the chance to present their work without any antagonism (Martin et al. 2000). The flexible nature of exhibitions can allow for greater creativity and if the student is heavily invested in their project and the exhibition it can provide the same level of motivation and engagement that competitions do (Martin et al. 2000).

It is possible to integrate robotics into education in a variety of settings including the core curriculum, camps, competitions and exhibitions. The integration of robotics into education introduces students to a variety of STEM fields because of the multidisciplinary nature of robotics. This is possible through the use of age appropriate educational robotics kits such as the Lego Mindstorm devices. Furthermore the constructivist learning that occurs when people work on something “hands-on” like robotics facilitates learning in a variety of ways. Students in mainstream education as well as from special education can benefit from the use of robotics in the classroom however technology alone cannot deliver effective education as the environment of learning and curriculum must also be considered.

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