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Looking at the pedagogy of innovation and entrepreneurial education with Bernstein

Innovation and entrepreneurial education (IEE) as a curriculum area was first introduced into the official curriculum in Iceland in 1999. In this article pedagogy in IEE is analysed using the concepts of classification (power) and framing (control) developed by the sociologist Basil Bernstein. When working with IEE, teachers are faced with the challenge of balancing structure and freedom and of allowing learners some control of their learning. Most teachers are accustomed to strong classification and strong framing, but IEE requires weaker forms aligned with integration and co-construction of knowledge when appropriate. By analysing data from interviews with thirteen teachers who work with IEE and by developing indicators based on Bernstein's concepts, it is possible to identify four modes of pedagogy. Teacher choice of instructional discourse involves personal choice and disposition. The majority of teachers working with IEE relinquishes some control of communication to learners, but find it more difficult to free themselves of strong delineation of roles. Teachers that embrace and deliberately organize their work towards some measure of learner control develop a pedagogy that supports working with IEE.

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Kennsla í nýsköpunar- og frumkvöðlamennt skoðuð í ljósi kenninga Bernsteins

Nýsköpunar- og frumkvöðlamennt (NFM) eða nýsköpun og hagnýting þekkingar var fyrst kynnt sem sérstakt svið í námskrá fyrir íslenska grunnskóla 1999. Í þessari grein er kennsla í NFM skilgreind út frá hugtökum félagsfræðingsins Basil Bernstein um flokkun (vald) og umgerð (stjórnun). Kennarar sem vinna með NFM þurfa að hafa hæfilegt jafnvægi milli valfrelsis og skipulags sem leyfir nemendum nokkra stjórn á námi sínu. Flestir kennarar eru vanir sterkri flokkun og stífri umgerð en vinna með NFM þarfnast minni stýringar í takt við samþættingu og sameiginlega þekkingarsköpun þegar það á við. Í þessari rannsókn voru greind viðtalsgögn frá 13 kennurum sem unnu með nýsköpunarmennt og var hugtökum Bernsteins beitt til að draga fram lýsingu á því hvernig flokkun og umgerð birtist í kennslu þeirra. Sérstaklega var greint hversu stíf umgerð í samskiptum kom fram og hversu sterk flokkun í hlutverkum kennara og nemenda. Niðurstöður sýna að kennarar velja sér kennsluorðræðu sem byggir á persónulegu vali og viðhorfum þeirra. Meirihluti kennaranna í hópnum sýna einkenni

veikrar umgerðar í samskiptum í NFM en þeim virðist erfiðara að losa sig við sterka flokkun á hlutverkum. Kennarar sem tileinka sér og skipuleggja vinnu sína markvisst í átt að því að nemendur stýri eigin námsferli, eru að þróa kennslu sem styður við vinnu með NFM.

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Introduction

In the 21st century, education must prepare learners for living and learning in the present and in the unknown future. Education today is not just about preparing for a specific job or for further education, it is also about learning how to live as an individual in a sustainable society. In addition to gaining knowledge, learners also need to be equipped with skills and competences that help them to use, evaluate, act, criticize, investigate and produce new knowledge. In formal education, such as in compulsory schools, a response from the education system and from teachers to meet 21st century needs is required.

The emerging curriculum area, ***Innovation and the practical use of knowledge****,* was introduced into the national curriculum for compulsory schools in Iceland in 1999. Its goals and aims were such that learners should have opportunities to utilize their knowledge in a meaningful way (Ministry of Education, 1999). Known as *Innovation and entrepreneurial education* (IEE) (í. nýsköpunar- og frumkvöðlamennt) it can be conceived of as a subject area, or as a method or an approach that would enable teachers to work with integration (Kysilka, 1998). It formed part of the *Information and technology education curriculum* alongside *Information literacy* and *Crafts and design* but did not get a specific time allocation in the curriculum. School leaders were to decide how they organized the area in practice and some ways were suggested such as integrating it with other subjects, using the elective hours or mixing the two (Ministry of Education, 1999).

In this article the pedagogy of IEE, ideally and in practice, is explored through interview data from thirteen teachers and observations in three schools. Innovation education was promoted as a curricular area that could fulfil many of the demands of the modern society but it has not been widely implemented in Icelandic compulsory schools (Jónsdóttir, 2005; Jónsdóttir, Thorsteinsson & Page, 2008). The core idea of IEE is that learners identify needs in their surroundings that they find important and develop appropriate solutions. In developing their ideas and solutions, they use their personal social histories, and their own lives and experiences form the foundation of their understanding of the world (Gunnarsdóttir, 2001). Burke (2002) defined IEE as follows:

> Innovation education involves inventing new objects, redesigning things that already exist and building for change to enhance and improve the conditions of social life. It encourages children and young people to look carefully and critically at the material world that surrounds them. It teaches, through active engagement, that the material world has been made by people and can be altered, changed and improved. It develops critical thinking and practical skills in design and technology and in marketing and enterprise.

