SCHOOL AND DEVELOPMENT OF INNOVATION

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Abstract:
Slovenia lags behind more organised and globally competitive states, as measured by a number of important indicators. This has exposed its lack of appropriate strategies and policies to improve the situation. The following paper presents the findings of a project that monitored the work of enterprise circles and analysed their strengths and weaknesses. Differences were also found between the positions taken by the group of teachers that participated in the project and a randomly selected control group of teachers. The findings indicate that teachers who led enterprise circles were critical of an over-emphasis on administrative work connected to the preparation of typical business plans. They were frustrated by overly detailed and prescriptive syllabuses, are more likely to accept pupils' ideas, and make more frequent use of ICT in their teaching. They are less likely to attribute open thinking and innovation to their schools and also believe that their schools are less tolerant of mistakes and put more emphasis on discipline**.**

Keywords: school, teachers, innovation.

1. INTRODUCTION

Slovenia lags behind more organised and globally competitive states as measured by a number of important indicators (EIS, 2006; Glavič, 2011). This has exposed a lack of appropriate strategies and policies that could improve the situation, at the same time it has focused attention on the education system for young people, which must become more open and relate more closely to life, as well as promoting creativity and innovation. The need for more ambitious and broader-based innovation policies and entrepreneurial thought and action among young people is today emphasised more than ever before, because creativity and innovation are and will remain drivers of social development. Florida (2002) even writes of societies moving from the information age to a "creative society", while Salkowitz (2010) states that there are three main factors that will influence the transformation of society in the 21st century: young people, ICT (information and communications technology) and entrepreneurship. Educating and motivating young people to take initiative at all levels of the educational process is therefore a vital part of lifelong learning, and is becoming an important part of general human knowledge.

Developing creativity and innovation demands the formation of a suitable environment that promotes the flow of new ideas, curiosity and innovation. This occurs in integrated forms of learning that facilitate problem-solving in realistic, authentic situations. If we want to promote the development of innovation, then work in school cannot be separated from the local community and the production process. Of course, encouraging pupils to generate new ideas is only an initial step. Good ideas must also be developed, made tangible, and put into action, and perhaps one day also marketed (Likar, 2004). This entails pupils attempting to pass creative ideas along the entire invention and innovation chain to the point where useful results are produced that could also be of interest to others. This develops the entrepreneurial competence, which is not an absolute ability that is independent of the work and life context, but is demonstrated by an individual managing or overcoming new or different conditions. Companies and organisations are also aware of this, since they understand that in order to be innovative in the environment in which they operate, they need the support of a local community that provides sufficient initiative and entrepreneurial challenges for young people to be able to form their ideas into projects that relate to various fields of life in that local community.

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It would be unfair to claim that Slovenian schools do not have ideas; they also do have organised external initiatives to develop creative and innovative processes among pupils. Despite this, the findings of the 'Mladina 2010' research (Lavrič, 2010) indicate that young people are conscious of specific shortcoming of the educational system in this field. This

means that the improvements required for the curriculum could influence whether young people generally manage to internalise creativity and innovation, while also encouraging initiatives relating to linking up with the local environment. Clearly there is a need for initiatives that would use tangible actions to place schools alongside the latest developments in teaching creativity, innovation and entrepreneurship and therefore create and strengthen a field of best practice.

A project took place in 2010 and 2011 in eight Slovenian regions that were dedicated to promotion of creativity and innovation; the aim of the two-year project was to train teacher-mentors, who would subsequently train pupils and run projects together with them and local-community representatives in "enterprise circles". The overall work plan was based on a classic concept of innovation and enterprise development. The work process was focused on several interlinked phases, in which pupils worked on improvement of their innovative abilities through practical exercises. The project groups produced a considerable amount of interesting products and services after one year's work.

2. METHODS

The authors followed the work of the enterprise circles and investigated how teachers perceived the narrower school and broader local environment in terms of promoting creativity and innovation. The aims were as follows:
- to monitor the work of the enterprise circles and analyse their strengths and weaknesses;
- to determine whether differences exist between the positions taken by the group of teachers that participated in the project and a randomly selected control group of teachers.

The first aim involved diaries kept by enterprise circle mentors. The entries were reviewed and analysed, and the definitions and characteristics that most comprehensively and succinctly described the course of the enterprise circles' work were linked together. The second aim was met by interviewing 100 teachers (mentors) who had led an enterprise circle for a year, and a control group of 142 randomly selected teachers (other teachers). Both were questioned using a printed questionnaire (Ferrari et al., 2009; Chell & Athayde, 2009) which measured positions on creativity and innovation, the use and the role of ICT, study and the role of pupils, education and professional training, curricula and syllabuses, and the school and support environment. The statistic significance of differences was tested with an appropriate t-test.

