THE IDEOLOGY OF INNOVATION EDUCATION AND ITS EMERGENCE AS A NEW SUBJECT IN COMPULSORY SCHOOLS

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The view of the world that the child should acquire through Innovation Education is a belief in people in a harsh world, a belief that a person can solve current problems with the methodology of innovation.

The child brings its ideas into reality in the material world as a solution to needs or problems which she/he has observed and analyzed in his/her environment (Thorsteinsson,2002).

ABSTRACT

Innovation Education and Practical Use of Knowledge was introduced into the Icelandic National Curriculum for compulsory schools in 1999, where it is defined by the curriculum writers as a "school subject" but it is not allocated any direct time in the recommended guidelines for subjects. This paper describes a master's research project from the University of Iceland, Faculty of Pedagogy and Education which focuses on how Innovation Education emerged in Iceland and how the subject has developed; what makes the subject special; and what factors, internal and external, have influenced its dissemination. The paper includes an overview of the data collection and analysis methods and an overview of the findings.

INTRODUCTION

In Innovation Education it is assumed that everyone can be creative and the emphasis is on enhancing creative activities of students through direct connections to everyday life. Educational innovations based on this kind of approach have struggled against the strong underlying factors inherent in the institutional culture of education.

In this research, an attempt is being made to understand and analyse how a new school subject is emerging. The subject taken for research here is Innovation Education (IE) which started in Icelandic compulsory schools in the early 1990s and was formalized in the National Curriculum for Compulsory Schools in 1999 (Aðalnámskrá. Upplýsinga og tæknimennt, 1999). The primary author had worked as a compulsory school teacher for well over twenty years and had experienced that many students were uninterested in school, but when Innovation Education began ten years ago it was found that students were more interested and active than before. It seemed that Innovation Education [IE] needed to be adopted throughout many schools in Iceland, so identifying the factors that could influence its development as a subject, became an interesting concept for research. There are several factors influencing the implementation of the Innovation Education Curriculum in Iceland, and whether or not it is maintained. As identified by this research, these factors include the role of teachers and their professional philosophies; school culture; the role of the head teacher; assessment; emphasis on academic learning; and access to information and teaching materials. One other research project had been undertaken on Innovation Education [IE] in Iceland, this was Rosa Gunnarsdóttir´s PhD research, *Innovation Education - Defining the Phenomenon* (Gunnarsdóttir, 2001).

Less research has been undertaken on the formation of school subjects and perhaps the best known is on Geography, Biology and Environmental Studies (Goodson, 1993). Goodson points out that in order to gain status, new school subjects have to adapt to the constraints of academic standards. The study

investigated the historical background and work underpinning the introduction of Innovation Education into the national curriculum. This provided an understanding of the ideological work that preceded the formal curriculum. In this research officials in the Icelandic Ministry of Education, the catalysts of IE and Entrepreneurship, IE teachers, former IE students and principals and administrators in compulsory schools were interviewed. Furthermore, field observations in IE lessons and Icelandic lessons of the same groups were undertaken. This provided a range of perspectives of the complex reality of schoolwork and how different parties experienced Innovation Education. Laws, curriculum, reports and products of IE lessons were researched and analysed. In addition, curricular concepts, as a framework and a tool to understand the findings of this research were used.

Theoretical Background

The term curriculum can have a different meaning depending on who is speaking, and can range from very broad to very specific definitions. A common view is that a curriculum "is a guide or a plan of what should be done (learned, taught) in schools" (Ísaksson, 1983). A broad interpretation of the term is that a curriculum is "a cultural tool, used to choose from our culture, what is considered worthwhile mediating formally to the next generation" (Hamilton, 1993).

Today the world is more complex, the future is uncertain, industries and family patterns are changing, and the demands on schools are growing. This makes it harder than before to choose what we think important from our heritage to hand over to the new generation (Geirsdóttir, 1997). A characteristic of curriculum in democratic countries is that they try to combine many different views (Geirsdóttir, 1998). These are often a reflection of such compromise and do not have a clear direction. On the other hand, there are many scholars who think it is important that the curriculum is not too constrained and can be interpreted according to the needs of individual schools (Sigþórsson et al., 1999; Vígþórsson, 2003).