Critical examination of the material world and the competence to make changes means that the role of the teacher who works with IEE is different from the more traditional role of delivering a set package of knowledge of a defined subject. Some teachers are uneasy about relinquishing control and giving learners more power in the classroom and fear losing control altogether, an emotion sometimes described as "chaos angst" (Fischer &

Madsen, 2001; Jónsdóttir, 2006). In this doctoral research the first author wanted to look at and learn from cases where IEE is offered to answer the research question: What pedagogical approaches do teachers deploy when working with IEE?

In order to describe and analyse in some detail how teachers work with IEE in the classroom, we turned to Bernstein's theories to develop tools to understand the powers at play in education.

Bernstein's theory of pedagogic practice

Bernstein's (2000) theory of pedagogic practice identifies a series of rules internal to pedagogy. These rules affect the knowledge to be transmitted and act selectively on those who can successfully acquire the knowledge. Bernstein introduced two concepts, *classification* and *framing*, that explain the translation of power and power relations and the form it takes in the control of relationships.

Classification and framing

In dealing with the social world and making of meaning, humans sort what they know into categories or groups with certain qualities or identities. Power relations create, legitimise and reproduce boundaries between categories of groups (gender, class, race) or categories of discourse and of agents (Bernstein, 2000, p. 6). *Power* establishes the relations between categories and establishes the legitimate relations of order. These can be concrete categories of discourse (e.g. school subjects) or categories regarding the division of labour (e.g. specialists, unskilled labourers). *Classification* (í. *flokkun*) is used to categorise the construction of a social space such as school subjects or roles such as teachers vs. learners or home vs. school (Bernstein, 2000). Categories can have either strong classifications (specialised discourses) or weak classifications (less specialised discourses) but classification, strong or weak, always carries power relations (Bernstein, 2000, p. 7). If there is strong insulation between categories they have a unique "voice", whereas weak classification indicates less specialised identities or "voices" (Nsubuga, 2009). The power of a school subject is, for example, reflected in the amount of time it is allocated and the space it gets in the curriculum, the building and the timetable of schools. A category is defined by boundaries that create the relation between it and other categories and establish its own unique identity and special voice (Bernstein, 2000, p. 6).

Control establishes legitimate forms of communication appropriate to different categories. Control carries the boundary relations of power and socialises individuals into the appropriate relationships, the legitimate communications. Thus, power constructs relations between categories, and control constructs the relations within given forms of interaction (pedagogic practice for example). *Framing* (í. *umgerð*) refers to where control is located. Framing regulates relations within a context; it refers to the relationship between transmitters and acquirers (Bernstein, 2000, p.12). In strong framing the transmitter has explicit control but in weak framing the acquirer has more apparent control (Bernstein, 2000; Bolton, 2008). Strong framing indicates that control is located in a category that has power, for example a teacher or a school subject, and weak framing indicates control shared between categories, for example by a teacher and a learner or among several subjects (Macdonald & Jóhannsdóttir, 2006).

Bernstein's theories suggest how power and control translate into principles of communication and how these differentially regulate forms of consciousness and potential for change. The pedagogical discourse is always conditioned by the rules of classification and framing for the particular context (Bernstein, 2000, p. 5). Thus, in this research it was important not only to develop the Bernstein approach but also to understand the classroom context in some Icelandic schools.

Regulative discourse and instructional discourse

Bernstein (2000) distinguishes between two systems of rules that are regulated by framing, the *rules of social order* and the *rules of discursive order*, also known as the regulative and instructional discourse. The rules of social order refer to the *regulative discourse* and to hierarchical relations. The *regulative discourse* (RD) (í. *stýrandi orðræðan*) is a discourse of order, relation, and identity. The RD distributes rules of the organization on matters regarding cultural practice and values. It is "the *moral* discourse that creates the criteria which give rise to character, manner, conduct, posture etc." (Bernstein, 2000, p. 34). The RD holds criteria for the appropriate values in the organization, for example appropriate behaviour, conduct, ethics, manner and character, as well as giving the basis for criteria of knowledge. The RD mediates the rules of an institution relating to general morals and values and its criterion for appropriate behaviour and the sorts of characteristics that are appreciated (Jóhannsdóttir, 2007). It also creates the rules for the internal order of the instructional discourse, thus the teacher's choices of pedagogical ideas to put into practice are not just a question of choosing an approach but are rather controlled by the RD. School traditions and expectations of learners are reflected in the regulative discourse.

