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OVERCOMING INERTIA IN MEDICAL EDUCATION

NAVIGATING CHANGE WITH ADAPTIVE REFLECTION

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in·er·tia

noun \i-ˈnər-shə, -shē-ə\

1   a: a property of matter by which it remains at rest or in uniform motion in the same straight line unless acted upon by some external force
     b: an analogous property of other physical quantities (as electricity)
2   indisposition to motion, exertion, or change: inertness

New Latin, from Latin, lack of skill, from inert-, iners

First known Use: 1713
From: http://www.merriam-webster.com/dictionary/inertia

ABSTRACT

Introduction: Medical education continually demonstrates difficulties in keeping up with and preparing students for the evolving demands of patients, practice, and society. This is not due to a lack of effort: Change without reform runs rampant. Analyzing these efforts reveals a tendency to fragment and focus on planning and designing solutions, i.e. content. However, content is only one of the three ingredients identified as essential to successful change by the strategic management literature. Attention needs to be paid to the interaction between content, context, and the change process. The conventional approaches to change employed in medical education are mechanistic and based on linear process thinking unsuited to the complexity of the context. The aim of this thesis is to explore how knowledge from change management can be applied to understand and facilitate the process of improving medical curricula.

Methods: Study I, a conceptual analysis of peer-reviewed articles of Linköping Health University's successful change effort, employed a strategic management framework to understand curricular innovation. An abductive action research approach was then used to understand the challenge of change in medical education by participating in the facilitation of change. The experience gained was formulated as a question-driven, facilitator-led planning and implementation process, Adaptive Reflection (AR). AR was subsequently tested and evaluated in Study II, III, and IV. Study II, an explanatory case study, used a complexity framework to explain how AR helped participants develop three undergraduate medical school courses at Karolinska Institutet (KI). Study III, an explanatory multiple case study, used thematic analysis of 17 semi-structured interviews with participants from two AR interventions in four psychiatric residency courses in Sweden. Study IV used content analysis to explore how 13 undergraduate nursing students at KI experienced the process of creating web-based continuing professional development courses with the help of AR.

Findings: Knowledge from change management was used to understand how Linköping Health University used the threat of closure as an opportunity to innovate their curriculum (I). They collaborated outside the boundaries of the medical school, created a unique strategic profile, and used it to develop interprofessional training and create exceptional utility for their graduates.

When Adaptive Reflection was used to facilitate curriculum change, a complexity framework analysis showed how interaction and reflection were encouraged and power gradients mitigated (III & IV). The juxtaposition of outputs from the different AR steps made explicit contradictions in desired learning outcomes and behaviors (II). This led to self-organization and the emergence of new curricula.

In terms of output generated from AR, three courses mobilized an improvement effort, participants took over the facilitator's role, and the process spread to and triggered another course to start their own (II). A pre/post AR comparison (III) found reductions in lecture time, more learner-centered multimodal activities, which were explicitly aligned with clearly defined learning outcomes that included ethical aspects and addressed patient concerns.

In terms of how participants experienced the AR process (III), they described: a) a strict structure that paradoxically felt free; b) ploughing ahead; c) collaborative and creative; d) validating and participative. When nursing students worked with AR (IV), they described their experience as a journey from chaos to confidence which led to the acquisition and development of new ways of working, new competencies, new ways of viewing the group, and increased feelings of self-efficacy.

Conclusions: The AR process proved effective in changing medical curricula. The changes occurred through local dialogue as participants answer the AR questions. Instead of focusing on content, the content emerged through a reflective process that respected the complexity of the context.

Keywords: Adaptive Reflection, Complexity, Action research, Change management, Medical curriculum development

LIST OF PUBLICATIONS

I.   **Savage, C.** & Brommels, M. (2008). Innovation in medical education: how Linköping created a Blue Ocean for medical education in Sweden. *Medical Teacher*, 30(5), 501-507. doi: 10.1080/01421590801953760

II.   **Savage, C.** & Brommels, M. (2010). Overcoming educational inertia: An explanatory case study of an innovative model for improving medical curricula. Submitted.

III.   **Savage, C.**, Janarv, T., Stenfors-Hayes, T. (2010). Improving Psychiatric Residency Training in Sweden: Perceptions of a Curricular Improvement Intervention. Submitted.

IV.   **Savage, C.**, Amanali, S., Andersson, A., Lohr, S. C., Eliasson, Z., Eriksson, H., Erlandsson, A., Goobar, S., Holm, J., Johansson, C., Langendahl, E., Lindberg, A., Lundin, J., Uhrdin, A., Schwarz, U. V. (2010). Turning the tables: When the student teaches the professional - A case description of an innovative teaching approach as told by the students. *Nurse Education Today*. doi: 10.1016/j.nedt.2010.11.023

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TERMS AND ABBREVIATIONS

Abduction	A logical process of inference described by Charles Sanders Peirce. To *abduce a* from an observed circumstance *b* is to surmise that *a* may be true because then *b* would be a matter of course. See Peirce, 1955.
Action Research	Research directed towards improving an existing social practice through a systematic series of cyclical or iterative stages of fact finding, reflection, planning, action, and evaluation in collaboration with the participants (Peters & Robinson, 1984).
Adaptation	An evolutionary process of adjusting to an evolving environment.
Adaptive Reflection	An inquiry-based, facilitator-led six-step curriculum development process which invites those with content expertise to reflect on which competencies are relevant to the context and subject at hand and how assessment and teaching and learning experiences can be designed so that these competencies are developed.
AR	Adaptive Reflection
BEME	Best evidence medical education. The evidence-based medicine corollary in medical education (www.bemecollaboration.org).
BHAG	Big Hairy Audacious Goal. A goal that is beyond the normal expectations (Collins, 2001).
Blue Ocean Strategy	A strategic management framework that suggests how companies can leave the "red oceans" made bloody by competition and move to a "blue ocean" through value innovation. It is a pattern of behaviors and analytical tools based around the development of a radically new idea with high value for the customer (Kim & Mauborgne, 2005).
Change	An altered state.
CNE	Continuing Nursing Education
Complex Adaptive Systems	Complex, (inter)dependent collections of actors which exhibit behavior indicative of a certain number of properties and mechanisms such as self-similarity, emergence, non-linearity. Examples include ant colonies, political parties, neural networks, and the stock market. See Holland, 1995. Because of its link to systems thinking, there is an assumption that external, rational, and objective observation is possible (Stacey, 2011).
Complex Responsive Processes	It is based on the idea that knowing is a social process that involves interactions and which leads to increased understanding as well as the emergence of self-identity among participants – individuals are formed and forming through social interactions. For example, the audience can be in the middle of the play or the researcher in the middle of the action, participating in changing and being changed through interaction. From these complex responsive processes emerge patterns. See Stacey, 2011.
Complexity	Complexity is a property which is the result of (inter)dependencies and interactions between actors/agents/nodes/elements. These connections which often can be described in simple terms can lead to the emergence of paradoxically complex behaviors. An analogy – baking a cake is simple, shooting a rocket to the moon is complicated, and raising a child is complex (Glouberman & Zimmerman, 2002).
CPD	Continuing Professional Development
Curriculum	Harden defines curriculum as "a sophisticated blend of educational strategies, course content, learning outcomes, educational experiences, assessment, the educational environment and the individual students' learning style, personal

	timetable and program of work" (Harden, 2001).
Double-loop learning	The ability of an individual or organization to modify goals or behaviors by reflecting on experience. Single-loop learning is to make repeated attempts to achieve a goal without learning during the process. See Argyris & Schön, 1978.
EBM	Evidence-based medicine
Espoused theory	The generally accepted and expressed theories of how things work. See Argyris & Schön, 1978.
Go to *gemba*	Toyota asks its leaders to go to the actual location of the problem to observe and understand the actual situation. See Liker, 2004.
Innovation	A new idea or way of doing something. It can be incremental (sustainable), radical (disruptive), emergent and evolutionary, or revolutionary in thinking, products, processes, or organizations. Kim and Mauborgne refer to "value innovation" stressing that a new idea is not enough; it should be of value to someone. See Christensen, 2005 and Kim & Mauborgne, 2005.
Instructional Objectives	Describes the input, what the teacher intends to teach. See Harden, 2002b.
KI	Karolinska Institutet
Learning Outcomes	Describes the output, what a graduate of a course or program is able to do and includes knowledge, skills, and attitudes. See Harden, 2002b.
METIS	More Theory in Specialist Training. A national project started by Raffaella Björck and Kajsa Norström to improve the residency training for psychiatrists in Sweden (www.metisprojektet.se).
OLL	Organization, Leadership, and Learning. An undergraduate nursing course at the Karolinska Institutet discussed in Study IV.
PoL	Professional development and Leadership. An undergraduate medicine course at the Karolinska Institutet.
S.M.A.R.T.	Specific, Measurable, Attainable, Relevant, and Time-bound. A common approach to defining goals in management and quality improvement (Edström, Svensson, Olsson, & Sveriges kommuner och landsting, 2008). In Adaptive Reflection, it is used as a tool to help in the definition of learning outcomes.
S.P.I.C.E.S.	*Student-centered* and *Problem-based* curricula which are *Integrated* within itself, *Community-based*, makes use of *Electives*, and which *Systematically* builds on previous training and learning. See Harden, Sowden, & Dunn, 1984.
Single-loop learning	See double-loop learning.
Tacit knowledge	Coined by Michal Polanyi (1966), "tacit knowledge" is that knowledge we may not even be aware we have or knowledge we have incorporated such that we do not think about it, such as riding a bike. This is in contrast to "explicit knowledge" which is readily available in conversation.
S.W.O.T.	Strengths, Weaknesses, Opportunities, and Threats. A common strategic management planning tool. See Have, Have, & Stevens, 2003.
Triple-loop learning	Includes not only the ability to engage in double-loop learning and make adjustments based on reflections, but also to anticipate needing to do so.

PROLOGUE

I have always been fascinated by theater. Partly because of its minimalism: things that are on a stage are there for a reason, either as a symbol or to be used. They have to be motivated. Another aspect I have found fascinating are the absurdist plays about plays, such as Pirandello's Six Characters in Search of an Author or Tom Stoppard's Rosencrantz and Guildenstern are Dead. They are examples of meta-theater, where the audience joins the actors in watching a scene unfold on the stage. Pirandello's play opens with a group of actors rehearsing a play when they are interrupted by the arrival of six characters. These characters have been abandoned by their author and are looking for someone else to finish writing the play they are suspended in. As the actors try to understand the six characters, they discuss how they can find out more about where they came from and what they have gone through. Eventually, the actors become an audience by asking the characters to act out their story. The actors then act what they have seen, playing the characters, without really becoming the characters, which leads to the actors being critically reviewed by the characters who have now become the audience. Throughout all of this, the "real" audience is forced to reflect on and decide whose reality to follow. What is "real" becomes even more absurd when an actor acknowledges and addresses the audience. Pirandello's play breaks through the "fourth wall" – the invisible wall that exists between the audience and the stage in a classic proscenium theater. When it was first produced in 1921, the play so polarized the audience between those who loved it and those who did not, that Pirandello and his daughter had to sneak out of the theater.

In a way, this thesis takes a more visceral approach to studying change by breaking through the fourth wall. Instead of just watching change unfold from a distance (Study I) or interviewing people about their experiences (Study III), I have also climbed on to the stage, interacted with the actors and observed their interactions (Study II, III, IV). Reflecting on these interactions I have seen patterns emerge and be reinforced or left to wither away. I have learned (and am still learning) how to reflect on how I have influenced and been influenced in these interactions. It has required me to stand on stage and at the side of the stage, at the same time. "Climbing to the balcony," a concept developed at Harvard and which has been applied to negotiation and leadership (Heifetz, 1994; Heifetz & Linsky, 2002; Ury, 1991) has become a valuable metaphor. It fits well with the action research approach of reflecting in and on action (Argyris & Schön, 1978; Schön, 1991). It has allowed me to participate in the play as I became more aware of and was able to see the larger infinite play that was and is continually unfolding around us (Carse, 1986).

The play that we will delve into in this thesis is about change (which most plays are about). The setting for the first scene is the medical university. It is where I began this project. It is where I first asked myself, "Why is it like this? And what can we do about it?" These two questions set me off on a journey to understand the context of health professions education, from the undergraduate and graduate levels, through to continuing education and professional development. I have sat through innumerable meetings, talked with even more people, designed, run and taught my own and other's courses, and through it all met some of the most wonderful people imaginable. The subsequent chapters are based on data from Studies I, II,

III, and IV, as well as background information including my observations and reflections from numerous interviews, interactions, workshops, and meetings; informed by frequent forays into the literature. This means that the scope of this play involves much more than what is specific to any particular medical school or even medical schools in general. In fact, I use the terms medical school and medical education loosely as I see their respective challenges, in terms of how to deal with change and improvement, as similar to those facing others in health professions education.

As in any play, there are characters. To understand a change process requires us to understand the actors who engage each other in the drama. These characters all have hopes and fears, things they are passionate about; others they are wholly uninterested in. Over the course of this research project, I have gotten to know many of the "actors who play these characters" in many different venues – personally, in official capacities, as well as through researching their situation in the four studies (see also Bergin & Savage, 2011). In deference to them, I have created composites to illustrate some of the drivers of which others may be unaware. Read through the list and see if you find a role that you can identify with – one that resonates with the challenges you are facing, the problems you are experiencing, the fears you might not have put words to, and the changes you are interested in seeing happen in your organization. Then, after reading the scenario, ask yourself, if you were this person, what would you do now?

THE CHARACTERS
So go ahead, choose your own adventure. Read through the following scenarios. When you have found one that fits the type of change situation you are facing, whether it is in education, in health care or in a wholly different context, take a moment to reflect. Why does this description resonate with you? What are the challenges you face? The frustrations you would feel? What would you do if you found yourself in this person's shoes?

The Dean
"This is an exciting time," you think to yourself as you look out the window at the construction site from which the new university hospital is beginning to emerge. As dean of education in a health professions university, you see that entirely new, pristine blue oceans full of possibility for collaboration with local and regional health care providers are opening up. And the growing health tourism and medical innovation markets, increased patient participation, and quality improvement and patient safety initiatives all promise to make the next few years all that more exciting. Unfortunately, a recent review by the accreditation council has not been flattering, to say the least. And now, a newspaper article written by some hospital CEOs bemoans the poor training and practical skills of the newly graduated health professionals. You try to nonchalantly hide the newspaper as the president of the university walks into your office, but it's too late. "I see you've already read it," the president mutters. "Look, your name, we need to do something, and I want you to do it fast." So… what do you do now?

The Program Committee Chair
You are the committee chair for one of the educational programs in a medical university. An active clinician and researcher, you feel you have finally arrived at a position of power where you can truly make a positive impact in an area you feel passionate about – the training and development of your future colleagues. If only the day-to-day tasks of the job weren't so much,

because you still haven't had a chance to get around to all the great ideas you had when you took this position. Thankfully, though, you have an incredibly competent administrator who is a lifesaver. Still, despite so many dedicated teachers, curriculum committee meetings are filled with palpable levels of frustration. The course directors talk about how hard it is to keep things running, let alone try to change things, when all the money goes to research and other areas. And those student representatives didn't like that suggestion of yours at the last meeting. Finally sitting down! Just as you're getting used to the cushion on your chair, the Dean walks in and tosses a newspaper on top of that dreaded report from the accreditation council lying on your desk. "Look, (your name), I just talked to the president, and well, we need to do something, and we need to do it fast." So… what do you do now?

The Department Chair

You are the department chair. Sure, it's a position of authority, but you're only there for a few years, and you still have to pull in the research grants for your group. With all the new administrative work to do and all the meetings you have to go to, you need to start simplifying and delegating. Economy with a big 'E' is the word of the day, the month, and the year. The increased budget transparency and other reports required by the university have led to a growing departmental administration which you need to finance. So how do you reign in the professors and their demands? It's like herding cats! And now the president said something about the bad press the education programs have received. Well no wonder, just look at the last curriculum plan! How are the students supposed to learn anything when the course your department teaches keeps getting shortened? You know that you have capable teachers running and teaching the courses, but the spreadsheets show it is hurting their ability to pull in external grants. So… what do you do now?

The Course Director

That last curriculum committee meeting was tough. The program committee chair told everyone that because of the critique from the accreditation council and the press, something needs to be done. But what do they know? Those inspectors or hospital brass don't really understand what it's like. And the survey data they used for the inspection? Come on. On the other hand, you can admit to yourself that you know exactly what needs to change. It's obvious that the other courses have some serious problems; you saw that when you snuck a peak at their course evaluations the other day. But actually, there are some "minor" things you do want to change and revise in your own course – perhaps a new module or maybe even… maybe it IS time to bring up that idea for the new course again? Or will it be the old solution, another one of those across the board cuts of 10%? Not to mention that grant proposal that needs to be turned in next month… And you need to find another teacher for next semester's module. So… what do you do now?

The Teacher/Professor

"Again?!" you think to yourself. The course director just came by and told you that, yup, once again, course time will probably be cut. Fortunately, you recently attended a teacher training workshop and got some great ideas. Well, there was a lot of fluff there as well, but you have an idea about how to improve your lecture that you want to test. If only you could find another colleague who would "dare" to change as well… But then again, how easy is that? Ten years ago you had a great idea, you even wrote up a proposal. It was good. Too bad nothing came of

it – tabled as usual. Wonder where that report is now, maybe in that box in the corner? Ah, well. And now there is that e-learning thing – you saw a course about it advertised at the library. How to fit that in with the work on the clinic and finishing that latest article? Oh, that knock is probably those student representatives who wanted to come by and complain about something, or did they say they had an idea? Students are great, seriously, that's why you love to teach, but sometimes… So… what do you do now?

The Student Representative

Finally, the education of your dreams! Took you long enough to get here, but you're excited. Well, at least you were in the beginning. Then you got the feeling that sometimes the teachers think you get in the way; that the program would run much more smoothly if none of you were around. There have been some great teachers along the way, true, but they are often overshadowed by the "stuff-then-regurgitate-on-exams," what that Finnish professor of education who visited last year called the "bulimic learning process". And whatever happened to that idea of team-learning with students from the other programs, integration between courses, or exams which test what you need to know? You hear your classmates complain, but you also have started to realize that the best solution, the one that is suggested by that best evidence medical education guide, might not be so popular with them. Not to mention the teachers. So… what do you do now?

The Educational Developer

You are an educational developer. While you may not have the same professional background as the teachers you are trying to help, you feel comfortable in what you are talking about. You have read the articles; you can talk about the books. If only the teachers would respect you for what you are trying to help them understand about how to teach! Instead, they insist on clinging to their old ways despite the literature and all the courses you and your colleagues have created. You have met many enthusiastic teachers, but there are just so many of the others. And can you blame them – is the university really all that interested in education when so much focus is on research and getting grants? Your colleagues at other universities are also feeling the economic pressures. But then finally, good news! The accreditation council has come with an evaluation that "proves" what you have been saying all along. The opportunity to jump in and help has presented itself! So… what do you do now?

So how can we help our characters and write the conclusion to this play? My suggestion is that we follow Pirandello's lead and start by trying to understand more about how these characters ended up where they are now and the challenge they are facing.

INTRODUCTION: THE CHALLENGE OF CHANGE

Learning is not a luxury. It is a necessity. Too often, learning and reflection are treated by organizations as something which people should do in their free time. Work in these organizations is thought to be about production. A short pause allows us to see, however, that production occurs within a context and that reacting to and adapting to the dynamics of that context requires reflection and learning. So while this thesis is fundamentally about change, it takes the view that without creating opportunities and making time for learning and reflection, there will be little improvement and over time, this will most likely have an impact on production.

EDUCATIONAL INERTIA

One approach to studying change is to look at areas or use models with high rates of change, such as the development of computer hard disc drives (Christensen, 2005) or observing genetic and phenotypic changes in the *Drosophila melanogaster*. In this study, I have taken the opposite approach and studied an area that exhibits slow rates of change. The case I have explored is that of health professions education. What makes this context so interesting for a study about change and improvement is that the university where most health professionals are educated presents a paradox. A center for learning, the university is, strangely, rarely a learning organization. It plays host to some of the most creative minds of each generation, yet it is also one of the most conservative of institutions.

This conservatism is expressed in a pace of change which is significantly slower than in industry (Gale & Grant, 1997). Medicine, one of the original university faculties, is viewed by many as being inherently conservative; its practitioners are often seen as resistant to change. The education of doctors has not changed much during this last century despite a growing body of research about how to teach medicine (Norman, 2002; Rae, 2001). Recent studies have shown that universities and academic medical centers are not developing graduates with the competencies necessary to meet the challenges which will face them as they enter the healthcare workplace (Boaden & Bligh, 1999; Emanuel, 2006; Finocchio et al., 1995; Frenk et al., 2010; Jakobsson & Fridén, 2010; Langdale et al., 2003; Willman, 2010). Health professions education needs to become better at continually adapting to the changing needs and attitudes of society (Gibbs, 2006; Schuwirth & van der Vleuten, 2006) as well as at equipping its graduates to take an active role in defining these new realities (Nash & Pasternak, 1995).

The interesting thing is that this situation is not new. The effectiveness and relevance of medical education (i.e. the ability to support students as they develop the competencies necessary for their profession) has been questioned repeatedly. One hundred and one years ago, Abraham Flexner presented his report detailing how medical education should be reformed (Flexner, 1910). In a content analysis of 19 major reports addressing under-graduate medical education reform from Flexner and onwards, four objectives for reform were consistently identified (Christakis, 1995). According to the calls for reform, medical education needs to:

1. Better serve the public interest.
2. Address physician workforce needs.
3. Cope with burgeoning medical knowledge.
4. Increase the focus and emphasis on generalism.

The fact that these four themes are consistently repeated suggests two possibilities. The first is that medical schools do not actually change. Despite recent changes in the form of adding and developing curricula in humanistic areas such as including ethics and communication skills, there is evidence indicating failure of large scale reforms in medical education (Enarson & Burg, 1992; Guilbert, 2001; Patel, 1999). This documented inability of medical education to effectuate change despite the repeated attempts and calls for reform, has led to the phenomenon being referred to as "change without reform" (Bloom, 1988) or "reform by modest curriculum extension" (Boaden & Bligh, 1999).

The other reason for the repetition of the themes in calls for reform could be that medical curriculum developers are focusing on the wrong thing (Hafferty, 1998). For instance, I could list all the changes in medicine over the past decade and conclude that there is a pressing need to change medical education. However, look at an article from two or three or more decades ago, and you will find similar examples and arguments that a crisis is here or at least is just around the bend (Korn, 1996; Watson et al., 1998). I would argue that the one constant we can rely on is change. Focusing on specific solutions to specific problems and on implementing those solutions does not immediately lead to the capability to deal with tomorrow's challenge. As Gibbs (2006) writes,

> We cannot afford to keep 're-inventing the wheel'; we need to make the wheel adaptable to a dynamically changing and real-world environment. We need to design programs that are not dependent on stability, but are sustainable by adapting to change.

As I reflected on the situation, two questions came to mind:

1. Why are medical schools continually so unsuccessful in adapting to the needs of society, patients, and health care systems?
2. Can we apply some of the knowledge others have gained as they studied change in other contexts and domains?

In developing our solutions to meet the needs of yesterday and today, is it possible that we have forgotten the need to develop and integrate into curricula the capability for flexible and adaptive responses to a continually evolving environment? Alfred North Whitehead, writing about education a few years after Flexner, lamented the *inertia* that had gripped education (Whitehead, 1929). He worried that if a society does not invest in continually updating its education to adapt to the needs of society, it is doomed to fall behind. His suggestion was that the focus of change efforts be directed at the level of individual schools, that they should have the autonomy to design their curricula.

To answer the second question, the obvious place to look was the field of change management. I found that while management literature is abundant, little has been written on its application in educational reform. This might not in itself be a bad thing – walk into any airport bookstore and you can easily be overwhelmed by all the latest high gloss management secrets you cannot hope to be successful without. It is all too easy to import

models because they are popular without considering the evidence base. There is a very real risk of importing fads that were fatally flawed even in their original context, such as the current trend to restructure universities and research funding by implementing business process reengineering (Head, 2011). The challenge lies is in finding relevant literature that is not purely theoretical but also applicable to medicine and medical education, a challenge which has not been met (Harden, 1998). This suggests both a possibility to identify management theory could be of relevance to the context of medical education as well as to explore the practical relevance of this knowledge in the improvement of medical education.

AIMS OF THE THESIS

Overall Aim

Given the history of failures in reforming education, the aim of this thesis is to see what can be learned by bridging the knowledge gap between the field of change management and the challenges faced in changing medical education as described in the preceding scenarios.

> *How can knowledge from change management be applied to understand and facilitate the process of improving medical curricula?*

How the Studies Contribute to the Aim

Alone, each of the four studies has an individual and specific aim. These are as follows:

Study I   To explore how Linköping University made the revolutionary decisions it made in the 1980s through the application of a strategic management framework.

Study II   To explain, using change management thinking, how a new question-driven facilitated model for improvement in medical education integrated content, process, and context when it was applied in practice.

Study III   To explore how a new approach to faculty and course development is perceived by the participants and to analyze its effects.

Study IV   To describe a student-teacher-professional collaboration and explore how students experienced the collaboration.

Together, the four articles provide a framework which can be used to help answer the overall aim. Study I provides information about the suitability and feasibility of applying a strategic management framework to understand a successful change effort in medical education. Study II applies a complexity paradigm to understand a novel process intervention model, referred to as Adaptive Reflection (AR). Study III looks at how this intervention was perceived by teachers and Study IV explores what occurs when traditional roles are turned on their head and those lowest in the hierarchy facilitate curricular change and development with AR.

THE STRUCTURE OF THIS THESIS

Those used to reading doctoral dissertations from Karolinska Institutet will undoubtedly have noticed that the structure of this thesis appears to be different. In the standard IMRaD (Introduction, Methods, Results, and Discussion) structure (Day, 1989), the researcher uses the introduction to define the context for the research problem by reviewing the current knowledge as embodied in the literature and presenting a summary of the state of the art. In this way, knowledge gaps can be identified which provide the rationale for the study and

the research question. The methods for data collection and analysis appropriate to the research questions are then described. The results are presented and then discussed with comparisons being made to the literature that were presented in the introduction.

Instead of following the classic IMRaD format, I have elected to structure the thesis so that it more accurately reflects the abductive action research approach I have engaged in. In this approach, the literature has functioned as a way to move from observations of practice to an interpretational understanding. As I encountered and interacted with actors in the health professions education environment, I reflected over my experiences and observations and then consulted the literature to better understand and interpret what I saw. This was an iterative process, cycling back and forth between practice and theory. This precluded a general theoretical overview as I tested and chose based on fit and utility. In my attempts to identify and understand the patterns that have emerged during the project, I have turned to several research areas and disciplines. I began this project in medical education, convinced that the gap in knowledge was in curriculum design; that we simply did not know how to effectively "create" good doctors. Over an intense period of several months, I read through the medical education literature, with a focus on curriculum design, and talked with and interviewed many of the actors. I eventually realized that the problem was not so much that teachers lacked knowledge (P.J. McLeod, Meagher, Steinert, Schuwirth, & McLeod, 2004), or that it was difficult to design the ideal curriculum. Instead, I became aware of the scope of the challenges involved in implementing an ideal curriculum.

Keeping one foot in medical education (both as a teacher and using it as a research case), I turned to the management literature to look for similar discussions about change, implementation, and improvement. The journey has since led me to other fields and disciplines, such as behavioral economics, change and innovation management, complexity, higher education, intellectual capital/knowledge management, leadership, lean manufacturing, philosophy, psychology, quality assurance, quality improvement, sociology, and strategic management. In so doing, I am aware that I expose myself to critique. In some circles, this is research heresy. However, I have been driven by an insatiable curiosity to understand and I eventually realized that our understanding can be limited by the assumptions inherent to the field or discipline we adopt. What eventually emerged based on these explorations and Study I, II, III, and IV was a theoretical base grounded in dialogue (Bohm, 2004; Isaacs, 1999) complexity (Hamel, 2007; Holland, 1995; Stacey, 2011) leadership (Collins, 2001; Heifetz, 1994; Heifetz & Linsky, 2002) and learning organizations (Argyris, 1991; Argyris & Schön, 1978; Schön, 1991).

The thesis is divided into two parts. The focus of Part 1 is on applying change management knowledge to understand the *content*, *process*, and *context* of change in health professions education. The focus of Part 2 is on testing and understanding how *Adaptive Reflection* works as an alternative approach to facilitate the development of medical education given the understanding of the situation as described, analyzed, and discussed in Part 1.

Much of science is about increasing our understanding by deconstructing and reducing the complex to the simple. This is often accomplished by removing details and emotions to uncover the dispassionate hidden logic. However, the secrets of change do not solely reside

viii

at the level of logic (Gardner, 2004). In order to both help the reader bridge the different disciplines as well as better understand the complexity of change, I have included some of the reflections and observations I have made as well as illustrations from the literature. My intention is not to purely transmit the knowledge and understandings I have accrued, but to engage the reader in reflecting on concrete phenomena that occur in health professions education and how the literature can help us interpret this and then, if necessary, act differently (Kolb, 1984; Peirce, 1955). The reflections, case examples, and illustrations are not included as personal opinions or meant to detract from the seriousness of the situation, but are offered as conceptual analyses based on and in order to understand empirical observations as well as an attempt to encourage the reader to see the current challenges in a new light.

In this way, the thesis is both indicative of and a product of the research approach (More about how this reflects the abductive action research approach of the project is explained in the first appendix). For those used to the IMRaD structure and who might find that the structure of this thesis distracts from their interpretation and review of the findings and the discussion, I have made an attempt to equate the different parts.

