

Watch out - the Power Users are Coming

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Abstract: This paper analyses and discusses the future challenges that tertiary educational institutions may expect to face when the traditional organisational forms and norms of the industrial society meet the first generation of *natural born* ICT using students who have lived their whole life with ICT and the ever changing norms and demands of the unfolding information society. In order to analyse the premise for these challenges the paper applies a long-term perspective on the generations and organisations affected by the transmission. A key to gain insight to the future students and the nature of the encounter is research aimed at the present primary school. Additionally a key to the organisational perspective is identification of organisations' readiness for change and the potential barriers for adaptation to the information society and the 'power users'. Based on the analysis, the paper comprises an outline of institutional obstacles inhibiting a successful encounter and argues the necessity of integrating top-down and bottom-up initiatives in future organisations. Thus, the process of change demands awareness and support from both the authorities empowered to make grants and from the management of the educational organisations, and the paper explicitly focuses on collaborating teaching staffs as a tool for improving both individual and organisational adaptability.

Keywords: ICT, Power users, game generation, university pedagogy, collaborative teaching staff, adaptability to change, information society

1. Introduction

In a 4th grade at a Copenhagen suburb primary school, the class gathered data about the weather for a couple of weeks. The data was entered into a database and on the day I visit, the class was going to use the database as a tool for analysis and to produce narratives about the weather. Emilie and Camilla are working together on one computer. They have several windows open in both the database program, Google and Word, the last of which they use to produce their narrative. They have produced a graph displaying hours of sunshine each day and ask me, "what about the days where the sun did not shine?" "You could compare your graph with a graph of days with precipitation", I suggest. Emilie looks at the apparent mess of windows on the screen. "Like this", she says, and shows me a graph displaying both sunshine and precipitation. "We thought that we could only have one thing in each graph". "This is good", I say, "Try to find out what it tells you".

Later when I return to Camilla and Emilie, they have *Googled* an illustrative photo and they have designed a layout for their narrative about the weather. On the days with neither sun nor precipitation, they have concluded that it must have been cloudy. (unpublished research data from the PIL project at The Danish University of Education, 2006)

The story illustrates ICT's learning potential as these children (age 9 and 10 years) multitask and handle complex and relatively abstract information as they navigate between applications and multiple windows within these applications. They manage to design a layout for the narrative, discuss the wording and spell correctly. Dependant on the sophistication of their

competencies, Sørensen (2005) describes these kids as either 'competent' or 'power users'. The kids represent a process, where the educational system's traditional, hierarchical 'food chain' from teacher to inexperienced pupils and students, seems to disintegrate into horizontal networked relations.

2. The emerging problem

The changing relationship between pupils and teachers is one phenomenological representation of society's change from industrial society's educational and organisational top-down practice, to the information society's more flexible and horizontal network-organisation. In the latter, roles are intertwined and informal learning processes become common (Trilling and Hood 2001). Although children still organise learning hierarchies that resemble formal learning environments (Sørensen 2005), what is new here is that kids learn and use ICT, which is paramount for dealing with and participating in the emerging information society, and that their teachers do not. The generation born before 1970 has acquired all knowledge of computers as adults. Those born after 1970 - 'The Game Generation' (Prensky 2001) - are more ICT-competent, but they have acquired their wireless and mobile competencies as adults. Also, The Game Generation (GG's) is too young to possess influential positions in tertiary educations and most teachers, in schools and in higher education, do not possess the knowledge and competencies that can make the ends meet in a future educational system. Thus, teachers in tertiary educations will soon find themselves caught between on one side: Students who integrate ICT in their everyday lives, possess

advanced competencies and expect ICT to be n; and on the other side: Research institutions and companies that correspondingly expect candidates to be ICT-competent beyond the level

fully integrated in their education of informal learning, that students can acquire on their own.