The *instructional discourse* (ID) (í. *kennsluorðræðan*) is a discourse of competences relative to a given discipline. The rules of discursive order refer to the *instructional discourse* and the selection, sequence, pacing and criteria of the knowledge, elements commonly associated with the curriculum. It is about choices of tasks, how they are done, sequencing, pacing and which knowledge is considered of value in a given context and how it is evaluated. It is the discourse that articulates the kind of skills and knowledge our learners should acquire. Instructional discourse (ID) is a part of and is embedded within the regulative discourse (RD) making change that is not aligned with the regulative discourse problematic (Bernstein, 2000, p.13).

Recognition and realisation rules

Classification indicates the boundaries of a discourse and acquirers must be able to *recognise* (í. *félagslegt táknlæsi*) the text, the relations between categories, what characterises the context, what is "legitimate" (Bernstein, 2000, p. 17). Framing refers to how meanings are put together, the appropriate forms made public and the nature of acceptable social relationships. Framing is about whether acquirers are able to *realise* (produce) the expected text. The stronger the classification and framing the more the relationships tend to be hierarchical, with teachers being seen as experts and learners as novices with low status and few rights (Bernstein, p. 58). To function effectively within a particular cultural group, an individual needs to possess both the recognition and realization rules of that society (Chien & Wallace, 2004). The *recognition rules* (í. *félagslegt táknlæsi*) are what the acquirer (usually the learner) understands to be important or correct in a given context. The recognition rules include the necessary understanding of "the rules of the game", of what is expected of you. The *realization rules* (í. *athafnalæsi*) are about being able to play the game.

Methodology and data generation

To understand pedagogy a description of classroom practice and underlying rules is needed. Written texts, observation and interviews were used to gather information and generate data. Criteria were then developed to analyse some of the data more closely.

Analysis of text and practice – discourse analysis

Locke (2003) explains *discourse* as sense-making stories that circulate in society and cannot easily be traced to a particular source. It is a way of making the world meaningful. Foucault explains discourse "… as practices that systematically form the objects of which

they speak" (Foucault, 1972, p. 54). Such an understanding requires looking carefully at discourse in order to find the messages they carry.

The language used in interviews and documents was carefully studied, and with repeated reading, interpretation and analysis, Bernstein's theories were increasingly consulted to sharpen the focus. We wanted to find out how social situations were described and defined to reveal the discourse, the norms and messages implicit in the conversations and other texts (Schwandt, 1997).

The critical viewpoint in social research is concerned with social order that is seen as historically situated and relative, socially constructed and therefore changeable (Locke, 2003). Social order and social processes are sustained and constituted less by individuals than by the pervasiveness of social constructions or versions of reality that are embedded in discourses. Human subjectivity is constructed at least partially by discourse, and discourses are manifested in the way people *are* and *enact* (p. 2). Discursive practice refers to rules, norms, and mental models of socially acceptable behaviour to produce, receive, and interpret the message (McGregor, 2003). These are the spoken and unspoken rules and conventions that govern how individuals learn to think, act, and speak according to various social positions. We learn through different discourses to be learners, daughters, mothers, members of a gender group, entrepreneurs or volunteers (McGregor, 2003). This is where Bernstein's theories helped us to identify the different rules that reside in the way pedagogy is talked about and enacted (discourse) and how the rules relay messages of identity.

Informants and field work

In this article we draw on data from three main sources:

- Case studies of three compulsory schools: observations and interviews with six teachers, the core study of the first author's doctoral research.
- Interviews with seven teachers in seven additional schools, also part of the doctoral research.
- Interviews and other information from the Intention and Reality research on science and technology education in which both authors participated and that was led by the second author.

The main data were collected in Icelandic compulsory schools in 2006-2010. City School was the main case and site of much of the data collection, and data on the other two cases were collected in two small rural schools, Trio School and Country School, located in other parts of Iceland. The key case informants are listed in *Table 1.* There are 28 sets of field notes from City School, 11 from Country School and 18 from Trio School.

Table 1 – Case school information		
City School	**Country School**	**Trio School**
Principal Linda	Principal Ragna	Acting principal and the principal
Runa textile teacher, head of department of arts and crafts	Sunny arts teacher	Sif lead teacher in IEE, language and class teacher
Bryndis arts and crafts teacher		A group of seven IEE teachers, five individually and all in a focus group
Asa art teacher		Two department heads in a collaborative meeting about IEE in the school
Heidi student teacher		

Photographs were also taken on site and included in the field notes, and the school curricula and web-sites were also consulted. As data was collected through observations and interviews, comments were jotted down in a field book. Pictures taken on a digital camera were noted and numbered in the field book. Immediately after visits, careful descriptions were written and pictures uploaded into the notes. Independent transcribers typed up the interviews and later the recordings were listened to again to determine if there were discrepancies and to check parts that were unclear.

