IDEATION TRAINING VIA INNOVATION EDUCATION TO IMPROVE STUDENTS' ETHICAL MATURATION AND SOCIAL RESPONSIBILITY

By

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ABSTRACT

This paper will represent the pedagogy of Innovation Education in Iceland that is a new school policy within the Icelandic school system. In Innovation Education (IE) students are trained to identify needs and problems in their environment and to find solutions: this is referred to as the process of ideation. The main aim is to improve their social capital through general education. Innovation Education has taken form as a new cross curriculum subject called 'Innovation and practical use of knowledge' as presented in the new National Curriculum from 2007. It has a place in the National Curriculum as a part of the new area for Information Technology and Technology Education. Innovation Education in this form can be said to be the result of 25 year's research work, aimed at developing this new model for education. This was done in cooperation between the school system and the work place. The paper presents how the curriculum subject has developed its character, the pedagogical framework it is based upon as well as the ideology behind it and its ethical value as a part of general education.

Keywords: Innovation Education, Ideation, Social Capital, Social Responsibility, General Education, Innovativeness, Future Society.

INTRODUCTION

Innovation Education (IE) originated in Iceland in 1991 (Thorsteinsson 2002). It was developed within Design and Craft lessons and was closely linked to the principles of the Nordic Sloyd Pedagogy (Thorsteinsson, Page and Olafsson, 2009), in that it also aimed to educate children holistically, via a carefully structured system (Borg, 2006). In the case of Sloyd, such a carefully structured system was handicraft and, with regards to IE, the system refers to ideation skills (Thorsteinsson, Page and Niculescu, 2010) within the context of innovation (Thorsteinsson and Denton, 2006).

IE focused on the conceptual work of students, searching for needs and problems in their own environments, generating appropriate solutions or applying and developing known solutions (Figures 1 & 2; Thorsteinsson & Denton, 2003; Gunnarsdottir, 2001). While IE had its roots in Design and Craft, it was aimed at general education and, in 1999, IE was developed into a new subject within the Icelandic National Curriculum. In 2006, it became a cross-curricular element of the National Curriculum.

The paper firstly defines ideation and describes its role in building innovativeness through general education in order to increase social capital in students through general education. Subsequently it demonstrates the ideology and pedagogical model of innovation education. Then it discusses the value of the ethics inherited in the pedagogy. Finally conclusions are drawn.

Innovation and Practical Use of Knowledge

The pedagogical framework for IE is now part of the Icelandic National Curriculum, under the term 'Innovation and Practical Use of Knowledge' (The Ministry of Education, 1999). This is a set of broad principles (not classroom actions) that guide plans and actions implemented by teachers.

IE is intended to be a framework for the teaching of ideation skills and thus aims to increase students' innovativeness. In Innovation Education, students seek solutions to real world problems: they propose solutions at a conceptual level and research the knowledge that is needed to develop the solution (Figures 1 & 2). As the students engage in the process of innovation, gaps in their

knowledge emerge and they find it necessary to research and gain appropriate knowledge, in terms of the particular innovation process they are involved in (Figure 1). This process is paramount, as subject knowledge develops accordingly. As students acquire increased knowledge and experience of ideation work, they can employ this in new contexts (The Icelandic National Curriculum, 1999). The resulting effort can be seen across the curriculum, as individuals rely on critical knowledge and information from different sources in searching for viable solutions, and the emphasis is to train students to produce valuable and practical results of their knowledge through innovative work (Figure 2). (The Icelandic National Curriculum, 1999). Innovation work can take place within all school courses and can be seen as the formation and development of human knowledge at all levels of education (Thorsteinsson, 2002).

Innovation Education is intended to strengthen an individual's innovative and independent thinking, together with the ability to respond to a new situation. As the Ministry of Education asserted: 'In today's ever-changing environment, what individuals need is the ability to respond to new situations, rise to challenges and exploit innovations and advances in all areas' (2011, p. 19).

Ideation and its Role in Building Innovativeness through General Education

The main emphasis of the pedagogy of IE is to make students better equipped to deal with their world and take an active part in society through innovation (Figure Gunnarsdottir, 2001; Thorsteinsson & Denton, 2003). The ideational skills developed during IE aim to encourage this aspect of students' development and thus strengthen the ability of future societies, in terms of innovation and development (The Ministry of Education, 1999).