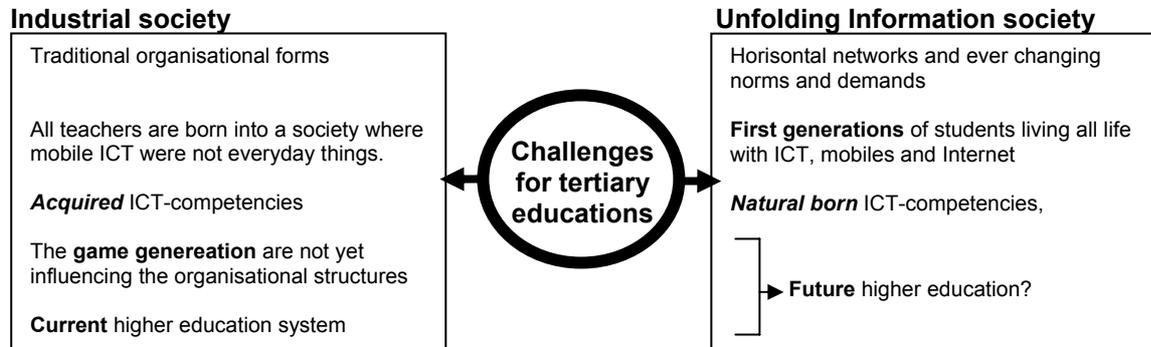


Figure 1: Model illustrating the field of tension challenging the educational system

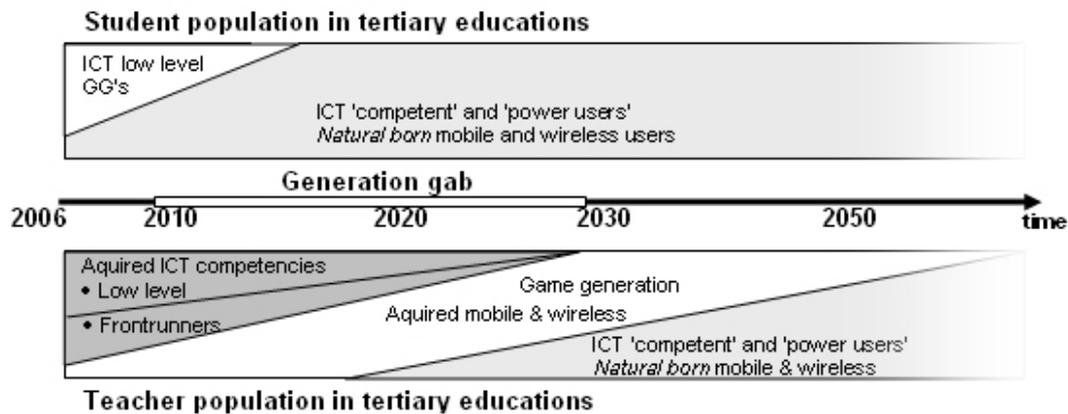


Figure 2: Generation gap-model based on simple demographics and duration of job life-circles

The conflicts arising are not just a matter of contrasting societal paradigms. The paradigms are embedded in the generations and as figure 2 illustrates, the process bridges a generation gap that may continue for decades. Thus, organisations' readiness for change becomes highly important.

3. Empirical studies of universities readiness for change

Recent studies of universities and their institutional awareness of and readiness towards change imposed by the societal transformation revealed some obstacles constraining that process, both in terms of ICT, organisational support, and the teachers' attitude. The Rambøll Management Report for the EU (2004, pp. 10) divides European universities into four clusters based on their integration of ICT: Front-runners (16%), Co-operating universities (33%), Self-sufficient universities (36%), and Sceptical universities (15%). The Rambøll Reports' levels of readiness towards changes (table 1) corresponds well to Rogers' (1995) categories of acceptance of

innovation in a population: innovators (2,5%) and early adopters (13,5%), early majority (34%), late majority (34%), and laggards (16%), telling us that: 1) necessary changes can only be pushed to a certain point without engendering counterproductive resistance; 2) processes of necessary fundamental changes must be supported and facilitated rather than forced.

Table 1: Rambøll management report, university clusters

Front-runners	Integrate ICT in both the educational and the organisational setting.
Co-operating universities	Relatively far ahead in their ICT development process, especially in the organisational setting. Heavily involved in strategic co-operation with both domestic and foreign universities and with other education suppliers. Quite far advanced in integrating ICT in their campus-based teaching, while e-learning courses as such are offered only to a minor extent

Self-sufficient universities	Similar to the co-operating universities as regards ICT integration but have a larger group of sceptical teachers. Much less involved in co-operation with other universities or actors and place less emphasis on EU initiatives and new forms of co-operation. The Rambøll study found that these universities are engaged in strategic co-operation only to a very low extent. 28% of the self-sufficient universities are quite large, with more than 20,000 students each.
Sceptical universities	These universities are lagging behind the rest in almost all respects. They are characterised by limited use of all kinds of digital services. Additionally, only 13% of these universities have developed a formal ICT strategy. The attitudes towards ICT are mixed, with substantial numbers of teachers and management being sceptical.

