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Does Problem Based Learning affect empathy?

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Abstract

Problem based learning as used at Linköping University focuses on self-directed small-group learning in group sessions that are facilitated by staff or older students. We believe PBL might affect empathy because of two reasons; the feedback produced and received during tutorial sessions as well as the frequent collaboration could encourage the development of empathy. Also, personnel involved in tutoring engineering students often perceive that students from the engineering program that uses PBL are more mature in many respects, including empathy, than other students in engineering. The purpose of this study was to investigate the level of empathy among engineering students on a programme that uses PBL at Linköping University. 35 students from the first semester, and 22 from the 5th semester were analysed. The results show significant increase in empathy between the first and 5th semester.

Introduction

Graduate Engineers face challenges in their professional lives when they are to manage project groups and be leaders for organisations, because such positions demand many skills. Graduate engineers must have acquired elements such as interpersonal skills, as well as teamwork and appropriate degrees of empathic skills. Such skills are particularly relevant in our globalised world and times of increased intercultural communication. In the globalised world, international cooperation is important, and engineers must interact with different professions, which requires skills in empathy. Many researchers have asserted that empathy plays a central role in social interaction, in both informal and professional contexts (Davis, 1994).
Graduate engineers must have acquired, in addition to engineering fundamentals, skills such as emotional intelligence, communicating skills, collaborative abilities and empathy (Edvardsson Stiwne & Jungert, 2010). However, Goleman (2004) has stated that engineering education has ignored this range of skills in the past, and that engineers in leadership positions often lack the requisite leadership abilities.

The master of information technology program, the IT programme (an engineering program with a main content of mathematics and computer science) at Linköping University is taught using Problem Based Learning for several reasons, one among many being the preparation for working in teams and managing project groups that the tutorial groups used in PBL is expected to provide. Problem based learning as used at the IT-programme focuses on self-directed small-group learning (Woods, 1997) in group sessions that are facilitated by staff or older students. The groups

are of 6-8 students and change every semester. The students meet twice a week and set their own learning goals between meetings, supported by the facilitator and by learning goals set for the course. "Situations" (cases) are used to focus the work in the group and academic subjects are semi-integrated (2-3 academic subjects are integrated in a course, and 2-3 courses are studied in parallel). Personnel who supervise project groups of these students as well as other engineering students occasionally perceive that these groups are more "team oriented" and more productive after a couple of weeks in a new project group than other engineering students. In later years of their education, personnel who supervise master thesis projects sometimes observe that the IT students seem more mature than other engineering students (Ragnemalm, personal experience).

The word “empathy” originates from the Greek word "empathiea", which means feeling other persons’ reactions and entering their world (Campbell & Babrow, 2004). Empathy is a profound human ability and a fundamental feature of helping behaviour. The ability to empathise and identify with others is essential to all human relationships and can be understood as a bond that makes social life possible (Hogan, 1969; Kohut, 1984; Eisenberg & Strayer, 1987). Empathic individuals have a better capacity to orientate themselves in a variety of interpersonal relationships in their lives, in professional life, in family life as well as in contact with individuals from other cultural and ethnic groups (Batson & Ahmed, 2001; Hoffman, 2000). Therefore empathetic individuals should be more "team oriented" and should also be capable of achieving productive interaction in teamwork. Conversely, it is reasonable to assume that people who collaborate well in teams should have at least some minimum level of empathy.

The purpose of this study was to:
analyse whether the basic level of empathy is higher for students in the later years of the PBL-based IT programme than when they start, and if there is a difference between students of the IT-programme and other Engineering programmes.

Method

In the psychological literature, empathy as a personality trait and as a learned ability has been assessed by quantitative measures (Davis, 1994; Hogan, 1969; Mehrabian & Epstein, 1972). We chose to measure the basic empathetic level using Interpersonal Reactivity Index (IRI: Davis, 1994). It consist of four factors Empathic concern (7 items), Perspective Taking (7 items), Fantasy (7 items), and Empathic distress (7 items) designed to tap two separate dimensions on basic empathy (Davis, 1994). All of the items were listed in random order and rated on a 5-point Likert-type scale (1 = strongly disagree to 5 = strongly agree). The items were phrased both positively and negatively to offset any potential response bias. Negatively phrased items were reverse-scored. The questionnaire package consisted of 34 items in total.

The questionnaires were issued to two groups of IT students, one group of 35 students in their first week of the programme (i.e. before they had experienced PBL), and one group of 22 students in

their fifth semester, i.e. having studied using PBL for more than two years. The students received the handouts during the break in a lesson. The questionnaires were briefly introduced as measurements of empathy and an appeal to assist in the study of empathy levels on the programme was made, along with guarantees of anonymity. Most of the students present filled in the questionnaires, although one woman expressed concern that it would be possible to identify her from the answers to the demographic questions. She was assured that the answers would not be handled on individual level by anyone familiar with them, and was satisfied with that.

Results

A two-way ANOVA was performed using the semester as independent variable and mean basic emphatic level as dependent. The basic empathy for the first semester was 3.35, with standard deviation 0,40 and for the 5th semester 3.61, with standard deviation 0,35, with $p < 0.01$, thus indicating a small, but significant increase in basic empathy. As a comparison, data collected for a related study in progress (Rasoal, Danielsson, & Jungert, 2011), using students from a Master of engineering in physics and electrical engineering at Linköping university (a programme not using PBL), indicate that these students (data collected in the 6th semester using the same instrument) have a basic level of empathy at 2.6, a significantly lower level. The level of empathy among these students at the start of the education is not known.

It is conceivable that the change in empathy for the IT students is related to age. A backwards multiple regression analysis was performed on the two variables age (in years) and semester. Results show that semester explains a significant percentage of the variance in empathy (Beta =-0,42, $p<0.05$). Age also explains a significant, but lower, percentage (Beta -0,30, p value <0,05). Thus semester explains 42% of the variance, while age only explains 30%. It is known that gender is also related to empathy, but women in engineering are so few that the effect is insignificant in this context.

Conclusions

We have shown that the students of the IT programme (Master of Information Technology), a master of engineering programme that uses Problem Based Learning, have a higher level of empathy in the 5th semester than in the first semester, and that although age explains part of the change, the time spent studying using PBL (i.e. the difference in semester) explains a larger part of the change. This increase in empathy is possibly the effect of working in supervised tutorial groups and frequently evaluating their own behaviour in the group. Thus, training engineers using PBL could possibly result in engineers better prepared to work in teams and lead project groups.

Related research in progress (Rasoal, Danielsson, & Jungert, 2011) has shown that engineering students on a programme not using PBL have an even lower basic empathy in their 6th semester. Another related study did not show a significant increase in empathy for students of programmes in medicine and nursing (Rasoal, Jungert, Hau, Edvardsson-Stiwne, & Andersson, 2009) although

these programmes do use PBL. Thus, while PBL appears to make a difference for engineering students, such an effect is not visible for other educational disciplines. Further work is needed to analyse both larger samples of engineers and other programmes, and making comparisons with similar programmes in other countries.

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