Part I: The Essential Ingredients of Change

To structure the analysis of the current situation which forms the foundation for the second part of this thesis, I have chosen a framework developed by Pettigrew and Whipp (1993). They suggest that there are three essential ingredients to strategic change: content, context, and process (See

Figure 1). In their book, they draw the model on an x, y, z graph. However, they also stress that it is not enough to be aware of the three essential ingredients, it is how they are interrelated that is important to understand as well. For this reason, I have recast the three essential ingredients in a Venn-diagram. This figure will serve to structure our analysis of change efforts in medical education in Part 1. As you read Part 1 of this thesis, I encourage you to reflect on both the challenges an effective change process must overcome as well the

many (latent) strengths and possibilities that coexist with the limitations we tend to focus on.
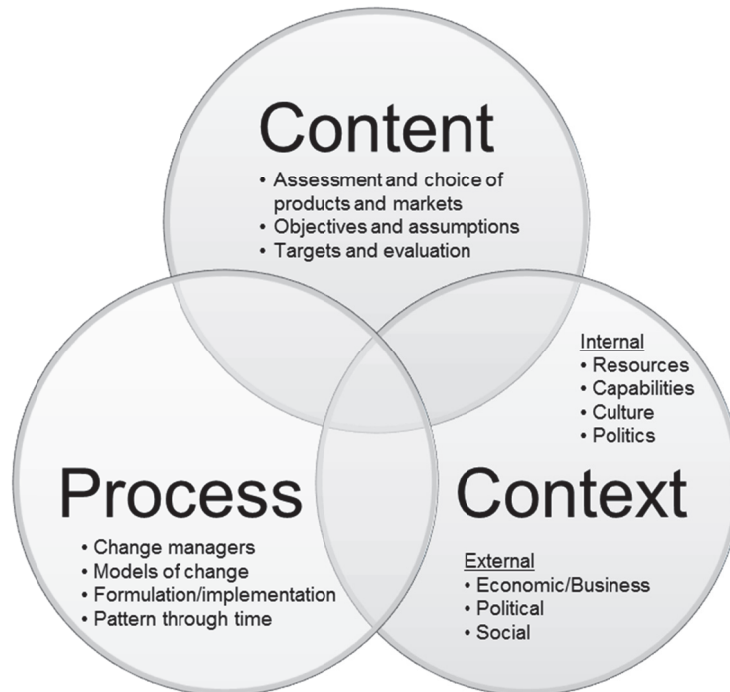
(Adapted from Pettigrew & Whipp, 1993)

One way to identify these strengths and possibilities is to begin by looking at the others around you. Think of the role which resonated with you. If you had that role, which of the other characters would you talk with? What kind of questions would you ask to find the strengths and possibilities necessary for driving change? To help with this reflection, the first three chapters conclude with a summary of the main points.

Part II: Integrating the Essential Ingredients of Change

Chapter 4 concludes our review of the current situation by describing the worst-case scenario, a doom loop that can draw in well-meaning curriculum reformers and which may explain the phenomenon of "change without reform" (Bloom, 1988). We then return to our scenarios and I present an alternative model for change in the university setting (Adaptive Reflection). The findings from the application of the model in Study II, III, and IV are summarized. In chapter 5, the AR model is discussed based on findings and the literature. In chapter 6, I present the implications of the findings for how change managers can navigate change in medical education and how the facilitation of curricular change in medical education can inform change management. I conclude with some last reflections on overcoming inertia.

The appendices include a description and analysis of the methodology and methods (Appendix 1), a list of courses and workshops in which the process model introduced in this

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thesis was developed and tested (the material) (Appendix 2) as well as a "Do-it-yourself" curriculum development guide (Appendix 3).

PART ONE

1 CONTENT – *WHAT?*

Content is the *what* – the "solution". It describes the details about what you want to achieve. It is the plan of what you want to have in place when you have implemented the change. It describes what you will be doing differently and how you will know it is different when you get to that future point in time. Thus content is very much a product of and tied to the knowledge and assumptions we hold about what works and what is needed.

Pettigrew and Whipp have divided content into three components (See

Figure 1):

- Assessment and choice of products and markets.
- Objectives and assumptions.
- Targets and evaluation.

All of these three components are included in the concept of *curriculum*. The etymological origins of the word curriculum refer to either a chariot or the course the chariot was driven around (Bransford, Brown, & Cocking, 2000). Harden defines curriculum as "a sophisticated blend of educational strategies, course content, learning outcomes, educational experiences, assessment, the educational environment and the individual students' learning style, personal timetable and program of work" (Harden, 2001). As such, discussing the curriculum can involve looking at what is taught (the syllabus), how it is organized (the process, progression, and order of courses), how it is taught (teaching praxis and educational philosophy), and its aim, i.e. the product or outcomes (the competencies of the graduate).

1.1 HISTORICAL TRENDS IN MEDICAL EDUCATION

A "sophisticated blend" is where we are today, largely because of the way in which medical education has developed over time in Hegelian patterns of thesis – antithesis – synthesis. A good place to observe this is in the following somewhat abridged history of medical education (similar patterns of change can be found in the other health professions). Allowances must also be made for differences in the way medicine is taught, both within and between countries and regions. If we narrow our focus to western medicine, we can see that the original focus on the art of medicine was eventually replaced by a focus on the science of medicine. In the last few decades, the focus has gradually moved to respecting the role art has to play in the science of medicine as educators become more aware of global trends in education and health care.

1.1.1 Medicine as Art (Ancient Greece to Industrial Europe)

At the time of Hippocrates and Galen, Ancient Greece was the educational hotspot for medical education in the west. The basic philosophy was that of master and apprentice. The medical student would learn through observing the master in action. The doctor's role as teacher was considered an integral part of the profession: "to teach them this art, if they require to learn it, without fee or indenture" ("Fifty years ago: The hippocratic oath," 1998).

The focus on anatomy brought about by Vesalius' book, *De Humani Corporis Fabrica* in 1534 and new technologies such as the Laennec's stethoscope, invented in 1816, found

their way into clinical practice. Emphasis was placed more on doctors' knowledge than on their clinical skills and attitudes and the "art" of medicine taught by clinicians was replaced more and more by "knowledge" taught by academic researchers. Indeed, Rudolf Virchow (1821-1902), the father of pathology, viewed medical practice as "nothing but a minor offshoot of pathological physiology as developed in laboratories of animal experimentation" (Rae, 2001). This sentiment, which lay at the heart of the German philosophy of medical education, attracted the attention of educators in the United States, among them the dean of Johns Hopkins University.

1.1.2   Medicine as Science (The 20th century)

At the end of the nineteenth century, medical education in the United States and Canada was catastrophically poor. There had been an enormous overproduction of poorly trained doctors. Compared to Germany with its ratio of one doctor per 2000 inhabitants, the US had one doctor per 500 people. Part of the problem had to do with the numerous medical schools that were run as private, for-profit, institutions (Flexner, 2002; Ludmerer, 2004). Instruction consisted mainly of didactic lectures despite Gutenberg's printing press which gave students access to the same books that the lecturers read from. Little time was spent in laboratories, mostly for economic reasons. As a result, advances made in medical education and in medical science were largely ignored by universities and colleges. Moreover, there was little clinical training as it was rare for an academic institute to be affiliated with a hospital.

At the beginning of the 20th century, the American Medical Association created the Council on Medical Education which pushed for standardized entrance exams and national implementation of education consisting of two years laboratory science followed by two years of clinical rotations. In 1908, the Council asked the Carnegie foundation for the Advancement of Teaching to conduct a survey to describe medical education in the United States (Beck, 2004).

The Carnegie Foundation gave the task to the educationalist, Abraham Flexner. In 1910, he presented his report which, heavily influenced by the dean of Johns Hopkins University, recommended adopting the German view of science as the foundation for medical education. Flexner also called for the use of paid researchers to teach medical students instead of clinicians. This created two distinct cultures within medicine where only those trained in the laboratory were deemed suitable as teachers, effectively preventing the majority of clinical practitioners from teaching (Rae, 2001).

From the Flexner report, we can glean an understanding of what the competitive factors were between medical schools at the time: entrance requirements, size and training of the faculty, size of endowment and tuition, quality of laboratories, and availability of a teaching hospital whose physicians and surgeons served as clinical teachers (Beck, 2004).

1.1.3   Medical Education Today

Flexner's legacy can still be seen in the way medical education has designed and organized today. Despite innovative curricular designs such as the spiral curriculum (Harden, 1999), the basic pattern of two years of basic science education followed by two years of clinical

rotations has endured (Emanuel, 2006). These curricular structures can be reinforced by external factors such as board examinations (Guilbert, 2001) and, in the case of Europe, by the bachelor-master delineation according to the Bologna Process. Or they can be reinforced by tradition. Germany is still grappling with the throes of Rudolf Virchow's thinking. For many students there, the medical school experience is mainly theoretical until a final "practical year".

For the purposes of this thesis, a traditional medical school is defined as one which is discipline-based, focus on the gathering and transmission of information largely at the impetus of teachers (Harden, Sowden, & Dunn, 1984). Students concentrate on learning (memorizing) the facts and the "science" of medicine one discipline at a time. Clinical instruction is hospital-based with the expectation that students follow the same sequence of courses (Armstrong, Mackey, & Spear, 2004). Students are exposed to the patients they happen to meet at the clinic or ward they are assigned to rather than making sure that the student meets the patients deemed necessary to provide a rich learning experience. There is little integration between courses and didactic lectures dominate (Harden, et al., 1984).

In the late 60s, a group at McMaster in Canada, inspired by the ethos of the times, developed a new approach to teaching called problem-based learning (PBL). PBL shifted perspective from teacher-centered to student-centered learning and is perhaps the most recent disruptive innovation in medical education (Study I and Frenk, et al., 2010). A disruptive innovation as defined in the context of medical education is a new idea (of value) that disrupts or transforms the practice of education (Study I based on Christensen, 2005; Christensen, Grossman, & Hwang, 2009; Kim & Mauborgne, 2005). The development of PBL coincided with the start of the research field on medical education.

In the past four decades, medical education research has developed its evidence base (referred to as BEME – best evidence medical education) and together with research in education, psychology, and cognition become more able to suggest efficient and effective approaches to teaching. Central among these are a shift to a *Student-centered* and *Problem-based* curriculum which is *Integrated* within itself, *Community-based*, makes use of *Electives*, and which *Systematically* builds on previous training and learning (Harden, et al., 1984; Parsell & Bligh, 1995). Together, these phrases form the acronym SPICES. SPICES provides a framework which can be used to evaluate and identify the profile of a medical program (Study I and Davis et al., 2007; Harden, et al., 1984). To these concepts can be added other approaches – such as faculty development, outcome-based learning, and teaching practices such as case methodology which has found a new renaissance in medical education (Tarnvik, 2007). Much has also been done to re-incorporate the humanistic art of medicine into curricula (Patel, 1999). However, just as in many other fields, there exists a gap between what we know and what we do. For example, in 2001, despite widespread dissemination of these and similar ideas for improvements in learning and practice over a 30 year period, only about 100 of the world's then 1621 medical schools had put these principles into practice (Guilbert, 2001).

4

To summarize: we have a situation where educational innovations are designed, tested, and researched, but only implemented by a few. We also have repeated calls for reforms which seem to go unanswered. Why is this? And what is the clamor about?

An analysis of the calls for reform found that they are directed at ways of teaching, what is taught, faculty development, focus on community, self-directed and lifelong learning, rewarding teaching, defining the school mission, and centralized curriculum control (Christakis, 1995). Except for the last two, these concepts all refer to questions of content. Four of the concepts are worth visiting as they have bearing on the rest of the thesis: Outcome-based education and the associated concept of constructive alignment, student-centered education, faculty development/teacher training, and integration. The topics related to defining the school mission and centralized curriculum control will be discussed in chapters 3 and 4).

1.2 OUTCOME-BASED EDUCATION

Walk into any car dealership and you will find fact sheets on the windows of the cars. These sheets present information about the contents of the car in front of you. They do not tell you everything about the car, only the information that you need to know in order to make an informed decision about whether or not this is the car for you: mileage, power, CO_2-emission, warranty, etc. When the car was designed and manufactured, it was generally to these specifications as well. This is analogous to the idea behind outcome-based education. The corollary to beginning with the fact sheet on the showroom floor is defining the "product" of the educational process, the graduate. In this way, the thought is that it becomes easier to design and engineer learning environments which will allow the graduate to develop the desired learning outcomes.

FIGURE 2. OBJECTIVE VS. OUTCOME-BASED EDUCATION
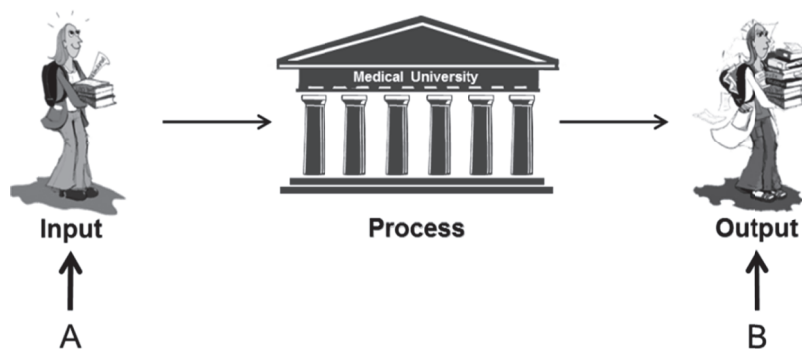
Consider Figure 2 above. A graduate enters a medical university and then graduates as a doctor. This journey can be said to be comprised of three basic parts:

- **Input** = that which gets put into the process. This includes the student, teachers, what is taught, knowledge, information, books, posters of the metabolic pathways in the body, etc.
- **Process** = the steps which are strung together, usually in a linear fashion. In the medical university this includes the different courses and the order in which they fall, how the information is taught, how the students develop and learn the information. It involves skills training, formal instruction, initiation into social norms and values, and induction – thinking and problem solving (Prideaux, 2000). It includes both the explicit curriculum as well as aspects related to the process of socialization into the profession and a professional identity – the hidden curriculum (Aultman, 2005; Fins & Rodriguez del Pozo, 2011; Hafferty, 1998; Karnieli-Miller et al., 2011). Some of the steps can add value, i.e. they contribute to the development of the output of the process. Some of the steps do not add value; what Toyota refers to as *muda* (Fujimoto, 1999).
- **Output** = this is what comes out at the other end. In this example, the output is the doctor with her new competencies consisting of the knowledge, skills, and attitudes which she developed while attending the university.

The outcome-based approach begins by envisioning this newly graduated doctor and then describing the knowledge, skills and attitudes she has developed. In essence, the curriculum designer mentally places him or herself at point "B" and then designs and engineers teaching and learning activities that will lead to this output (Harden, 2002a). What exams should be given to make sure that the correct knowledge, skills, and attitudes have developed? What needs to be taught to ensure these competencies are developed? How should these competencies be taught? What kind of skills do the teachers need to be able to teach? What kind of students should be matriculated? This alignment of the process and input with the output is referred to as "constructive alignment" (Biggs & Tang, 2007).

Objective-based education is the result of the teacher standing at point "A". From this point of view, curriculum design is about delineating the information that will be presented and covered by the teachers during the process. While a list of objectives and outcomes may seem similar at first glance, the differences in perspective between points "A" and "B" has important ramifications.

In defining objectives from point "A", there is a tendency for teachers to design their courses based on the contents of the course book or on what they feel it is important to know. The teacher is the one who determines what information is relevant to learn. This might not strike you as problematic. But let us compare it to what happens if the same teacher places himself at point "B".

Standing at point "B", the teacher begins by defining which competencies (or sets thereof) a graduate should have when they have graduated. This requires the teacher to think about the context in which the student will find herself upon leaving the medical university. While there will be similarities between what teachers standing at "A" or "B" teach, the idea is that the relevance of what is taught will increase if the teacher reflects on what the graduate should be able to do (point "B") instead of what the teacher wants to teach (point "A").

An outcome-based approach to education can lead to significant improvements in learning. In a study to evaluate the effectiveness of an outcome-based continuing medical education intervention in rational prescribing, and using a clustered randomized controlled design, my colleagues and I found significant improvements in the knowledge and skills of those physicians participating in the intervention group (Esmaily et al., 2009). In contrast, since objectives were first introduced in the 1960s, they have had little impact on student learning or teaching practice and assessment (Harden, 2002b). Not making this switch from objectives to outcomes can have negative consequences – the student can experience their education as fragmented and have difficulties in developing a "comprehensive view of the knowledge required for the profession" (Bolander et al., 2006).

The concept of outcome-based education developed out of discussions on instructional objectives. Learning outcomes were introduced to medical education in the 1990's (Harden, 2002a, 2002b; Harden, Crosby, & Davis, 1999). The concept quickly gained credibility as several different countries began to redefine their medical education curricula using various outcome-based frameworks (Metz, 1999; Simpson et al., 2002). These pioneering efforts resonated well with a concurrent trend of defining "core curricula", the basic knowledge, skills and attitudes which all graduates should have (Chop, 2000; Editorial, 1991; General Medical Council, 1993). The term "core curriculum" has since gone out of favor, largely because as it was applied in Britain, people felt it restricted their freedom to choose how they wanted to teach. It is worth noting that this interpretation is not supported by the definition. The concept has since been replaced with discussions about "core competencies" and "progression". The Bologna process ("The Bologna Process: Towards the European Higher Education Area,") and the related Medine 2 Tuning Project (http://www.medine2.com) are just a few of the many projects which have increased the focus on defining outcomes.

The failure of the term "core curriculum" suggests that despite efforts to create clear definitions, the application of a term, how it is used and measured, and the way it is spread, all play a role in how it is received and interpreted. Outcome-based education is now going through a similar process. Often presented as a comprehensive approach to medical education, it is far from the panacea many curriculum developers have been looking for. Harden, one of the foremost translators of both outcomes and core curricula to medical education, has identified three different ways of reacting to the increased use of outcomes (Harden, 2007b). The two basic requirements of outcome based education are to define explicit learning outcomes and then to base curriculum decisions on the outcomes (educational strategies, learning opportunities, course content, student progression, assessment, educational environment, and student selection). Harden has found three types of behaviors exhibited by individual teachers and institutions. One group, the ostriches, head-in-sand, ignore it all together, hoping the "irrelevant fad" will pass. Peacocks create their lists of outcomes, and feeling satisfied, stop there and strut around, proudly showing off their lists. The beavers actually go on to build their subsequent curricula on the outcomes.

Another example of this "drift" into irrelevance is the practice of prefacing the phrase "learning outcomes" with the word "intended". The power of learning outcomes lies in the requirement it places on teachers to stand at point "B" and define demonstrable and observable competencies. Objectives are statements of educational intent that can easily become unrealistic or impractical (Harden, 2002b). "Intention" suggests instead a view from point "A", it implies "input", a lowered degree of accountability for teachers, i.e. we are back to objectives. This is an example of how subtle differences in language can have profound effects on our interpretations and behavior.

Several different models to define outcomes have been suggested and applied with varying degrees of success. Delphi and modified Delphi approaches, where surveys are sent out to various people is one such approach (Alahlafi & Burge, 2005; Esmaily et al., 2008; McLeod, Steinert, Meterissian, & Child, 2004; Metz, 1999; Syme-Grant, Stewart, & Ker, 2005). The difficulties with this are the length of time and effort involved, and the tendency for participants to add to the number of outcomes which can result in long lists (P. McLeod, et al., 2004; O'Neill, Metcalfe, & David, 1999). Other approaches I have found involve focus group discussions, nominal group technique, interviews, PBL-based processes, cross-referencing, literature reviews based on, for instance, World Health Organization (WHO) or equivalent guidelines (Crenshaw et al., 2011; Cumming & Ross, 2007; M. H. Davis, et al., 2007; Ellaway et al., 2007; Hoat, Yen, & Wright, 2007; Newble, Stark, Bax, & Lawson, 2005; Schwarz & Wojtczak, 2002). Defining outcomes are also included in approaches to and as a focus for curriculum development (Fish & Coles, 2005; Harden, Crosby, Davis, & Friedman, 1999; Kern, Thomas, Howard, & Bass, 1998; Kreber, 2009). One year at the annual AMEE conference for medical education, I came across one method which only took five days, but resulted in 900 plus outcomes. When I asked what the teachers were supposed to do with the 900 plus outcomes, the proponent of this method said, "Well, they have to choose."

1.2.1 Taxonomies

How can we choose? How can we differentiate between outcomes? For instance, can we determine if certain learning outcomes are harder to achieve, e.g. take more time to learn and develop?

One way to differentiate learning outcomes from each other in regards to the complexity involved in attaining them is to make use of a taxonomy. A taxonomy is an orderly classification based on natural relationships. In the 1950s, and as part of the discussion on instructional objectives (Harden, 2002a), Bloom et al. developed a six level taxonomy to describe cognitive processes. The taxonomy can, in a simplified way, be seen as a hierarchical categorization of how we think and understand in which the higher levels are based upon and fulfill the requirements of the subordinate categories. Bloom's cognitive taxonomy (See Table 1), which was revised in 2001, consists of six levels of categories and cognitive processes (Anderson, Krathwohl, Airasian, & Bloom, 2001) with level one as the "lowest" and six as the "highest".

TABLE 1. BLOOM'S REVISED COGNITIVE TAXONOMY

Category	Explanation (Adapted from Anderson, et al., 2001)
1. **Remember**	Retrieve relevant knowledge from long-term memory.
2. **Understand**	Construct meaning from instructional messages, including oral, written, and graphic communication.
3. **Apply**	Carry out or use a procedure in a given situation.
4. **Analyze**	Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose.
5. **Evaluate**	Make judgments based on criteria and standards.
6. **Create**	Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure.

It is perhaps important to point out that learning outcomes at a "higher" taxonomical level are not inherently "better" than those at lower levels. The value of an outcome lies in its relevance to the type of situations in which a student can be expected to utilize the competency. As an example, knowing how to create and manufacture a new car key (level 6) is unnecessary if all you need to start your new car is to remember (level 2) that you put your car keys in the front pocket of your red jacket.

Other taxonomies were developed by the same group for affective and psychomotor behaviors (Krathwohl, Bloom, & Masia, 1964). The affective taxonomy has five levels.

TABLE 2. BLOOM'S AFFECTIVE TAXONOMY

Category	Explanation (Summarized from Krathwohl, et al., 1964)
1. **Receiving**	The learner passively pays attention. This level is a pre-requisite for learning to occur.
2. **Responding**	The learner is an active participant in the learning process who not only "attends to a stimulus," but also "reacts in some way".
3. **Valuing**	The learner "attaches a value to an object, phenomenon, or piece of information."
4. **Organizing**	The learner "can put together different values, information, and ideas and accommodate them within his/her own schema; comparing, relating and elaborating on what has been learned."
5. **Characterizing**	The learner "has held a particular value or belief that now exerts influence on his/her behavior so that it becomes a characteristic."

Biggs and Collis developed a Structure of Observed Learning Outcome (SOLO) five-level taxonomy. It is primarily focused on knowledge acquisition or construction, and describes the level of understanding of a topic in respect to a larger context. Bloom's taxonomy can be said to focus more on determining the ability to use knowledge. When these two are compared, the SOLO taxonomy is encompassed by the first two levels of Bloom's taxonomy (Anderson, et al., 2001; Biggs & Tang, 2007). There are many other taxonomies that are applicable to medical education, such as Miller's framework for clinical assessment (Knows, Knows How, Shows How, Does) (Miller, 1990). The committee tasked with updating the residency program guidelines by the National Board of Health and Welfare in Sweden even created their own taxonomy, albeit without reference to the literature (Savage & Harenstam, 2008).

While all of these taxonomies have flaws, some more than others, regardless of the model used, taxonomies seem to have a role to play in helping teachers express and differentiate outcomes. It is therefore important to reflect on the reason for using a taxonomy in defining learning outcomes. Is it to differentiate between learning outcomes and identify natural progressions between them? Or, as I have seen in many instructions about how to write outcomes, is it to categorize them according to set definitions? One of the problems with instructional objectives was that they became so specific and difficult to write because of restrictions on which verbs were considered ok to use and which were not. Educators eventually found it easier just to select their objectives from pre-prepared objectives banks (Prideaux, 2000). If educators now use the same taxonomical lists of verbs as back then, it is even more important to ensure that competencies are written from point B and not A. Otherwise learning outcomes will go the way of core curriculum and objectives and wander off into obscurity.

1.2.2   Vision, Mission, and Goals

In designing outcome-based education, the idea is to begin with defining the learning outcomes and then to design the rest of the curriculum backwards – from learning outcomes to content to teaching and learning experiences to assessment and then to evaluation (Harden, Crosby, & Davis, 1999; Prideaux, 2003). At the same time, there is a need to explain intent – the broader intentions, purpose, and higher designs of the curriculum and individual courses (Prideaux, 2003).

There is a story of a man who walked by the building site of a medieval cathedral (Kay, 2010). He asked three different stone cutters what they were doing. The first grunted, "I am cutting these stones into square blocks." The second stone cutter explained, "I am building a great cathedral." The third replied, "I'm working for the glory of God."

The corollary to outcome-based education in organizations is the use of goals, mission, and vision. The vision describes an organization's view of the future, what it hopes to become (the glory). The mission describes the broader intentions, the day-to-day purpose of the organization's actions, what the organization should achieve (the cathedral). The goals are the specific measurable steps that need to be achieved in order to realize the mission and vision (the square blocks). In education, outcomes are akin to goals, purpose the same as mission, and vision would be the way a university or program describes what they strive to become. Unfortunately, I have noticed a trend to create outcomes "at different levels" which seems to reflect a misunderstanding of the differences between vision, mission, and goals as well as contribute to an unnecessary and complicated curricular structure.

A challenge in defining outcomes is to do it in such a way that they ring true when compared to the vision and mission. When we forget the larger purpose, it is easy to, like the third stone cutter, stare ourselves blind at the stone, missing the proverbial forest for the bark of the tree trunk. This is of particular importance when one tries to measure outcome attainment.

1.2.3   Measuring Outcomes

Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes.   *– Charles Goodhart*

Whether defining goals, objectives, or outcomes, the key is to make sure that they are measurable so that it can be determined if they have been met or if more work needs to be done. A common approach to defining goals in management and quality improvement is to use the acronym S.M.A.R.T. – Specific, Measureable, Attainable, Relevant, and Time-bound (Edström, Svensson, Olsson, & Sveriges kommuner och landsting, 2008). However, just because an outcome is written in a form that is measurable does not mean that it will be relevant.

The story of how the New York Police Department lowered soaring crime rates to levels not seen since the early 1960s has become a favorite in the management literature (Collins, 2005; Gladwell, 2002; Kim & Mauborgne, 2003; Levitt & Dubner, 2005). Using a quality improvement management approach dubbed CompStat, Police Chief Bratton required precinct chiefs to attend monthly meetings where they presented data about crime statistics and explain how they were working to improve the situation. Bratton credits the process of continual measurement coupled with new policing methods as leading to the dramatic drops in crime rates. What is interesting is what happened later, after the dramatic drop, after the management books had been published. The constant drive and expectation of lowering crime rates has led to allegations of new behavioral patterns emerging among police who have been accused of ignoring or reclassifying crimes, thus impacting statistics (Jones, 2011). In the hunt for improvement, the larger purpose/mission has been lost.

As this example shows, measurement is tricky because over time it can change the very thing which is to be measured, making the data which is gathered and followed meaningless. Referred to as Goodhart's Law (Kay, 2010), similar patterns of behavior change such as gaming and/or creaming to "meet the numbers" have been found in other areas, such as pay-for-performance initiatives in the National Health Service of the UK (Doran et al., 2006; Gubb, 2009). If the rewards are not aligned with the values and vision of the organization, some goals that are not rewarded can be ignored (Campbell, Reeves, Kontopantelis, Sibbald, & Roland, 2009). This suggests that caution should be exercised when choosing what to measure, when developing measurements, and when considering how to raise awareness of and/or reward goal attainment.

1.2.4 Fragmenting Outcomes
The fragmentation that plagues medical curricula seems to have also spread to the formulation outcomes. Competencies are often defined as knowledge, skills, and attitudes. For some reason, this has been interpreted by some to mean that lists of outcomes should be divided up into three lists, one section each for knowledge, skills, and attitudes. I have not been able to track down the origin of this, but I find it to be another example of how we may talk about the importance of integration and the evils of fragmentation, but then we undermine our arguments by going out and fragmenting yet another concept. Let me illustrate this with a real-life example from an internal medicine course. The topic is evidence-based medicine. Evidence-based medicine (EBM) addresses many of the aspects of quality care (Safe, Timely, Effective, Efficient, Equitable, Patient-centered) (Institute of Medicine, Committee on Quality of Health Care in America, 2001). I have chosen it as an

example because it requires doctors to have developed proficiencies in knowledge, skills, and attitudes.

After the course, the student should:
Knowledge
Be able to describe basic concepts in health economics and psychology and also be able to explain principles and ways of working in evidence-based medicine (S 2-3).
Skills
Be able to demonstrate how one, based on evidence-based medicine, critically reviews and evaluates clinical questions, formulate goals and treatment plans for health care and how one uses active watchful waiting (M3).
Attitudes
Be able to demonstrate a critical, reflective, and scientific approach (M3), be able to motivate the importance of being a reflective doctor on the clinic and be able to integrate clinical knowledge with the best available evidence (S3)."

The problem of breaking up a competency into separate ones for knowledge, skills, and attitudes is that many times, all three must be present for the competency to be worth anything for the patient. For instance, a student might be able to explain the principles behind EBM and demonstrate how it can be applied in the clinic, but if the student does not value it, they probably will not do it later. In other words, what I am suggesting is that in order for a competency to develop into a recurring pattern of behavior – a habit (Bloom's affective level 5) – knowledge, skills, and attitudes need to be integrated (See Figure 3).

FIGURE 3. DEFRAGMENTING COMPETENCIES
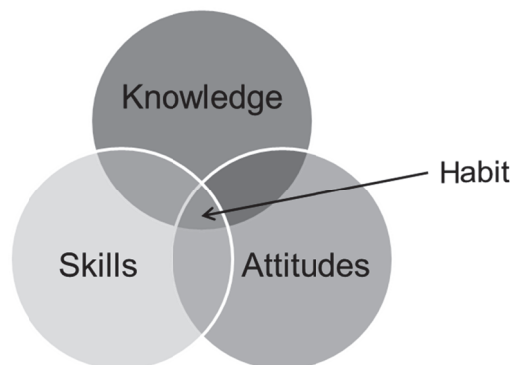
(Covey, 2006)

The problem is even more explicit in the third outcome which uses the Miller taxonomy for skills and the SOLO taxonomy for describing cognitive development to measure an attitude. As Figure 3 illustrates, there is room for knowledge, skills, and attitudes that exist independent of each other. But if we are to develop the capability to use the competencies when the pressure is on, then an approach that integrates these three from the start may be more productive.

1.2.5   Summary

In defining outcomes, it is not enough to make them measurable or S.M.A.R.T. Outcomes need to be clearly linked to the mission and vision of the educational program and they probably should encompass and not separate knowledge, how that knowledge can be used, and in what manner (Harden, 2007b). The very process of constructively aligning the teaching methods, content, and assessment practices with the outcomes can also provide an

opportunity for teachers to reflect about what it is they should teach, how relevant it is to the future workplace of the graduates, and if the educational process and input into that process are aligned with the desired outcomes.