Three studies of Danish universities published in 2005 support the conclusions in the Rambøll Report. Dørup et al. (2005) found that all twelve Danish universities use ICT in the organisational setting, while the implementation of ICT in teaching differs. Learning Management Systems (LMS) are mostly used as tools for course organisation, administration and document sharing. Only few Master Programmes are either online or blended mode. Levinsen (2005a) found that the universities strategy plans for implementing ICT and e-learning were ill-defined, and in-service training for teachers displayed low capacity of participants pr. time unit. These courses prioritise introduction to technology and software such as PowerPoint and LMS-basics, while neglecting pedagogic issues related to online teaching and general use of ICT. Levinsen (2005b) found that in 2003, the number of courses and Master Programmes including e-learning was low (38 courses and 13 Master Programmes). Most were only one or two semesters old and some were offered for the first time in 2003. In late 2004, the numbers rose steeply: 125 courses and 60 educations (inc. Master Programmes). When examining the content using Feltovich et al.'s distinction between well- and ill-structured knowledge domains (1996), it was found that courses using ICT were clustered around training skills and well-structured knowledge domains, while educations and Master Programmes contained more complex and ill-structured knowledge domains.

It was also found that Danish university teachers, who in 1995 had adopted ICT, comprised a small and identifiable group (The Danish Governments IT Plan of Action, 1995). Although the group of teachers using ICT has grown since then, the above mentioned 'innovators' are still domineering the picture. Thus, recently trained ICT-using teachers still belong to the 'early adopters', leaving the majority of present Danish university teachers in Rogers' three groups: 'early - and late majority', and 'laggards'. Additionally, many teachers maintain an 'industrial society'-attitude towards in-service training, as they insist on learning by attending instructional courses (Sørensen 2005). Thus, findings in the literature point out that neither organisations nor teachers are in general ready for change and adaptation to the future of ICT and 'power users'.

4. Teachers readiness for collaboration and change

The challenges that both organisations and teachers face can be described as a radical learning process (e.g. in terms of Piaget's Accommodation, Argyris' Second Loop Learning, Vygotsky's Dialectic Learning or Engeström's Productive Learning). It is generally agreed that this kind of radical transformation is best facilitated within knowledge-sharing environments such as Communities of Practice (Wenger 1998). In a formal context such as tertiary education this is typically a collaborative teaching staff. Accepting the premise that radical learning transformation needs a collaborative environment, teachers' readiness to engage in a collaborating teaching staff with their colleagues becomes an area of importance.

A recent unpublished qualitative study (Personal information from M. Pedersen at Copenhagen Business School (CBS) Learning Lab) displays two extremes among teachers when they were asked about collaborating with their colleagues. These teachers had attended an in-service course where experiments with teachers' collaboration were part of the learning objectives. Few teachers reported that they had continued to collaborate after the course, that they felt their students had profited and they were positive towards the thought of a collaborating teaching staff. Others said outright that: "Why should I participate in a collaborating teaching staff?" – "It works fine for me and my students" (Author's translation). Some of these latter teachers represent the 'late majority' and the 'laggards' with acquired ICT-competencies, the ones who (according to Rogers) display not only a resistance towards changes but are also the embodied 'industrial

society'-approach to learning. Other teachers from this latter group represent the GG's. The CBS study found that GG-teachers use advanced ICT, collaborative- and group pedagogy, and they act as facilitators and coaches for their students. To some extent GG-teachers fulfil the demands of the information society, just as GG's are said to "make great workers and great employees" (Silverthorne 2004), while paradoxically at the same time they reject to collaborate with their colleagues and display an attitude which Silverthorne (2004) describes as highly individualised - "It is all about me".

In relation to the generation gap illustrated in figure 2, the GG-teachers' attitude becomes important, as they constitute the next generation of politicians and decision-makers in tertiary education. First of all it is necessary to take a closer look at the organisation of teaching staff in order to identify what it is exactly these teachers think work and why, and what they reject and why.