Innovation teachers in all three case study schools were interviewed individually and also as a focus group in City School and Trio School. Data from observations of lessons were collected from the three case schools.

Interviews with IEE teachers in additional schools were as follows:

- With two pioneers, Rósa and Kolbrún (two interviews each) who were chosen as they were experienced IEE teachers and we wanted to hear from some of the pioneers.
- Two crafts and design teachers: Sigurd and Gunnar (one each) because Gunnar was teaching IEE as a special subject and Sigurd as a project and Sigurd was also trying out teaching materials written by the first author.

Both authors took part in a research project called *Intentions and Reality* (IR) on science and technology education, visiting compulsory and upper secondary schools in 2006–2007, taking interviews with teachers, administrators and learners in five different areas in Iceland. In this research we use three interviews related to technology and innovation education taken during the IR research, as well general information from interviews with administrators. Interviews with teachers in the IR research were three crafts and design teachers: Paul, Sedna and Hanna (one interview each). They were identified during visits in the IR research, chosen by the principals as they were responsible for IEE teaching in their schools.

All names of people and schools in the article are pseudonyms, except Rósa' and Kolbrún,' which are used here with their consent.

Coding of field data

When each full set of field notes was complete, the text was critically read over in relation to the research question asking: what is to be found here, what is interesting, what "jumps out", what is repeated and what is there but is not so obvious? At the end of the notes, reflections were written about emerging issues, often followed up in the next visit or data collection.

Analysis was carried out in the tradition of qualitative research, beginning with open coding, moving on to thematic coding, using a hermeneutic approach and engaging in discourse and image analysis. These methods supported giving voice to the participants and enabling their own space to emerge, respecting the cultural, social and the personal.

Open coding is a method used to sort data into categories or issues that seem to be important or appear repeatedly in the data. The researcher reads the data carefully and notices certain words, sentences or patterns of behaviour that can be categorised together under codes (Bogdan & Biklen, 2003). It is important to be open to whatever appears in the data even if it seems irrelevant in the beginning (Esterberg, 2002). The codes and themes in the data started to emerge early as the transcripts and other texts were read. By using the hermeneutical view and discourse analysis codes were found. Gradually the codes were categorised into themes that indicated important issues in the

findings (Creswell, 1998). To analyse what kind of pedagogy was being used by the 13 teachers when working with IEE, we developed criteria to assess the values of framing and of classification appropriate for each teacher.

Developing criteria for analysis using Bernstein's concepts

Classification influences the social base, the categories of power in the classroom, who decides where work is located, who speaks to whom and when and what sort of messages are given about accepted behaviour. This gives rise to the regulative discourse (RD). We developed indicators from the codes that had emerged in the first rounds of data analysis and sometimes consulted raw data as well. Indicators were developed to identify the RD through four strengths of classification in IEE lessons, from very strong to strong to weak to very weak (*Table 2*). These were used to identify who controlled the location of work, the social space and communication of learners and teacher, learner behaviour and division of labour (roles).

Framing and the instructional discourse was identified through development of indicators of the strength of framing, from very strong to strong to weak to very weak. These were used to describe the curriculum (*Table 2*). We could identify who controlled selection, including content and themes, needs to address, tasks, materials, methods and direction of developing ideas, and who controlled pacing, sequencing and criteria of knowledge.

The criteria developed are presented in *Table 2.*

Table 2 – Criteria developed for assessing classification and framing values adopted by teachers in working with IEE			
Classification – strength of boundaries between learners and teachers			
C + +	C +	C -	C - -
Learners have very limited agency and are receivers. The teacher is the specialist and sets criteria of roles. The control in lessons is with the teacher.	Teacher controls most aspects of lessons and is the specialist. Learners have agency within certain well defined areas.	Learner have agency in defined areas and are aspiring innovators. Learner and teacher communication is often on equal footing though the teacher has the power to decree.	Learners have ample agency and are innovative i.e. creative and active. Learner and teacher roles are often interchanged; learners are experts and teachers learners.
Framing – nature of interaction between teacher and learners			
F + +	F +	F -	F - -
Teacher takes/ makes decisions in developing solutions.	Teacher suggests choices in development of ideas or influences learner choice.	Learner with teacher's support develops his or her idea and learner makes final choices.	Learner controls the development of his or her ideas and teacher supports.