In IE, students are introduced to a process of innovation that focuses on the 'front-end' of the design process; i.e., problem and need identification, initial concept generation, the development of basic solutions using simple models (Thorsteinsson, Page and Niculescu, 2010) and descriptions with images or multimedia content (Thorsteinsson & Denton, 2003) (ideation skills are central to the formation of ideas in this process). The Icelandic National Curriculum takes the position that everyone can be innovative and that it is possible to introduce classroom activities that develop ideation. Innovation Education is integrated into regular ordinary schoolwork and taught by non-specialist teachers, who aim to:

- Stimulate and develop innovativeness in students and teach them certain approaches and processes, from concept through to realisation;
- Teach individuals to be innovative in daily life, so that they become better equipped to adapt their environment;
- Encourage and develop students' initiative and strengthen their self-image;
- Make students aware of the ethical values of 'objects', while teaching ways in which to improve their environment (Thorsteinsson, 1998, p. 143).

Related Approaches to Idea Generation

The term ideation originated from (Guilford (1950) Thompson, 2008) who used it to describe the pattern of interactions that arise when an individual produces an idea. As (The Oxford Dictionaries Online (2011)) states, ideation is the formation of ideas or mental images of things not present to the senses. Idea generation is the generation of possibilities, performed at various points in problem solving and innovation episodes (Smith, 2003). Lying at the heart of both invention and design, it is widely acknowledged as a key part of the innovation process (Van de Ven et al., 2000).

Innovation is closely related to idea generation, as the innovation process invariably includes problem-need identification and problem solving (Smith, 2003). Osborn (1967) understood idea generation and idea evaluation as two separate activities. Demerest (1997), similarly, recognised knowledge creation as a key separate activity supportive of idea generation. Rickards and Friedman (1978) suggest that an additional time separation or deferment of judgement should occur in the idea generation phase, as this time factor allows ideation to develop before idea evaluation takes place. Titus (2000) speaks of periods of idea generation rather than

separated events, suggesting the need for reflection and further development. Similarly, Henry (1991) considers the need for a period of incubation in idea generation: this period is referred to as deferred judgement and is distinct from dormancy. Rather, it should be a period of knowledge creation through dialogue, debates, scanning, etc. Accordingly, ideas are generated and shaped, prior to idea evaluation.

Ideology of IE

Innovation work is based on the concept that everyone is creative. Through creative abilities the student uses his/her creative power to form the world (Thorsteinsson, 1998, p. 309). Creativity is important as it enhances the quality of solutions to life's problems. Creative thinking results in original solutions to problems that continually arise (Runco and Albert, 1999, p. 215-216). Everyone can utilize their creativity if they have the opportunities to develop and mature through education in a conscious and targeted manner. The ideology behind innovation work concerns individual's abilities to use their creative powers and creative intelligence to modify their environment (Figure 3). Innovation projects are intended to augment those strengths or qualities in a child's makeup and thus strengthen society in the future (Thorsteinsson, 1998).

Pedagogical Model for IE

Gunnarsdottir (2001) examined how students learnt in IE classes. She looked at how students learned through their social activities during ideation in IE and put forward a pedagogical model (see Figure 1) of teaching and learning in Innovation Education (Gunnarsdottir, 2001).

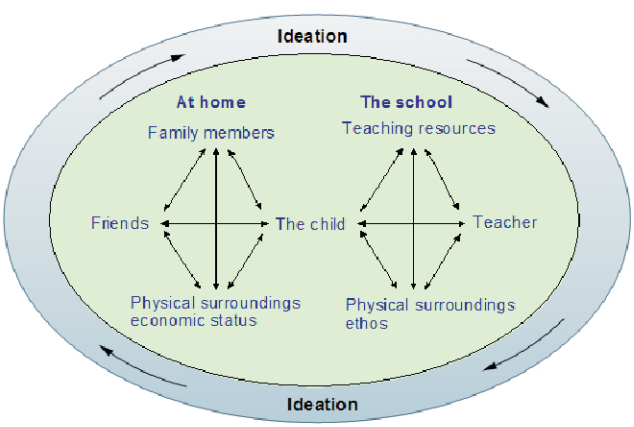

Figure 1. Gunnarsdottir's Model Shows the Interaction Between a Student's Home Life and Ideation During IE Classes and Illustrates the Relationship Between the Two