3. RESULTS AND DISCUSSION

The diary entries by teacher-mentors on the progress of enterprise circles have been selected since they best define the research problem relating to the first aim.

"The work with pupils in the enterprise circle is good. It revitalises the routine work of normal lessons. This goes for me as a teacher, as well as the pupils. Certain phases are a little too rigid and administrative. For example, when we prepared the business plan, the pupils were not particularly motivated, and had not yet really connected all the different phases into a whole. That only happened, when they developed an idea and presented it at a presentation event."

"We found with the integration of the local community, that it was much easier to present

activities to pupils in the workplace, so it would be better for all the work to take place in their space, rather than for them to come to school to present their work."

"We faced the greatest problems in the potential innovation production phase. We produced the product prototype externally, but that took considerable time and we had to pay for material and labour, so it led to quite a lot of costs."

The diary entries indicate that the teachers perceive the work of the enterprise circles as sound and rational. They consider that there is too much emphasis on the administrative work connected to preparing the business plan and market analysis. The enterprise circles are a welcome development stage on the path towards a comprehensive understanding of the promotion of innovation and entrepreneurship in the school environment. The use of business plans in enterprise education does not give satisfactory results (Honig & Karlsson, 2004; Garavan & O'Cinneide, 1994), perhaps also because of the sense of rigidity and bureaucracy, which was confirmed by mentors in their diaries. The authors therefore focused on promoting creative problem-solving (Martin, 2010; Meinel & Leifer; 2011; Kelley, 2005), which is otherwise a universally applicable skill that also represents the essence of entrepreneurial thought and action. A designer-oriented method of thinking as a pedagogical approach does not demand a revolution in the education system and is therefore a welcome addition to the existing system that includes the enterprise circles and other organisational forms of promoting enterprise at all levels of education.

The results relating to the second aim, setting out differences in positions expressed by the group of teacher-mentors that participated in the project, and the randomly selected group of teachers (table 1). Significant differences between the groups were found for statements agreeing that syllabuses were overly detailed for quality work with pupils, and that they had too much prescribed and not enough optional content. Teacher-mentors proved more critical on this issue. At the same time teacher-mentors were more likely to accept pupils' ideas; in fact this statement produced the largest difference between the two groups. Compared to the group of randomly selected teachers, the mentor group expected more from their pupils, and also used ICT more frequently in their lessons, as well as being more likely to include them in project work.

On the other hand, teacher-mentors are more critical when discussing the level of promotion within the narrower school environment. They are less likely to attribute open thinking and innovation to their schools and also believed that their schools were less tolerant of mistakes, although the statistical significance for this last statement is only borderline significant. Teacher-mentors mention discipline as a characteristic of schools more than other teachers. They also consider that research projects and tenders to participate in projects are an important factor in the promotion of innovation. This is another statistically significant difference between the groups. Teacher-mentors attribute greater influence in the promotion of innovation specifically to the family, i.e. the domestic environment, while they also consider personality traits to be important. The difference for this statement is only borderline significant.

Teacher-mentors who have led enterprise circles are also statistically significantly different from their colleagues by being more critical about syllabuses, which they consider to be overly detailed for quality work with pupils. They say that they contain too much prescribed content and not enough optional content, which makes it harder to focus lessons on themes that are not directly linked to the syllabus.

Another major area in which the positions of teacher-mentors are significantly different to those of their colleagues is their attitude to cooperation with pupils in lessons. It is clear that mentors are more open and more likely to accept pupils' ideas, while also expecting more of them. They also use ICT more frequently in lessons, and are more likely to include pupils in project work. Teacher-mentors are less likely to attribute open thinking and innovation to their schools and also believe that their schools were less tolerant of mistakes, while they are more likely than their colleagues to mention discipline as a characteristic of their school. They