1.3 LEARNER-CENTERED EDUCATION

1.3.1 Teacher-Centered Education

One of the effects of thinking in terms of learning outcomes instead of learning objectives is the shift in focus from the teacher to the student. There are many different models which describe teachers' conceptions of and approaches to learning and teaching (Stenfors-Hayes, 2011). Parker J. Palmer (2007) provides a model which clearly illustrates some of the assumptions behind the traditional approach to teaching as embodied in the conventional didactic lecture which he labels as the "objectivist myth" (See Figure 4a). The lecture implies the existence of a knowledge gradient between the teacher and the students – the teacher has the knowledge and then transmits it to the students who did not have access to the knowledge when the lecture began.

In this model, knowledge is seen as an object, a truth that is "out there". It requires an "expert" to grasp it and who has the ability to translate and transmit it to "amateurs" (students) who lack the skill sets necessary to understand the objective truth. This inability is represented by the horizontal barriers. The objectives approach to teaching reinforces this approach, placing the teacher and the teacher's ability to determine what is important at the center of the teaching experience (the shaded circle). If you ask a colleague or teacher to describe how they approach teaching and they use words such as "transmit", "tell", "communicate", or "explain to" or if they focus on what they as teachers do to the students, chances are they are operating from a mental model similar to the objectivist myth.

Paulo Freire referred to it as the "banking" concept of education, where teachers deposit knowledge which students receive, memorize, and repeat (Freire, 1993). Teachers project ignorance on the students and presenting themselves as their opposites, justify their existence. That this approach to teaching should persist is no surprise, especially in expertise driven professional organizations such as universities and in health care. In these environments, status and position are often correlated to higher levels of competency as measured in years, experience, grants received, impact factor of articles, or amount of information one is party to relative to others. Moreover, the positivist quantitative research paradigm where variables are isolated or controlled for, and hypotheses are proven right or wrong, reinforces the supposition that there is an objective reality that can be correctly identified and measured.

(Adapted from Palmer, 2007)

1.3.2 Learning-Centered Education

In a "community of truth," knowers engage each other about and around a subject (See Figure 4b). This approach to teaching is generally considered to be student-centered as contrasted to the conventional teacher-centered approaches. This activating (and when it is constructively aligned) approach to learning has a greater impact on changing physician learning and behavior than traditional didactic lectures which appear to have little or no effect changing physician performance (Bero et al., 1998; D. Davis et al., 1999; Davis, Thomson, Oxman, & Haynes, 1995; Esmaily, et al., 2009; Friedlander et al., 2011; Sohn, Ismail, & Tellez, 2004). Didactic lectures appear to instead have a role in validating or reinforcing learning and behavior (Smith, 2000). A cautionary note – moving from a lecture-based to a student activating approach such as PBL does not equate to a guarantee for an increased ability of students to learn, attain, or maintain competencies   (Mann & Kaufman, 1999; Norman, Wenghofer, & Klass, 2008).

If we examine the model more closely, we see that knowledge is not represented as an absolute and it is the interactions between the knowers as indicated by the dark arrows that enable learning and not the ability of the expert to explain. The focus is not on the teacher, nor the student, but on the subject and delving into the subject together. As Freire described it, "Knowledge emerges only through invention and reinvention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other" (Freire, 1993, p. 53).

For this reason, it may be more correct to call this approach a subject centered or learning-centered approach to teaching because as the students and teachers interact as knowers with each other, all of them have the possibility to learn new things. Students become teachers and teachers become students. There are similarities to communities of practice (Wenger, McDermott, & Snyder, 2002) as knowers delve into a subject and develop their expertise and identity.

The challenge this view of learning implies to the authority of the traditional teacher's role and to the control the teacher exerts is profound. The teacher is required to relinquish power and the spotlight and leave the role of "sage on the stage" in favor of becoming a "guide on

the side". This shift is akin to asking teachers to move from point "A" to "B" in Figure 2 (page 5). Teachers have traditionally looked for inadequacies in students, grading on the basis of degrees of incompetency. Seeing students as knowers requires the teacher to identify and understand the competencies the student already has. Learning becomes an activity of collaborative exploration and teachers become "teacher-students". But how often do you hear teachers describe how they intentionally create opportunities to learn from their students in their teaching sessions?

Parallels can be drawn between approaches to teaching and how we approach content development. Neither teaching nor content development should be a question of *for* or *to*, but instead be one of *with*. Operating from an objectivist myth, bank director approach, content refers to what to tell or communicate to the students. The questions raised are those that are important to the curriculum designer, and those questions are answered through the course. "For the dialogical, problem-posing teacher-student, the program content of education is neither a gift nor an imposition but rather the organized, systematized, and developed "re-presentation" to individuals of the things about which they want to know more" (Freire, 1993, p. 74).

The irony is that many of the teachers engaged in medical education are themselves researchers and research is about continually looking to learn something new. In fact, the research process itself provides a good example of a learning process (Hult, 2001). It is question-driven/problem-posing, and knowledge, laws, theories, and concepts are learned not so much in the abstract, as in their application (Kuhn, 1996). Kolb (1984) has described this as one of reflecting on a concrete experience one has had, abstracting from these reflections and generalizing to new behavior which can be tested, which leads to a new concrete experience, another opportunity for reflection, and so on (See Figure 5).

FIGURE 5. EXPERIENTIAL LEARNING
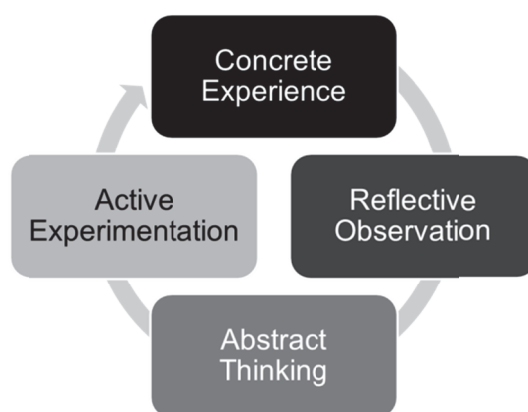
(Kolb, 1984)

This would suggest that learning is a personal experience which involves experiencing something or at least recalling a concrete experience. So how is it then, that when it comes to sharing what we have learned in our research that we lecture to people (abstract thinking) instead of inviting them to experience and reflect on our learning process together with us?

15

1.4 FACULTY DEVELOPMENT

A teacher at a medical school is a content expert, well versed in the intricacies of their field. Until recently, most teachers were autodidacts in terms of pedagogical knowledge, teaching based on experiences or how they themselves were taught. In an environment where the lecture has been the norm for teaching, it is not unusual to find the objectivist myth of teaching with the teacher as translator and transmitter of knowledge to be the dominant metaphor. "…Academics trained in the research of a particular discipline for a long period of time naturally use methods and perspectives similar to those that they experienced when pursing their studies" (Roxå & Mårtensson in Kreber, 2009, p. 209). Nevertheless, they still develop a tacit knowledge of basic pedagogical principles (P. J. McLeod, et al., 2004). The importance of other aspects of teaching, such as facilitating personal and professional development, managing and developing sessions, courses, and curricula, and learning through research and local community-building (Harden & Crosby, 2000; Ross & Stenfors-Hayes, 2008) might easily be overlooked. (Re)Acquainting teachers with these roles opens up an entirely new arsenal of approaches to improve the learning process.

Faculty development has evolved in function, scope and importance (Irby & Wilkerson, 2003; Skeff, Stratos, & Mount, 2007; Y. Steinert, 2000). A variety of methods are used, such as workshops, seminars, short courses, fellowships, and other programs including peer coaching, mentorship, self-directed learning, and e-learning (Steinert & Mann, 2006). Differences in effectiveness have been tied to the use of experiential learning, feedback, peer and colleague relationships, diversity in the use of several educational methods within a single intervention and how well the intervention design adheres to principles of teaching and learning (Steinert et al., 2006). While many of these interventions have proven effective, sustainability is still an unknown. As faculty development has spread and gained acceptance, even becoming required at many universities, awareness of the need for faculty development has been grown. Now the next challenge is to help faculty prioritize in a complex work environment (Steinert et al., 2009).

Wilkerson and Irby suggest that the full scope of faculty development includes professional development, instructional development, leadership development, and organizational development (Wilkerson & Irby, 1998). This increased scope can be seen in the increase of research articles on different medical education perspectives, teaching methods, general faculty development methods, and teaching-specific curricular topics (Skeff, et al., 2007). Faculty development has a definite role to play in curriculum development efforts (Hendricson et al., 2007; Mennin & Krackov, 1998). It has even been used as an approach to curriculum change (Steinert, Cruess, Cruess, & Snell, 2005). Moreover, the lack of impact on teachers' knowledge and beliefs has been offered as a central explanation for educational change without reform (Bloom, 1995; Gess-Newsome et al., 2003; Woodbury & Gess-Newsome, 2002).

1.5 INTEGRATION

Integration appears to be a challenge in health professions education, regardless if it is between people, subjects, courses or professions (Harden, 2000). Lack of integration has been suggested as a major reason for the mismatch of competencies to the needs of health

care and for the weak teamwork that exists within and between educational programs (Frenk, et al., 2010). This lack of integration can lead to unnecessary overlapping, repetition, and curricular overload. It can also lead to distrust, rivalries, misunderstandings, and competition between different professions (Frenk, et al., 2010).

Curriculum mapping, the identification of when and where different outcomes occur in a program, has been on suggested as one approach to dealing with the lack of integration (Harden, 2001; Prideaux, 2003; Ross & Davies, 1999). Learning outcomes have also been suggested as a way to delineate progression and encourage integration between courses in a medical school and from novice undergraduate to expert clinician (Harden, 2007a). Flexner pointed out the need to integrate education with research and the clinic (Flexner, 1910). Frenk et al. lift this to a macro level when they stress the importance of integrating with global trends in health care (Frenk, et al., 2010).

Integration develops through meaningful interaction. If teachers don't interact with each other, it becomes difficult to figure out how what they teach can be taught together, built upon, or eliminated. Professor Anders Hjerpe, former program director and chair of the medical school at Karolinska Institutet, was looking for a way to identify areas where interaction efforts could be suggested and supported. He sent out a survey in 2003 to the course leaders of the medical school asking them to "identify those subjects which you think it would be most useful to cooperate with." He then took the answers and summarized them in the diagram below (See Figure 6).

FIGURE 6. SUMMARY OF COURSE LEADERS SUGGESTIONS FOR INTEGRATION
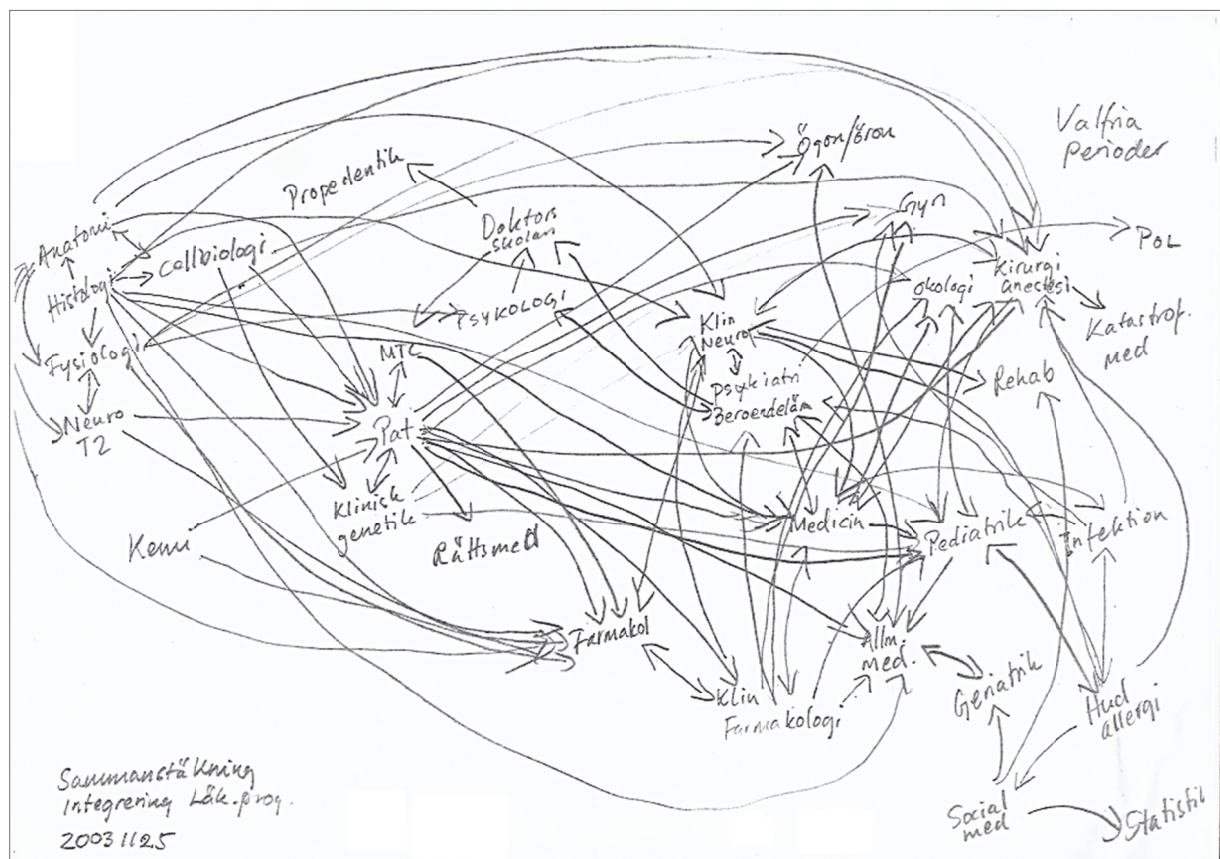
What the figure shows is that based on the course directors opinions of which areas can be integrated, some of the subjects are more central than others in that they have a larger number of connections to other courses. It is not possible to discern from the diagram how many connections could exist between two particular courses or how strong these connections could be. This can be done with computer modeling and represented by variations in the thickness of the arrows or through proximity. The diagram does suggest that many areas exist where subject matter can be integrated. Other areas such as leadership ("*PoL*"), statistics ("*Statistik*"), and student selected electives ("*Valfria Perioder*"), are viewed as subjects with little potential to integrate (See Figure 6).

1.6   THE CHALLENGES PRESENTED BY CONTENT

In analyzing the current discussion on the content of medical education we have reviewed many of the aspects that need to be addressed if changes in medical education are to be considered successful reforms. Having moved from an art-based to a science-based curriculum, the development of research in education has led to new approaches to teaching which has impacted how we look at health professions education. The shift that outcome-based education implies, of moving from objectives to competencies opens up many new opportunities to integrate education with the workplace as long as universities remain true to their vision and mission.

Focusing purely on content implies a solution focus, a focus on the answer. It is akin to asking a consultant to find out why things don't work. They provide an answer and leave behind their PowerPoint recommendations. The organization, caught like the deer in the headlights, is at a loss of how to proceed with implementing the change process.

1.7   CHAPTER SUMMARY

Content – *What*?

- Curriculum development teams often begin by discussing and planning the content of the change by designing the curriculum.
- In medical education content = curriculum. It includes the educational strategies, course content, learning outcomes, educational activities, educational philosophy, assessment, educational environment, flexibility (or lack thereof) for individual learning styles, personal timetables, and program of work.
- Historically, medicine was seen as an art, then a science, and now a combination of both. This has had an impact on the way medicine has been taught.
- The knowledge about how we should teach and assess is growing rapidly, but there exists a gap between what is known and what is done.
- Recent advances in educational research has led to a shift towards outcome based education, student-centered education, faculty development and integration with the community. All are aspects commonly addressed in calls for curriculum reform.
- Outcome-based education involves defining the product before defining the content. This can be compared with objective-based education where the focus is on the content the teacher intends to cover.
  o   There are several approaches to defining learning outcomes/competencies
  o   Taxonomies can help students and teachers understand and relate to learning outcomes as well as to identify a progression between them
  o   Learning outcomes are the concrete measurable steps that help achieve the larger vision and

purpose of the educational program

- o Measurement of learning outcomes can be a challenge. Improper specification can encourage detrimental behaviors. Quality improvement efforts have used the acronym S.M.A.R.T. – specific, measurable, attainable, relevant, and time-bound.
- o There is a tendency to fragment competencies, dividing them up into knowledge, skills, and attitudes instead of reinforcing the interaction of the three to help students develop habits
- Learner-centered education describes a transformation from the teacher as translator of an objective truth to the development of a learning community where teachers and students interact around a subject as knowers.
- Faculty development has evolved in function, scope, and importance to include leadership, organizational, and curricular development.
- Lack of integration has been cited as a major issue in health professions education
  - o When asked, course leaders can identify possible areas of integration
- A content focus is a solution-based focus.

2 PROCESS – *HOW?*

Military test pilots perform a difficult task. They fly very expensive planes where any number of variables can go wrong. Given the high risk for failure, you might find it odd that military test pilots don't actually ever crash, at least not according to them. It's not that it doesn't happen, but it's called something else. These pilots don't crash, they "auger in" (Yeager & Janos, 1985). So why use a term from before the 12th century when there is a perfectly good modern word for drilling a plane and its pilot into the ground? Perhaps because it is a way to avoid believing that something so unpleasant could ever happen to you.

In analyzing reports of curriculum reforms and talking to veterans of these efforts, I have noticed a similar use of euphemisms. Few will say that they failed, instead the euphemism is that the outcomes of the changes were "modest" (in comparison to what was envisioned) or "in line with what is being done elsewhere" (Mårtenson, 1989). Like the pilots, it appears difficult to accept that something so unpleasant could happen when one has worked so hard.

In preparation for and during the course of this project, I have closely followed a series of changes in medical schools in Sweden and talked with a number of people who have led similar efforts abroad (Savage et al., 2002). I have found it surprising that the launch of the changes was so often heralded with optimism by the committee in charge. What did they see that made them think they would succeed where so many other competent groups had previously encountered such difficulty? Especially considering that the change process they were planning was so similar to previous attempts?

Maybe it is based on a belief that what one needs is a better plan? In reviewing the medical education literature, I have noticed a content-centric approach to describing change. Perhaps I should not have been surprised. When politicians describe change, they describe their vision of the Promised Land. Winning an election is often seen as a matter of how many of the electorate shared that vision. Describing the way to get to that Promised Land often has a negative effect on election results.

Process is about the *how* – how we plan, how we act, and the steps taken. Understanding the how often requires a type of meta-reflection that looks at the role of change managers in curricular reforms, the models of change that are used, the formulation and implementation processes, and the patterns of change through time (See

Figure 1). This meta-reflection involves becoming aware of the often tacit models which lie behind why we think we should do what we do. This reflection on and in action is similar to what the theater of the absurd asks its audience members to do.

Outside of the theater, we do this by creating opportunities to reflect on the assumptions, beliefs, and mental models behind why we think we should behave, act, and do the things we do. This reflective process is referred to as double-loop learning (Argyris & Schön, 1978).

2.1   DOUBLE-LOOP LEARNING

To understand double-loop learning, we can use the example of a student who enters a medical university (See Figure 7). This makes her the input to the system. During her period in the university she undergoes training (process) which results in becoming a doctor (output). In medical education, this output is now commonly specified in terms of learning outcomes.

FIGURE 7. DOUBLE-LOOP LEARNING
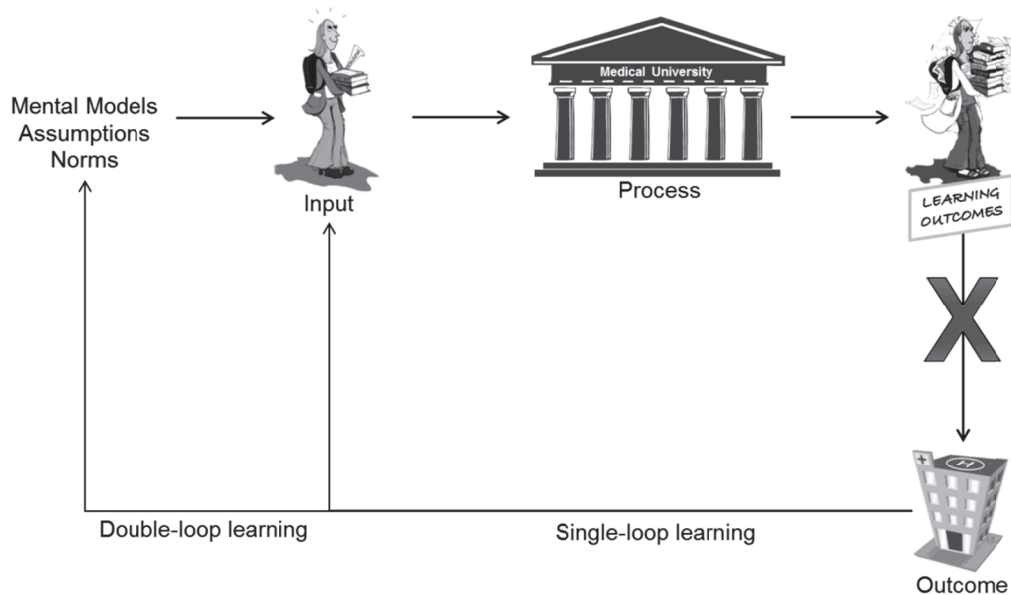
The doctor then begins to work in an environment, for example the hospital. This inter-action with the environment leads to certain outcomes, such as patients becoming healthy. This outcome generates a reputation which is fed back to those interested in becoming doctors who then apply to the medical university. This feedback loop is referred to as single-loop learning. This is also an example of a system in its simplest form.

As has been explained in the introduction, in the case of medical education, the com-petencies of today's doctors (the output) are not in line with the needs of the workplace (Boaden & Bligh, 1999; Finocchio, et al., 1995; Frenk, et al., 2010; Jakobsson & Fridén, 2010; Langdale, et al., 2003; Willman, 2010). This is symbolized in the figure with an "X". In such a situation, the feedback can affect the way teachers approach their teaching. This is where many medical schools find themselves, and it is tempting for teachers to, frustrated with the lack of knowledge and skills of their students, to try and work harder, faster, stronger, e.g. increasing lecture time and the personal transmission of information to the students. Ironically, this approach has been found to be directly counterproductive (Schmidt, Cohen-Schotanus, & Arends, 2009).

Double-loop learning suggest that we should take a moment to reflect on why things are the way they are. For instance, why would we as teachers feel the need to increase control over

students' learning through lectures? Argyris and Schön suggest that many of our decisions of how to deal with feedback are based on tacit understandings, norms, culture, and mental models that we have collected, built up, and formed through interactions with others in our environment (Argyris & Schön, 1978).

So let us now turn to the conventional change process in health professions education and try to discern the assumptions and models-in-use.

2.2   CHANGE MANAGERS

For the purposes of this discussion, we can see "change managers" as being those people engaged in and who feel a responsibility for leading or organizing change efforts. This does not require that they are in positions of formal authority. In the prologue, we met seven different characters. While there are many other characters involved in the drama of change in health professions education, these seven are all actors I have seen in the role of change manager.

2.3   PATTERNS OF CHANGE OVER TIME

Traditionally, the medical school has updated its curriculum periodically, attempting to create a new, advanced, and modern curriculum through a process of radical change. This has often been due to outside pressure for reform. Following a kick-off with much fanfare, the approach usually involves getting buy-in from influential persons, support from the top, and a charismatic and persuasive strong leader who can develop a good plan with his working group and then meet and allay the fears of those who will then implement the proposal (M. H. Davis & Harden, 2003; Maccarrick, 2009; Mennin & Krackov, 1998; Tosteson, Adelstein, & Carver, 1994; Watson, et al., 1998). Often these efforts take longer to implement and refine, and require more energy than the planners had expected (Mennin & Krackov, 1998; Mårtenson, 1989). Not to mention the documented lack of major reform (Enarson & Burg, 1992; Guilbert, 2001). And so, despite the fact that the need for change in medical education has been well documented, both in Sweden and abroad (Christakis, 1995; General Medical Council, 1993, 2002; Högskoleverket, 1997, 1998, 2001; Jakobsson & Fridén, 2010; Karolinska Institutet, 1996; Månsson, 1997; Thome & Arstam, 2001; Todd, 1992; Willman, 2010), little changes.

I have tried to summarize in Figure 8 how this situation plays out over time. The needs of society, patients, and the health care system are continuously developing and at ever faster rates. New discoveries question current praxis. New treatments, diagnostic techniques, and technologies coupled with political and economic policies have insured that the medicine of today is different from that of the past and most certainly that of the future. This development is represented in the figure below with a thick dark line denoting this exponential growth.
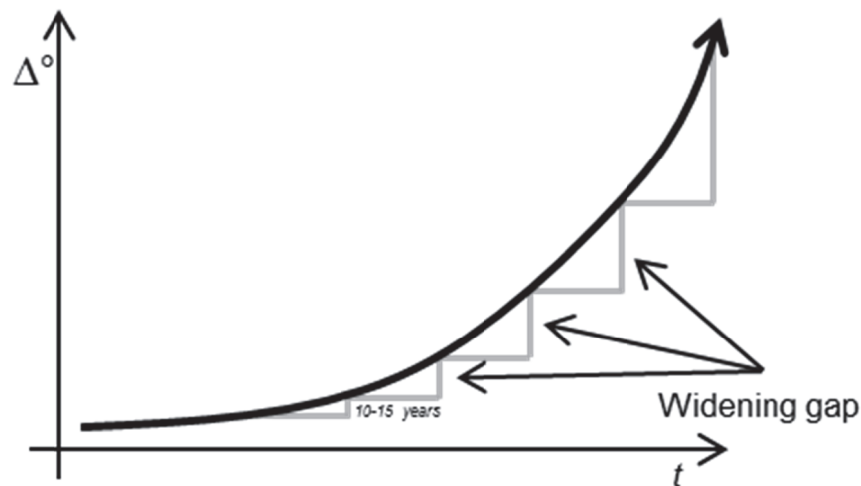
These developments put pressure on medical schools to graduate doctors capable of finding their ways through the health care maze. When the gap between the needs of society and what is taught in a medical school (represented by the vertical lines pointed to by the arrows in Figure 8) differ to such a degree that the relevance of the curriculum is called into question (e.g. through accreditation reviews or newspaper articles) calls are made for a reform of the curriculum. This appears to occur about every 10-15 years (N. A. Christakis, 1995).

The problem is that these change efforts that occur in fits and starts not only seem at best a game of catch-up, but that the gap between the type of medicine the curriculum is teaching and the type of medicine health care needs is continually widening. This leads to increased pressure and calls for radical change. A radical change is a dramatic difference in the strategies, structures, power relationships, and forms for leadership and governance of an organization (Greenwood & Hinings, 1996; D. Miller, 1982). The Newtonian assumption held by many is that the more radical the change needed, the more radical the change to be designed and implemented. There is a tendency to believe in a linear causality between the amount of effort put in and the degree of change achieved (Dörner, 1996). But is that really the case?

2.3.1   Innovation in Medical Education

The change without reform is certainly not due to a lack of new ideas or effort. Research in medical education is producing new ideas all the time. Instead, "the bottle neck to change in medical education is not lack of innovative ideas, but rather a lack of understanding of the innovative process and the factors which facilitate the process" (Lazarus & Harden, 1985).

In 1986, the Linköping Health University medical school stood at the brink of closure. Yet it managed to transform itself into school renowned for its innovative thinking and modern curriculum (Parsell & Bligh, 1995). Study I is an analysis of the process Linköping went through. The "Blue Ocean Strategy" strategic management framework (W. Chan Kim &

Mauborgne, 2005) was used to structure the conceptual analysis of the case which had reconstructed from peer-reviewed articles and validated by key informants. The blue ocean metaphor is of a pristine body of water untainted by blood spilled in competition. It is the result of an innovation defined as a new idea of value to customers. One of the most powerful tools of the framework is the strategy canvas (See Figure 9). It is created by listing qualities which are attractive to customers and which can be used to differentiate one offering from another. By mapping the traditional offering, a new offering can be designed and/or its innovative potential understood by looking at the variables and reflecting over what could and/or should be raised, reduced, created, or eliminated. Using the SPICES model as the basis for comparison, the "Traditional Medical Curriculum" was mapped based on the results of a workshop conducted by two experienced curriculum developers, Patsy Stark and Nigel Bax (Newble, et al., 2005) with students and faculty from the Karolinska Institutet. This was compared with data from the Linköping Health University.

FIGURE 9. BLUE OCEAN STRATEGY ANALYSIS OF INNOVATION IN MEDICAL EDUCATION
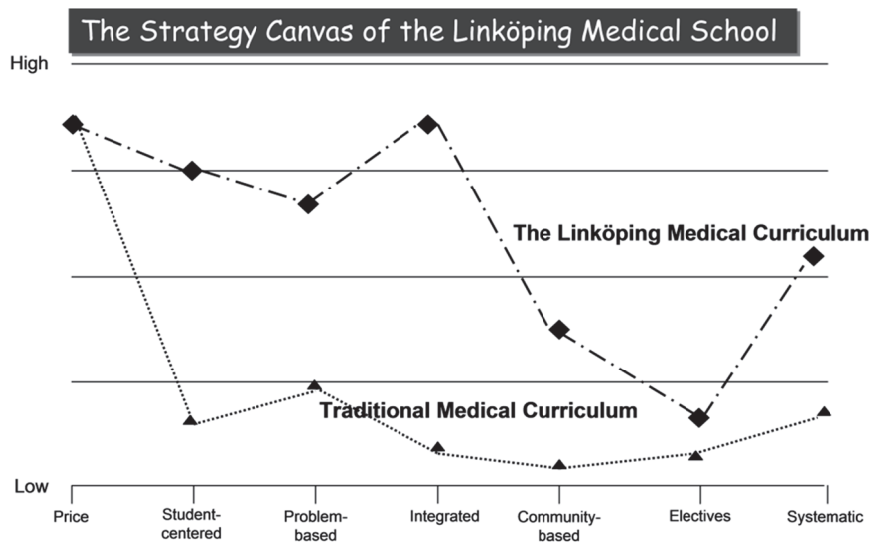
In analyzing the difference between the two curves on the strategy canvas we can see that within a university setting, dramatically different profiles can be achieved. Linköping Health University used the threat of closure as an opportunity to innovate their curriculum. They collaborated outside the boundaries of the medical school, created a unique strategic profile, and used it to develop interprofessional training and create exceptional utility for their graduates (Study I). The value of these changes has been shown in the national reviews of the different medical schools as well as surveys of medical graduates (Bengtsson & Johansson, 2001; Borgström, 2007; Högskoleverket, 1997).