Given the intended nature of IEE, with learners as decision-makers and creators and meeting needs in their environment, we felt that it was important to analyse the dynamics of classroom practice. We located the practice of each of the 13 teachers according to one of the four values of classification and of framing (*Table 2*). To do this, short descriptions of each teacher's characteristics in working with IEE were prepared (*Table 3*).

Table 3 – Application of criteria on classification and framing in the IEE classroom		
Teacher	**Classification and boundaries – power (Discourse, agency)**	**Framing and interaction – control (Selection, sequence, pace)**
Kolbrún	IEE is a very open area sometimes a subject, sometimes an approach C- - Teacher supports learner agency i.e. learners become explorers and creators of knowledge C- -	Framing is weak to very weak F - to F - - Learners have control over selection and pace and some control over sequence. Learners often have control over communications.
Rósa	IEE is used a special subject that integrates different knowledge and appears in different forms* Teacher supports learner agency learners become explorers and creators of knowledge. C- to C - -	Framing is mainly weak to very weak within the boundaries of the timetable. F - to F - - and sometimes F +
Sif	IEE is a special subject that integrates different knowledge and appears in different forms.C- Learner have agency in defined areas and are aspiring innovators. C mixed C + towards C -	Mixed framing: weak to strong, seldom very strong or very weak. F - to F +. Weaker framing in elements of projects of older learners. Most commonly the learners develop their ideas with teacher's support Weak F, sometimes very weak (F - and F - -)
Runa	IEE is a special subject that integrates different knowledge and appears in different forms C-. Considerable learner agency C -	Framing mixed: sometimes F+ (tasks and themes) F – to F - - PBS system F +
Bryndis	IEE is a special subject that integrates different knowledge and appears in different forms C-. Considerable learner agency C -	Framing mixed: sometimes F+ (tasks and themes) F + ,F – to F - - PBS system F +
Asa	IEE is a special subject that integrates different knowledge and appears in different forms C -. Considerable learner agency C - -	Framing mixed: sometimes F+ (tasks and themes) F +, F – to F - - PBS system F +
Heidi	IEE is a special subject that integrates different knowledge and appears in different forms C-. Teacher limits learner agency i.e. learners often become receivers C+ to C + +	Framing mixed: F – to F + sometimes F + + PBS system F +
Sunny	IEE is a special subject that integrates different knowledge and appears in different forms C- Learner agency somewhat limited C +	Framing mixed: F + to F -, a tendency towards strong framing.
Hanna	IEE is a special subject for one age group, that integrates different knowledge and appears in different forms C- Learners are aspiring innovators C -	Framing is mixed F – to F + and sometimes F - -
Sigurd	IEE is a special project within craft that integrates different knowledge and crosses boundaries of school and world of work C- Learners are aspiring innovators C -	Framing mixed: F – to F - - and sometimes F +
Gunnar	IEE is a special subject for one age group linking common knowledge and innovation. C+ Learner agency is somewhat limited but learners are aspiring innovators C -	Mixed framing towards strong: F – to F+ and sometimes F + +

Paul	IEE is a distinct element within craft C + + Learner agency is limited C + to C + +	IEE within craft Strong to very strong framing F + - F + +
Sedna	IEE is a special subject for one age group with a design focus C++ Learner agency is limited C + to C + +	Framing strong to very strong F + to F + + Framing weak in design parts F -
* Different forms: design projects, paperwork, field visits, drawing, writing, craft, model making, computer work, discussions and/or introductions		

Modes of pedagogy – findings and discussion

To explore the pedagogy we developed an interactive 2-D model (*Figure 1*) of the two factors, classification of roles and framing of communication (*Table 2, Table 3*).

On the horizontal axis, the continuum is from strong classification of *roles of teachers and learners* i.e. from well-insulated categories where power lies with the teacher to weaker boundaries and power shared between teachers and learners.

On the vertical axis, we move from strong framing of *communication between teachers and learners*, where teachers have strong control of the communication to weak framing to a point where teachers relinquish some control.

By mapping the two sets of indicators in *Table 2* against each other and then locating the teachers in this research within the resulting model, we identify four different modes of pedagogy for working with IEE: *emancipatory*, *progressive*, *controlled* and *transmissive* (*Figure 1*).