Choosing and defining the aims for the formal (official)

curriculum from the various ideas and views that seek a place in the work of the school is not an easy task. To make that process more scientific Tyler (1949) put forward a model for choosing worthy aims for the formal curriculum. The suggested model has been widely used but has been criticized for being too simple and mechanistic and for reflecting a top-down view of curriculum. Walker's model (1990) is probably more realistic as it builds on research of how curriculum makers in USA view the intriguing process of negotiating the aims to set forward in the curriculum.

The influence of the formal curriculum on the work in schools is not always straightforward and clear, and the tools that mediate the cultural heritage are not always as visible as the formal curriculum. Often a difference can be seen between what is done in schools and what is written in the formal curriculum? There are other unwritten factors that affect what happens in the classroom and also how students experience school work. Scholars have noted that there can be a big difference depending on who reports his or her experience of the curriculum. The different curricula identified by Goodlad et al. (1979) are: the ideological, the formal, the perceived, the operational and the experiential curriculum. The *ideological curriculum* refers to the ideas or ideologies that lie behind the formal curriculum, the ideas we have about what is best or ideal. The *formal curriculum* is the one that has received some kind of official sanction and is usually in written form. The formal curriculum is built on ideas and ideals that have been adopted or modified to suit a written systematically presented document. The *perceived curriculum* is the one that different interest groups perceive in their minds to be the curriculum. Parents perceive the curriculum differently from the teachers, but the teachers' perception is likely the most significant for the schoolwork. The *operational curriculum* is the one that teachers actually perform in their classrooms. There may be considerable difference between what the formal curriculum says and the curriculum that the teachers perform. The perceived curriculum can also be quite different from the operational curriculum, i.e. there is often a discrepancy between what people think they are doing and what they

are actually doing. Then there is the *experiential curriculum,* that is, the one that the students experience in the school.

Other factors that affect what is done and not done in schools have been identified as the *invisible curriculum* and the *null curriculum* (Eisner, 2002). The *invisible curriculum* or the implicit curriculum, is everything that is not written but has an impact on what happens in the schools (Eisner, 2002; Goodlad, 1984). The various factors such as the school culture, the grading system, various discourses, the environment, use of time, respect of subjects and every other force brings some kind of message to the students even though they are not written anywhere. The *null curriculum* (Eisner, 2002) is everything that we don't include in schoolwork but perhaps should.

The Power of Education

The belief in the power of education to influence positively the economy, prosperity and success of nations has been controversial, but this is the general belief held in democratic countries. This belief is roughly twofold: on the one hand the belief is that education can improve the economy and prosperity, and it can also improve the person and the society on the other. One of the most famous people to believe in the power of education to empower the individual and to improve society is probably John Dewey who has been called the father of progressivism. His work started around 1900 and was critical about the traditional schoolwork that Dewey said held mechanical discipline, recitation and a rigid division of subjects. His educational policy revolved around "learning by doing" and the role of the teacher was to support and to provide a frame for learning (Dewey, 2000; Eisner, 2002). From the time of Dewey's work we can say that roughly two ideologies have been competing for power in the educational policies, the progressive ideology and the traditional ideology. The traditionalists have strong allies in academic schoolwork but there also seems to be a constant need for progressive schoolwork that often surfaces in the simmering pot of education. Such endeavours to reform education have been criticized and called "tinkering" (Tyack & Cuban, 2001) and it is debated whether such changes are possible as

educational history shows the constant pull back to academia, traditional teaching and testing.

Gunnarsdóttir´s research on IE concluded that the paradigm of IE is one of the social constructivisms. The author uses those theories to explain how individuals become active participants in the culture that surrounds them at school and in the life outside school. The students in IE use their innate creativity and former knowledge in a creative process and in that process they build up their self image as innovators. In IE lessons, the student always has access to others for support and significantly moulds the contents and working methods of the IE learning. The role of the IE teacher is to create circumstances that support or scaffold student learning and to be a source of information that facilitates the activity of the student (Gunnarsdóttir, 2001). In the light of this history, the findings of Gunnarsdóttir´s research and with positive experiences of teaching Innovation Education, the following research questions were identified:

- What is Innovation Education and how did it emerge in the Icelandic school system?

- What is the status of the implementation of IE in Icelandic compulsory schools?

- Which factors can be seen to hinder or strengthen IE?

Methods

Diverse research methods were used in this research. Most of the data collection can be categorised by using qualitative methods; though statistical methods are being based on questionnaire, data were used to measure the dissemination of IE. Data collection consisted of the following.