As we looked at the process of how Linköping achieved these remarkable results, we found that:

- The threat of closing the medical school was one of the most influential factors behind the success of the transformation.
- There was an initial *disruptive innovation* of moving from a traditional educational approach to PBL.

- Linköping did not stop changing as in Figure 8; instead they continually innovated and updated their educational practices in concert with the environment, such as developing electronic PBL-cases.

Looking at these subsequent innovations, I realized that they can be classified as *sustainable* innovations which built upon the initial *disruptive* innovation. A disruptive innovation is one which improves things in a way that the market does not expect; a sustaining innovation builds and is dependent upon previous ways of doing things (Christensen, 2005). So how is this relevant to the improvement of medical education?

As humans, we have a tendency to view change as a linear process, where something will change and improve over time (Dörner, 1996). However, research into evolution, organizations, and the spread of innovations have found that another pattern emerges. As Malcolm Gladwell explains it, an innovation or trend, such as the use of a new type of grain or shoe or way of drinking coffee, will spread slowly among a few individuals. Then there comes a point, a "tipping point", when a critical mass has been reached and a sudden growth in popularity occurs (Gladwell, 2002). As the population becomes saturated or new interest wanes, the growth will level off. On a graph, the pattern describes an s-curve. In science, we can liken these disruptive innovations to paradigm shifts.

Everett Rogers studied a population in which these innovative tipping points occurred and characterized both the process as well as the people (Rogers, 2003). People he divided up into five ideal types: innovators, early adopters, early majority, late majority, and laggards. Each group is characterized by a specific type of behavior. The innovators are "venturesome", reaching out, traveling around, and vacuuming up new ideas. The early adopters have a large social network and engender respect; they are opinion leaders and role models. Their adoption of an innovation is seen as a stamp of approval. The early majority, who represent about a third of the population under study, take a longer period of time to adopt an innovation, but follow with "deliberate willingness" (Rogers, 2003, p. 284). The late majority, also a third of the population, are much more skeptical and cautious, prone to peer-pressure and doubts originating in a scarcity of resources. The last group consisting of "laggards" is rooted in the past and to their local area, tending to socialize with like-minded individuals. Their skepticism is entirely logical, also tied to an awareness of resource scarcity as was the case for the late majority. What is important to point out is that each group has a valid reason for why they react in their particular manner.

Roger's findings suggest that for a change to be successful, it is necessary for early adopters to sign on. With their large social networks and widespread respect as role models and opinion leaders, they can lend credibility to change efforts. These are the "change champions" so often referred to in the literature. Get enough of these on board, and you are all set. Well, not really.

The ability to label people who are "resistant to change" as laggards, while personally satisfying for many frustrated change agents, belies many of the complexities behind innovations which are only now beginning to be understood. One of the most important is the bias in innovation research which Rogers himself points out in the later versions of his

book. The categories are termed in respect to a group or an individual's affinity to adopt an innovation. The underlying assumption is that the innovation is inherently a good thing.

Take the example of the introduction of genetically modified "miracle rice" to Bali (as presented in Rogers, 2003, pp. 50-52). Bali is a small island with a rice production that has been able to support a population density far exceeding that which would be expected based on land mass alone. The Indonesian government and agricultural change agents working to improve agricultural yield in Indonesia, introduced new rice varieties, pesticides, and fertilizers, and campaigned for farmers to plant three instead of the traditional two crops per year. At the time of the campaign, water irrigation systems and coordination of planting and fallow rotations for the different plots were under the control of Hindu priests. The change agents considered this old system of to be "religious nonsense". The campaign successfully convinced the farmers to change. The result was a dramatic increase in vermin and disease as well drops in eel and fish populations, not to mention the dramatic drop in rice yields as well.

So what happened? The recommendations of the agricultural change agents had increased rice yields three-fold in other areas. There was evidence that it worked. But the generalization of that evidence to other areas did not take into account the particulars of the new context. The traditions, the current systems, and their proponents were all disparaged and thought of as backward. However, subsequent computer simulations found that the "traditional" approach was close to the optimum. The original system had developed through adaptation to its environment over a long period of time. Not understanding (and respecting) this process of change over time and how it has evolved through interactions with the environment lead to negative outcomes. Similar patterns have been described in medical education when transferring innovative ideas from one school to another, stressing the importance of adapting, not adopting innovation (Bandaranayake, 1989).

But it is important to remember that catastrophes are also a part of evolution. Innovations don't necessarily stack one upon the other. Evolution moves in fits and starts, with s-curves replacing others in a jumpy process called punctuated evolution (Eldredge & Gould, 1972). In companies, patterns of creative destruction repeat as s-curves when one company goes into a period of decline, another innovates and takes over market share (Christensen, 2005; Foster & Kaplan, 2001).

The Bali rice story is an example of a change process that succeeded in that change agents were able to convince enough people to adopt new growing practices. For many other change agents, though, the process fails on the threshold of adoption. The Rogerian approach would be to look at how the different categories of people interacted with each other. In medicine we talk about conservatism or old-fashioned thinking. Clayton Christensen, in his book, *The Innovators Dilemma*, looked at innovation in the context of companies (Christensen, 2005). He noticed that companies which were able to capitalize on disruptive technologies often created new and independent organizations whose size matched the size of the opportunity. He suggests that what make organizations capable of implementing innovations are not just the capabilities of the individuals in the organization,

but the capabilities of the organization itself in regards to three factors: resources, processes and values.

Resources are the people, things, and assets that an organization has. Processes are the "patterns of interaction, coordination, communication, and decision-making" which allow an organization to create value when its employees/members transform inputs into services, products, or offerings (Christensen, 2005, p. 187). Processes present an interesting dilemma. One way to achieve quality is to ensure that the recurring steps of the process are consistently performed the same way. This suggests that "the very mechanisms through which organizations create value are intrinsically inimical to change" (Christensen, 2005, p. 188). Values are defined by Christensen as the "standards by which employees make prioritization decisions" (Christensen, 2005, p. 188). Values allow individuals to make independent decisions that are aligned with an organization's strategy. The larger and more complex an organization, the better aligned the values need to be with the strategy if individuals are to be able to make independent decisions.

What is interesting is what happens when we add the dimension of time which I have tried to summarize with the following relationship:

$$R \rightarrow P \dashrightarrow V \rightarrow C$$

$$\uparrow\Delta° \qquad\qquad\qquad \downarrow\Delta°$$

When faced with a situation, a new organization will have to come up with a response based on its resources (R). In the beginning, these responses will vary and be dependent on the competencies and capabilities of individuals. There is generally a very high degree of flexibility and ability to adapt and change. Over time, as similar situations repeatedly arise, routines will develop through a learning process based on successful responses and become established processes (P). As these processes are repeated, an organization will learn what to prioritize, i.e. the values (V) of the organization will form. Over time, many of the processes that exist in the organization, ones that were initially performed consciously and with deliberation, become routine and enter the tacit dimension. The processes and values become the way things are done and we start to assume that this is the way they should be done. This becomes the organization's culture (C). Culture allows an organization to grow in size while still maintaining consistency and alignment with overall strategy. It is more difficult to introduce innovations at this point because routines are established in the mental models, norms, and assumptions of the members. Since we are usually unaware of these tacit understandings, surfacing them requires some work. So, due to the flexibility of responses when an organization is working on its routines, innovative ideas introduced at this stage are more likely to succeed in becoming part of the routines and protocol of the organization. Conversely, innovations that are introduced when a behaviors and processes have become part of the organization's culture are much more difficult to implement.

This could explain why so many highly publicized interventions directed at changing culture and the values and ethics of organizations have failed. It could also explain why small, innocuous changes, such as requiring people to say hi to each other the first time they

27

meet in the morning (=change in routine), seem to have profound effects on working climate (=culture) (TT, 2011). Realizing this connection between what we do every day and the culture that emerges in an organization over time made me pause when I came over a description of curriculum reform at the Indiana University of Medicine (Cottingham et al., 2008; Suchman et al., 2004). After a four year process to "fully implement" their changes to the formal curriculum, they then went back to change the social environment, what they referred to as the informal curriculum. The idea was that the culture of behavior should mirror and reinforce what was taught in the formal curriculum. That sounds great. But I do wonder – if culture is a result of changes in routines, how successful, really, has a curriculum reform been when it does not impact the values and culture of an organization?

The method that Indiana University of Medicine was applying to change culture was based on Appreciative Inquiry. But Appreciative Inquiry was not designed to change culture; it originated as a process approach to organizational change (Cooperrider, Whitney, & Stavros, 2003). Could it be that a reason for our failure to effectuate change lies in the process approaches we have chosen to apply?

2.4   CONVENTIONAL MODELS OF CHANGE IN USE

That appears to be a tough question for many to answer. Perhaps because we appear to be largely unaware of the models of change we use in medical education. Morcke and Eika conducted an explorative qualitative case study of medical teachers at three medical schools to more completely understand the curriculum design models of medical faculty (tacit and espoused) (Morcke & Eika, 2009). They conducted four individual in-depth interviews and four focus groups involving a total of 20 faculty. Only one of the respondents was able to explicitly describe the model of designing curricula that they were using. However, by analyzing the responses, the authors were able to look at the double-loop and identify five different models-in-use. They labeled them as "method-driven", "pragmatically driven", "content-driven", "outcome-driven", and "vision-driven". However, applying our Pettigrew and Whipp framework definitions (See

Figure 1), all of these methods express a heavy content focus.

The models in use by these teachers are also largely mechanistic in nature. By this I mean that they are built upon assumptions of linearity and direct causality and that these are relationships that can be controlled and manipulated. It appears then, that without realizing it, we have adopted our models of change from industrial era management thinkers, such as Kurt Lewin (Lindberg, 1998). In 1951, after studying the process of change in several different companies, Lewin described change as consisting of three distinct stages: *unfreezing, moving* and then *(re)freezing* (See Figure 10). The first stage (the melting ice cubes) is entered into through self-reflection. As an organization becomes aware of its shortcomings, anxiety and uncertainty spread and the barriers to change as well as the current structures are slowly unfrozen. During the thaw, motivation for change is established. In this chaotic state, the organization searches for new models and new examples to emulate, trying to create a new identity (borrowing a picture from the art gallery for inspiration). As structures are moved around and new models incorporated,

things settle down and a new identity and structure emerge and are then frozen into place (the colorful black-and-white popsicles).
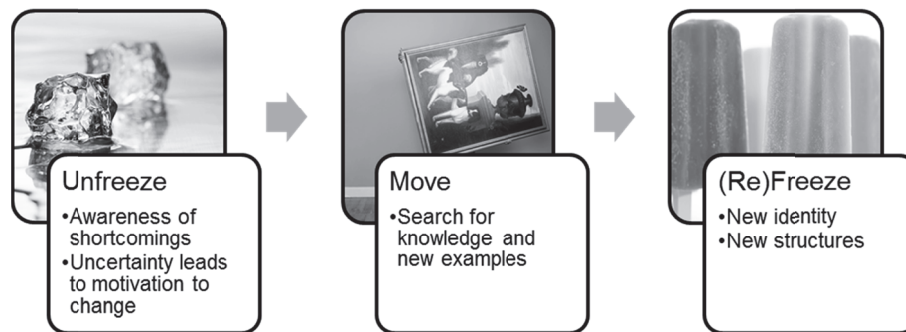
In medical education this can take the form of first creating awareness for change that "unfreezes" the curriculum (planning and initiation); then a process where new ideas from other universities are copied and implemented and other parts of the curriculum are restructured or changed (implementation). Finally, the entire structure is "frozen" into place (institutionalization) (Bland et al., 2000; Mårtenson, 1989). A similar approach developed by Levine (1. Recognize the need for change; 2. Develop a concrete plan; 3. Initiate and implement the plan; 4. Institutionalize or terminate the plan) has also been used in medical education (Mennin & Kaufman, 1989). A more detailed version of these two conventional change process, and one which has recently made inroads in medical education (Mylona, Anderson, Gruppen, & Haramati, 2009), is Kotter's eight step approach (Kotter, 1996):

1. Establish a sense of urgency.
2. Create the guiding coalition.
3. Develop a vision and strategy.
4. Communicate the change vision.
5. Empower broad-based action.
6. Generate short-term wins.
7. Consolidate gains and produce more change.
8. Anchor new approaches in the culture.

Gale and Grant (1997) have presented a ten-step model for change management in medical education. Notice the similarities:

1. Establish the need or benefit for the change. This must be shared by all upon whom the change will have an impact.
2. Look at the sources of power to act or to move the change forward and the forces which might hinder it.
3. Design the innovation taking into account its feasibility, the resources needed, an appropriate timescale and those involved in the change.
4. Consult widely with all those affected by the change.
5. Publicize the change widely, taking feedback with a view to amending the proposal.

29

6. Agree detailed plans to implement the change with those concerned.
7. Implement the proposals using an appropriate implementation strategy.
8. Provide support in dealing with difficulties and maintaining the change.
9. Modify the plans, redesigning the system in the light of experience.
10. Evaluate the outcomes.

Common to these change approaches (and those used in changing medical education) is a heavy reliance on a strategic planning stage led by a small committee of "thinkers" which is then "communicated out." Then follows an organization-wide implementation stage by the larger group of "doers" (as illustrated in Bland, et al., 2000; Harden, 1986; Kern, et al., 1998; Kjellgren, 1993; Lindberg, 1998; Maccarrick, 2009; Newble, et al., 2005; O'Neill, et al., 1999).

I find this approach troublesome for many reasons, among them that it involves a questionable level of hubris on the part of the small planning group. In focusing on developing the ideal process or the most correct answer, the tendency is to believe so strongly in the right answer that the easiest explanation for difficulty in implementing it lies with the other people. We can find this level four leadership mentality time and again in organizations as leadership look at themselves in the mirror and see "Rambo" and then aghast look out the window and see their employees as barriers to progress (A level five leader would look outside the window and see all the possibilities and blame failure on his/her own personal shortcomings) (Choi, Holmberg, Löwstedt, & Brommels, 2011; J. C. Collins, 2001). Once again, knowledge (the answer presented in the plan) is an object to be translated and transmitted to the lower members of the organization. The tendency is therefore to put effort into more clear communication plans as if the challenge lay in beating the truth into the heads of the cognitively challenged. Remember the objectivist myth (Figure 4)?

2.4.1 Strategic Planning vs. Emergent Strategy

However, my biggest objection to this process is that it simply does not work (anymore). The gains are not worth the cost. Despite committee members' deep commitment to change and their inspiration from new pedagogical insights, very few schools can show evidence of radical, lasting, and effective change (Bligh, 2002). Moreover, it is not uncommon to find a lack of congruence between the identified problems (and goals if these have been defined) and the changes proposed. I think Kotter himself sums it up best. When asked how you move professors to change, he replied, "Moving senior professors to do anything… you might as well do something like try to find Jimmy Hoffa's body" (Harvard Business Publishing, 2008).

One reason for this failure is that the basic assumption that strategic planning works has been shown to have little effect and be discouragingly difficult to implement (Mintzberg, 1994, 2000). Insights from strategic planning have pointed to the fallacy of dividing up the planning and implementation stages. It is when the plan is initiated and implemented that most of the barriers to change in medical education appear (Mennin & Kaufman, 1989). It may be better to view strategy as something which emerges in an organization, something which is crafted over time (Mintzberg, 1987).

This division is a natural effect of standard project management models which involve a lengthy planning stage where risk calculations are made, project triangles are drawn forcing you to weigh quality, time, and resources against each other, and Gantt-diagrams plan out in detail how the project will unfold over time. I taught courses in project management. I know it well. I also almost believed it worked. But then I started to follow the fate of projects that were run by the various curriculum committees at KI and noticed that most of them ran out in the sand. Part of the problem had to do with overly optimistic time estimations. Anyone who has renovated a bathroom or built a house can tell you about that. Of course, good examples are always worth learning from. When our department was changing buildings, I noticed that the movers at our institution were right on the money on their estimation of how long it would take. Intrigued, I found the project leader and asked her how she did it. "Easy", she replied. "You write down how long you think it will take. Then you look at your crew. If they are experienced, you multiply by two. If they aren't, you multiply by three."

But this example is about moving boxes and furniture a distance of 150 meters and five floors. With an elevator. It is a complicated problem, not a complex one. How much do you multiply by when you are dealing with 3000 teachers stretched out over at least eight different sites? Classic project management works when you are dealing with simple and even complicated problems. When success can be measured with obvious clarity (number of boxes moved, number of planes delivered, rocket to the moon and back) and when the target itself does not move or change. In the next chapter, we will look more closely at the context and see that this level of detailed planning does not work when we are dealing with complex problems where success is not easily defined as a number and time changes the nature of the challenges.

The tendency to separate planning and implementing and an "obsession with control" are now seen as major barriers to commitment and large-scale change. Instead, it may be better to view strategy formation as an emergent property which can develop anywhere in an organization (Christensen, 2005; Mintzberg, 2000) and the development process more successful if it engages everyone (Senge, 1990). Otherwise, what planners believe to be wide spread commitment to a shared vision may merely be a temporary state of (malicious) compliance (Hamel, 2007; Senge, 1990). Nor are logical arguments enough to convince people to change their behavior (Gardner, 2004). More lasting results are achieved by those who are actively engaged in the entire change process as well as have the power to effectuate the change (Mogestad, 2000; M. Wheatley, 2001).

Let me explain what I mean with an example from Ericsson, the global telecom company. In the 1990's, Ericsson decided that they needed to review and revise the values of the company. It was a popular global trend at the time. A consulting company was called in to develop the plan with employees in Sweden. An acronym, "DO IT!" was developed so that everyone would remember the values. The plan was then communicated out across the world following the standard plan-communicate-implement approach. The roll-out went well everywhere except Britain which strongly resisted adopting the acronym, among other things for the sexual innuendo. To handle the crisis, Ericsson enlisted new consultants to

talk with employees and work through their opposition and find a better solution. What evolved over time was a new phrase, "Do it better!"

In a rare example of follow-up, Ericsson returned two years later. What they found surprised them. Sweden had changed the culture somewhat. There was no change in the culture of any of the places in the rest of the world – except for in Britain. Ericsson's analysis was that the failure to implement the new cultural program was due to a poor communication plan. I disagree.

The only two places where a culture change was observed were in Sweden and Britain. Both of these countries had been involved in developing and choosing the values that were to be emphasized in the new corporate culture. The difference that I could identify in the case description between the British employees of Ericsson and the Swedes was that the British employees were emotionally charged. Their vocal "resistance" had led Ericsson's leadership to call in new consultants and let the implementers (the doers) plan and implement. The end result may have been different values. But they bore similarities and, most importantly, they actually led to a change. A similar pattern was suggested regarding change efforts in K-12 education, where more often than not it was the planning committees themselves who changed (M. Wheatley, 2001). In medical education, teachers involved in the curriculum design process were more satisfied with the curriculum than those who had stood outside the process (Bolander, et al., 2006).

2.4.2 Resistance to Change?
This brings us to a common explanation of failure to change: the phenomenon of "resistance to change" (S. W. Bloom, 1988, 1989; Mårtenson, 1989). Looking at the Kotter inspired model for change in use in medical education, I cannot help but wonder if part of the problem lies in a belief that a planning committee can dictate to others how they should change? And in the belief that failure to change is the result of poor communication plans and an inordinately high number of laggards?

As I came across the phrase "resistance to change" in the literature and in conversations with frustrated or cynical change agents, I noticed that it often seemed directed outwards, that it was other people who were resistant to change. As one passionate change expert explained to me after I wondered why he continued after sharing a particularly bleak description of his school's latest failure, "Where there's death, there's hope." Max Planck would agree – "A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it." While these are extreme examples, they illustrate the level four tendencies to externalize reasons for failure and find fault in others (Collins, 2001).

In all fairness, dictating how others should behave does have a place in organizations. In certain contexts this command and control approach to leadership makes perfect sense. The military has learned that when someone is shooting at you, the best you can do is run at them and close the gap. This works because a moving target is harder to hit and someone running at you yelling and waving a weapon tends to unnerve people with a subsequent

effect on aim. The faster you close the gap, the quicker you can start to hit them. Another lesson the military has learned is that when you come across a minefield, you should stand still. So far, so good. But what happens when the enemy starts shooting at you when you are standing still in that minefield? The answer, as defined by maximum number of survivors, is to run towards the enemy who is shooting at you. For the individual who might be sacrificed for the good of the others, this does not make intuitive sense. With command and control leadership you can force people to go against their individual survival instincts to improve the survival chances for the larger group.

While many companies and organizations might feel that they are in a minefield and others that mergers or political decisions are the bullets of their undoing, the command and control approach often involves the dehumanizing of employees to the level of automatons. Henry Ford illustrated this well, when he, a champion of Taylor's mechanical scientific management, purportedly lamented, "Why is it that every time I ask for a pair of hands, they come with a brain attached?"

Hamel has suggested that the future of management lies in making organizations more humane (Hamel, 2007). In studying how and why individuals change their minds, Howard Gardner has found that it requires much more than just logical argument (reason) (Gardner, 2004). And Christensen found that over time and with increasing size, organizations internalize routines and develop cultures at which point implementing innovation is more difficult.

So why persist in looking for the ultimate answer, communicating it out, and then becoming surprised when logical argument does not carry the day? Even the military is shying away from the objectivist myth and is working to integrate the development of shared mental models as a tool for their leaders to deal with the constant changes occurring on the ground (Entin & Serfaty, 1999).

The brothers Chip and Dan Heath, one a professor at Stanford, the other a professor at Duke, use the metaphor of the elephant and the rider to illustrate the many aspects that need to be addressed (Heath & Heath, 2010). The rider represents logic, our brains. The elephant represents our emotions. Logic can influence our emotions, just like the rider can steer the elephant. But if our emotions take over, no matter how much the rider tries or how much we appeal to the rider, the elephant can still run wild. The Heaths also point out that it is a lot easier to steer an elephant down a path, rather than through a forest full of underbrush. In other words, context plays a pivotal role.

This raises the possibility that "educational inertia" and "resistance to change" may be in the eye of the beholder rather than an inherent trait found in people and organizations. That resistance arises when we treat creative humans as objects that need to be told what, when, and how to do things. After all, "…change is itself the very basis of our continuity as persons" (Carse, 1986, p. 45).

2.5 THE CHALLENGES PRESENTED BY PROCESS

"Change is a complex process, particularly where large numbers of people and processes are involved, and it is easy to underestimate the difficulties" (Gale & Grant, 1997). The

university environment has been classified by Mintzberg as consisting of "professional bureaucracies with a decentralized and fragmented structure and wide diffusion of decision-making power" where Weick argues that "any beneficial mutation cannot easily be diffused" (Sanyal, UNESCO, & International Institute for Educational Planning, 1995). The university environment is not a place where strong authority figures can easily support or lead a reform. If the formal and informal power structures mirror one another, than authority has a say. But this becomes much harder when large numbers of people and processes are involved. Not only is the process complex, but so is the environment. The decentralized and fragmented structure of the educational institution can be considered a complex system, and as such, other rules apply.

While many point to the change process as complex, few have applied the lessons and understandings of complexity to the change process in medical education. In a complex environment we are affected by many different sources, many of which may at first glance appear to be independent of each other. Lewin's model does not appreciate these complexities and therefore change after this model seldom ends up where the architects intended. The lessons learned from failure are not disseminated and the failure itself is often attributed to the person who led the attempt (scapegoating?).

The mistake that most people make in trying to advance change is not realizing that attempting to *control* a complex system is doomed to fail (M. J. Wheatley, 1999). Not only do people in a disseminated power structure have a hard time following authority, but an individual authority simply does not have the capacity to digest and transform all the information that they are exposed to from the system (Nørretranders, 1994). We need another model, another way of looking at the change process.

There is room for improvement in which models from change management we choose and how we apply them in medical education. What we do not yet have is a systematic approach for guiding the medical education reforms process.

2.6 CHAPTER SUMMARY

Process- *How?*

- Process includes
    - Change managers
    - Pattern through time
    - Model of change
    - Formulation/implementation
- Double-loop learning involves making explicit the tacit mental models, assumptions, and norms which govern our behaviors.
- The change manager is traditionally seen as leading and managing a change effort. However, there is no requirement that they hold an official position, meaning that the change manager in a medical university can be the dean, the program committee chair, the department chair, the course director, the teacher, the student representative or the educational developer.
- Over time, there is potentially a widening gap between what is taught and its relevance to society's needs. The continual repetition of the same basic calls for reform suggests that adaptation is one of the greatest challenges for health professions curricula.
- Innovation in medical education is the ability to introduce a new idea of value. Implementation of an innovation is enhanced by threats. An initial disruptive innovation can seed sustaining innovations which further develop the original ideas/intentions.

- Change follows s-curves where inflection points, or "tipping points," occur that lead to exponential growth or adoption. Five responses to how people react to innovative ideas have been characterized. There is tendency in innovation research to view innovations as inherently positive.
- Change is easier when an organizations is still developing resources and without well-defined processes. As values and cultures develop, change becomes more difficult to achieve.
- Conventional models to change are mechanistic in nature, deficit-based in that they begin by identifying problems and gaps, and divide people into thinkers and doers.
- Strategy emerges in an organization.
- Resistance to change may be an effect of not paying attention to people's emotions and their hopes and fears.

35

3 CONTEXT – *WHERE*?

There is a growing appreciation for the impact context has on interventions in complex environments (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Mazzocato, Savage, Brommels, Aronsson, & Thor, 2010; Ovretveit, 2011; R. Pawson, Greenhalgh, Harvey, & Walshe, 2005; Ray Pawson & Tilley, 1997; Stacey, 2011; Walt, Pavignani, Gilson, & Buse, 1999). In an observational study, data about the context helps us to understand the influence it can have on implementation. In an uncontrolled trial, it can help in the assessment of the influence of context on outcomes (Ovretveit, 2011). As Paul Batalden writes,

> *This is not the kind of science practiced in darkened rooms or in pristine laboratories. It is a highly applied science; it deals with the complex, messy problems in the 'swamps' of the real world, rather than the well-formulated hypotheses of the academic world. The tools at its disposal are equally complex. Its development requires scientists to have a deep understanding of the environment within which their work is applied and an intimate relationship with both the practitioners and those who use the service (Batalden, Davidoff, Marshall, Bibby, & Pink, 2011).*

This understanding is gaining ground in medical education research. For example, understanding context plays a vital role in designing educational interventions (Douglas-Steele & Hundert, 1996; Gess-Newsome, et al., 2003; Ogrinc, Nierenberg, & Batalden, 2011), in introducing an intervention (Genn, 2001a, 2001b; McGaghie, 2011), scaling-up an intervention (McDonald, Keesler, Kauffman, & Schneider, 2006) as well as evaluating an intervention (J. B. Biggs, 1993; Freeth & Reeves, 2004). Context also influences approaches to teaching (Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006). Mennin and Kaufman (Mennin & Kaufman, 1989) write that innovative ideas alone cannot lead to change, "it is the relationship between innovative ideas and the political, economic, and social environment into which they are introduced that determines acceptance and growth of the innovation." However, describing context is a challenge. It requires more than knowing the number of students or beds or the size of grants to the research groups or whether or not people felt open to change.

Pettigrew and Whipp define context as consisting of both internal and external dimensions (See

Figure 1):

- Internal: Resources, Capabilities, Culture, Politics
- External: Economic/Business, Political, Social

By paying attention to these aspects, it is possible to identify factors which can have an impact on change efforts. It can help in choosing a relevant approach to change. Many companies and universities already attempt this through S.W.O.T. analyses (Strengths, Weaknesses, Opportunities, and Threats). Unfortunately, this approach is often more difficult than it seems due to the difficulty of determining which actions to take based on the analysis (Have, Have, & Stevens, 2003). In situations that are simple or even those that are complicated (Glouberman & Zimmerman, 2002), classic project management and

conventional change strategies work quite well. They have for decades. However, they do not work as well when we find ourselves in the complex swamps of the real world.

3.1   THE ARCHIPELAGO OF THE MEDICAL UNIVERSITY

In preparation for a workshop with the surgical course committee (surgery, orthopedic surgery, rehab, and anesthesia) at Karolinska Institutet, I was looking for a metaphor which would help explain the challenges facing a curriculum committee and the shortcomings of command and control approaches. The workshop was to be held on an island in the archipelago outside of Stockholm. As it turned out, the very setting for the workshop was a good description of the context for curricular change in health professions education.

As an example, about 3000 teachers are involved in teaching more than 1400 students over the course of the five-and-a-half year curriculum at Karolinska Institutet's medical school. That is a lot of people, a lot of wills, and a lot of brilliant minds. Remember the seven scenarios on in the beginning? All those people have legitimate interests, worries, and concerns and they all view the world from their vantage points. This leads to a divergence of ideas and opinions. Perhaps is not so strange that when faced with this diversity, curriculum reformers repeatedly call for increased centralized control (Christakis, 1995; Tosteson, et al., 1994). Unfortunately, even if such control were possible, it would still stretch the limits of our cognitive capacity – the way we have dealt with this in the past is by diminishing the worth of each of the individuals (Smith, 1904).

Remember the map of arrows between the courses that the former chair of the curriculum committee, Anders Hjerpe, created (Figure 6)? Recall that most of those connections did not exist. If we take away all the arrows and look at the picture again, we see individual nodes. Realizing that each individual course more or less stands on its own (Kreber, 2009), the image of an archipelago comes to mind. Each island is a course or department with its teachers and respective committees (See Figure 11).

FIGURE 11. THE MEDICAL SCHOOL ARCHIPELAGO

While the teachers may see links between their different courses, and even desire to connect, they themselves tend to stay on their own islands. In fact, there is a running joke at KI that the best place to meet a colleague at another department is abroad, at a conference.

Instead, it is the students who travel between the islands as they build on and develop their competencies. This causes a difference in perception, teachers are largely unaware of what is going on in other courses and teach from their local perspectives, while students tend to view the education as something that is connected and progressively allows them to develop their competencies.

As explained in Study II, the picture is further complicated due to individual variations and scheduling issues and the order of progression between islands may vary for individual students. The result is that graduates can leave the same medical school with different experiences, knowledge, skills, and attitudes (Armstrong, et al., 2004). Another possible source of variation is the fact that each island is primarily the domain of an individual department (Kaufman, 1998).

3.2   COMPLEXITY: A FRAMEWORK FOR UNDERSTANDING CHANGE

Recall the Palmer figure of the learning community (Figure 4). Each knower enters the learning community with their own experiences, knowledge, skills, and attitudes. But it is the interaction around the subject that creates a context for learning opportunities and what generates value. This interaction can be described as nodes (the knowers) and the connections between them. In our traditional approach to learning, it was the individual nodes which were viewed as generating value in the system (the teacher). In a systems thinking approach, it is the interactions between the nodes that generate value.