As we mapped the teacher characteristics according to our criteria into the modes of IEE pedagogy we could see how different teachers worked with IEE and identify the qualita-
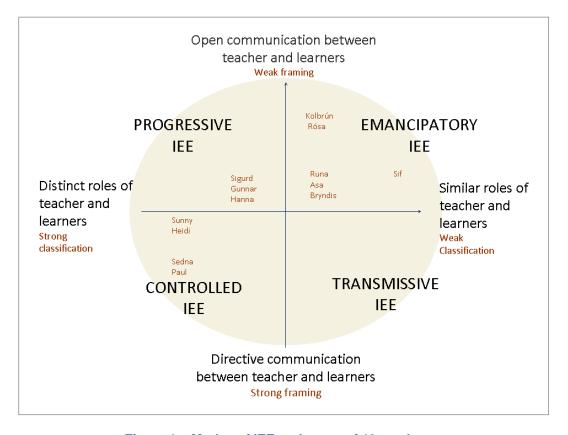

Figure 1 – Modes of IEE pedagogy of 13 teachers.

tive differences in their approach (*Figure 1*). A range of framing was found within IEE lessons of the 13 teachers, but on the whole there was a trend towards weaker framing (see *Table 3,* second column and upper two quadrants in *Figure 1*) even though stronger framing came more naturally to many teachers. The nature of roles of teachers and learners (*Table 3,* first column) was roughly split in half with about half showing somewhat strong classification of roles (left half, *Figure 1*) and half weaker (right half, *Figure 1*). Classification and framing varied quite a lot within the repertoire of each teacher but distinct tendencies could still be identified. These modes will now be described and supported by examples from the data.

Transmissive mode – the impossible?

The content of IEE is wide ranging and typically is influenced by learner choice (Jónsdóttir, 2011). In a *transmissive* pedagogy, a teacher selects themes, tasks, methods and materials and influences the development of student ideas with predetermined directions. Learners learn the *right* way to work from the teacher. The teacher controls activities with strong curriculum framing (selection, sequence, pacing). Weak classification of roles (teachers-learners) seems difficult with strong framing of communication, unless the learners are willing to concede authority to the teacher on the base of his or her specialist knowledge which is not part of this analysis. Possibly the teacher is a *capable peer*.

Controlled mode – the teacher is the expert

The control of learner behaviour is distinctly in the hands of the teacher. The controlling teacher has authority over students in *controlled* lessons and uses strong framing in the selection of content and approach. The teacher uses reminders, rewards or consequences to control communication and behaviour. The teacher is probably the *expert* and makes decisions accordingly, who controls most aspects of lessons and provision of learning opportunities. He/she chooses the content, tasks, needs to address, methods and materials to use. Some freedom for creativity and agency may be given to students in the development of ideas and some in pacing. Learners get prescribed and controlled opportunities to be creative. The macro and micro elements of learning are more and less designed and controlled by the teacher. Examples of a controlling pedagogy are found in the practice of Sedna and Paul and Sunny and Heidi.

Sedna and Paul are both craft teachers in compulsory schools in the Reykjavík capital area. Paul, about 60 years old, is very secure in his knowledge and skills in IEE, craft and technology, which are his areas of teaching. Paul's craft lessons are on the restrictive side, with strong framing. In addition to time-tabled lessons, he offers an out-of-school course on technology where students can come and design and make different creations like an electric car and similar technological artifacts.

Sedna is educated as a designer from a technology college and later added craft through teacher education. Sedna is creative and resourceful in finding different materials to use in her teaching and comes up with creative ideas and enjoys it when students are creative. She controls what is designed (selection of knowledge and tasks F + to F + +) in the IEE lessons, for example, when she organizes "her own" school wide competition and decides the theme each time. She also decides the materials (F + +) to be used for the ideas that students are to design for and use in IEE lessons. "In the next course for year seven I have decided what is going to be done …". She is very secure in working with IEE and considers herself to be the specialist in the school thus eliciting a very strong classification of the IEE teacher's role within the school (C + +). She has not collaborated much with other teachers in the school but has experience of working with the textile teacher (weaker classification). In general her approach is very strongly classified and strongly

framed: "I let them make a ruler that they use in mathematics", and she decides the material for that task as well.

Heidi in City School and Sunny in Country School showed a tendency to take control and decide for students and limit what was allowed, possibly displaying their fear of losing control over the classroom activities. Sunny was however closer to the progressive mode as she often supported learner ideas and "levelled" with them. Sunny's mode also diverged in different projects where she sometimes displayed weaker framing such as in the car competition and preparing for the market.

Progressive mode – supporting learning agency

Within the frame of the lesson learners have considerable freedom and agency though in the *progressive mode*, the teacher is undoubtedly the designer of the learning opportunities and leader of the lesson. The overall frame of time and content is controlled by the teacher, but learner agency is supported within lessons and learners can decide and control different tasks and elements especially in the development of ideas. Where learner agency is allowed, teachers are supporters rather than experts. Learners are aspiring innovators; they are creators of knowledge as inventors and can sometimes be explorers and experimenters. Examples of the progressive mode are Hanna's, Sigurd's and Gunnar's teaching.