1. A statistical questionnaire about implementation of IE.

2. Interviews on IE

    a) Interviews taken with key informants using qualitative methodology.

    b) Interviews with the pioneers of IE to gain more detailed information and historical information by e-mail and by phone.

    c) Observations of learning situations.

3. Analysis of written materials, laws, reports, syllabuses

and artefacts from IE lessons.

Statistical Survey

In order to establish whether IE was being adopted in Icelandic schools as a formal school subject, a questionnaire was sent to all compulsory schools in Iceland in the autumn of 2007 by an e-mail list from the Ministry of Education. Some schools did not receive them because of technical difficulties or of invalid e-mail addresses. The original number was 189 schools and the samples that got the e-mails were 129 schools. Answers were received from 63 schools and a call was made to more than ten randomly chosen schools. The final answers were from 73 schools, with the response rate at 57%.

By conducting qualitative inquiry one can look behind the numbers, get a deeper understanding of the subject taken for research, and find out the meaning of the phenomenon for the people who experience it. The goal of qualitative inquiry is to understand the subject from the viewpoint of the persons who take part in the research (Traustadóttir, 1993). This survey gained an overview of IE through attending and making a presentation at a conference for practicing teachers entrepreneurship. Observations in IE lessons and Icelandic lessons of student groups with different teachers were undertaken. 15 interviews took place, with three former students of IE, with four IE teachers, two catalysts (also teachers) of IE, two catalysts of entrepreneurship in Iceland and Norway, and a focus group interview with school principals and administrators in compulsory schools in Iceland. Furthermore written documentation and artefacts were consulted and analysed: lists of needs from IE lessons, artefacts and ideas made in IE lessons, teaching materials for IE, the Icelandic laws for compulsory schools, laws for teacher education, the syllabus for the Iceland University of Education in 2003-2004, reports for the Icelandic Innovation Contest for Compulsory Schools and other reports from the first years of IE, e-mails from the catalysts of IE with information about the history of IE and the InnoEd Website are among them.

A number of qualitative research methods were applied in analysing the data. Grounded theory by using open coding and axial coding (Creswell, 1998) was used. Discourse analysis to interpret the contents of needs-lists from IE lessons and to explain the links between the lives of the students and their work in IE. Hermeneutics was used to find new angles and to find more pillars to support various findings. The analysis was conducted by alongside data collection and constant comparison was made to find leads to the next step in the investigation.

One of the main difficulties in Icelandic research is the small community where everybody knows everyone else. That makes it particularly difficult to disguise which schools are taken for research and to guarantee confidentiality for the persons taking part. Names of schools and persons and sometimes gender were changed to make sure that the participants' identity was not revealed. One of the difficulties is personal bias towards IE and had to minimize the effects that might result from our own attitudes and experiences.

Findings

The beginning of Innovation Education in Iceland can be traced to Paul Johannsson who was a teacher at the Technology University of Iceland. He had studied in Sweden and through his contacts there got to know a competition for children called "Finn-Upp" ("Invent"). Paul wanted to start a similar competition in Iceland and worked from 1987 (Jóhannsson, 2003) for a few years to gain interest in the project. Guðrún Þórsdóttir, a teacher adviser for the Reykjavík LEA, started to work with Paul on trying to start Innovation Education in Icelandic compulsory schools. A crafts teacher in Foldaschool, Gísli Thorsteinsson was willing to try Innovation Education in his teaching and started working with Guðrun and Paul. Gísli had taught earlier at a small rural school where he practiced teaching that was similar to IE where the children were trying to solve real family needs in their crafts lessons. Bragi Einarsson an Icelandic inventor became a part of the group and the four started to offer courses in Innovation within Foldaschool. The first national competition was held in 1991-1992 and the award ceremony was held on 20th April, 1992 where the Minister of Industry presented prizes to the children. Since then the

competition has been held once a year and the ideas sent in by Icelandic schoolchildren every year are around two thousand.

Gísli Thorseinsson and Guðrún Þórsdóttir started a development project in Foldaschool with chosen teachers where they tried out the pedagogy of IE and developed teaching materials for the course. Since then IE has been taught as a special school subject in two lessons per week, half the school year. Rósa Gunnarsdóttir, who started her career as a science teacher at Foldaschool, noticed a difference in the innovative ways, were some of her students worked and found out that those students had been taking the IE course with Gísli and Guðrún. Rósa got involved in the IE work and she and Gísli developed further materials for teaching IE. For a few years Rósa, Gísli and Guðrún offered in-service training for teachers in IE. Rósa later took her Ph.D. from Leeds University where she researched IE and her main task was to define Innovation Education.