We can see the same thing if we look at our archipelago metaphor for the context of medical education. Each island or repository of knowledge is the equivalent of the knower in the learning system. When the graduate goes out to meet the patient, these repositories of information are useless to the patient. It is when the doctor integrates knowledge from several islands that the patient can effectively be treated. We can widen the metaphor to multiprofessional care. In this situation, each island is one of many health care professionals. And once again, many organizations are realizing that patients will benefit more when the care is interprofessional – when the many health care professions interact with each other around and with the patient.

We can summarize this by realizing that the poet John Donne really was on to something – no man, no learner, no course, no subject, is an island entire unto itself. What emerges in this metaphor is the property of self-similarity, when patterns repeat at different layers, from the micro system to meso and macro levels. This fractal behavior is one of the properties which has led several to realize that medical education displays mechanisms and other properties which are characteristic of complex adaptive systems (Armstrong, et al., 2004; Mennin, 2007; Stewart Mennin, 2010; S. Mennin, 2010).

In translating complexity thinking to education and training in health care, Fraser and Greenhalgh suggest that the following concepts are applicable (Fraser & Greenhalgh, 2001):

- Neither the system nor its external environment are, or ever will be, constant
- Individuals within a system are independent and creative decision makers
- Uncertainty and paradox are inherent within the system

- Problems that cannot be solved can nevertheless be "moved forward"
- Effective solutions can emerge from minimum specification
- Small changes can have big effects
- Behavior exhibits patterns (that can be termed "attractors")
- Change is more easily adopted when it taps into attractor patterns

The realization that medical education and universities are examples of complexity is certainly profound. Just as in so many other domains, by viewing change and improvement from the vantage of complexity, it can help us interpret and understand the successes and failures of reform in medical education (S. W. Bloom, 1989). Complexity is, to employ a somewhat overused word in management speak, a paradigm shift precisely because it provides another perspective from which to look at and interpret phenomena, to explain, "how things already are" (Stacey, 2011). So, while it can help us identify patterns, this is the caveat: complexity cannot itself be used to predict. One major reason for this is that it is impossible to account for all sources of input.

In the 1950's, Edward Lorenz was trying to develop a way to predict weather patterns. Just as with the nodes and interactions in our archipelago metaphor, he could see patterns. Meteorology has been good at identifying these patterns, giving them different names, cumulus, hurricane, tornado, etc. But the challenge he set about overcoming was to be able to predict when and where these will occur. Eventually he realized that that due to the interconnectivities, an intervention at a micro level could have widespread implications and effects throughout the entire system. He popularized this phenomenon of the "Butterfly Effect," in a talk where he suggested that a butterfly flapping its wings in Brazil could theoretically create a tornado in Texas (Waldrop, 1992).

Many other disciplines also started to discover that their current paradigms and their related models were unable to explain their research data. This occurred in fields[1] as diverse as biology, physics, economics, management, chemistry, mathematics, sociology, cybernetics, and psychology.

As I presented in Study II, two aspects of complexity are central to grasping how complexity thinking can be applied to the medical education, *self-organization* and *emergence*. Complexity arises when a number of individual agents interact and adapt to each other. As these agents become more specialized and sub-specialized over time, they also become more dependent upon each other. Their interactions and responses start to self-organize in response to each other, giving rise to observable patterns called "strange attractors". This process is referred to as emergence and often occurs in a context, called an attractor basin.

One of the most popular examples used to illustrate this is a computer simulation developed by Craig Reynolds called "Boids" (think of a New Yorker trying to say "birds"). The simulation is governed by three rules (Reynolds, 1987):

1. Collision Avoidance: avoid collisions with nearby flock mates
2. Velocity Matching: attempt to match velocity with nearby flock mates

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[1] For those interested in learning more about the history of how this paradigm evolved, I recommend the book, *Complexity*, by Mitchel Waldrop (Waldrop, 1992).

3. Flock Centering: attempt to stay close to nearby flock mates

These three simple rules resulted in behavior which resembles flocks of birds (search YouTube for "starlings") and exemplified one of the properties of complexity – simple rules can yield complex behavioral patterns.

This has led researchers to realize that despite their apparent complexity, complex adaptive systems (CAS) follow certain basic principles and characteristics: "…It would appear that CAS have lever points, wherein small amounts of input produce large, directed changes" (Holland, 1995). This is because certain impulses or behaviors are recycled and amplified and their impact develops along non-linear trajectories.

Diversity, deviance, and interdependence in and among local interactions between agents all can influence the development of (novel) patterns. And what is truly fascinating is that these variations are not just the result of external factors, i.e. butterflies far away completely oblivious of how their insistence on flapping is ruining your research results. We can, for example, identify a very simple, completely understood and controlled for equation, which when repeated yields results which are unpredictable, producing patterns which fluctuate randomly. Even with the boids, we can observe that their behavior patterns are similar to birds, but we cannot predict where these patterns will occur.

This is a tough canary to swallow, especially in management, with its roots in Taylor's scientific management and literally hands-on guidance. Simple rules are often interpreted as the belief that if a manager can define and establish simple rules, the manager will be able to encourage complex behavior that is conducive and beneficial to the goals of organization. Unfortunately, despite our desire to reduce complexity and make it simpler, it is simply not that simple.

3.3 WHY WE FAIL IN DEALING WITH COMPLEXITY

In science we often reduce complexity in order to isolate variables which we then can change one at a time by controlling for the others. We organize things into systems by defining limits and barriers. Complex adaptive systems, for example, are defined by the interactions between agents which give rise to patterns called strange attractors. These occur due to outside factors or forces which create attractor basins. Now factor in the butterfly. Who in Texas will be tearing out of town in their pick-up to get away from the tornado and think to curse that butterfly in Brazil that caused it all? Complexity is complex because it is impossible to account for all the initial conditions that could influence outcome.

For example, in action and naturalistic research (the research approaches and methodology used in this thesis) subjects are studied within their environment and in real time. Participants will interact with each other, but behind these interactions exist variables which the researcher is not privy to. Anything from a warm cup of coffee and a hug at breakfast from a loved one to a frustrating traffic jam on the way to work to hearing about the latest developments on the news to past slights all can affect future interactions. And unless the researcher can find a way to expose these, they will not be aware of them even though they

may have been the variable which caused a crucial behavior pattern to emerge. This suggests that it may be naïve and premature to try to fit complexity thinking into the clearly demarked inputs, processes, outputs, outcomes, and nice feedback loops of systems thinking.

One way to try to expose the assumptions behind behavior is to interview people about how they interpret past events and why they did what they did. There are two major problems with this approach and which overlap. The first is the phenomenon of "sensemaking" (Weick, 1995). Weick suggests that how we interpret past events is affected by how we are experiencing the present. Indeed, as we recall, we actually change the memory. The other is what Schön and Argyris noticed when they looked at learning in organizations. They found that there were differences between the explanations people gave for their behaviors (espoused theories) and the theories that could be derived by the researchers from the observed behaviors and that would explain the actions (theories-in-use) (Argyris & Schön, 1978). We can find a similar situation when we look at the decision making patterns of doctors.

Researchers in decision making differentiate between system 1 and system 2 thinking (Taleb, 2007). To generalize: System 1 thinking is intuitive, heuristics based (rules of thumb), emotional, parallel processing; "flying by the seat of one's pants". System 2 thinking requires effort. It is slow, logical, serial, clinical, and self-cognizant – we can follow the steps in our thinking. Asked to explain the thinking behind their decisions, doctors will say one thing, but when algorithms are derived based on the decisions made; the factors which influenced the decision are often not the same as those that are explicitly expressed (Gigerenzer, 2007). The adoption of heuristics is not so much a conscious decision as it is a matter of practicality – if it works it seems practical to keep doing it (Slotnick, 1999). It has proved difficult to accept that we make decisions based on heuristics rather than by integrating all the information in order to make an optimal decision (Wegwarth, Gaissmaier, & Gigerenzer, 2009).

What Gigerenzer's research illustrates with the way doctor's think is that one of the cognitive challenges we face when it comes to decision making is that we think we are logical when we in fact are following "intuition". There are strategies to integrate heuristics into our decision making processes, but asking people in an organization to follow specified simple rules, once these have been identified, and which conflict with our espoused theories, does not seem to be a promising approach. Especially when we realize based on sense-making that reason can function as a way to impart some semblance of logic for intuitive decisions (Weick, 1995). John Kay calls this tendency to rationalize decisions that already have been made "Franklin's Gambit" after Benjamin Franklin who wrote in his autobiography, "so convenient a thing it is to be a reasonable creature, since it enables one to find or make a reason for everything one had a mind to do" (Kay, 2010, p. 90).

Let us pull all of this together and put system 1 and 2 thinking in the context of the migrating capabilities of organizations over time as expressed in the summary of Christensen's findings. Organizations in their early period which have to design and create routines and processes will most probably be employing more systems 2 thinking then

systems 1 thinking. Conversely, the thinking in organizations with established processes and values for what to prioritize and where these have entered into the organization's culture in the form of norms, assumptions, and mental models, could be characterized as system 2 thinking.

The German behavioral psychologist, Dietrich Dörner, emphasizes that the tendency to make processes more efficient to save time and effort is actually one of the four main reasons for our failure as humans to adequately deal with complexity (Dörner, 1996). We can economize by ignoring the interrelationships between variables and focus on only one of them, e.g. content of the new curriculum. This simplifies the amount of analysis that needs to be done during the planning and with only one variable to follow over time, it reduces the amount of information we need to gather and process. We can also set up rules, think in terms of linear causality, plan without thinking about unintended side effects or long term consequences, "methodism" (application of established ways of working to new problems without considering local conditions – e.g. Bali miracle rice), and "ballistic" decision making ("Damn the torpedoes, full speed ahead!").

The second reason is our need to preserve a positive view of our competencies. Methodism shows up here as well. When confronted by a problem, rather than analyze the context and face the possibility that what we know is not enough, we make the assumption that the problem is familiar. It makes us feel good. Confident in our capabilities we apply the same method that has worked before. If it does not work, we go ballistic. Or we only solve problems we know we can solve. We also avoid following up the outcomes of our decisions. This avoidance of feedback can be seen in improvement and development efforts. In a five year project to update the curricula of eight medical schools (Mennin & Krackov, 1998), general outcome measures and satisfaction scores were collected by most, but only a few linked the feedback to decisions about innovations. In the faculty development initiatives, follow-up was "the exception rather than the rule" (Mennin & Krackov, 1998).

Dörner's finding that the need to maintain a positive view of our competencies which so affects our inability to deal with complexity paradoxically signals what I think may be a valuable opportunity for learning. Study IV shows that through structured processes of reflection, such as using a "worked well/do differently" framework (Fisher, Sharp, & Richardson, 1998), students were able to deal with their frustration by engaging in double-loop learning and reflect about how the assumptions behind their decisions and ways of working. Frustration, anxiety, and feelings of chaos, far from being something for teachers and leaders to assuage and pacify, could instead be interpreted as a sign to climb to the balcony and reflect on and question our assumptions (Neufeldt, Karno, & Nelson, 1996).

The last two explanations that Dörner suggests explain our high rate of failure in dealing with complexity are the relative slow inflow capacity of our memory to store memories and absorb new material and that we do not think about problems that we don't have which means we focus only on the immediate pressing problems (Dörner, 1996).

3.4 THE CHALLENGES PRESENTED BY CONTEXT

This discussion about complexity suggests that resistance to change is partly a function of change agents ignoring the integrity and humaneness of those they are trying to change as they navigate the process of change (as discussed on page 32) as well as a function or our own shortcomings and inabilities as humans to deal with the complexity of the context of medical education. What we should be doing is to emphasize the role that learning and adaptation have in the context of complexity (Dörner, 1996; Holland, 1995; M. J. Wheatley, 1999; Zimmerman, Lindberg, & Plsek, 2001).

3.5 CHAPTER SUMMARY

Context – *Where?*

- Context consists of both internal (Resources, Capabilities, Culture, Politics) and external (Economic/Business, Political, Social) dimensions.
- Medical education exhibits behavior patterns indicative of complexity. Complexity arises when a number of individual actors interact and adapt to each other.
- In complexity it is possible to discern certain principles such as self-organization and emergence. However, complexity is not predictive; it is a framework for understanding and explaining.
- We as humans have difficulties in dealing with complexity due to:
  1. The need to economize – to save time and effort.
  2. The need to preserve a positive view of one's competence.
  3. The relatively slow speed of our ability to store memories and absorb new material.
  4. We don't think about problems we don't have.

PART TWO

4 BREAKING FREE OF THE DOOM LOOP

There is certainly no purpose in remaining in the dark except long enough to clear from the mind the illusion of having ever been in the light.   — *T.S. Eliot (From* The Cocktail Party*, 1969, p. 364)*

In Part 1, we looked at the content, process, and context of change in medical education. We have also looked at one medical university which was able to break out of the traditional boundaries and create an innovative profile as described in their strategy canvas (See Figure 9 and Study I). One of the strongest drivers of this innovation was the question of the continued existence of Linköping's medical program that either had to innovate or face closure.

While there is a need for medical schools to continually evolve and adapt to meet the challenges of the health care sector (Gibbs, 2006), I do not suggest that all medical schools need to create a blue ocean and develop disruptive innovations in order to be as effective in developing graduates with the necessary competencies as Linköping was able to do (Antepohl, Domeij, Forsberg, & Ludvigsson, 2003; Borgström, 2007; Högskoleverket, 1997). Nor do I suggest that reform should be driven by threats of closure. Based on the evidence, I have argued that the approaches suggested by conventional wisdom, and as embodied by Taylor, Lewin, and Kotter, are ineffective because, rooted in a Newtonian mechanical paradigm; they do not adequately address the challenges and opportunities present in the complexity of the context. These conventional approaches are also solution-focused. This creates a dichotomy between the central planning group who know about the solution and those at the periphery and on the floor who do not. It is another example of the objectivist myth.

4.1   THE DOOM LOOP OF CONVENTIONAL APPROACHES TO CHANGE

Recall the well-meaning teachers and course directors as described in roles 3, 4, and 5 in the beginning? As they develop their courses, there exists a tendency to add new material or create new teaching and learning activities without reducing or eliminating the old material. Deciding what should be taught is a challenge, but it can be even more difficult to decide what should not be taught (Watson, et al., 1998). The result is a "curriculum overload" which in 1997 was identified by the Swedish National Agency of Higher Education as a major problem in the curricula of all the Swedish medical schools with the exception of Linköping (Högskoleverket, 1997). The situation is by no means unique to Sweden (Boaden & Bligh, 1999; Editorial, 1991). Indicative of the island mentality, the desire to build out is shared by many and "turf wars" can erupt in a zero sum game environment where time and money are limited resources. Increasing frustration over having to compromise on ideals and original intentions can lead to a vicious cycle (See Figure 12). Looking at this from the perspective of the balcony, we can see characteristics similar to what Jim Collins refers to as a "Doom Loop" (J. C. Collins, 2001). Collins noticed patterns of "back and forth, lurch and thrash" oscillations between short-sighted renewal efforts which prevent organizations from achieving sustainable results. In medical curricular we can observe these patterns when change champions begin to complain about "resistance to change."

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FIGURE 12. THE "DOOM LOOP" OF TRADITIONAL CURRICULUM CHANGE
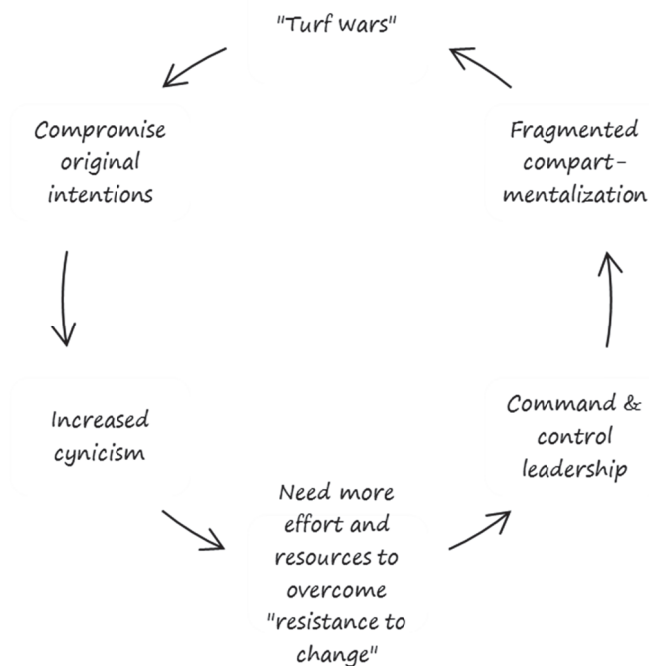
In such a situation, the tendency is to adopt top-down command and control leadership to meet the growing cynicism and compartmentalize to handle the complexity. And just like frustration over poor student performance can lead teachers to begin lecturing as a way to control the learning process (Schmidt, et al., 2009), this only exacerbates the problem. Ambiguity about which competencies should be developed is either not recognized or not dealt with. Unclear about the outcomes of the program, teachers and course directors tend to teach based on what they themselves deem important as specialists (teacher-centered) rather than developing the competencies that newly minted physicians need in order to be successful as interns (learner-centered).

As the doom loop turns and we progress further down the spiral we find ourselves in a process reminiscent of Sisyphus, doomed to eternally push a boulder up a mountain only to see it roll down and have to start all over again. New groups take over, thinking that the fault lay with the people in charge. They then use the same techniques, and then, to their chagrin, eventually find themselves just as lost as their predecessors. Frustrated, they cover their tracks with euphemisms and then return to their research and teaching, placing what they learned in the boxes, applying what they learned to their own courses. And then a new group takes over, determined to succeed now that they have new people…

4.2 INTEGRATING CONTENT, PROCESS, AND CONTEXT

How can we break free of this vicious cycle? I have found that the various elements of the content, process, and context that trap us in the doom loop can also free us from it. Let us return to our Pettigrew and Whipp diagram and use it to summarize Part 1. There are three essential ingredients to change. We have gone through each and the essential points are summarized in

Figure 13. I If we reflect upon the situation as described in Part 1, we can redraw the figure and include the summaries from the three chapters of Part 1 (See Figure 13).

FIGURE 13. THE INTERRELATIONSHIPS OF CONTENT, PROCESS, AND CONTEXT
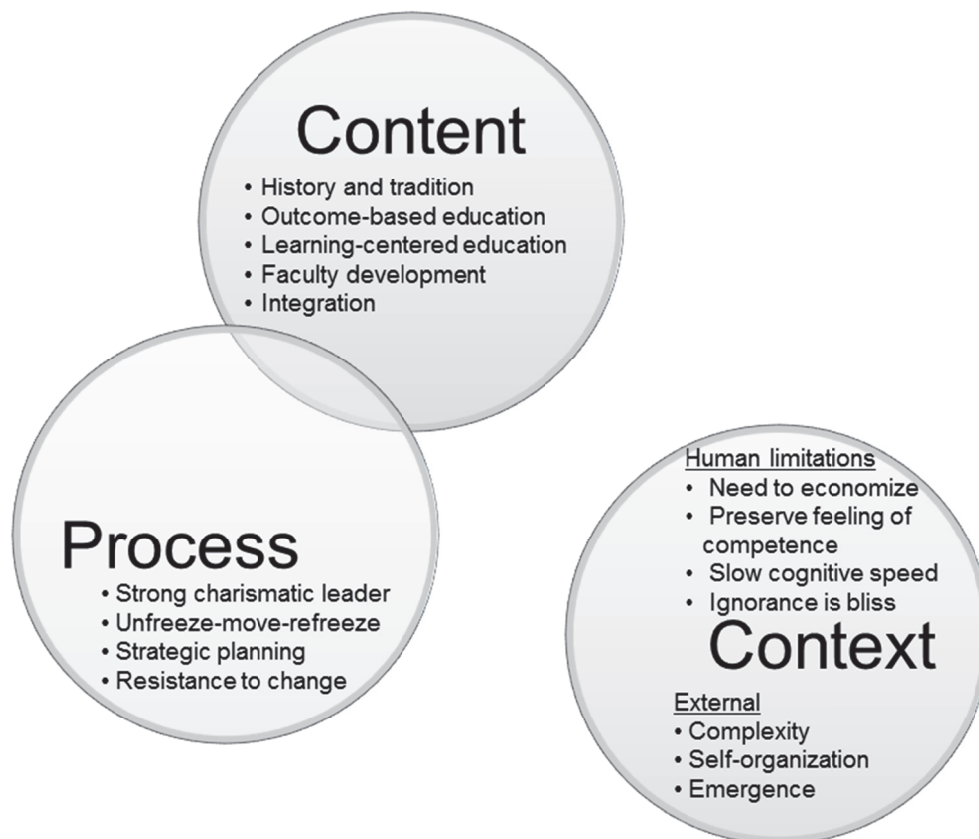
(Modified from Pettigrew and Whipp, 1993)

Viewing Pettigrew and Whipp's framework in this way, we can see that the traditional approaches to improving medical education utilized processes that are not compatible with the context, that by focusing on content, many are oblivious and unknowledgeable about the importance of process. Basically, it is a case of not integrating what one does, with where it is done and what one hopes to achieve. For change to be successful, it should occur at the intersection of content, process, and context (Pettigrew & Whipp, 1993). Another important component which Pettigrew and Whipp have categorized under process is that of the patterns that occur through time. In order to integrate content, process, and context we must be able to realize and identify that there are aspects in all of these that can be combined to help us move forward, evolve, change, and adapt – to learn. We must resist our (natural) desire to deconstruct and simplify.

In Studies II, III, and IV, I have tested an approach that focuses on using process as a way to build on the unique aspects and capabilities of different contexts by helping different actors or agents to engage each other in connection with their context and to let content evolve through their interactions.

4.3 ADAPTIVE REFLECTION: A NOVEL APPROACH TO CURRICULAR DEVELOPMENT

Let us return to the seven different roles on page ii. Think back to your response. Based on our understanding of complexity and the principle of self-replication, there is a theoretical possibility that the same response pattern can elicit change at different levels of the organization as seen from the seven different roles. The empirical findings of Studies II, III, and IV point to the interpretation that this in fact may be so. These studies are based on the application of a novel approach to curricular change, Adaptive Reflection. The following case example is based on how I have facilitated the process in the different studies. I will be using the term "course", but feel free to substitute the most applicable term for the role that you have chosen, such as university, program, department, or teaching and learning activity, etc.

So… what do you do now?

What if your response was this: Instead of pulling together a team with the right alliances, representation, political sway, etc., you walked down to the floor and gathered together those people who can effectuate any change that might need to be put in place to answer the vague problem of curricular improvement that is dogging you. Ask them, "Should anyone else be here?" (Study II). What I am suggesting is that planning and implementation should not be separated – the experts that are designing should be implementing and thus learning and adapting at the same time (Mintzberg, 2000).

Hand out a stack of Post-Its and pass around the same color felt-tip pen to all of the participants. Ask them, "Now, imagine that you are standing at the workplace of the graduates of your course. What are the competencies (knowledge, skills, and attitudes) that you need to be effective in your work?"

"Take a moment to write those things down, one word or phrase per sticky note. And so everyone can feel free to think, let's do this in silence." Encourage the group to write until they can't think of anything more. Wait a few moments, and then encourage them to write down those last things that suddenly popped up. Remind them to still remain silent. Then ask everyone to stick the Post-Its up on a white-board, and still in silence, start sorting the Post-Its, moving them around as much as needed until certain themes start emerging in columns of Post-Its. When there are 8-12 columns (Harden, 2002b) and no Post-Its are moving, breathe out. Now you can speak. Ask people to pair-up and come up with headings for each of the columns. Continue working until all the columns have headings. Be as specific as possible in choosing the headings.

You'll notice that as you listen in to the conversations that while there are many phrases that are similar, different people may interpret similar or even the same word or phrase differently. This will become more pronounced as the each pair motivates the heading for the rest of the group. The goal is not to compromise on the heading, but to find the best fit. When all the groups have finished, when everyone is in agreement about the headings, you will notice that your group has begun to develop a shared understanding of the subject.

Put this shared understanding to the test and ask everyone to start to mark the boundaries of the course by defining which of the columns should be included in the course and which should be

offered in other courses and can be sent to another group. Ask everyone to help summarize the purpose of the course by looking at the headings that are to be included. It's a tough task, and if you get stuck, ask the group, "How would you describe what students learn in your course for a student or for a teacher from another course?" and "How does our course contribute to the definition of the new graduate?"

When you have finished, the purpose for the course should be the answer to the following three questions:

1. *What are we passionate about?*
2. *What can we be best at?*
3. *What is so important that we need to examine the students to see if they have achieved it?*

The three questions are a litmus test to see if the purpose that the group has defined is in fact their big hairy audacious goal (BHAG) (J. C. Collins, 2001). Jim Collins, in his research on what makes certain companies move from good to great, found that those that had achieved sustainable greatness (for a period of 15 years), were able to clearly define their "hedgehog concept", i.e. what it was that they do which produces the best long-term results and keeps the organization focused and centered. For Collins, the third question revolved around the economic drivers or, for organizations in the social sector, resource drivers (time, money, and brand) (J. Collins, 2005; J. C. Collins, 2001). I have adapted the third question to reflect the "currency of education" – exam results.

The first step to doing that is to begin defining the competencies the graduate should have. You and your group need to describe what it is that this graduate should be able to do when they are standing there on the floor. You turn to the group, "Ok, so let's go back to the headings for the different columns and let's "verbalize" them. What is it that the student should be able to do after the completed course?" You set yourselves down and working in two's, three's, and four's you rework the headings into sentences with verbs that describe what the graduate should be able to do. To help everyone get started, you hand out a sheet of paper with a list of verbs in alphabetic order.

Looking around the room you notice that one group seems a little stuck. Walking over, you ask them what they're working on. "Tell me, what should the student be able to do after the course?" You also check to see that the sentences are S.M.A.R.T. – that they are **S**pecific, **M**easurable, **A**ddressed, **R**ealistic and **R**elevant, and **T**ime-bound – i.e. possible to develop within the framework of the course. As a group, you go through each other's sentences, making sure you agree, offering suggestions for improvement. You also check that the Post-Its® in each column are covered by the suggested outcome. If not, you add an additional outcome where needed.

Then you pull out a new list of verbs, this time organized according to Bloom's revised cognitive taxonomy as well as a paper describing the different levels in Bloom's affective taxonomy. All the groups are given 10 minutes to find the verbs they had chosen in the taxonomy and, if needed, to identify if there is a need to denote an affective level.

Now that everyone knows where you want to go and what you need to help the students achieve in order to get there, you suggest taking a look at what is already being done – "Who knows? We might already be on our way there with the current course and some of modules in that other course." The group makes a list of the different teaching and learning activities (including forms of examination). As you are doing that, you think of some new ones that might work and other ones that might be fun to try. You encourage the others to be innovative and even a little "wild and crazy"!

On the whiteboard you draw a matrix with all of the outcomes listed in the first column and then across the top row, all of the different teaching and learning activities and forms of assessment you have brainstormed. "Now, how well aligned are the activities with the outcomes?" Working through each activity at a time, the group marks the learning outcomes which each activity helps develop with a plus sign in the corresponding square. When you have gone through all of the activities, you ask the group to go through each learning outcome, one-by-one. Looking at all the activities that help develop this learning outcome, are any of them more effective than the others? The group goes through and adds an additional mark to the most effective activities. "Hey!" says one member, "How come all the ones that have multiple plus signs seem to be one's where the students are active and not just sitting listening to lectures?"

"That's a great observation. What else do you notice?" you ask. And the discussion continues. Eventually, everyone agrees that there seems to be a lot of activities that have just been around for a long time, but without really adding much value – i.e. they don't help students develop the learning outcomes. "Let's get rid of those!" one of the participants yells out.

After a frenzy of activity, tossing out the old, throwing in some of the new ideas, a course has suddenly begun to take form. "Ok, everyone – that's has been an incredible amount of work in one day. We have defined the purpose of our course so now we can explain it to the students and other teachers in the time it takes to ride an elevator up to the fourth floor where we have our seminar rooms. And it is short enough that we can remember it without having to pull out the course plan each time. And that short tag line that someone thought up was great! Won't ever forget that one! We have defined outcomes which are specific, measurable, relevant, realistic, and possible to achieve within the course period. By identifying the appropriate Bloom's level, we can see how they build upon each other and how some of them require that we really tie in and connect to and build on some of the previous courses. We also see that some of them require that we really stress the "softer" side of things as we work through the cases for the student-activating sessions that we have chosen as they seem the best fit to create the environment for students to develop the desired competencies. What a great job you have all accomplished!"

"Go home tonight and relax (Study II). Tomorrow when we meet at 9 o'clock, let's start by reviewing what we did today and then looking to see how we can tweak the way we teach and assess to make sure that we are helping challenge students in the best way possible and to make certain that we are able to determine if the outcomes have been met and how we can build in ways to identify if certain students might need help along the way."

4.4 ADAPTIVE REFLECTION: THE STRUCTURE

The Adaptive Reflection Process as presented above and in Study II is an alternative approach to develop a "ready-to-teach" aligned curriculum with clearly defined outcomes. In this section, I will present the individual steps of the model as it was applied in the above description. A more thorough and detailed presentation of each of the steps can be found in Appendix 3: How to Run an AR Workshop.

Adaptive Reflection is a six-step, facilitator supported, question driven process, which invites teachers and those with content expertise to reflect about what really matters and how to get there (See Figure 14). The name refers to the process of reflecting over what we do today and in so doing, enables the adaptation of our curricula to the needs of health care, society, and patients.