Hanna taught in a rural school by the seaside in rural Iceland and teaches one class IEE as a separate subject within a traditional timetable without collaboration with other teachers (C +) but she had rather weak framing in her lessons. She decided the overall content of lessons (F +), but allowed the students to choose the ideas (selection of needs and tasks F -) they wanted to work on and they could partially control the pacing and sequence (F+ to F -) of their activities but were obliged to introduce their idea in a poster (task F +). At the end of the IEE project a formal introduction of ideas was meant to be for parents but the students wanted to do it just for each other and not the parents and Hanna allowed them to decide this (task F -) after consulting with the principal.

Sigurd taught in a small town in rural Iceland, operated within a classified school curriculum and timetable but is open to students' suggestions and ideas of tasks and design (F -). He decided the timing for the projects (pacing F – to F +) and partially the content (F +) though students choose what to do (tasks F -). He took the students on field trips in the neighbourhood, thus weakening insulation between school and community (C -). His lessons in IEE were time-tabled as craft lessons but he finds the emphasis of IEE to fit well with the modern design and craft (handicraft: í. *handmennt*). The relevance of an IEE pedagogy emerges through the needs analysis, and so he is weakening the classification of craft a bit (C -). However he worked on this project alone in the school, most of his other work is within his own specialty (geography) and he teaches alone in his classroom (teacher role C + +).

Gunnar is a craft teacher, who taught in a large compulsory school in Reykjavik. He had the support of the principal for teaching IEE and got one hour per week for one third of the winter for year five as a special subject on the timetable. He taught IEE as a separate subject (C +) for one year within a classified curriculum and timetable and without collaboration with other teachers in the school (C + +). He allowed students to choose what to work on (tasks F -) and how to make their ideas (design F-) within a narrow time frame so the sequencing and pacing is more and less decided for the students (F + to F + +). His framing is mixed but in the development of ideas he allows learners to direct their ideas and supports their decisions (F -). Gunnar controlled the overall frame of the lessons with a focus on taking part in the innovation contest (F +) that has defined areas to work with. And he decided what learners were going to do with their ideas as he offered them the

process of finding needs to solve and to choose one or more need to design for and send to the innovation competition. In the development of learners' ideas they controlled the direction with the teacher's support (F –).

Emancipatory mode – creative learners

The *emancipatory* setting is like a workshop or a place of work with a democratic and creative atmosphere. Learners experience these lessons as a lifting of restrictions and have opportunities to have an influence on their environments. Learners select the location of their work, and learners and teacher freely communicate and take on each other's roles; learners talk together, help each other and teachers learn about student ideas. Learners are explorers and creators of knowledge as inventors and they work autonomously and responsibly alone and with others.

The focus and content of themes and projects develops around learner interests and ideas and learners select needs, tasks, methods and materials. Learners control the progress of their idea development, and teachers support them. Learners set goals and criteria for evaluation, set the time frame and control pacing and sequence that fit their goals. Learners are leading agents in the lessons and often learn through experimentation and exploration.

This kind of atmosphere was identified several times in observation data from City School. These episodes when learners were active and engaged were described by the teachers as "good working spirit". The teachers considered such episodes, sometimes covering whole lessons, as successful and enjoyable. In one such lesson when everyone was immersed in work Runa described another example from a class in IEE she had recently taught:

> They started by looking for needs, analysing them and working on solutions. They began to throw ideas between themselves and one started working on a solution and that gave the next one an idea and so on. The working spirit was so good; they often needed assistance from me but they also reached for help from each other and gave for example a lesson with 9–10 year old learners shortly before Christmas 2007.

In Trio School this workshop setting was also identified in IEE lessons where learners could move freely about and work on their ideas independently or with their mates. The descriptions of Rósa and Kolbrún also indicated learner choice of locations, experiments and research as well as a flow of creativity (see in more detail in Jónsdóttir, 2009).

Sif's framing varied with overall framing tighter in the preset projects but weaker within the other projects in IEE with younger classes. In general she acknowledged students' ideas and allowed them considerable autonomy and choice within the frame of the overall projects. Sif's mode of teaching is mainly located at the weaker end of framing. She has an integrative approach and thinks about the educational value for students. She pointed out the rational fit of integrating outdoors teaching and learning and IEE and also saw how the projects already in place like taking part in the national Smoke Free Project, were ideal as IEE projects with both a creative and entrepreneurial emphasis. In Trio School IEE Sif looks at IEE from an integrative point of view, she sees it as something that can be woven into other subjects with very weak classification.