The teaching materials developed within Foldaschool were written as teacher resource material. The materials promote a systematic approach for teaching IE. The ideology of IE reflected in the material is: "people are the creators of their own world". The material was written with the aim of enhancing the students' creativity by teaching them certain ways of working and expression (vocabulary and drawings). The materials were also meant to help teachers meet their students at individual levels and to offer them various ways of learning and thinking. The view of the world that the child should acquire through IE is that people can cope in the harsh world and that a person can solve the problems of today through the methods of Innovation Education (Thorsteinsson, 2002). IE is about children working with their own ideas that spring from looking at their environment, discovering and analyzing its needs and finding solutions to those needs. The creative process of working through inventing enhances the children's initiative and creativity and they discover their power to influence their own environment through their creative abilities. Thus, the school takes part in the child's life and the students form the content of learning in harmony with their own experience and interests.

The teaching materials were a series of four units meant for four years of teaching and were called Innovation and Science. Each had a different main theme as reflected in the names of the units: 1. Initiative - creativity, 2. Innovation - technology, 3. Ideas - ingenuity and 4. Environment - design. All of them have a main core that includes the training of the working ways of the inventor. This included:

- Looking for needs
- Working on solutions
- Using the small notebook
- Drawings
- Models

Additionally, these materials emphasize a connection to the life of work where each unit contains a suggestion for a visit to a firm or an establishment that is relevant to that unit's theme. In these materials a learning process is created that gives the students opportunities to utilize knowledge from everyday life and knowledge that they acquire in school.

The Latest Steps in Innovation Education [IE]

Four countries, England, Iceland, Finland and Norway, run a project called InnoEd, funded by a Minerva grant. The InnoEd project was coordinated by the Iceland University of Education and the aim was to set up an educational structure that promotes the pedagogical aims of Innovation Education, offering Diploma courses for teachers in IE and a website that served as a working tool for teachers and students. One master's research project was finished in 2005, the one being introduced here, and two doctoral projects on Innovation Education are ongoing, the author's research at the Loughborough University and research at the Iceland University of Education.

The Formal Curriculum

The experience from the work in 'Fold a school' and other schools in Iceland that followed its lead, led to a formal recognition of the subject as a part of the *General Curriculum for Icelandic Compulsory Schools* in 1999. In the curriculum, it was placed in a curriculum called

Information and Technology Education with Crafts and IT in a chapter called *Innovation and Practical Use of Knowledge* (*Aðalnámskrá. Upplýsinga og tækrimennt*, 1999). The subject is placed as an option for schools in the curriculum, without an allocation of time and three ways suggested to execute it: 1. By integrating it into other subjects, 2.Using timetabled lessons of the schools and 3. A mixture of 1 and 2. Other ways than those suggested have also been used by schools in Iceland such as offering a course in IE outside school hours and paid by the community (Jónsdóttir, 2004). In the report from the preparation committee for the IT curriculum they proposed that Innovation Education get an allocation of time that the schools can use to develop the subject within each school (*Markmið upplýsinga- og tækrimennta í grunnskólum og framhaldsskólum. Skýrsla forvinnuhóps á námssviði upplýsinga- og tækrimennta*, 1997). This proposal was not accepted and reflected the struggle between subjects for time and influence.

Implementing IE In Icelandic Compulsory Schools Curriculum

It turned out to be difficult to find out exactly how well the implementation of IE was proceeding but as far as the findings showed, it was not doing well. "Formal teaching" of IE was defined and it was suggested that IE could be considered as being implemented (having emerged) when it was being taught as a special school subject on the timetable and/or being taught continually for at least three weeks or longer [1]. All compulsory schools in Iceland were sent a list of questions by e-mail. Of those who got the questions the final answers were from 57% of the schools. Less then 10% of the schools had formal lessons in Innovation Education.[2] 36% more considered themselves to be teaching some kind of innovation education, either integrated into other subjects, as an emphasis or as a new way of doing things in school. Most of the lessons in IE were in the years 4 to 7 (age 9-12). 48% of the principals who answered the questionnaire turned
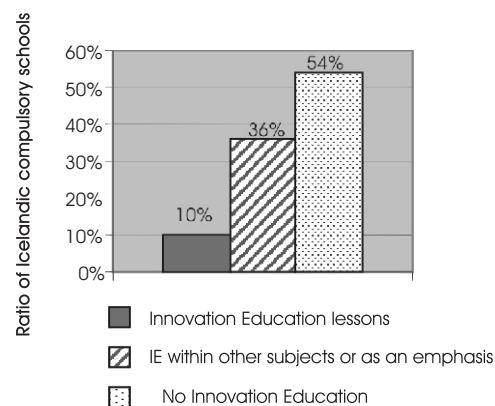