4.1 Teaching staff organisation – two general patterns

In higher educations the teaching can be organised in various ways both online and on-campus. When looking at the ways teachers collaborate - in degrees of collaboration - we (M. Pedersen and the author) found two distinct extremes which can illuminate the spectre, 1) The collaborating teaching staff and 2) The individualised teaching staff. The collaborating teaching staff can be found at certain Master Programmes in Denmark. The teachers come from different institutions, but know each other from earlier contexts. They work together because they have chosen to do so, and they have designed their Master Programmes within a social constructivist and problem-oriented group pedagogic frame (Dirckinck-Holmfeld 2002). In Rogers' terms these teachers are 'innovators' and 'early adopters' and they are the innovators from the 1995 Danish Governments IT Plan of Action. The organisation of their collaborating teaching staff is mirrored in their pedagogy as well as in the collaboration among students and between students and teachers.

The individualised teaching staff can be found at large universities with large institutes (Gleerup 1997), and in an extreme form at large courses attended by 500 or more students at CBS. These large courses have their own top-down organisation where one single person who is responsible for the subject matter has defined the course, content, learning objectives, and evaluation criteria. These courses are subdivided into parallel tracks, each attended by a teacher,

who is only responsible for running that particular track. The teachers manage their own track, and there is no formalised collaboration between the tracks. These teachers are often part-time assistant professors, and they generally do not have daily communication, neither to the workplace nor with colleges. The closest they get to genuine collaboration is sharing PowerPoint presentations.

4.2 The course participators and the individualised teaching staff

When asked about where they acquired their teaching skills the GG-teachers replied that they never had any courses in university pedagogy. They relied on their own experience from school and university. Most of them had tried group work and remembered collaborative group work as good learning experiences. They deemed this approach the best solution in their own teaching – but in a self-taught and not theoretically grounded variant. A reflection on the nature of the memory the teachers refer to, may explain why they practice group oriented collaborative pedagogy, and at the same time do not see collaboration as something tied to the teacher's role. These teachers have experienced collaborative pedagogic approaches as students. From that position, they remember themselves as participators in a group with an inner dynamic and synergy, which drives the project forward to a shared goal beyond the achievement of the single individual. This is what the teachers want to offer their own students on the single track. At the same time they remember an inspiring teacher and supervisor, and this is how they would like to be viewed by their own students. However, the teacher they remember appeared as an isolated individual without a context regardless of the actual context at that time and place.

When the GG-teachers draw on experiences from their own past, they draw on an image of an individualised and isolated teacher. It worked well then, it works well now so they see no contradiction in that practice. From the GG-teachers' point of view there are few incentives for collaboration with colleges. Additionally, the organisation of the courses as parallel tracks and the part-time status reduce the teachers' incentive to collaborate. Thus, arguments for participation in a collaborating teaching staff are scarce.

4.3 Looking for answers in the literature

Until recently, literature has focused on the students and their preconditions for attending studies. A recent trend is to focus on teachers' competencies in relation to exploiting the potential of ICT and thus perform teaching within the frame

of the information society's demands (Laurillard 2002, Levinsen 2003, Salmon 2003, and Sørensen 2005). When applying ICT and particular in relation to CSCL and CSdCL the teachers' competencies are challenged, and it is generally agreed that the change from traditional attendance classes to implementing ICT in various forms of networked collaboration, presupposes re-education of teachers. The latest trend is to look at how teachers collaborate and communicate about the development and carrying through of e.g. online courses. Bang and Dalsgaard (2005) demonstrate how genuine collaboration among teachers in four Danish primary schools supports the development of both knowledge-sharing and teaching methods. However, in the paper "Farvel til den 'privatpraktiserende' lærer?" (Goodbye to the 'privately practicing' teacher?), which refers to the universities, Heilesen and Lerche (2005) asks:

"If we want to facilitate a scenario, where students are seriously and emphatically involved in net-based dialogue and/or mutually binding project collaboration and elaboration of a shared product, it is essential that we as teachers become conscious of the culture we communicate. Can we expect collaboration, interaction, and knowledge-sharing among our students, if we behave individualistically and do not dare to participate in mutually binding collaboration ourselves?" (Author's translation)