FIGURE 14. THE ADAPTIVE REFLECTION PROCESS FOR CURRICULAR DEVELOPMENT
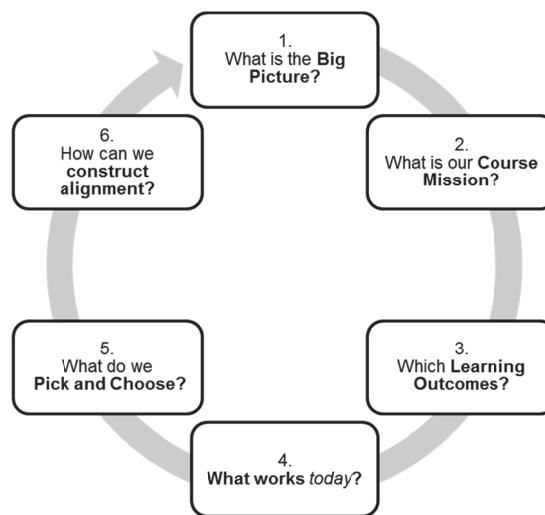
(Study II)

The process begins by gathering "experts" in the subject area and asking them to brainstorm individually about what a newly graduated professional should be able to do in terms of knowledge, skills, and attitudes (Step 1). The answers are then grouped into themes/categories by the participants in silence. Those categories relevant to the course are identified (the rest can be "farmed out" to other courses). The selected categories are then given headings by the group as they work in pairs. Each pair then presents the headings they have written and motivate them for the rest of the group. Based on feedback from the group, the headings may be modified. When there is complete agreement about each of the headings, the group then summarizes them into 1-2 sentences as the course mission (Step 2). In step three, the category headings are written as outcomes using active and S.M.A.R.T. (Specific, Measurable, Addressed, Relevant/realistic, and Time-bound) verbs that specify what a graduate should be able to do. The outcomes are complemented with additional outcomes if the category contents are not satisfactorily covered. All the outcomes are then "ranked" using Bloom's revised cognitive taxonomy (Anderson, et al., 2001) and (when applicable) affective taxonomy (Krathwohl, et al., 1964). With the help of a matrix, the existing course is reviewed to identify those teaching and learning activities that contribute to achieving the outcomes (Step 4). Decisions are then made by the group about what to increase, reduce, eliminate or create (Step 5). The final, sixth step,

focuses on making sure that the educational methods and types of examination employed support the development of and test the desired learning outcomes.

The process is question-driven. The questions that are used in each step and as exemplified in the above scenario are presented in Table 3.

TABLE 3. FACILITATION QUESTIONS FOR ADAPTIVE REFLECTION

Process step	Purpose of the process step	Facilitation questions
1	Create a shared understanding of the big picture	*Should anyone else be here?* *What competencies (knowledge, skills, and attitudes) should a new graduate have?*

2	Define a course mission that concisely summarizes the course (the category headings), is easy to remember, and simple to explain (1-2 sentences)	*Should all these category headings be included in the course? Can some of them be suggested to another course?*
		
		How would you describe what students learn in your course for a student or for a teacher from another course?
		
		How does the course contribute to our definition of the new graduate?
		
		The "litmus" test – Does the course mission describe:
		  What are we passionate about?
		  What can we be best at?
		  What is so important that we need to examine the students to see if they have achieved it? (Modified from (J. C. Collins, 2001))

3	Define the learning outcomes for the course	*What should the student be able to do after the completed course? (use "active" verbs)* *Are the outcomes S.M.A.R.T. (specific, measurable, addressed, realistic, time-bound)?* *Where do the outcomes fall in Bloom's taxonomy?* *How do we build on what students have learned earlier? Are there other courses that have teaching/learning activities that are related to our outcomes? How can we build on these?*
4	Identify what works and doesn't work in the current course	*What are we doing today? (Create a matrix)*
5	Pick, choose and develop effective teaching and learning activities	*How well do the activities help students achieve the learning outcomes? Does what we emphasize accurately reflect the mission of the course and our learning outcomes?*
6	Construct alignment between the educational methodologies employed, the examination form(s) and the learning outcomes	*How can we use our teaching to help students achieve our learning outcomes?* *How can we use our examination to help students achieve our learning outcomes? How do we know if our learning outcomes have been met?*

We will analyze how these questions work to integrate aspects of the context as participants interact and let content emerge. But first we need to understand if Adaptive Reflection is a viable alternative.

4.5 CAN ADAPTIVE REFLECTION BE A VIABLE ALTERNATIVE TO CONVENTIONAL CHANGE APPROACHES IN MEDICAL EDUCATION?

Our conventional approaches to change have a firm basis in research and tradition, are widely used, and form the norm of what is expected behavior. Study I provided a better understanding of how a strategic management framework can be applied to understand innovation in medical education, how innovation differs from change without reform, and that threatening the very existence of a school is one way to energize a change process (See Innovation in Medical Education on page 23). In this section, we will examine the Adaptive Reflection process and attempt to determine if it is a viable alternative. It is important to point out that I have not collected data with the intention to compare AR with any specific curriculum development process. This is a limitation in the study design which was partly addressed by a *de facto* comparison based on output (Study III). The focus has been on understanding the outcomes it generates and how it is experienced. To do this, we will consider the ability of the model to effectuate change. Several questions need to be raised, among them:

1. What has the AR process generated when it has been applied? (Studies II, III, IV)
2. What prerequisites need to be met in order for AR to generate these outcomes? (Study IV)
3. In what contexts has AR been tested? (Studies II, III, IV)
4. How has the process been experienced? (Studies III and IV)

These questions will be addressed with the empirical data from Studies II, III, and IV.

4.5.1 What has the AR process generated when it has been applied?

In Study II, I analyzed an AR intervention in three courses in the last semester of an undergraduate medical education program. The three courses mobilized an improvement effort which defined new learning outcomes and a purpose for each course. Those teaching and learning activities and assessment forms which did not help develop or measure the learning outcomes or were not aligned with the course purpose were removed or decreased. Teachers actively invited in other courses to find ways to connect and build on each other. Efficiency can be determined by looking at the resources that were required or used during the intervention. In this case, the results were achieved in 26 hours of meetings spread over 10 meetings. The suggested changes, however, were tabled due to the launch of a new curriculum reform effort.

In Study III, AR was used to develop graduate medical education courses for residents in psychiatry. Course plans and course schedules were compared pre and post intervention. Learning outcomes and course purpose were clearly defined in the new courses. Ethical aspects as well as the concerns of patients and relatives were included in the learning outcomes. These aspects were absent in the objectives of the pre intervention course plans. Each teaching and learning activity was clearly linked to the respective teaching and learning activities. Lecture time was not only dramatically reduced, but it was also coordinated with the other face-to-face teaching and learning activities in such a way that the lectures served to summarize and answer questions triggered by small-group case discussions in a pattern similar to Kolb's experiential learning (See Figure 5). An introductory phase was introduced so residents could prepare themselves, identify areas where they wanted to improve by submitting case descriptions of challenging patient cases, and through self-tests on the literature or specific competencies. This phase was e-learning based to allow residents to prepare when it best fit their schedule. E-

Learning had not previously been used in psychiatric residency training. Work-place based assessment was introduced as an assessment form. Previously, assessment forms either did not exist as part of the residency courses or were often in the form of group seminars at the end of the standard 5-day course.

In terms of efficiency, the interventions consisted of a three-day intervention hosted at a conference center with two one-day follow up sessions at approximately one-month intervals. This allowed the course developers time to collect and develop the materials for the courses, such as films or multiple-choice questions that had been agreed upon during the intervention meetings. Hosting the intervention at a conference center raised costs considerably, but was deemed a necessity in order to bring in content experts from around the country and to keep outside interruptions to a minimum.

In terms of the outcomes of the graduate medical education application of the AR process beyond that which was studied in Study III, a total of 19 graduate medical education courses have been created for residents in psychiatry under the auspices of the METIS project (More Theory In Specialist Training) using the AR approach (See Appendix 2). These have replaced the previous course offerings. According to the National Board of Health and Welfare, the METIS project has also successfully met the need for courses in specific areas, such as suicidology and transcultural psychiatry, met the need to define competencies in clinical supervision and in psychotherapy, and involved patient groups and relatives of those affected by psychiatric illness in the process (Socialstyrelsen, 2011). In all of these areas, the AR process was applied. Eight courses were offered in 2009 and eighteen in 2010. There are now 389 of the approximately 500 residents in psychiatry who have begun at least one of the courses (data from the METIS-database as referenced on April 8, 2011).

4.5.2 What prerequisites need to be met in order for AR to generate these outcomes?

In Study IV, I wanted to see if the results of the interventions were due to the fact that I was the one who was facilitating the process. The formulation of the questions in the first step (See

Table 3) is such that content knowledge of some fashion appears to be a requirement. Some degree of competency expertise and experience is most likely needed in order to be able to determine the relevancy of an outcome. But how much of an expert does the person who facilitates the process have to be? As I am not a psychiatrist, I had already understood from Study III that content expertise is not a prerequisite for the facilitator. To test this further, the idea arose to let undergraduate nursing students lead their nursing staff through the AR process to develop the relevant outcomes. Then the students would continue on with the rest of the steps in order to develop a continuing nursing education course for the rest of the nursing professionals on the ward.

Six hours were spent with the nursing students to introduce them to the basic idea, to familiarize them with the AR model and then to plan the two-hour workshop that they were to hold with the nursing staff. In developing the continuing nursing education courses, the students had to learn about e-learning as well as the learning management system, which they did in the context of their course, "Organization, Leadership, and Learning" (OLL). The output from each step of the process was checked by the teachers of the OLL course and content was reviewed by a doctor and a nurse at the hospital.

Three e-learning based courses were created which the clinical nurse educators, responsible for the continuing education of their nursing staff, described as "inspiring, challenging, and pedagogical." Based on the analysis of the project as summarized and presented in Study IV, the nursing students demonstrated that they were more than capable of facilitating the two-hour workshop with the registered nurses and guiding them through the first three steps of the AR process. The students would then check the output with the teachers and then continue with steps 4-6.

The approach was repeated the following semester with the AR process instruction steps for the nursing students now e-learning based. The nursing students created an additional twenty-two courses and further developed and improved two already existing courses. These have included continuing nursing education courses designed and created in collaboration with the hospital as well as courses in specialist nursing education and teacher education which have been used at Karolinska Institutet.

4.5.3 In which contexts has AR been tested?

I have now applied Adaptive Reflection, in part or in whole, in over 80 different programs and courses in medicine and the health professions at the undergraduate, graduate, post-graduate, and continuing professional development level; in local, national and international contexts (See Appendix 2: Settings in which AR has been). It appears to be applicable in all of these contexts. At first, the model was tested using an action research approach with the aim of improving its ability to effectuate a change. This culminated in Study II, where the process, which had now found its form, was applied in the creation of three courses in undergraduate medical education. In Study III, AR was applied in graduate medical education, and in Study IV, it was applied by undergraduate nurses to develop continuing nursing education courses. In all three studies, outcome-based and aligned curricula were created.

4.5.4   How has the process been experienced?

In Study II, the AR process appeared to create enthusiasm and energy for change as well as to awake and bring forth feelings of frustration. To understand this more thoroughly, participants of two AR-interventions were interviewed in Study III within two weeks after a three-day intervention during which they began, but did not complete step 6. The aim was to understand how they perceived the AR curriculum development process as it had been led in the workshops.

In analyzing the responses to the questions about how the process was experienced, four themes were discerned. In all of them, respondents made frequent mention that the process was stimulating. The analysis in full can be read in Study III. For the purposes of the subsequent discussion in Chapters 5 and 6, I have chosen to illustrate some of the themes with a few of the responses.

4.5.4.1   *Theme 1: AR provides a strict structure which led to a paradoxical sense of freedom*

> *It was a very structured approach which inspired new ways of thinking. (WW04)*

> *Yeah, it might be structured, but it still gave a lot of space for discussion, which you could say is a little paradoxical. This structured way of working caused us to leave our old structures and conventional course designs… (P2-1501)*

4.5.4.2   *Theme 2: Ploughing Ahead*

Participants commented on the effectiveness of the process. What was achieved in the three days was more than expected, the individual steps helped to organize ideas and move things forward and the tempo was quick. This was especially noticed when participants were absent for part of the time.

4.5.4.3   *Theme 3: A Co-Creative Process*

The process was perceived as one of collaborative creativity that allowed the participants to work together to identify new possibilities in terms of course structure, educational methods, and the types of courses that they were capable of creating.

> *I think it was a way of working that was very open and very different which in a serious way tries to make use of many different viewpoints from many different people (P2-0601)*

> *I think I got a good overview and tried to think even more about the person who is going to learn. Sort of like starting with the goal: Ok, what are they supposed to learn? And what is the best way to get them to do that? Sort of along those lines. (P2-0602)*

4.5.4.4   *Theme 4: A Validating and Participative Process*

Participants described the process as engaging as well as inclusive. Participants, regardless of their background, felt that they could contribute. One respondent compared this with previous experiences where doctors and patients worked together in projects and the patients did not feel that their contributions were as valued. Comments were also made that the involvement of participants from around the country would contribute to a more widespread understanding of the project, especially among teachers.

In Study IV, the nursing students continually wrote down individual and group self-reflections about what they learned, what went well, and what could be improved. At the conclusion of the OLL course, they reflected on what they were taking with them from the course. This data, while covering a course which contained elements outside of the AR process, did generate

58

reflections which can, with care, be connected to the AR process. The themes that emerged from the data analysis were the development of new ways of working, new competencies, new ways of viewing the group, and that the overall experience was one of moving from chaos to confidence. Here too, the nursing students described how they worked as a team with everyone able to participate and contribute.

It isn't my way that is best, but ours. (I14)

The Adaptive Reflection process was easy to follow. It helped the students to design the courses by providing them with a new way of structuring their working from the start.

It was easier to work when we had an overall picture of the product. (I13)

4.5.5   Summarizing the Empirical Findings

The research questions and a brief summary of the findings and the implications of the four studies in the context of this thesis are provided in Table 4.

TABLE 4. SUMMARY OF THE FINDINGS OF THE FOUR STUDIES

Study	Research Questions	Main Findings	Implications (in the context of this thesis)
I	Can a strategic management framework be used to understand how Linköping University was able to innovate its medical curriculum?	Linköping Health University used the threat of closure as an opportunity to innovate their curriculum. They collaborated outside the boundaries of the medical school, created a unique strategic profile, and used it to develop interprofessional training and create exceptional utility for their graduates.	Strategic management thinking can be applied to understand innovation in medical education; disruptive innovation is rare and it remains unclear how to drive change without threats.
II	Can change management thinking be used to explain how a question-driven facilitated model for improvement in medical education can be used to integrate content, context, and process when it is applied in practice?	Using the AR process, three courses mobilized an improvement effort, which spread to and triggered another course to start their own; participants took over the facilitator's role; high level of engagement. Facilitation encouraged dialogue and reflection through the questions which formed an attractor basin; encouraging self-organization and emergence through interaction; helping to mitigate power gradients; the juxtaposition of outputs from the different steps made explicit contradictions in desires and behaviors.	Complexity science helps us understand how AR can successfully be applied in the medical school context.
III	1. Can AR be applied to create graduate medical courses and to improve existing ones? 2. How do participants perceive the AR curriculum development	1. A pre/post AR comparison found reductions in lecture time, more learner-centered activities, clearly defined learning outcomes which included ethical aspects and addressed concerns of patients and relatives. Preparatory e-based and face-to-face learning activities	AR proved to be an effective and efficient way to create and revise residency training courses. Teachers replaced lectures with student-activating activities, improved constructive alignment,

59

| IV | 1. If the students take a teacher role, how will the students experience the learning process?
2. Will students achieve the learning outcomes used in a more "traditionally" structured course?
3. How will the CNE courses be received by the registered nurses? | 1. The experience was described as a journey from chaos to confidence which led to the acquisition and development of new ways of working, new competencies, new ways of viewing the group, and increased feelings of self-efficacy.
2. Students achieved a competency level in general exceeding the learning outcomes.
3. Student created CNE courses exceeded expectations. | Students successfully applied AR to develop CPD courses for their teachers. By turning the tables, they also regained feelings of self-confidence. |

...and workplace-based assessments were explicitly aligned with learning outcomes.
2. Four themes emerged when participants described their experience of the process as:
   1. A strict structure with a paradoxical sense of freedom
   2. Ploughing ahead
   3. Co-creative
   4. Validating and participative

(third column continuation): created workplace-based examinations, and introduced e-learning.

Through Studies I-IV and the additional information from the National Board of Health and Welfare, the METIS Project and the OLL-course database, we have been able to identify some of the effects of the AR process. Based on this data, how can we understand and explain the effects of Adaptive Reflection?

4.6 CHAPTER SUMMARY

Breaking Free of the Doom Loop

- Our conventional change models can lead to organizations getting stuck in a doom loop of oscillations between short-sighted renewal efforts which prevent improvement
- Successful change requires integrating content, process, and context.
- Adaptive Reflection is a new approach to curricular development. It is a six-step, facilitator supported, question driven process, which invites teachers and those with content expertise to reflect about what really matters and how to get there. The name refers to the process of reflecting over what we do today and in so doing, enables the adaptation of our curricula to the needs of health care, society, and patients.
- AR appears to be an effective and efficient way to create and revise courses. Teachers replaced lectures with student-activating activities, improved constructive alignment, used new examination forms, introduced e-learning, invited in other groups to begin a similar process, and even impacted feelings of self-confidence. The process was experiences as a strict structure which offered a paradoxical sense of freedom, it ploughed ahead and kept the group moving forward, it created opportunities for creative collaboration, and it invited participation and validated participants.

5 LETTING ADAPTATION AND LEARNING EMERGE

Chapters 1-3 provided an analysis of the content, process, and context of change for the studies in this thesis. Chapter 4 began with a description of the "doom loop" that can arise when the conventional approach to change is applied in complex contexts. Adaptive Reflection was then presented as a novel and alternative approach to curricular change which integrates content, process, and context. The process was described first in its application with the help of a generalized case description and then through the effects it generates as revealed in Studies II, III, and IV. In this chapter, we will discuss the empirical findings with the help of the concepts of interaction, meaning, motivation, anxiety, uniqueness of context, and emergence as well as reflect on some of the caveats of translating management thinking to new contexts. Before we enter that discussion, however, I want to share with you an insight I found essential in order to accept the findings I was seeing in the interviews and beginning to understand from the literature, namely that the plan is not the solution (Mintzberg, 2000).

With the conventional content focus, the goal is to develop a plan which is then implemented in a specific context. The plan is often designed to be a solution to a number of problems. In the content approach, process can be seen as the process of implementation.

In his book, *Sensemaking*, Karl Weick tells the story of a patrol of Hungarian soldiers, who shortly after the Second World War, got stuck for three days in a blizzard on the Alps (Weick, 1995). When the relieved lieutenant welcomed the soldiers back to base camp, he asked the sergeant how they had found their way back. "Oh, it was easy, we had a map," was the reply. Asking to see the map, the lieutenant discovered that it was of the Pyrenees and not the Alps. Weick goes on to explain that the map itself had little use, but having the map allowed the group to muster the courage to set out. As they moved along, they then used the landscape to navigate their way back home. This navigation was the result of iterative series of observations and reflections which resulted in changes in course which were then reappraised as new landscape "data" was collected, reflected upon, and analyzed.

In Weick's analysis, we can find some interesting thoughts. Formal plans and models (the map) appear to have an emotional effect by dampening anxiety about the unknown and triggering enough confidence to overcome inertia and promote movement. Once moving, corrections are made based on reading environmental cues and then engaging in an experiential learning process of reflection, abstraction, and then experimentation (recall Figure 5).

In the quality improvement community, there is an understanding that many of the problems we face today are the result of the solutions we had developed yesterday for the problems we had then. Toyota makes use of this understanding in their approach to problem solving. Instead of trying to find the ultimate solution, they design countermeasures until a "better approach is found or conditions change" (Spear & Bowen, 1999).

Agile/scrum project management is an example of a flexible process focused approach. It was developed in the software industry by project leaders looking for a flexible approach to project management that would allow a group to continually reevaluate what they were doing and to change course (K. Beck et al., 2001). Planning and change thus occur in conversation with each

other. As a group changes its plan, it changes its actions, resulting in a response, which is then reflected on, and a modification is made, a new behavior tested, and so on.

Compare this to the ingredients of curricular change as described in the opening content, process, and context chapters. If we begin with the aspects of the content that need to be addressed in a curricular change, there is a natural tendency for us to address these directly as well as to simplify, as shown in Dörner's research. In constructing a plan for a new medical curriculum, a small group (simplification 1) formulates the plan (simplification 2) and designs the model (simplification 3) by choosing which problems (simplification 4) need to be dealt with. The effects of time, for instance, are often ignored (simplification 5). We avoid getting bogged down by the individual hopes, desires, ambitions, and aspirations of the individual teachers, students, and patients by keeping our gaze at the organizational level (simplification 6). Thinking is separated from doing (simplification 7). Artificial class differences are thus subtly created between those chosen to think and those forced to do. Zero-sum games are perpetuated as individuals jockey for position, courses vie for time and monetary resources, and the doom loop starts to spin.

Yet, in these very same ingredients we can find the seeds for successful learning and adaptation. Paradoxically, we can simplify the process of change by embracing the complexity of the organization by seeking to encourage it where it naturally occurs and is needed. Toyota does this when they ask their leaders to go to the actual location in order to observe and understand the actual situation (go to *gemba*) (Liker, 2004). If we visit an island, we can see that the clinical teachers are continually adjusting their clinical practices to new patient categories, new diseases, new technologies, new treatment regimens, new research findings, and new management structures. They are adding things here and there to their courses. There is constant movement, a constant buzz at the periphery. However, lacking an understanding of the larger perspective, it becomes difficult to evaluate what should be eliminated or reduced and the result over time is curriculum overload. One day, this realization broadsided me.

Standing in a trauma room, looking at a series of MRI images over the shoulder of the radiology technician, it occurred to me (after we determined that the patient was fine) that what medical education needs is the equivalent of an MRI machine. MRI works by aligning all the molecules in the body with the help of a very strong electromagnet. When the magnet shuts off, the molecules spin back to their original positions, releasing energy. The problem is not how to get people in medical education to change; they are already changing, spinning in their vectors. What they are lacking is an understanding of the bigger picture, how their actions impact the whole (i.e. the graduate of the educational program or intervention). What if we could align all of these people for a split second, help each individual understand the whole, and then let them return and reflect on how their actions are aligned with that whole? The individuals on their islands are already in motion, we do not have to spend energy with kick-offs to get people moving. Instead, we could try to align the motion so that it compounds and builds upon itself.

5.1 LETTING ADAPTIVE REFLECTION OVERCOME INERTIA

Figure 6 illustrates what different course directors felt were potential areas for interaction and integration. An interpretation of the figure based on the objectivist myth would suggest that

while course directors may be aware of potential possibilities for interaction, these interactions do not occur because what is valued in the organization are the individual nodes, the islands of expertise.

A medical program is only a finite number of semesters long, the addition of a new topic or course is often seen to require a reduction for someone else. Seen from this perspective, where value is placed on the nodes, curriculum change becomes a series of turf wars. The stakes are high, lose and you may have lost time or resources from your course, your status, your place in the hierarchy, or even your job. We can find a similar pattern of behavior in game theory simulations such as the prisoner's dilemma (Dawkins, 1989). The game digresses into battles of "I win – you lose." These examples of Nash equilibriums or zero-sum games dominate much of our thinking about how we relate to and with each other. Unfortunately, thinking in this fragmented, finite, zero-sum way can have ramifications on the competency levels of future health care professionals and in turn, for patients.

Or, we could view curricular change as an infinite game, where the rules are constantly changing and there is no end; the game is played for the purpose of continuing the play despite the "impingement of powerful boundaries" against play (Carse, 1986). Fragmentation is thus not so much a question of planning points or periods of integration as it is a question of how to encourage interaction between different groups and individuals. In an organization which values the learning community, the interactions and interplay between the individuals on the islands would be what defines the content of the islands. In a learning community knowledge that is used lives and is strengthened through reinforcement, knowledge that is not used withers away.

Constructive alignment is often the conscious attempt to align teaching and learning activities with assessment and learning outcomes. At the same time, the growing awareness of the role the hidden curriculum (Haidet et al., 2006; Tekian, 2009) can play in education is a sign that there is an alignment that is constructed over time by the individual teachers on each island. This dynamic between central policy and the actions taken by those on the ground exemplify what Michael Lipsky refers to as "street-level bureaucracy" (Lipsky, 2010). "The decisions …, the routines they establish, and the devices they invent to cope with uncertainties and work pressures, effectively *become* the public policies they carry out" (Lipsky, 2010, p. xii). Yet, the teachers, health workers, public interest lawyers, and police often find that a conflict arises between their aspirations as service workers and the organizational limitations caused by requirements and values and culture to respond not to individuals, but types, i.e. not individual students or patients but "students" as a class or "patients" as a group. But if change is approached as the result of interactions and interplays between individuals in dialogue with each other in groups, then it is possible to resolve some of this conflict by working to promote interaction and thus emergence of new patterns at street level, the level of the islands.

5.1.1 Thoughts on Interaction and Emergence

The shift in focus from the nodes to interactions is apparent in many arenas. Epidemiological modeling and forecasting of the spread of contagious diseases such as the Swine flu is now being done based on Google searches instead of only relying on official health care system reports of cases. Variations in patterns of interactions between people can determine the success of public health initiatives (Nicholas A. Christakis & Fowler, 2010) – even shoe manufacturers,

like Hush Puppies have learned this, albeit inadvertently. A group of teenagers in Soho, New York, revitalized their brand and the company by making the shoes "trendy" (Gladwell, 2002). Viral marketing through social media has grown out of this understanding of the importance of employing (process) the network (context), not just the quality of the product (content).

Continued interaction is the result of individuals making meaningful connections. Over time, this interaction yields patterns of behavior which can be observed (Nicholas A. Christakis & Fowler, 2010). As Stewart Mennin puts it, "We need to merge to emerge." Paulo Freire echoes this when he suggests that through dialogue we can transform our reality (Freire, 1993). Appreciative Inquiry makes use of a similar approach by building on the idea that what we talk about is what we carry with us (appreciate) as we work to create a new future (Cooperrider, et al., 2003). If we apply this to the development of medical curricula, what is needed is a process which draws on the strengths, desires, and movement that exist within the context and which coordinates these in such a way that they interact with each other, and in doing so, let content emerge. Roxå and Mårtensson refer to these small patterns of intimate and meaningful conversations that help teachers develop their teaching and learning as "significant networks" (Roxå & Mårtensson in Kreber, 2009).

If in a complex context change occurs through conversational interaction, then the task for the change agent becomes one of maximizing conversational surface area. Think of it like butter – if you want to melt butter (create a change) you can increase heat (frustration, fear, and anxiety), you can stir (move people around), and you can increase surface area (increase the amount and quality of conversational interactions). Increasing the heat is the Lewin approach to change (See Figure 10) and what was used in Linköping (Study I). It may sound absurdly simple that the other two approaches, moving people around and increasing conversational surface area could work, but it has been shown that conversational interactions can help us create new realities and change our behaviors. Kiessling and Henriksson found this to be the case among cardiologists, where behavioral change as measured in patient outcomes data was achieved among those engaged in dialogue with each other, but not through the didactic lecture-based approach to presentation of information (Kiessling, 2002). Rogers summarized the research on physicians' tendencies to adopt newer drugs as, "being connected means being innovative" (Rogers, 2003, p. 68).

Freire defines dialogue as the interaction between reflection and action. In the absence of action, reflections become empty verbalizations, in the absence of reflection, actions become blinded activism. In their interaction, though, words are action and thus become transformative (Freire, 1993). Because these reflections and actions occur in groups, the individuals of the groups will influence the group, and the group will influence the individuals. Think of the brainstorming of step one which invites everyone to participate. Themes are then identified and as they are discussed, participants learn from each other and developed shared understandings about concepts integral to their continued conversations. Discussions around the matrix in steps 4-6, allow participants themselves to reflect over their own "data" about what works well and what can be improved by learning from each other's experiences and then openly comparing these experiences.

Freire's idea of the role that dialogue has in transforming reality through the interaction of reflection and action is powerfully illustrated by the work Jerry and Monique Sternin did to tackle child malnutrition in Vietnam as part of the Save the Children foundation. In an approach similar to Appreciative Inquiry, they identified "positive deviants," families who despite living in impoverished conditions, had well-nourished children. Driving back to Hanoi after having discovered these families and what they were doing differently, they recalled their past failures.

> *They had all occurred exactly at the moment in which we now found ourselves; the moment at which the solution is discovered. The next, almost reflex step, was to go out and spread the word; teach people, tell them, educate them. [But] By the time we reached Hanoi, Monique, Hien and I, were very excited, despite our fatigue and grittiness. We agreed that what we needed to do was to create an opportunity for villagers to discuss how they could "practice", rather than "know' about the successful PD behaviors they had just discovered. (Sternin, 1996)*

This reflection nicely captures the shift from the objectivist myth to the learning community. Through reflection about action, through conversational interaction, new behaviors emerge. Sternin summarizes this as one of the most important lessons he learned regarding lasting behavioral change according to the positive deviance methodology, ""It's easier to act your way into a new way of thinking, than to think your way into a new way of acting" (Sternin, 1996).

Stacey defines effective conversation as conversation that is fluid flow (Stacey, 2011). When we realize that behavioral change in complexity is the result of dialogue, we need to start questioning the desire of change agents to effect large scale change by focusing change initiatives at the organizational level or by expecting individuals to change when told to do so. Carse eloquently captures this difference.

> *Strength is paradoxical. I am not strong because I can force others to do what I wish as a result of my play with them, but because I can allow them to do what they wish in the course of my play with them (Carse, 1986, p. 39).*

The question then becomes how change leaders can engage individuals in play with each other and then capture that which arises during the course of interaction? In Study II, participants demonstrated this strength by initiating contact on their own with another group that they work with and, repeating the same questions, ultimately led that group through the same process. I began to see the AR process as a strange attractor in the form of a vortex, which, once it started to spin, could invite others to spin the same way.

In analyzing the failure of the intervention in Study II to lead to a sustainable and contagious change, I became aware of my own inadvertent contribution to its demise. I realized that I had been holding on to the old paradigm of change by not encouraging a local interaction between the group and the curriculum committee through conversation. In reviewing my own actions and similar situations, I found that I was lecturing, presenting, and talking about the AR process (i.e. the objectivist myth) instead of engaging other individuals in dialogue within the process (i.e. a learning community). This analysis provided a personal and sobering reminder of how difficult it can be to incorporate a behavior change at Bloom's affective taxonomical level five (See Table 2). While I might value the importance of local conversation in affecting change (level 3); even organize and accommodate it in my own thinking and behavior (level 4); it is still a challenge to have internalized the understanding to the level that it characterizes my own behavior (level 5).

Returning to complexity theory, we can remember that patterns (attractors) arise through interactions between actors/agents within an attractor basin. This attractor basin could be a watering hole on the Savannah, a water cooler or gourmet coffee maker at the office (Laksov, Mann, & Dahlgren, 2008), or the desire to improve something meaningful.

5.1.2 Thoughts on Meaning and Change

In Study III, what could be considered indicative of "resistance to change" was voiced by one of the respondents. Based on Roger's Gaussian division of individuals into innovators, early adopters, early majority, late majority, and laggards, more comments suggestive of resistance could be expected. While there could have been a selection bias for interested participants looking to change and improve their courses, the "hopes and fears" exercise at the start of the workshop did reveal expectations which could be linked to Rogers' different roles.