Figure 1. The Implementation of IE in Icelandic compulsory schools in 2003-2004

out to be interested in getting an introduction of IE for their teachers and 22% were interested in getting an introduction of IE for headmasters in the area. A similar survey has not been done before in Iceland and one can ask if the interest shown by principals in getting an introduction for their teachers reflects a lack of presentation of that part of the curriculum in 1999 (Figure 1).

It is quite disheartening for those who want IE to be disseminated widely to see the fact that under 10% of the Icelandic schools are teaching IE as a formal subject. On the other hand one can debate that it is only to be expected as the message in the curriculum is not clear and even ambivalent as it offers IE as a subject or an emphasis and without time allocated. This blurred view of IE may be more difficult in execution than the clear subject based version[3] that the visionaries at Foldaschool used. Other explanations for the lack of dissemination of IE can be as mentioned that this part of the curriculum needed a thorough introduction from the ministry. Also a likely explanation is the emphasis that the society places on the results of standardised national assessment which seems to result in a lack of time for subjects like IE that emphasize the learning process and skills rather than knowledge. Related to this is the power that academic subjects seem to exert at the expense of vocational subjects which is likely to influence the struggle for time in the school system.

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[1]*This could be a course for three weeks using 4-12 lessons per week for IE lessons, or two lessons per week half the school year and similar variations.*
[2]*This also includes shools that used one lesson a year to prepare for the IE contest*

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[3]*Taught as a special school subject within the time table.*

Factors Influencing Dissemination of Innovation Education

Many factors were identified in the interviews that explain the slow dissemination of IE in Iceland inspite of the acknowledgement it got by appearing in the formal curriculum. These factors were: schools organization, the reluctance to change, the status of school subjects, the importance of school leadership and support, the culture or ethos of the school, available teaching materials, teacher education, the demands that IE does to teachers and students and introduction of the subject to all concerning parties. The views of school principals and ministry officials towards IE will first be reported and then the experience and views of teachers and students of Innovation Education lessons.

In Icelandic schools the principals are very influential with regard to which innovations are tried in the schools (Sveinbjarnardóttir, 2004). In the focus group interview with the school principals and other administrators there were many explanations offered as to why IE is not widely spread. Hafdís, one of the principals, said that in order to allow IE to be included in the school curriculum the principal must be interested in and know about Innovation Education. Sigrún, an administrator, pointed out that IE should have had a powerful presentation for the schools principals when it was introduced in the curriculum in 1999. This lack of presentation appears again and again throughout the research and influences many of the other factors identified. Sarason (1971) points out that when innovations are entered the principal must support them and notice it that they are integrated into the existing culture so that it won't just be an ornament attached to the school. Sergiovanni (1995) argued that principals have to evaluate the relevancy and quality of the reforms that are being proposed.

The principals agreed that there was a lack of teachers who knew how to teach IE. Guðrún, the assistant principal of Jardarschool, said that IE had a special pedagogy that teachers had to be trained to use: "I think that the Iceland University of Education (IUE) must offer this for the teacher students. There are special methods used in IE that the IUE should teach". The same view was offered by the ministry officials who said that the IUE had not fulfilled its duties towards Innovation Education when it became a curriculum subject. Kristján, at the Ministry of Education, said that IE must be an integrated part of the IUE´s policy as they are responsible for educating the teachers in compulsory schools. He suggests that the IUE should be a leading force in the introduction of IE, that he admits was lacking in the introduction of the curriculum in 1999. Looking into the syllabus of the IEU it shows that IE is almost non-existent in the courses offered there (*Náms- og kennsluskrá Kennaraháskóla Íslands. Háskólaárið 2003-2004*, 2003).