The question of course is rhetorical, and the implicit answer is that we cannot expect collaboration among students if teachers do not collaborate themselves. Heilesen and Lerche see the culture and tradition in the universities as an obstacle preventing teachers from collaborating about their teaching, as well as an obstacle against practised collaborative learning pedagogy. Gleerup (1997) also points at the long tradition of ignoring pedagogy in tertiary education. The consequence is that the majority of teachers today are self-taught. Furthermore, Gleerup points out that the tradition of drawing boundaries around single subjects rather than around cross-disciplinary fields still dominates the educational systems and preserves the pedagogy of the closed door. These traditions, which are rooted in the industrial society's understanding of learning and education, are identified as obstacles against collaboration among teachers, both regarding knowledge-sharing of teaching experiences and regarding development of teaching the subjects and knowledge domains. Thus, literature offers a background for understanding the current situation, but no arguments for initiating collaborating teaching staffs in the future.

4.4 In search of good reasons - why should a 'privately practicing' gg-teacher change practice?

The GG-teachers at the CBS-course confirm Gleerup's statement that self-taught teachers perceive themselves as responsible for a subject and thus do not see any need to collaborate with their colleges. Heilesen and Lerche's rhetorical question, and Bang and Dalsgaard's demonstration of how development of methods depends on collaboration, would not make any sense to the 'late majority' and 'laggards' or the 'GG-teachers. Neither would they be motivated to change attitude towards their job as teachers. The basic problem is not to persuade these teachers to accept that a collaborating teaching staff would be beneficial for the teaching practice as such. When the GG-teacher at the CBS-course asks back: "Why should I do that when everything works fine?", the truth is that at present, there is no satisfactory answer. The personal experience does not correspond with the scholars' findings and claims. From the GG-teachers' point of view everything works well, the students collaborate, ICT use is advanced and there is no paradox. The teachers' individual practice and relationship to an individualised teaching staff is, contrary to the claims in the literature, neither a precondition for nor a barrier against the information society-approach to learning. Thus it becomes relevant to ask whether there are other good reasons why the 'privately practicing' teacher should change practice.

5. Educational product development – towards a new paradigm

In the preface of a forthcoming anthology "Kvalitetsudvikling af videregående uddannelser" (Developing Quality in Higher Education), C. Nygaard writes that the aim of the book is to establish a paradigm for continuing development of education. In this paradigm, students' learning process is the focus and the institutions are responsible for developing the study content and quality. Institutions of tertiary education are not isolated from society and Nygaard argues that the relationship between ICT 'power user' students and teachers in the role as coaches becomes highly important, because the students learning process is not only focused around understanding of and reflections on the educational content. In the information society, graduated students are expected to demonstrate adaptability, readiness for change, life long learning, and the ability to practice the educational content innovatively and independently. Therefore students must acquire a comprehensive academic knowledge, which is applicable in their future jobs. It is more important

to know about why and who, while the how becomes less important as it is constantly changing. The how is where the independent and innovative use of academic competencies comes to the test. Where Sørensen (2005, see above) described this from the present perspective of the primary school, Nygaard describes it from the future perspective of tertiary education. In order to offer education that meets these demands, education itself must be subject to constant improvement and innovation. In order to educate the future employees and entrepreneurs as flexibly and knowledge-sharing collaborators, teachers and institutions are bound to act flexible and knowledge-sharing and they are bound to be able to manage ICT at a high level. Thus, Nygaard argues, it is in relation to the improvement and innovation of educations that collaborating teaching staffs are not only advisable but an inevitable necessity.

6. Discussion

Bang and Dalsgaard (2005) explains the relationship between collaborating teaching staffs and innovation using Vygotsky' and Engeström's Activity Theory. Table 2 shows the application of their approach on the CBS teachers and their situation:

Table 2: Activity theory applied on the CBS context

Activity theory	CBS teachers and their situation
A cooperative division of labour	Parallel course tracks at large courses at CBS
can perform a joint activity	A joint course consisting of individual parallel tracks at CBS
The participants and other interested parties	Teachers, students and study board at CBS