In all the themes, comments were found which described the experience as stimulating (Study III). AR begins with asking participants what it is they hope to achieve with their course, to describe the end result. Talking about our dreams and desires may inspire by helping us find a sense of meaning and purpose in what we do. Daniel Pink, in summarizing the most recent findings from the field of motivation research, defines motivation 3.0 as consisting of purpose, master, and autonomy (Pink, 2009). An analysis of leading profiles at Karolinska Institutet found similar drivers at work: stimulation, autonomy, and variation (Bergin & Savage, 2011).

The ability to find meaning in the work one is doing is an important path to finding meaning in one's existence (Frankl, 2004). Camus wondered what Sisyphus was thinking during the walk back down the mountain after they boulder had tumbled down – again (Camus, 1955). In testing a modern day version, it was found that people quickly lose interest when work loses its meaning (Ariely, Kamenica, & Prelec, 2008).

The Kotter approach to change is about creating a sense of urgency and then clarifying the change vision. This is often expressed in practice by telling people about a problem and then presenting the solution. Science as expressed in the IMRaD structure is often presented by describing the gap in knowledge in the introduction and then about the experiment designed to address that gap. Given the discussion above, this is probably not enough to establish a sense of meaningful motivation. Ariely suggests that we work harder when we interpret work as meaningful, but that we generally underestimate the relationship between meaning and motivation (Ariely, 2010).

5.1.3 Thoughts on the Motivation to Change

In his analysis of successful companies, Jim Collins makes an interesting observation: it is only the unsuccessful companies in his study that talk about the need to motivate their employees (J. C. Collins, 2001). I have begun to understand that in all fields there exist certain organizations engaged in continual introspective reflection. These are organizations in constant search for improvement, who engage their employees in constant dialogue (reflection + action). These organizations become known for innovative practices and in their wake come researchers and management consultants who try to understand and codify the success by the rules and principles.

These approaches tend to become fads which spread. But instead of adopting the actual approach and philosophy that is often the result of an evolutionary iterative development over time, quick makeovers are sought and easy to understand techniques are implemented. In professional organizations such as health care, the introduction of the latest management fad becomes a way for management to legitimize their position (Kitchener, 2002). Management often settles for superficial implementation so as not to disturb the system and the professional deep structures of the organizations. Of course, this sedimentation on top of an organization does not lead to much change even if it does lead to a lot of scurrying about. Soon enough though, a new fad will blow through anyway.

In medical education we can see fads blowing through with the same superficiality. Whether they are concepts from other educational areas, such as learning outcomes or core curricula, or newer management ideas such as quality improvement or even old washed up management ideas that are long passé such as quality assurance or business process reengineering, they can find a temporary home in the university, sometimes with devastating consequences (Head, 2011). At the same time, all of these fads blowing through represent an invitation for individuals and groups to engage in meaningful reflection in, on, and for action. They can become an attractor basin within which participants can engage in deeper more meaningful and motivating reflection.

In the AR process, an invitation to contribute was extended in the first step to all the participants who were invited to contribute on equal footing, regardless of where they were in the power dynamic. The discussions led to a shared mental model about the course subject and the purpose and meaning of the course was clearly defined in the second step. The third made explicit the requirements needed to be met to achieve this purpose. The fourth and fifth gave participants the opportunity to on their own determine the relevancy and effectiveness of what they were doing (their actions) in comparison to what they wanted to accomplish. And in the sixth step, participants made sure that their actions were aligned with their intentions. These steps all could contribute to making the courses more relevant to the needs of the students and therefore more meaningful for the teachers who are creating the courses.

The matrix that participants create during the fourth and fifth steps helps participants compare what it is they do (teaching and learning activities) with what they want to achieve (the learning outcomes). When the activities and the learning outcomes match they are defined as constructively aligned. This is positive. When they are not matched, participants have to confront the fact that they are doing things which do not help them achieve the purpose of their course. In analyzing science teachers ability to effect reform, Gess-Newsome et al. (2003) found pedagogical dissatisfaction – the mismatch of personal teaching beliefs, goals, instructional practices and student learning outcomes – to be the impetus for change in instructional practice. This confrontation between desires and the outcomes of one's actions is also central to the technique of motivational interviewing (W. R. Miller & Rollnick, 2002).

Motivational interviewing is a psychological intervention method that originated in the treatment of patients with alcohol and drug abuse problems. The method is based on helping a patient understand what they desire to change and helping them find the desire to change that by helping them discover how their actions are preventing them from achieving their vision. The

key is not to manipulate people to do your bidding or to realize your own personal desires, ambitions, visions. It is to help people find and describe their own visions, and when they do so together, to help a group of individuals to collaboratively find and articulate a shared vision – and then to continue on and help them to realize and actualize their vision.

In some ways, orchestrating the exposure of conflicts between teaching and learning activities and learning outcomes with the matrix mirrors motivational interviewing. Participants have spent steps 1-3 in describing what graduates need to be able to do and then they are confronted with their own teaching behaviors that do not help students to develop the desired learning outcomes.

It is not too difficult to understand that this confrontation may contribute to a cognitive dissonance, the feelings that arise when it becomes clear that one's actions are in conflict with one's desire to maintain a positive self-image. Senge sees this creative tension as necessary for people to find the motivation to change and learn. Thomas Kuhn, saw this tension behind paradigm changes. He defined discovery as a process of becoming aware of an anomaly which cannot be explained by the current understanding. The anomaly is then explored and the paradigm theory adjusted so that the anomaly becomes expected. Several studies suggest that "the functional unit of learning for physicians is not the topic but the problem" (Slotnick, 1999). Carse finds this tension as a prerequisite for learning: "I can explain nothing to you unless I first draw your attention to patent inadequacies in your knowledge: discontinuities in the relations between objects, or the presence of anomalies you cannot account for by any of the laws known to you. You will remain deaf to my explanations until you suspect yourself of falsehood" (Carse, 1986, p. 126). Moxnes even describes this development as a journey of "positive anxiety" (Moxnes, 2001).

One way to determine the effect of this tension on participants' motivation for change would be to stop the process before the conflict between what one does and what one hope's to achieve has become apparent, e.g. stop after step 3. This did occur in one workshop and the results of the workshop up to step 3 were not used to improve the program. However, that this may have occurred once is not enough to establish a causal relationship. On the other hand, personal practical theories a

5.1.4   Thoughts on Anxiety and Change

Cognitive dissonance is something we often try to avoid. Just like Aesop's fox, it can be easier to say that the grapes are sour or to blame the facilitator (See Study II) than admit that we are not as competent as we thought (Dörner, 1996). Being forced to confront inadequacies can lead to frustration and anxiety.

Anxiety as a result of cognitive dissonance could therefore be expected later on during the AR process. A group which sees itself as developing routines and processes (to the left in the RPCV relationship described on page 27) may be less likely to succumb to this behavior of avoidance than a group with an established culture. This makes it all the more important that the process and facilitator engender an approach which supports risk-taking, the development of creative, even "crazy" ideas, and which minimizes defensive posturing among participants. If we look at the perceptions held by the participants in Study III, we find that the themes lend support to the

interpretation that they were able to take risks and test ideas without defensive posturing as they went through the AR process.

In three groups that I have facilitated, participants expressed anxiety and frustration from the beginning. These were not groups I was actively collecting research data from, which is disappointing because identifying why things do not progress as planned are important to developing an understanding of what is occurring. The objectivity one has in action research can and should be questioned, especially when the researcher is exposed to a lot of negative or positive feedback. The action researcher is also susceptible to attempts to maintain feelings of self-competency. However, after reflecting on what occurred with colleagues who were there and others who were not, it led me to change the way I began the AR workshops and for this reason and because the experience raises an interesting question, I offer it for analysis.

In all three instances, I began by explaining the AR process using a slide and briefly described each step with a few sentences (See slide "Presentation of the Process" in Appendix 3). This was the same way I had begun the AR process in Study II. A per the usual, discussion about the model ensued, comparisons were made to alternative approaches and the usual ways of creating courses, and several comments were made about the desire to become concrete and discuss course content, e.g. the literature, what to teach, and by whom. Previously, these discussions would abate as the participants started to brainstorm and then work together to define themes, headings, and outcomes. In these three instances, however, they did not. Instead, they increased as levels of frustration increased as seen in the way participants spoke to each other, to the facilitator and in body language (turning away from each other, avoiding eye contact, not participating in discussions). This frustration became even more evident during the second meeting.

One explanation is that of credibility. Without having established the necessary amount of credibility, by presenting another way to do things that differs from the norm I came off as a "young Turk" (Kotter, 1996). Another reason for the negative reactions could have to do with a serious divergence of expectations about what was to occur and what the purpose of the meetings were. Since the question of what participants "hopes and fears" were was never asked, nor were participants interviewed afterwards, this is impossible to know. Since then, I always make sure to begin by asking what participants what they hope will happen and what they hope to achieve during the workshop.

A third explanation could have to do with our inclination as humans to view progress in a linear fashion (Dörner, 1996). Applied in this context it would mean that as time moved on, participants would expect to have accomplished an equivalent amount per unit time, coming that much closer to the goal of a completed course. However, AR develops along an s-curve. Instead of the usual discussions about slotting in lecturers and discussing literature (as described in Study III), time is spent in the beginning discussing more abstract and non-threatening aspects about participants' views about what a graduate should be able to do. Neither are issues of time and money discussed. When the discussions about slotting in things do occur in Step 5 and 6, they move very quickly. This difference of where participants expect to be according to a linear progression compared with where they are in the first three steps of the AR process could

70

be a contributing source of frustration and anxiety. If we were to illustrate it by plotting an expectation versus AR graph, it might look something like this (See Figure 15).

FIGURE 15. LINEAR EXPECTATIONS VS. NON-LINEAR CHANGE
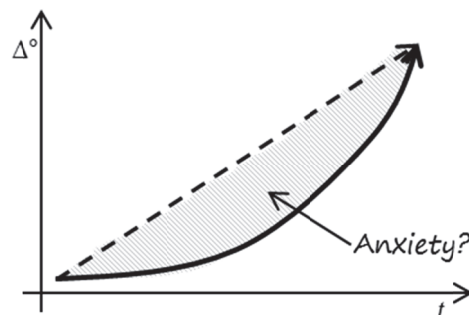
The dashed line represents the expectations according to a linear view of improvement. The solid line represents an S-curve development according to the AR process. The gray zone in between the two lines would suggest an increased level of anxiety around step 3-4 which would then decrease as the AR process turns to concrete discussions about course design and rate of change increases.

After reflecting on this possible relationship, I stopped introducing the AR approach in the beginning and instead launched into the process directly. With these two changes, asking about hopes and fears and waiting to present the process until the end, these expressions of extreme frustration and anxiety have not repeated themselves.

5.1.5   Thoughts on the Uniqueness of Context

Each island is unique. Just as is each individual in that context. As we go up in levels of abstraction, the particular uniqueness of the context and the individuals fades away. Thus, many recipes for change exist at a level of abstraction which makes them appear more applicable in several contexts. When change managers try to apply them in their particular context, they are often met with a "not-invented-here" response, e.g. "We don't build cars; we take care of patients." This can be a very valid reaction, especially if, for some managers, implementation of a new fad is motivated more by a need for legitimacy than a desire to improve the experience of the organization. Regardless, the uniqueness of context needs to be addressed when researching the applicability and effects of an intervention.

One way to address variations in context is to apply the intervention in several different contexts. Studies II, III, and IV all occurred in different context, spanning the range from undergraduate education through to continuing professional development. Another approach is to integrate the unique aspects of a particular context in the very intervention. Adaptive Reflection appears to help individuals define what it is that is unique in their context and helps participants identify how that can contribute to the larger purpose. Studies III and IV suggest that by helping individuals identify the unique and meaningful purpose of their teaching and their courses, they find the motivation and the stimulation of creating something that makes a difference.

The use of Bloom's taxonomies may help this process. Some of the courses that I worked with found that their learning outcomes were very "high up" in the taxonomy. The initial reaction

was that they therefore would need more time for their subject. As we continued to reflect together, the participants realized that many of the lower levels of the taxonomy were probably taught in other courses. This led to an invitation for other courses to join the process, and together the teachers from the different courses were able to more clearly elucidate what was unique with their course and how the competencies they taught built upon competencies developed earlier.

5.1.6 Thoughts on Letting Change Come through Empathic Dialogue

As I have met people who have been working with change initiatives around the world, I have met feelings of frustration, anger, despair, cynicism, pessimism, exhaustion, doubt. Listening carefully I have found that mixed in among these feelings are many others, among them passion. How we listen and engage others contributes to the responses that are elicited, and the meanings that emerge.

Much of our conventional approaches to change involve selling an idea or a solution and then creating "buy-in". We do this by first emphasizing deficiencies. This is finite speech. "Finite speech informs another about the world – for the sake of being heard. Infinite speech forms a world about the other – for the sake of listening" (Carse, 1986, p. 132). As we listen, some ideas will resonate and help us learn and view reality from another vantage point. As we interact, these ideas and our interpretations of them change our understanding. It is not the clarity of the message or the communication that is of interest. Sometimes, it is the very act of misunderstanding which will lead to a new understanding (Bohm, 2004). We need to leave the realm of debate and contention. "The rules of grammar, of a living language, are always evolving to guarantee the meaningfulness of discourse while the rules of debate must remain constant" (Carse, 1986, p. 11).

Otto Scharmer describes this process of dialogue as one of letting go, and then of letting come (Scharmer, 2007). By understanding that the future is formed and emerges in dialogue among those who have the power and potential to make the change, the behaviors of those interested in leading actual change have to be radically different from those suggested by Kotter's eight steps. A few organizations have understood this and developed processes, values, and a culture which support the emergence of improvement through collaboration. Toyota has understood this (Spear, 2004). In 2005, Toyota's employees in Japan contributed 540,000 improvement suggestions (O'Connell, D. as quoted in Hamel, 2007). The surgeon and coauthor of the WHO safe surgery checklist, Atul Gawande, summarized it this way: "What the best may have, above all, is a capacity to learn and change – and to do so faster than everyone else" (Gawande, 2007, p. 227).

Part of this capacity to continually learn and change may be due to overcoming a "Not-Invented-Here" effect. As seen in Studies III and IV, Adaptive Reflection offered a safe and validating space for participants to experiment and create together. Participants also worked on their courses with the knowledge that they would subsequently be responsible for hosting the teaching and learning experiences they were designing. This process might be buoyed in some way by the "IKEA" effect in which people value that which they work to create as highly as if an expert had created it (Norton, Mochon, & Ariely, 2011).

This would suggest that the role of the leader is not to look for solutions, but to generate and develop the learning capacity of the individuals in the organization (Jaworski & Flowers, 1996). Change occurs when the individuals in an organization learn, adapt, and act together. This understanding of the transformational capacity of education, "this view of education starts with the conviction that it cannot present its own program but must search for this program dialogically with the people" (Freire, 1993, p. 105). Instead of trying to find the ideal solution, the AR process engages people in defining the ideal outcome that reflects their own individual abilities to contribute. What emerges from this are ideal and relevant learning outcomes which appear from the results of Studies II and III to be meaningful enough for participants to pursue.

In this context, the facilitator works as a coach, "helping people engage their passion in pursuit of *their* dreams and aspirations" (Boyatzis & McKee, 2005, p. 194). The leader must, just like the teacher, contribute to creating an environment which is conducive to learning and honest reflection.

> *Each new school of painting is new not because it now contains subject matter ignored in earlier work, but because it sees the limitations previous artists imposed on their subject matter but could not see themselves (Carse, 1986, p. 84)*

5.2 DEVELOPING LEARNING UNIVERSITIES

This thesis began with the reflection that universities which are centers for learning are paradoxically rarely learning organizations. Hosting some of the most creative minds of each generation is apparently not enough for spontaneous metacognitive learning to occur. Summarizing the results of Studies II-IV, I have come to understand that Adaptive Reflection can contribute to a process of learning. I have also tried to understand how this could occur by analyzing the results with the help of the literature. In doing so, I rediscovered two pioneers in organizational learning theory.

In the 1970s, Argyris and Schön became interested in understanding the theories behind human action. They differentiated between those theories that people claim to follow (espoused) and those that can be inferred from action (theory-in-use) (Argyris & Schön, 1978). Almost everyone they observed followed what came to be called Model I theory-in-use.

Model I is built on four governing variables that dictate our action strategies. The traditional approach to curriculum change as described on page 28 shares these characteristics (See Table 5). The first is to *achieve the purpose as the actor defines it*. This is exemplified by the desire to improve the position of one's own subject/discipline. The turf wars and conflicts that arise illustrate the consequences of following the governing variable: *win, do not lose* (defined by the volume, space, time or money that a course receives). The change committee often puts an *emphasis on rationality* and tries to *suppress negative feelings* through kickoffs and hype around artificial results such as combining courses in name, but without much change occurring underneath (See Figure 12). These four governing variables foster competition and advocacy, discourage inquiry, and inhibit learning. They prevent open and honest reflection about the assumptions, norms, and mental models that dictate the way we think. This makes it hard to be creative and think outside of the proverbial box. No wonder, then, that medical curricula have remained the same for so long…

TABLE 5. MODELS OF THEORY-IN-USE

	Governing Variables	Associated Behavioral Strategies	Consequences
Model I theory-in-use	Achieve the purpose as the actor defines it Win, do not lose Suppress negative feelings Emphasize rationality	**Primary behavioral strategies (unilateral advocacy):** • Control unilaterally the relevant environment and tasks • Protect oneself and others unilaterally **Underlying behavioral strategy:** • Unilateral control over others **Ways of implementation:** • Make unillustrated attributions and evaluations • Advocate in ways that discourage inquiry • Treat one's own views as obviously correct, • Make covert attributions and evaluations • Face-saving	*(Both Model I and Opposite Model I)* Defensive interpersonal and group relationships Low freedom of choice Reduced production of valid information Little learning due to little public testing of ideas Hypothesis that are generated become self-sealing Learning occurs within the bounds of what is acceptable No double-loop learning
Opposite Model I theory-in-use	Participation of everyone in defining purposes Everyone wins, no one loses Express feelings Suppress the cognitive intellective aspects of action	Inquiry (that conceals the agents own views) Minimizing unilateral control	Error escalates, effectiveness in problem-solving and execution of action decrease
Model II theory-in-use	Seek valid information Make free and informed choice Create internal commitment	Share control with those who have competence and who are relevant to designing or implementing the action. Combine advocacy and inquiry Illustrate attributions and evaluation with directly observable data Surface conflicting views in order to facilitate public testing	Minimally defensive interpersonal and group relationships High freedom of choice High risk-taking Likelihood of double-loop learning is enhanced Effectiveness should increase over time

(Created from Argyris and Schön (1978))

The traditional approach does not help surface the ambiguities and assumptions that lie behind our actions. Avoiding these discussions allows us to maintain the belief that we are in agreement, when in actuality, little change in our individual ways of thinking has occurred (Weick, 1995).

In contrast, by designing a process which helps people to actively use their previous skills and experiences and at the same time involves them in a joint creation process, we open up and lay the ground for Model II thinking through active inquiry. The win-lose (Model I) or even the win-win (Opposite Model I) paradigms become irrelevant. Thus, a structured reflective dialogue which initially might appear constraining ultimately proves liberating.

The AR process begins by sharing control with those who have expertise in the subject. This may assuage the fears faculty can have of losing control over their curriculum (Mennin & Kaufman, 1989). The facilitator driven process of inquiry creates a safe environment, a basin (Holland, 1995) framed through questions, which helps the group become aware of and reflect on their individually held assumptions – the premises upon which their thinking and actions are based. This double-loop learning (Argyris & Schön, 1978) is a prerequisite for effecting a paradigm shift, such as the move from teacher-centered to learning-centered education. Discussing their different answers, the group confronts ambiguity and can reach consensus about how they want to contribute to the larger whole. This structured reflection over the big picture is one of the three approaches suggested by Hafferty in order for curriculum developers "to squander their efforts as they participate in rituals of reform" (Hafferty, 1998).

Through a process likening reverse-engineering, the group then decides how best to get to where they want to be. The use of the matrix in the fourth step of the AR process helps participants directly evaluate what works and what does not and allows the group to make free and informed choices about what to apply from the research on how people learn. By constantly reevaluating their ideas against the big picture (step 1), the course mission (step 2), and the learning outcomes (step 3), participants are continuously encouraged to publicly reflect on and test their hypotheses.

Model II theory-in-use can explain the power of the AR approach, but it also explains why it is hard to accept the model on faith. The AR approach challenges the rational approach we have been trained in since medical school and before. From an early age, we are socialized into Model I thinking. Add to this the causal, deconstructive, linear, logical, mechanical, and positivistic approach of our science training.

Changing minds requires more than presenting teachers with a different way of doing things (i.e. in a workshop about new pedagogical methods). Mental models die harder. What is necessary is to strongly feel a need for change on both an intellectual and an emotional level (Gardner, 2004). This need for change must strike a chord that reverberates within us. Imagine that a curriculum planning group, instead of finding, designing, and imposing solutions and structures encouraged an emergent curricular learning process among administrators, students, and teachers? The course design process offers such a (too often untapped) learning and improvement opportunity (Hafferty, 1998).

Where I have had most difficulty has been with those in leadership positions who do not participate in the AR process (Study II). The irony is that Model II is readily and freely espoused, but as a theory-in-use it is rare (Argyris & Schön, 1978). Part of the reason could be that the jump from Model I to Model II requires relinquishing oft cherished symbols of success

(power and status). Another could be that in interacting with those in leadership positions, I have myself inadvertently fallen into Opposite-Model I thinking as described in Study II.

Leadership is also often trained in hierarchical command and control (Entin & Serfaty, 1999), poorly skilled at double-loop learning (Argyris, 1991), and the attempts they make to simplify the tasks for their employees often end up complicating matters (Weick, 1995). The challenge for leaders is to stop using direct supervision (first order control) or control by programs and routines (second order controls) which follow the Model I approach (Weick, 1995). They have to have faith in the power of premise controls (third order controls) to direct behavior and the actions of employees. The required leadership corresponds to the uncommon Level 5 leadership, described by Jim Collins in his analysis of companies with decades of sustained growth and profitability (J. C. Collins, 2001). It is characterized by the challenging combination of professional will and personal humility – the will to drive and instigate a project and the humility to let others develop, interpret, and realize it.

Unfortunately, neither change management nor organizational learning has devised a smooth way to transition from Model I to Model II thinking. The solution prescribed by Argyris is for management to willingly expose their own defensive reasoning and vulnerabilities as an invitation to exercise productive reasoning (Argyris, 1991). As Argyris points out, we humans have certain universal tendencies:

1. We genuinely strive to produce what we intend.
2. We value acting competently.
3. Our self-esteem is intimately tied up with behaving consistently and performing effectively.

Just as Dörner observed in how we relate to complexity (Dörner, 1996), we engage in defensive routines to minimize the chances of feeling embarrassed or threatened. Unfortunately, these defensive routines simultaneously prevent us from being able to reduce the actual cause of embarrassment or threat (Argyris & Schön, 1978). Given the findings from Study III and Study IV and the way the participants describe the experience, Adaptive Reflection could be a viable alternative: Expose participants to the creative tension between what they would like to achieve and what they are doing (Miller & Rollnick, 2002; Senge, 1990), and do so in a safe environment, where the facilitator adheres to the governing variables of Model II. Adaptive Reflection, with a simple series of powerful questions (Plsek & Wilson, 2001; Vogt, Brown, & Isaacs, 2003), could possibly offer a clear stepwise path toward deep, reflective, and productive reasoning about the design, development, and delivery of medical education. By creating a shared understanding about "clarity of purpose, expected outcomes and boundary conditions" (Balogun & Johnson, 2005), medical educators can become better at creating medical curricula that are "relevant, responsive, and responsible" (Todd, 1992).

The AR approach suggests a new role for leadership in change and improvement: Ignore the calls and resist the desire to become knights in shining armor who lead the charge top-down! Leadership can instigate, but it should do so in accordance with Model II and humbly facilitate a structured improvement process that makes use of the expertise distributed throughout the system.

6 IMPLICATIONS

6.1 RETURNING TO THE AIMS

The aim of the thesis (See page vii) was to see what can be learned by bridging the knowledge gap between the field of change management and the challenges faced in changing medical education as described in Part 1.

> *How can knowledge from change management be applied to understand and facilitate the process of improving medical curricula?*

The first part of the question was answered by applying change management theory to understand change without reform as well as innovation in medical education (Study I and Chapters 1-4). By then switching from a mechanistic to a complexity paradigm, I described how the Adaptive Reflection process was facilitated, how it was experienced within the context of an abductive action research approach. Based on the literature I analyzed how results emerged from the process in the various contexts in Study II, III, and IV (Chapters 4 and 5).

The findings have implications for how we should approach and navigate change in medical education. After addressing these, I will discuss how the facilitation of curricular change in medical education as exemplified by the AR process may inform change management.

## 6.2 NAVIGATING CHANGE IN MEDICAL EDUCATION

The application of change management theory, in particular complexity theory and strategic management theory, helped highlight the importance of paying attention to the context. One of the biggest mistakes made in change is not paying attention to and understanding the context of the change. In both simple and complicated situations, this does not matter so much. In such situations, conventional models to change do well. But in *complex* situations, they do not fare as well. The approach needs to fit the context (Heifetz, 1994). A mechanistic process implies the ability to control, but complexity cannot be mastered nor controlled because it is unpredictable. It does not follow Newton's laws. Rather complexity requires humility, an approach that likens navigation – a reflective observation of the environment and a subsequent correction in course. The experience, the curricular journey, emerges over time in interaction with the actors in the environment. This is the central idea of this thesis, the hedgehog principle (Collins, 2001): The lack of success in effectuating change and adaptation in medical education is related to an under appreciation of the interaction between process, context, and content. If the *context* of medical education is complex, then the process of change must respect the principles characteristic of such a context, and patience (Mårtenson, 1989) and courage are needed to let the content emerge through a process of dialogue (reflection and action) which leads to adaptation.

The thesis began by engaging the reader in an attempt to make explicit many of the tacit assumptions we hold about change. These are assumptions which guide and determine our behavior but often without us being aware of that. Based on the findings of Studies II, III, and IV, I suggest that AR helps participants realize what they truly seek to achieve in change and then to become aware of our self-defeating and paradoxical behaviors. For change is a paradox – it is always around us, but seemingly never there when we want to change others.

I found that the metaphor of the islands makes clear the logic of our failure in respecting complexity, our failure to match methods to context, and that by focusing on content, we are oftentimes unaware of the processes we follow. Not cognizant of the processes we follow, we often miss signals in the environment which could help us choose appropriate strategies. Like the classic saga of death coming to visit, we get surprised when it didn't play out like we thought it would, having ignored all the precursor signals that we had received along the way. In curricular change, one of the best signals we have is feelings of frustration. These can act as the signal for curriculum developers to engage in double-loop learning (Neufeldt, et al., 1996).

In comparing the conventional approach to curricular development with Adaptive Reflection, we could say that the questions addressed in the conventional approach appears to mostly be questions of *what* – "*what* to teach?" With the increased dissemination of research findings and investments in faculty development, the question, "In *what* manner?" has been added. Both of these questions are encompassed by the circle of content (See Figure 13). If we now move to the next circle, process, and focus on how we can support the process of curriculum development, we can see this process as one of learning how to adapt to the needs of the environment of which course developers are a part of (See Figure 16). In Study III, some of the participants described new ways of seeing things, of changing perspectives, of collaborating in ways they had never done before as they developed their courses.

FIGURE 16. CONTEXT, THE AR PROCESS, AND CONTENT
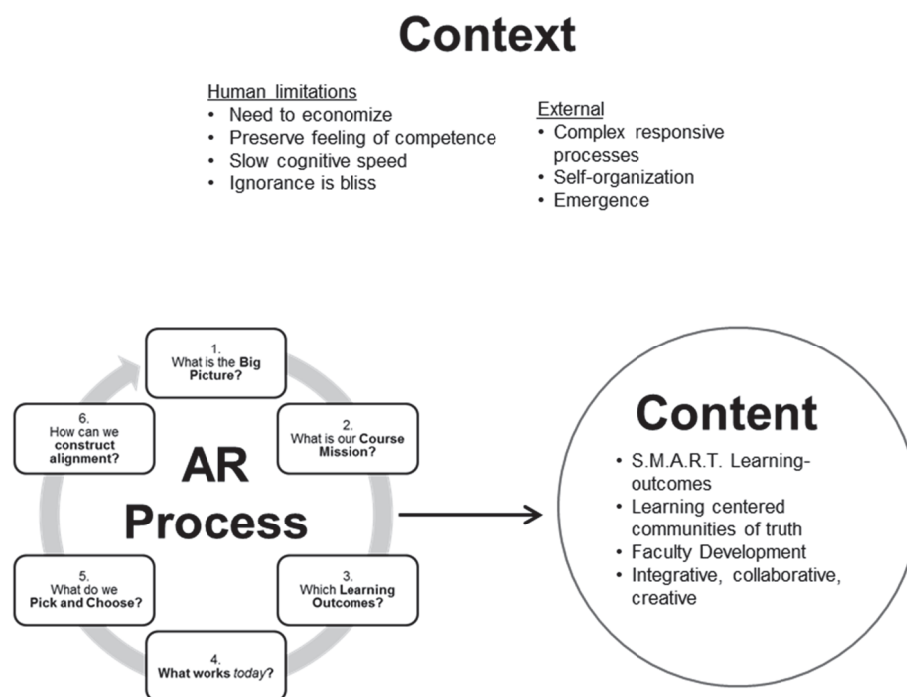
These contextual and behavioral patterns suggest that educational inertia is not the result of people resisting change as much as it is a result of teachers "mired" in the vegetation of their own islands and who have lost sight of the "big" picture that the students (who ride the boats between the islands) or the curriculum committee have about what is necessary to produce doctors with relevant knowledge. However, by choreographing conversations and orchestrating collaboration around meaningful questions – questions that mattered and require reflection and

dialogue, Adaptive Reflection can be seen as a behavior change delivery vehicle. In starting out to define competencies, participants themselves decided to change the way the taught, the way they approached teaching, and found new ways of preparing students for the challenges they will have to face in the real world. This occurred once the participants themselves saw what works and what can be done differently.