The principals gave as a part of the explanation for why IE was not taught in the older classes and the lack of teaching materials for their age. Also the evidence was the strong influence of public examination and a strong tendency to subject segregation in the organization of the schoolwork for the older students. Guðný, at the Ministry of Education, pointed out that one of the things lacking in the curriculum in 1999 was the preparation of teaching materials for IE and having exciting materials to offer students, that was crucial in the competition with the traditional subjects.

The Role of the Innovation Teacher

The voices of the teachers and of the students interviewed were very much in harmony even though none of the students had been in classes with any of the interviewed teachers. One of the things they agreed on was the special role of the IE teacher. They saw the role as the supportive teacher that correlates to the constructivist teacher. That was also one of the findings in Rósa Gunnarsdóttir´s research, that the role of the innovation teacher is the role of the constructivist teacher who facilitates active learning as opposed to the teacher who "feeds" the students with finite knowledge. Fríður, one of the innovation teachers, called the innovation teacher as "flexible teacher" who is willing to accept that the student is sometimes the specialist regarding his / her idea. Brynja an innovation teacher at Jardar school, said that some of her co-teachers were not ready to accept that role and wanted to be more authoritative rather than being good, for fragile creative process for time being. Fríður called

the opposite kind of teacher "the square teacher" who is inflexible, wants to be completely in control of the lessons and his/her main aim is that the students do well on the standardized tests. To be able to accept the special role of the IE teacher, it must fit with the professional philosophies of the teachers (Bjarnadóttir, 1993) or they must be ready to change their philosophies in that direction. Such changes are often a part of a reform or an educational change and it is important to give that process time and support (Fullan, 2001).

The Voices of the Students in IE Experiential Curriculum

Freedom, the power of decision, initiative, enhancement of thinking and creative thinking, an attention to the environment switched on, a connection with life outside school, learning the methods of the inventor and the ethos of a creative workplace, were all things that the students experienced in the IE classes. The freedom and the student's right to choose in IE classes were also evident in the interviews with the teachers. There is a requirement on the students that they often work autonomously in Innovation Education. Hulda and Brynja innovation teachers said that it was easier to teach IE in classes where the students were used to work independently, which largely depended on the working methods of their main teacher cultivated. This points to the necessity of having autonomous work as a rule was not an exception that just one or a few teachers within the school employ. An autonomous work culture in the school would ease the way for the implementation of IE and other subjects that rely on independent student work and versatile methods.

Conclusions - A Way Forward

The conclusions that are drawn from the short history of IE are that this young subject was boosted by being adopted into the formal curriculum, a boost that should have enhanced the development and dissemination of Innovation Education. One might have expected a rapid growth from there on, but the chance was not utilized neither by the schools nor especially by the authorities that failed to introduce the innovation to the schools. The subject is still emerging and the question is whether it will live or die. If IE lives, will it be drawn into the direction of

academia like Goodson saw in those new school subjects that survived, or will it be able to maintain the real life characteristics that are at its core?

Considering the researchers' own experiences of teaching IE in various forms and into the answers of the schools that teach IE within other subjects have concluded that IE should be taught as a special subject that incorporates knowledge from other subjects and life. It seems that it is necessary to hold together all the components that make IE a motivating and useful subject, where we learn a certain way of thinking and working. By doing IE in other ways some of the components seem to sieve through and the wholeness of it will get lost. Other conclusions of the history of IE are conclusions that apply generally in education but were certainly moulding its destiny and are similar to older findings in educational research.

It seems from the research that education is an intricate interplay of factors whose outcome cannot be fully foreseen. It might therefore be more useful to look at education as a biological process rather than a production process of a factory. It is important to recognize the factors of the hidden curriculum and the power they have, either to accept them or to change them. The first step would be to find them, make them visible, and analyze them to see if it could be changed and how. For example, the accepted measurement by conventional testing the only evaluation of the quality of our students' education and does it reflect the usefulness of the education for work and life? Or can we develop evaluations of education that value process and skills and can we earn such evaluations general acceptance?

From the emergence and struggling phases of Innovation Education for dissemination and acceptance there also appears to be the story that generally happens in education. We are still fighting for the respect of vocational subjects, and acceptance of their educational values and traditional tests and academic drift are powerful factors that always will be a strong influence in education. To make fundamental changes in thinking and working in schools is not a simple endeavour; it will take a combined effort where the school culture and

the teachers' professional philosophies form the foundation for development. Educational authorities should realize that it is not enough to put ideas and ideals into the formal curriculum. The formal curriculum must also be supported by various supporting strategies.

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