The Figure above illustrates how students learn through their social activities in the context of ideation. They become active participants in the culture that surrounds them at school and outside school (Edwards 2001). The figure demonstrates the interaction between the student's real life and their classes and explains how it affects the way they learn through ideation. This relates social constructivism (Edwards 2001) theory that new knowledge is an active product of the learner integrating new information and perceptions with prior knowledge.

The learners are allowed to demonstrate their resourcefulness and through the innovation process they use ideation skills and prior knowledge to suggest solutions and build up their self-image as innovators. Both at home and in school the student has access to others for support and this significantly moulds the contents and working methods in the context of ideation. They use their teachers as one of several types of resource and develop capacities to produce new knowledge (Edwards 2001). His role is to create circumstances that support or scaffold student's learning and to be a source of information that facilitates the activity of the student (Gunnarsdottir, 2001).

Gunnarsdottir's research concluded that the IE paradigm is related to social constructivism (Edwards, 2001), and this is supported by the work of Dewey, Piaget and Vygotsky (Thorsteinsson and Denton, 2008). The research is based upon the theory that new knowledge is an active product of the learner integrating prior knowledge with new information and perceptions. Social constructivists study how people use social activities to change their conditions of existence and their self-image (Shotter, 1993, p. 111) and Gunnarsdottir uses social constructivist theories to explain how individuals become active participants in the culture that surrounds them, both inside and outside of the school (Edwards, 2001and Figure 3). She demonstrates the extent to which a high degree of learner autonomy and limited direct instruction by the teacher can be indicative of Vygotsky's Zone of Proximal Development (Vygotsky, 1978, Jonassen, 2006) that is the difference between what a student can do alone and what he/she can do through supportive collaboration.

Based on Gunnardottir's work (2001) and the author's description of the innovation process in IE, the author put forward an initial model for IE (Thorsteinsson & Denton, 2003 (Figure 2).

This illustrates the way to students work through the innovation process in Innovation Education classes and is based on a series of steps, iterations and relationships, with the overlying direction leading from 'finding needs' to 'presentation of solutions'. Students employ ideational skills at all stages and learn through the innovation process within the overall IE pedagogical framework (The Ministry of Education, 1999 and 2007). In the model, students learn through the innovation process within the overall IE pedagogical framework, which is managed by the teacher. The process is as follows (Thorsteinsson and Denton, 2003):

- Finding needs;
- Brainstorming;
- Creating and choosing initial solutions;
- Concept drawing or modelling, in order to develop the technical solution;
- Creating a description of the solution, in addition to the drawing;
- Presentation.

Students work through the IE innovation process iteratively with the overlying direction lead from 'finding needs' to 'presentation of solutions'. Innovation relates to the usefulness of ideas and/or how they can be implemented as solutions to the many problems encountered in daily life. In Innovation Education, students use appropriate knowledge and information from different sources to find solutions to the problems or opportunities identified: this mirrors Vygotsky's (1978) zone of proximal development. In the school classroom, they communicate with the co-students and the teacher and expose to each other thinking processes throughout their communication during the innovation process.

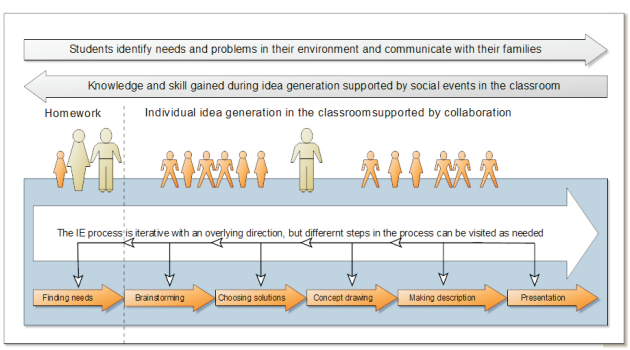

Figure 2. The Basic Pedagogical Model of the IE Innovation Process. The Model illustrates Innovation as a 'Process', with Appropriate Feedback Loops and Options