Rósa and Kolbrún were both pioneers in IEE in Iceland and both took part in instigating and developing the subject in Icelandic compulsory schools. The IEE approaches and pedagogy are in line with their professional values and personal attributes. Kolbrún was in the position of principal and with the flexibility and support that a small school allowed

her, she could change the course if the opportunity rose. These conditions allow weak to very weak classification of structure of timetable, lesson content, group arrangements and physical location (C – to C - -). Kolbrún described her situation:

> I was able to work in the best of conditions to work with students and freedom to do whatever I've wanted to do. … In our school we mix it all together a bit… I don't make a clear distinction between what exactly this innovation education is… we have IEE on the timetable for the third and fourth year, the fifth and sixth and for year eight. We have of course integrated age groups, we have 70 students in all and in these lessons we are working systematically on IEE so to speak.

Kolbrún, as a principal and leader of IEE in the school, would work closely with the crafts and design teacher on IEE and with other teachers in the school as she was also considered the specialist in IEE in her school.

In Rósa's teaching the students had the opportunity to control the selection of needs, tasks, methods, materials and direction of developing ideas (F – to F - -), within an overall theme (F + to F -). Learners also could control sequence but had less influence on pace. However Rósa offered them the opportunity to come out of school hours to finish their projects and she was there to help them, and thus extended the flexibility otherwise offered by the school weakening the control of pace (F -). Rósa worked with the crafts teacher in the school on IEE and later a larger team of teachers that worked on IEE as a collaborative developmental project. Rósa complemented the principal for his support to the IEE development in the school as he was open to its special requirements and was resourceful in finding grants to support the extra work needed and to pay for additional student time.

Both Kolbrún and Rósa cross the boundaries of classroom work easily, indoors/outdoors, between teachers, boundaries of subjects and time. Both included other teachers in the IEE work, class teachers, science and crafts teachers (collaboration C- or C - -). Kolbrún would often take the students outside to the seaside or to local factories, and Rósa would allow students to work in the library or in the classroom, or she would allow them to go to the beach near the school to investigate its ecology. Both emphasized the use of real problems and materials and topics that the students were interested in and found important (knowledge C – or C - -).

Conclusion

Using Bernstein's concepts of classification and framing facilitated the identification of four different modes of pedagogy in IEE, three of which were displayed by teachers in this research. The four modes are transmissive, controlled, progressive and emancipatory.

Although a key idea in the IEE curriculum and the main advice in teaching materials and IEE courses (Jónsdóttir, 2011) is to be sensitive to the agency of the learner in developing ideas, and that the teacher should often "step back", it could be seen that teachers did this in different ways, in different degrees and for different elements.

The literature on and ideology of innovation education indicates that teachers need to use weak framing of communication in interactions with students, giving students some control over their learning. A change in classification of the teacher as facilitator is also desirable if IEE is to have the educational value it promises with regard to creativity and innovation. *Emancipatory pedagogy* is the one most aligned with IEE aims and pedagogy with weak to very weak classification and framing.

Although the 13 teachers in this research generally display characteristics of weak framing of instruction, there is also an inbuilt tendency towards strong framing and strong classification of roles of learners and teachers. The regulative discourse generally savours such an arrangement. Teacher choice of instructional discourse involves personal attitudes and disposition towards giving learners agency and allowing them to be explorers and creators in IEE and towards crossing boundaries of teacher roles, school subjects and school and society. This may create *chaos angst* in a teacher, a fear of losing control. Teachers working with IEE must become aware of the need for structure and freedom and realise the choices they have for balancing these without losing control.

Through school support, training and advisory work, Bernstein's concepts of classification and framing can be used to deconstruct and then reconstruct pedagogic practice through identifying what needs to be controlled by teachers and what learners need to control in order to support their agency and strengthen their creativity and innovative capacities. By understanding the different modes of pedagogy teachers can locate their own pedagogy and decide if it needs adjusting towards a more emancipatory version. The model can also be used in other contexts, to analyse other subject areas, where the goal is to support learner agency and creativity such as in arts education or any other area aiming for creative thinking such as science or mathematics.

In the doctoral research of the first author (Jónsdóttir, 2011) school settings were also studied for their influence on the development of IEE. Different settings offer different conditions ranging from rigid to flexible organization and levels of support of leaders and colleagues ranging from neutrality to enabling support. Teacher interest and approach in IEE is a crucial factor in developing a favourable pedagogy for IEE but school ethos and the organization of the schools offered settings that differed in their support for working with IEE. It seems that in schools where traditional time tables set the basis for their practice, the views and actions of leaders can soften their rigidity to create some flexibility for IEE. In schools where the timetable is rigid it can be softened towards more flexibility with positive views from leaders that can arrange for some leeway when needed, moving into a more flexible organisation. Such flexibility is needed for work with holistic arrangements of time conducive for IEE.

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