Even though the participants and interested parties at CBS are satisfied, this particular and similar ways of organising education do not possess the necessary preconditions for adjustment and development. The joint activity functions well as long as the conditions for performing the isolated parallel tracks are unchanged – just as the teachers' state in the interviews. However, changes do occur and during this process the teachers do not have a comprehensive overview of the whole, and they are therefore cut off from efficient action. Figure 3 shows a model, which demonstrates the blind spots produced by this kind of fragmented organisation

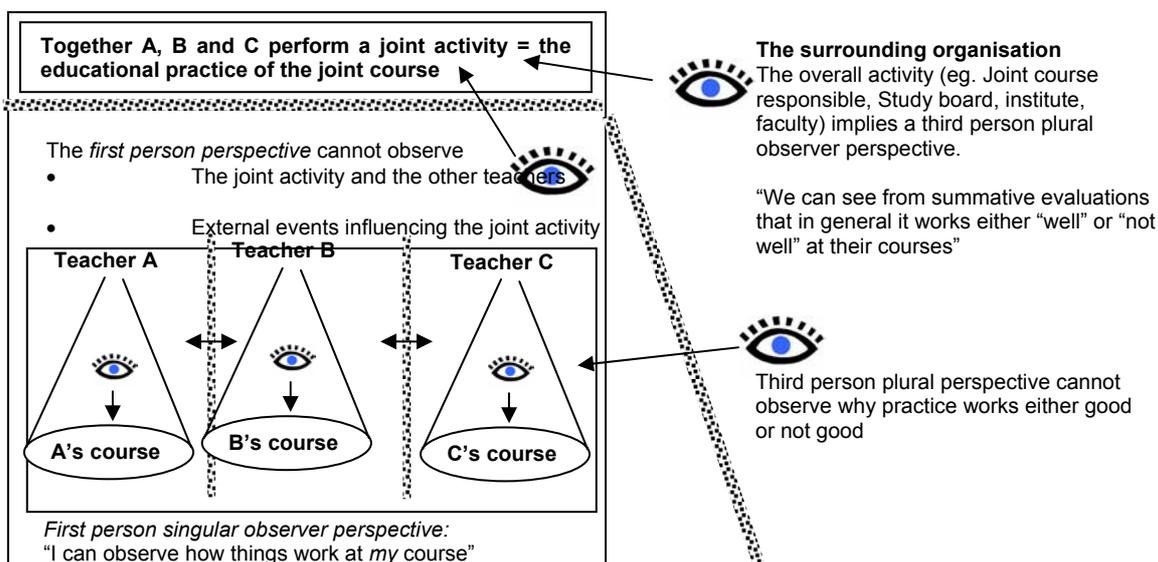


Figure 3: Model demonstrating blind spots inside a fragmented organisation

The individual teacher's position implies a first person singular observer perspective, but this first person perspective has some blind spots. It cannot observe how external events may influence the joint activity or the single track, and it cannot observe the parallel tracks. The surrounding organisational observer-position implies a third person plural observer perspective. This third person perspective has a blind spot too. Being outside it cannot gain the necessary insight

into how things work in the practice. Changes can be implemented top-down but we cannot be sure that practice develops according to our intentions. In order to grasp how educational systems are interrelated and interact with the external environment, it is necessary to include an internal participating first person perspective and a general shared perspective implying a collaborative we looking at us rather than a hierarchical we looking at them. Integration of

perspectives is a strategy, which compensates the blind spots of the isolated perspectives and offers the ground for an innovative approach to the changes. That is, the constitution of Communities of Practice securing the negotiation of meaning across boundaries, using brokers and boundary objects (Wenger 1998).

The above analysis demonstrates that the encounter between educational systems, the future ICT 'power users' and the information society's demands is a very complex field. It cannot be expected of any individual teacher to rise to this kind of challenge alone, and therefore it is not an isolated question about how to persuade 'late majority', 'laggard' and GG-teachers to change their practice. This is also a question of how to address and persuade the 'Self-sufficient' and 'Sceptical' universities to change their overall organisational practice. In organisations still operating according to the industrial society

paradigm (remember that 'Self-sufficient' and 'Sceptical universities' \approx 50% of all European universities (Rambøll 2004)), the management can be expected to choose the top-down – hierarchical third person – approach when dealing with the problems caused by the unfolding information society. Thus, collaborating teaching staffs are not only a good idea; it is the Holy Grail for product development of educational courses in the information society.

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