Social Responsibility, Ethics and Social Welfare

Figure 3 refers to ethical awareness that is an important aspect of modern education of children and supports the responsible participation of individuals in forming and developing society. Ethical awareness is developed through ideation training because it builds upon solutions to daily problems. Such training as a part of general education encourages ethical awareness as part of the individual's morality. If the student can take a step beyond that, which would have occurred if they had done something by rote knowledge. The student has acquired ethical awareness when he/she knows and can think about the value of his actions (see Figure 3). Ethics is the ethical judgment of an individual that use ethical values when he/she progress beyond rote learning. The individual begins to acquire ethics when they can conceive their own actions and defend them. Ethical maturation is an important element of education. This element supports an individual's responsibility to take part in and help to shape the society (Thorsteinsson, 1996, p. 11; Figure 3). Ethics develop through a student's innovation work as they are working with real world problems (Figure. 3). Students augment their ethical maturity and ability to utilize their creative intelligence. When that occurs the student's self-image also strengthens. This enables them to move in a positive

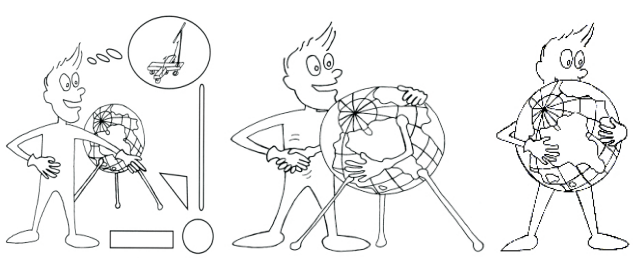

Figure 3. Student Social Responsibility is a Commitment Everyone has Towards the Society

direction, believe in their future and feel themselves to be an integral and independent person.

One example of how work with innovation can be a foundation for ethical growth was when a 9 year old boy came with a problem to an innovation class. Apparently, his mother was always falling asleep in front of the television set, at night, and he was concerned. The students in class came up with a variety of solutions to this problem; matchsticks to hold open her eyelids, a pail of water that would wet her when she fell asleep etc, etc, When the students had worked with that issue for a while, they began to analyse what lay behind the mothers sleeping problem and eventually one of them inquired whether or not tired moms might not be allowed to just sleep?

Another example of how ethical awareness can develop: After a tragic avalanche, in Sudavík, a small fishing village in north-west Iceland, in 1996, students came up with an incredible number of ideas for avalanche protection and searching equipment. Many students made simulations of avalanches to test their prototypes. One student came up with a novel concept that could make it possible to find victims of an avalanche. What struck the students was the remark, on the evening news, by a survivor, that he had called out for help but the rescuers could not hear him. The student's concept used a simple stick which included certain sensors. As a concept it requires considerable development, but the point is, that the 11 year old student's the concept was new and had a true humanitarian basis.

Conclusion

Work with Innovation Education encompasses many possibilities, which can be opportunities for individuals to both develop their talents and contribute to their environment, as well. Some people may not see the possibilities involved and feel that the activities are not in rhythm with daily realities. But small steps become yardsticks by which change can be measured and new avenues to progress unleashed. The ideas proposed in innovation are supportable in all areas of education as well. Its basis lies in creative endeavours, which help the individual mature on many levels with the emphasis being on individual empowerment, initiative and working with ideas. The participation of teachers needs to be redefined. In innovation he does not judge their proposals. He introduces them to the different work methods and takes the position that these people are his equals with abilities to take decisions and he merely helps them find technical solutions to the problems and functionality of the design.

All ideas are valid. They may have more or less intrinsic value, for the individual, and it does not matter that the concept does not succeed at first. The proposal holds its value nonetheless and merely waits its time before it becomes a reality. The teacher does everything in his/her power to motivate and keep alive the creative wisdom of the child. They do not evaluate the child in relation to its cognitive stage of development but rather look at the child and its project as a whole. That is the target for the teacher. Our inherent creative wisdom is something that needs to be stoked and encouraged in a larger measure in the future. The author proposes that the elementary schools will become, to a much larger degree, the platform for emphasizing creativity and initiative as a building block for life.

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