Table 1: Differences in positions according to teacher group

Area	Indicator	Mentors (n)	Other teachers (n)	t (sig.)
Curriculum	Syllabuses were overly detailed for quality work with pupils.	3.99 (98)	3.58 (141)	3.724 (0.000)
	The curriculum had too much prescribed content and not enough optional content.	3.60 (97)	3.41 (139)	1.9 92 (0.048)
Lessons	Pupils' ideas are welcome.	4.56 (99)	4.34 (140)	2.963 (0.003)
	I expect a lot from pupils.	4.14 (96)	3.98 (140)	1.973 (0.050)
	I frequently use ICT in lessons.	3.76 (99)	3.37 (141)	2.869 (0.005)
	I involve pupils in project work.	4.18 (98)	4.01 (140)	1.768 (0.078)
School environment	Open thinking.	3.79 (99)	4.00 (139)	-2.268 (0.024)
	Innovation.	3.79 (99)	3.96 (140)	-1.956 (0.052)
	Toleration of mistakes.	3.31 (97)	3.51 (140)	-1.794 (0.074)
	Discipline.	3.84 (100)	3.65 (141)	1.839 (0.067)
Research project work	Research projects.	4.11 (99)	3.70 (142)	4.543 (0.000)
	Various tenders for participation in projects.	3.85 (99)	3.51 (142)	3.026 (0.003)
Family and other traits	Family.	3.96 (99)	3.74 (141)	2.084 (0.038)
	Personality traits.	4.48 (99)	4.34 (142)	1.816 (0.071)

attribute greater influence in the promotion of innovation to the family in particular, i.e. the domestic environment, while they also consider personality traits to be important. There is also a statistically significant difference between the mentor and other-teacher groups in their view that research projects and tenders to collaborate in projects are an important factor in the promotion of innovation among pupils.

The positions expressed by the teacher-mentors are encouraging since they indicate that a school that shapes pupils into standardised models of thought, ways of thinking and resolving problems actually functions as a block to pupil creativity. That has been a mistake that many

of us have made. Pupils learn that when they do and think about things in the "right" way, they will be rewarded with good marks, while they are punished for acting and thinking in the "wrong" way (Robinson, 2010). On the other hand, this form of encouragement means the focus of young people's motivation in their school work is outwards from within, while external motivation starts to replace internal motivation if there is an emphasis on school marks. Therefore when pupils learn that there are "right" and "wrong" ways of thinking and solving problems, it consolidates the concept that different ways of thinking and other solutions are wrong. When what is different becomes "wrong" and is generally followed by punishment in the form of lower marks, then pupil creativity and innovation will not be best developed. Why should a pupil take a risk and be innovative, if that will only lead to punishment, i.e. being marked down.

Teacher-mentors are also significantly different from the randomly selected group of teachers in one more, exceptionally important area – tolerating mistakes in pupils' work. When pupils learn it is not worth risking making a mistake, they simply stop trying, and give up on being curious, creative, original and innovative. According to Robinson (2010), people do not learn to be creative, but in contrast they can become less creative. School can make us "unlearn" creativity. Not school per se, but the schools we have, the schools of the early industrial age, which in recent years have slightly updated their approaches but which have not updated their basic philosophy, which still understands school as a factory for producing young people that are equipped with sufficient knowledge.

Creativity and innovation are typical of cultures that allow risk rather than risk avoidance. Studies (Ferrari et al., 2009) indicate that the competences of risk-taking and research – the basis of creativity and innovation – are the opposite of typical school values such as obedience and discipline. A tolerant environment or culture is exceptionally important, an environment that permits recognition of what is original and what is mere conformity. A creative culture offers many opportunities for individuals to engage, to build knowledge and to negotiate. It is dominated by open communication at all levels, creating trust, promoting difference, and understanding relations between people and culture at its centre. How open the school management is to all kinds of innovation is also very important. If the management is open, many kinds of changes can take place, but if not one cannot expect major changes to take place.

4. CONCLUSIONS

Teachers who had led enterprise circles differed significantly from their colleagues in being more critical of syllabuses, which they consider to be overly detailed. Mentors are more likely to accept pupils' ideas, in lessons they use ICT more often, they involve pupils in more project work, and they are less likely to attribute open thinking and innovation to their schools. The more critical views of mentors are also expressed in their view that their schools are less tolerant of mistakes and place too much emphasis on discipline.

The findings suggest that participation of schools and the local community in the promotion of creativity and innovation is influenced by a web of social circumstances linked to the experiences, perceptions and interpretations of the partners involved. Although enterprise circles are a welcome form of promoting innovation and entrepreneurship within schools, in terms of seeking sustainable solutions, theory and practice are already moving beyond them. At the heart of new developments are approaches that emphasise creative problem-solving

among young people, which is a universally applicable skill, as well as being the essence of entrepreneurial thought and action.

Despite some limitations, the findings indicate that experienced and innovative teachers constitute an important element of innovative work. The study shows that there is an important opportunity here to organise and introduce more planned, focused and systematic professional training for teachers. Teachers who have participated in planned activities to promote the development of creativity and innovation think and act differently. This indicates that creativity and innovation can be developed though the development of an encouraging environment. Schools need to have development that can bring together professionals and knowledge.

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