> *If the environment is uncertain, imperfectly understood and constantly changing, the product of a process of adaptation and evolution may be better adapted to that environment than the product of conscious design. It generally will be (Kay, 2010, p. 138).*

6.3 IMPLICATIONS FOR CHANGE MANAGEMENT

If 1910 was a momentous year for medical education, 1911 was the same for the field of management. The Flexner report summarized current trends and contributed to defining quality in medical education. Frederick Winslow Taylor did the same for the field of management with his book, *Scientific Management* (Taylor, 1911). In it he laid forth the argument that efficiency can be improved and "maximum prosperity" achieved through the systematic application of certain fundamental principles. Challenging many of the assumptions of the time, Taylorism has since influenced much of our thinking about management practice.

Many of Taylor's ideas are focused on optimizing the efficiency of the individual steps in the production process. This is perhaps best illustrated in Adam Smith's pin-making factory (A. Smith, 1904). By dividing and sub-dividing the pin manufacturing process into 18 steps, ten laborers could increase the pin production from 10 per day to 48 000. As Smith himself points out, the dramatic increase does come at a cost – by focusing on one or a few steps, the laborer loses sight of the larger purpose, the bigger picture. He becomes the stone cutter who only sees the square blocks and not the cathedral. She becomes the medical student who sees the diabetes mellitus and not the patient. Taylor suggests that this can be compensated by sharing (part of) the prosperity and paying individual laborers more as well as helping them develop mastery (Taylor, 1911). However, given our understanding of the importance of autonomy and purpose and meaning, paying well is not enough (Ariely, et al., 2008; Pink, 2009).

The influence of Taylor's scientific management can be seen in many of the management policies of today. As competition has become more fierce and innovative capability has become not only a competitive advantage, but for many a necessity for survival, modern (industrial era) management principles are starting to be questioned. Hamel believes that success now lies in the ability of organizations to innovate management, not just products or services (Hamel, 2007). The repeated failures of classic change management models in medical education supports Hamel's vision of the future of management.

If change is indeed local, management is about engaging employees in dialogue which encourages reflection and adaptation. Based on Studies II, III, and IV, I have recast AR based on the functions it appears to elicit among participants. Seen as a functional process, the following four phases can be described (See Figure 17). The form a framework for how managers can engage their employees:

- Reflect on what we want to accomplish (AR steps 1-3).
- Review what we do (AR step 4).

- Re-evaluate what we do, based on what we want to accomplish (Creative tension created by the matrix in AR step 5).
- Revise what we do (AR step 5 and 6).

FIGURE 17. THE FUNCTIONAL PROCESS OF ADAPTIVE REFLECTION
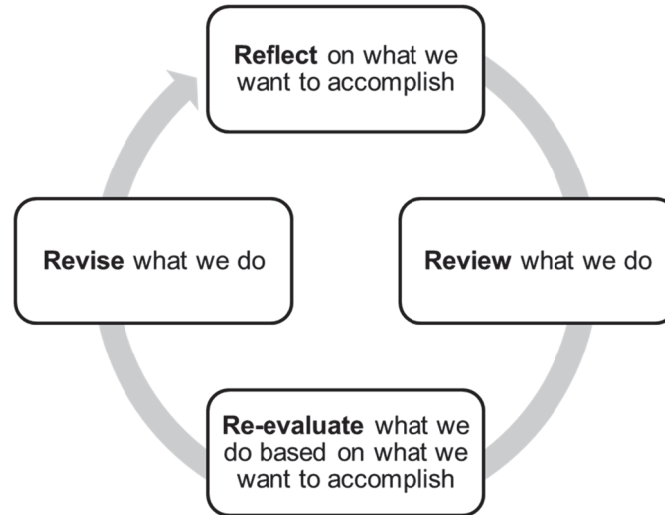
Parallels exist between the AR process and many different management models. Some of these have already been mentioned, such as Appreciative Inquiry and Positive Deviance. Another similar model that has not been mentioned explicitly is the Deming or Shewhart improvement cycle (Deming, 2000). Commonly referred to as the Plan-Do-Study-Act cycle, through successive iterative cycles, it is one of the most common tools used in quality improvement. Through small scale experimentation, theory is applied to develop a plan (P) which is then tested (D), data is collected and studied (S) and a new revised plan of action is formulated (A). The critique of the PDSA cycle is that while it is a systemic process to drive improvement, it is not clear that it increases the capacity of individuals or an organization to learn and improve.

In the PDSA cycle, change is expected to occur between the P and the D. In AR, change is not something that is expected to occur between steps; rather it appears to occur because of the steps and the tension and conflict created by the juxtaposition of the steps. Planning and doing become integrated – participants' behaviors changed as a result of the AR interventions in Study III as described by the change in the course documentation (e.g. the new course plans and schedules). These behavior changes suggest a professional development that occurs during the AR process. In other words, the AR process may encourage a learning process parallel and integrated with the change process. These phases and the findings in Studies II, III, and IV and their analyses coupled with the discussions of presented in this thesis yield the following insights with respect to change management:

1. Change through local dialogue (reflection + action)
2. Motivate through exposure of meaningful contradictions
3. Embrace a radical interpretation of complexity
4. The paradox of freedom through a controlled process

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6.3.1   Change through Local Dialogue

Many change efforts, in searching to address a gap, desire *radical change* – dramatic differences in strategies, structures, power relationships and forms of governance (Greenwood & Hinings, 1996). Faced with such a situation, it isn't surprising to find that leaders will simplify ("You are either with us or against us") or expect that the degree of change required has a direct correlation to the amount of energy and resources that need to be expended.

The "think globally, act locally" movement created awareness for the importance of local interventions. Whitehead suggested the level of the individual school (the organizational level) to be the locality to focus on (Whitehead, 1929). What Studies II and III suggest is that the AR questions provide a framework within which individuals engage each other in a group. Thus, the organization as focus for a change effort is as such uninteresting. By engaging the periphery to reflect, review, re-evaluate, and revise the change emerges from the interactions. The strategy "planning" committee, instead of planning, can engage individuals in the organization in dialogue and then captured the conversational patterns that emerge call the emergent strategy the "new (for now) five-year plan".

This is not a process of consensus building through compromise. The descriptions of the experience as stimulating, creative, collaborative, and validating suggest instead that participants instead developed a new, shared understanding of how to proceed and develop their courses. The questions appear to lead to a back-and-forth dialogue of development between the individual and the group where each forms and is transformed by the other.

6.3.2   Motivate through Exposure of Meaningful Contradictions

The field of behavioral economics is making us aware that much of our understanding about motivation, such as how we can encourage certain behaviors through the use of carrots and sticks, is not an accurate reflection of reality. This is partly due to the assumptions much of the old research is based on, and partly to the increased cognitive demands the jobs of today place on employees. Finding a sense of purpose, of meaning in what we do, is important in achieving a sense of fulfillment, whether it be in our lives in general or in our work (Frankl, 2004; Whyte, 2009), such as the scientist finding their passion in their research (Orton, 1997; Taleb, 2007).

Argyris and Schön found that what people do (theories-in-use) and what people say they do (espoused theory) differ (Argyris & Schön, 1978). To this mix, we can add the role of intention: what it is I intend to achieve with my actions. A difference in intention can lead to the same actions yielding very different reactions (Stacey, 2011). Or, as illustrated by opposite-model 1, even opposite governing variables can lead to the same outcome (See Table 5) (Argyris & Schön, 1978). By engaging in double-loop learning, the idea is to become aware of the tacit variables governing behavior and then to make corrections. This sounds great, but double-loop learning has proven difficult to encourage and adopt, even for those whose job it is to help companies become learning organizations (Argyris, 1991).

In this thesis, I have tried to encourage a double-loop learning process by looking at some of the mental models (the objectivist myth), assumptions (strategy can be planned, people can be controlled), and norms (conventional mechanistic change models, resistance to change) behind why we approach curriculum development the way we do. I have suggested that we need to move from repeated tendency to call for centralization and control (N. A. Christakis, 1995) to

seeing medical schools as organizations engaged in networks of complex responsive processes. I hold no illusion that it is possible for all the people involved to engage in double-loop learning.

The first three steps of Adaptive Reflection invite a group to define a shared mental model of what they want to achieve and why, i.e. they define their intentions. They then compare this with what they actually do in AR steps 4-6. If participants are comparing intentions and actions that carry meaning, the findings and the literature suggest that they will change their behavior if they are in a supportive environment (Study III and Argyris & Schön, 1978; Gess-Newsome, et al., 2003). Contradictions about something we don't care about won't lead to change – the contradiction is meaningful because it does not agree with your core values.

Without having to directly and consciously engage in double-loop learning, participants find themselves in an open, supportive, validating, creative, and collaborative environment as described in Study III. In this environment, the participants engage each other, evaluate their past and intended actions, surface conflicting views about the content, relevance, and educational principles and methods, and they take risks and try new techniques such as e-learning and workplace-based assessment. These are all behaviors which increase the likelihood of engaging in double-loop learning and which, according to Argyris and Schön, lead to increased effectiveness (Argyris & Schön, 1978).

6.3.3 Embrace a Radical Interpretation of Complexity

The findings from Study III and Study IV suggest a new role for curriculum design committees and change managers. Instead of working hard to find and develop solutions and then developing communication plans to explain, sell, and create buy-in, the findings support the concept of managing by walking around and integrating with staff on the floor and the periphery.

Many discussions of change are about top-down change efforts. The assumption behind this approach is that the role of leadership and managers is to plan strategy and that of the staff to execute the strategy. A bottom-up approach respects that change can occur at the grass-roots level. The danger is that management is often disengaged from the effort or not supportive. Thor suggests therefore a pincer approach to problem identification which makes use of both strategies (Johan Thor, 2007). The "grassroots" participants identify areas for improvement and narrow down the selection which is then presented to management who makes the final selection (J. Thor et al., 2004).

In Study III and IV, I found that Adaptive Reflection engages people in conversations which lead to them acting and planning differently than before. The activity of dialogue lies at the center and dialogue is an interaction at the local, not organizational or systemic level. As seen in Study II, this interaction can lead to other groups engaging in dialogue, but it is still an interaction on a local level. This obviates the need to think in terms of top-down or bottom-up.

This has slowly made me aware of the fact that I have largely interpreted complexity from a systems thinking framework. Indeed, when I began exploring the concept of complexity, I referred to it as complex adaptive *systems*. This is no surprise, in constructing our knowledge and understanding of the world we compare and integrate new knowledge with our existing

knowledge, relating to our previous understandings. In systems thinking, for instance, there are boundaries that define the system. Attractor basins form similar boundaries for complex adaptive systems.

In following the conversations that occurred, in reflecting over change with change managers, I realized how porous these boundaries were. In understanding more about the experience of the conversations and interactions as described by the participants in Study III and Study IV, I realized not only how difficult it was to define and maintain the boundaries, but also how little they mattered. What mattered most was what the participants felt was meaningful to discuss. As a facilitator, I can ask a question, I can try to spark a discussion and invite people to reflect, but I cannot impose my will only because their reaction will impact me and my subsequent interactions as new patterns of behavior and interaction emerge that I cannot predict. What this leads to are complex interactions of responses which flow between individuals and the group in the form of conversations. Stacey refers to these as *complex responsive processes* (Stacey, 2011). These interactions lead to the emergent formation of patterns of intent and of action which can be identified, described, and articulated. They can then be collected in, for instance, a strategy document with goals and methods for achieving these goals (Defining learning outcomes and course mission is the equivalent of members of an organization defining their mission and goals). If we relate this to Pettigrew and Whipp's model of the essential ingredients of strategic change, content becomes an emergent output of a process in a context.

The consequence of adapting a radical interpretation of complexity as a complex process of responses is the implication that systems thinking is an abstract exercise in theory. The goal should not be to overcome change inertia by focusing on organizational development and transformation as suggested by Whitehead (Whitehead, 1929). Instead, by focusing on encouraging local dialogue (reflection + action), the organization will adapt over time based on the interactions each individual actor has with their local environment.

Leadership therefore has a very clear reason to manage by not only walking around, but to go to *gemba* and interact with their staff. To engage in this emerging discourse, leaders need skills to encourage reflection and articulate the emergent patterns (Stacey, 2011). As described in Figure 17, this involves asking people questions so that they begin to reflect on what they want to accomplish, review what they are doing, re-evaluate what they are doing based on what they want to accomplish, and then revise what they do.

6.3.4   The Paradox of Freedom through Control

The doom loop of change (See Figure 12) describes one of the consequences of a command-and-control approach to leadership. Study III suggests that a controlled process can create an environment conducive to collaboration and creativity. This paradox of freedom through control can be explained by locating the locus of control in the Pettigrew and Whipp framework. In the doom loop, the change managers focus on controlling the content and utilize behavioral strategies similar to those of Model I and Opposite Model I theory-in-use. The focus of control for the facilitator in Adaptive Reflection is on the process. The functional processes of AR as described in Figure 17 are much more similar in intention and in behavior to the Model II theory-in-use. The implication for change management is therefore to focus on facilitating the process rather than controlling the content of the change.

6.4 CONCLUDING REFLECTIONS

In Part 1, we reflected over many of the challenges an effective change process must overcome. Rather than focusing on these challenges, we can look for the many (latent) strengths and possibilities that coexist in close proximity. One way to identify these strengths and possibilities is to begin by looking away from yourself and at the others around you. Think of the role from the prologue that resonated with you. If you had that role, who would you talk with and what could you ask them to find the strengths and possibilities for driving change? How could you help them reflect on where they want to go (their dreams and visions) and what they are doing today? And how will you or they know when you have arrived? In other words, what are the questions we can ask that spark change?

"What will undo any boundary is the awareness that it is our vision, and not what we are viewing, that is limited" (Carse, 1986, p. 75). Realizing this is essentially a question of triple-loop learning, of seeing our actions and our assumptions in a larger context. It is opening up to a continual reflective process of asking ourselves if and how our vision is affecting our sight.

Change does not have to be as hard to achieve as we often believe, mostly because it is constantly occurring. Change is ubiquitous. At least some of the inertia and resistance that change agents experience is most likely due to the tendency to force our ideas and solutions about what should be changed on others. What I have discovered in this thesis – what has changed me – is the realization that we as individuals more often than not genuinely strive to accomplish meaningful things. Realize this and accept that what some would consider irrational behavior often is quite rational if seen from another position. We do not have to experience change as a loss. If we recast change as an opportunity for learning and improvement, and if we then apply what we know about learning, reflection, and dialogue, improving what we do can become a stimulating, engaging, and validating experience worthy of our pursuit.

What we are left with is a conclusion so simple that it at first seems absurd to have spent all this time and all these pages to arrive at until we realize that it is a simplicity on the other side of complexity. In all its "simplexity" (Kluger, 2008): Through meaningful interactions we can transform medical education to meet the needs of our patients today and tomorrow. We can do that by working to increasing the conversational surface area between us by asking sincere, reflective, and powerful questions that invite us all to question why things have to be the way they are. So,

- Make use of the movement that already exists in the context and can be found in the periphery.
- Approach change as a process of reflection through dialogue (reflection + action) with others.
- Use powerful provocative questions to encourage reflection and the honest exposure of what works well and what can be improved through the juxtaposition of intent with current action.
- Allow content and change to emerge through collaborative reflection.

Adaptive Reflection provides structured questions which invite the passive audience and the already moving actors to engage each other in a dialogue about meaningful change. When that

happens, inertia has been overcome. As one student said in Study IV, "it isn't my way that is best, but ours."

APPENDIX 1: MATERIALS AND METHODS

We have to remember that what we observe is not nature in itself but nature exposed to our method of questioning. — *Heisenberg*

What makes good research? The answer to this question is often determined by the research paradigm that the researcher identifies with. For a positivist quantitative researcher, the answer would include the concepts of reliability, validity, and generalizability. For the qualitative researcher, the answer would include questions about credibility, dependability, and transferability (Lincoln & Guba, 1985). Regardless, it is necessary to clearly describe the research design, approach, data collection, and data analysis in such a way that that the reader can draw their own conclusions about these questions.

A.1.   METHODOLOGY

As is suggested by double-loop learning, our understandings are colored by our paradigms, assumptions, and opinions. In this thesis, I have adopted a social constructivist epistemological perspective. According to this paradigm, knowledge is seen as something that is constructed through interaction with others as a way to understand and explain our perceptions, norms, social experiences, and their meanings. Due to the complex nature of the context of the studies, and the resultant lack of simple causal relationships, I chose a qualitative approach and focused on understanding the experience of a change process.

A.1.2   Action Research

Studies II, III, and IV occurred within the framework of an action research approach. Action science is based on the idea of incorporating first-person data in the form of observations, conversations and experiences to enrich the traditional third-person approach to research. It allows the researcher to test their knowledge and working hypotheses as they proceed, to "generate knowledge about a social system while, at the same time, attempting to change it" (Fulop, 2001, p. 173). The researcher becomes a part of the social system and works for and together with participants instead of purely performing research on them. The result is both the generation of a specific local theory that is tested and modified through action and a more general theory based on the series of individual projects (Gummesson, 2000).

In trying to understand an organization and its individual members, one can study how it has adapted to and adopted a change based on a conceptual analysis of secondary data as was done in Study I. The action research approach provides another alternative, as summarized by Starbuck et al., "If you want to understand a system, try to change it" (Starbuck, Holloway, Whalen, & Tilleman, 2008). Since it was first described by Lewin (1946), action research has evolved to include a variety of methods, definitions, and uses (Fulop, 2001). These include democratizing the research process by involving the study subjects in the analysis of the data which can lead to increased levels of competency and greater capability. These tendencies can be seen in Studies II, III, and IV.

Action research has been used in a number of fields, such as social and community action, organizational development, transformations of educational organizations and practices and methodological and theoretical analysis of social science research (Peters & Robinson, 1984).

Analyzing the application of action research in these fields, Peters and Robinson (1984) identified three minimum requirements:

1. Involvement in change: Research directed towards improvement of an existing social practice.
2. An organic process: Consisting of a systematic series of cyclical or iterative stages involving fact finding, reflection and planning, strategic action, and evaluation.
3. Collaborative: Research is a joint cooperative endeavor among participants.

Otto Scharmer, in his book, *Theory U*, tries to capture the essence of this approach with three quotations from some influential practitioners of the approach in the field of organizational development (Scharmer, 2007, p. 98).

> *I know that I know when my knowledge is helpful to the various clients and practitioners in the field. – Ed Schein*
>
> *I know that I know when my knowledge is actionable – that is, when I can produce it. – Chris Argyris*
>
> *I know that I know when I develop the capacity to create the results I really care about – when what you know allows you to create. – Peter Senge*

Schein and Senge's quotations refer to the value that the knowledge gained has for those in the research project (the "clients") and the researcher. As action research was applied in this project, the purpose was not only to develop my knowledge as a researcher and to spread that knowledge in the form of articles, but to develop the knowledge of the participants and intentionally help them in their professional development at teachers. Argyris comments on the ability to make use of the knowledge in practice. Senge adds the dimension of the researcher being able to develop a capacity, i.e. to learn and develop a consistency in action which leads to the ability to create and develop further. Applied in the context of this thesis, *I know that I know when I am able to consistently create together with various actors results which they value using the same AR process and irrespective of context.*

I had as my own meta-model Kolb's experiential learning approach, described in Figure 5 (Kolb, 1984). By facilitating a group of participants through the AR process (concrete experience), I could observe the results and identify areas that needed to be improved (reflective observation), both in terms of the results and in terms of the AR process. Then I could consult the literature (abstract conceptualization), modify the process based on new insights, and then test the modified model (active experimentation).

This experiential learning based approach to action research necessitated the use of an iterative process between theory and action. An *abductive (Peirce, 1955) action research* approach was therefore adopted. Abduction can be seen as the inverse of deduction (Liberatore & Schaerf, 2007). In contrast to the more common approach of generating and then testing a hypothesis, the action research approach allowed me to observe the effects the facilitation strategy had on group meetings and to make alterations in the process in order to help the group move forward, thus maintaining a client focus. The abductive reasoning component of the approach refers to the back and forth movement between empirical data and theory with the purpose of identifying and informing the process and anchoring my understanding based on the most plausible theoretical explanation for an observed social phenomenon (Zanuttini, 2003). The corollary in

medicine, referred to as *ex juvantibus,* is to diagnose a patient's illness by how they respond to the treatment. So, through several iterations of the same facilitation process, in similar and diverse contexts, it becomes possible to over time generate a set of explanations by consulting with the literature whose effects include and can explain the different manifestations observed.

A.1.2.1 Complexity thinking as a framework for analysis

Complexity thinking provided the underlying framework for much of the analysis of the experiments. I have found it a challenge to describe the application of a complexity understanding in the structure of an article. I think part of this has to do with Kuhn comment that, "When paradigms enter, as they must, into a debate about paradigm choice, their role is necessarily circular. Each group uses its own paradigm to argue in that paradigm's defense" (Kuhn, 1996, p. 94). Instead of trying to fit complexity thinking into systems thinking, I adopted a more radical understanding of complexity as a paradigm of understanding rather than a paradigm for prediction (Stacey, 2011). Due to the different degrees of interdependence between actors, not all interactions can be accounted or controlled for. Moreover, this interdependence suggests that the boundaries that are needed in order to delineate a system cannot really be said to exist. This has implications for the researcher in that it is questionable if the researcher has the possibility of ever being able to leave the system and observe objectively it from the outside. Thus, the researcher is always part of what is occurring. The balcony metaphor (Fisher & Ury, 1991) which I employed as I facilitated by continually reminding myself to "climb up on it" has hopefully contributed to the distance necessary to reflect on and in action (Schön, 1991). I also adopted a "reflective stance" (Neufeldt, et al., 1996). This involved the express intent to reflect on my actions and observations, an active process of inquiry using Kolb and abduction, an openness to a variety of alternatives, and a vulnerability and humility to recognize what I do not know and to try out new ideas.

A.1.2.2 How the structure of this thesis reflects the action research process

In Swedish, the thesis is referred to as the "cover story". Its purpose is to explain (cover) the links between the different studies. The story describes the process of the research project. In this sense, the thesis can be seen as evidence for the development of the researcher. I have sought to use the story to demonstrate the research process itself, the abductive action process that in which the four studies occurred. The naming and the behavior of the actors, the content and its historical origins, the process, and the context it occurs in are described, reflected upon, and then analyzed based on the literature for the purposes of defining possible alternative approaches.

There is a growing understanding about the importance of metaphors and storytelling and about what it is that makes story telling both appropriate and functional in purpose (Denning, 2011; Heath & Heath, 2007; Lakoff & Johnson, 1999; Morgan, 2006; Stacey, 2011). The narrative approach to research has been suggested by Stacey as one fitting well with the context of complexity (Stacey, 2011). The descriptions are not "made up", they are not "just stories" but are instead my attempt to relate the data in the forms of the observations and material I have collected to the literature.

The conventional IMRaD structure, while appropriate to the research article and the four individual studies, can hinder a presentation of the human subtleties of interdependent

interactions which form the context of change in medical education. With this in mind, I chose to develop the structure for this thesis by building off Pettigrew and Whipp's understanding of strategic change, Kolb's description of experiential learning, and my own learning through the action research approach. I have attempted to write in such a way that the reader will be able to come to their own decision about the plausibility of my findings, their utility, and how connected they are with what really happens "out there". The caveat is that how the reader makes sense of the findings, their chronology, and analysis can differ based both on the context and state of mind of the reader as s/he reads as well as the author as he has written. As suggested by Weick, how we interpret the past is influenced by how we are experiencing the present (Weick, 1995).

A.2 METHODS USED IN STUDIES I-IV

The research designs and the methods used in the four articles that form the empirical basis for this thesis are presented in Table 6.

TABLE 6. METHODS USED IN THE FOUR STUDIES

Study	Design	Context	Data Collection	Length of intervention	Analysis
I	Conceptual analysis of a single case study	Linköping Health University Medical School	Nine peer-reviewed articles about the medical school obtained through a PubMed search; Cross-checked search results and obtained additional information to reconstruct the case from participants	NA	Case reconstruction; Informant validation; Conceptual analysis using the Blue Ocean Strategy framework (W. C. Kim & Mauborgne, 2004; W. Chan Kim & Mauborgne, 2005)
II	Explanatory case study (Yin, 2003) of an Adaptive Reflection curriculum change intervention	Three courses at Karolinska Institutet undergraduate medical school part of the same course committee	11 (+3) participants; Meeting minutes, photos, personal process and reflection notes, meeting output and final outcomes; observer notes	10 meetings 26 hours	Process notes and impressions compared; Case reconstruction; Interpreted from a complexity paradigm with focus on the process in its context
III	Explanatory multiple case study (Yin, 2003) of two 3-day Adaptive Reflection curriculum change workshop interventions	Four national residency training courses in psychiatry developed at a conference center as part of the METIS project	17 post-intervention interviews of 23 participants (8 women, 9 men, aged 32-74, representing all five categories of participants), "Hopes and fears" (group comments), Worked well/Do differently feedback notes, pre/post intervention curriculum plans and schedules	Two three day interventions	Thematic analysis (Braun & Clarke, 2006), document analysis, presented using SQUIRE-framework (Davidoff, Batalden, Stevens, Ogrinc, & Mooney, 2008; Davidoff, Batalden, Stevens, Ogrinc, & Mooney, 2009; Stevens & Andersson-Gare, 2007)
IV	Evaluation of undergraduate nursing students' experiences of using Adaptive Reflection	Three continuing nursing education e-learning based courses at Danderyd Hospital AB created by undergraduate nursing students at Karolinska Institutet	Student self-reflections on the learning process (group discussion notes and individual logbooks); 13 of 13 (all women) student self-assessed outcomes surveys; responses on the courses from 2 clinical nurse educators	5 week course involving 29 hours total teaching time	Content analysis of student self-reflections (Graneheim & Lundman, 2004); learning outcome evaluation and quality assurance through student self-assessed outcome achievement surveys and perceived relevance of the CNE courses by the clinical nurse educators

In Study I, although it is not explicitly stated, the secondary sources used to construct the case were peer-reviewed descriptions of the changes made at Linköping's medical school. Aspects of the case as well as the entire case description were then validated by informants who had been active and were currently active in medical education at Linköping Health University. Since the

article was published, I have reviewed other data sources including books and pamphlets about the process. In reviewing these, two aspects have emerged. The first has to do with Linköping's ability to reconstruct the market boundaries. What is not so clear in the articles is that problem-based learning had been tested by the nursing program prior to its adoption by the medical school. This most likely had some influence on the medical school's adoption of PBL. The other was that the process took seven years which was even longer than I was given to understand from the peer-reviewed articles (Wålinder, Boman, Stenke, & Hälsouniversitetet i Östergötland, 1996). This follows the same time frame as that of Harvard's "New Pathway" which also took seven years (Tosteson, et al., 1994). However, this information does not diminish the conclusions of the study which were to explore how the university came to innovate through an analysis based on a strategic management framework. It reinforces the importance of collaborating with strategic groups across the industry. That the process took seven years should also give pause to those looking for shortcuts to radical change.

The purpose of the data collection in Study II was to be able to describe the AR process, its output, and the reactions of the participants to the different AR steps. Data collection was divided up into two simultaneous data collection process "streams". The first stream focused on content and output with the purpose of helping the groups develop their product (the three courses they were revising) involved collecting data in form of meeting notes and photos. These summarized the content and output of the discussions and what was written on the whiteboard by the facilitator and the participants. The data from AR step 1 included all the words and phrases written on the post-it notes, the groupings into columns, and the heading of each column. These were recorded in an MSWord table and returned to the group before the next meeting. This table was used in AR step 2 to define the course mission which was then added to the top of the table from AR step 1. Based on this new document, participants defined learning outcomes which were then fed back to the participants in the form of a matrix which was created by the participants by adding information from the course schedule. The matrix was copied from the whiteboard into an MSWord table and fed back to participants to inform their discussion on constructive alignment, teaching approaches and methods, and examination forms. It is important to note that the data returned to the participants was neither altered nor restructured from how it emerged and was seen at the close of the prior meeting. In this way I departed from one possible role as an action researcher – to analyze and interpret data with the purpose of feeding back solutions to the group (Grieves, 2010). In the AR process, data collection and analysis are done by the group in response to the questions asked by the facilitator (See

Table 3).

The second data collection process stream in Study II focused on understanding and improving the AR process itself to improve the efficiency of the data output and the reflection and learning process of the participants based on the data output. I collected data from each meeting in the form of process notes with a focus on group dynamics and participant reactions. I also recorded any deviations I made from the AR script that had been developed and piloted in previous AR workshops (This script is the basis for the PowerPoint presentation in Appendix 3). To improve the credibility of the data, i.e. our ability to account for and capture multiple experienced realities, the project coordinator also kept process notes. She had experience from leading large international projects for a multinational company and had the competency and requisite skillset to observe, follow, and evaluate a process. Based on our notes, we debriefed after the meetings and looked for patterns of behavior. The patterns that emerged from our comparisons were discussed with colleagues versed in facilitation and psychology. By combining these discussions with the content and output data I could better understand, identify, and label the processes that were occurring. It also helped me identify relevant literature and research fields from which I could inform both the developing case description as well as my interpretations of the ongoing processes. This can be summarized as an abductive iterative process of experience and observation, reflection, review of theory, adjustment if and where necessary, which then informed a new facilitation experience.

A.3   METHODOLOGICAL CONSIDERATIONS
Meyer suggests that four potential limitations need to be addressed in action research (Fulop, 2001). These are concerns about:

1. Assessing validity and reliability (credibility and dependability)
2. Exploitation of participants
3. Generalizability (transferability) of findings
4. Lack of theory development

I shall address each limitation in turn.

A.3.1   Assessing Validity and Reliability
Due to the qualitative nature of the studies, this limitation is best answered by looking at the issues of credibility and dependability (Lincoln & Guba, 1985).

A.3.1.1 Triangulation
Triangulation involves the use of multiple sources of data (time, space, and persons), researchers, methods, and theoretical schemes in order to minimize the risk of bias by relying too heavily on a single data set. Below, I will reflect on aspects regarding data and methods.

A.3.1.1.1   Data Triangulation
In Study I, data came from peer-reviewed secondary literature based on a Pub-Med search which was then checked against a list of publications obtained from Linköping's former program director. The literature was used to reconstruct the case which was then complemented by specific questions to key actors. The case description was then validated by key informants. In Study II, data for the case reconstruction came from the material that was produced at the meetings, photos, and process notes from both myself as facilitator and an observer who kept a

meeting protocol as well. This was complemented by literature. The data in Study III came from 17 interviews, a "Hopes and fears" activity, anonymous "Worked well/Do differently" feedback, material produced during the different steps of the intervention, and pre-intervention course descriptions. Study IV had as its data sources student self-reflections consisting of group discussion notes and individual logbooks, self-assessed learning outcome surveys, and feedback from two clinical nurse educators.

There is an increasing understanding for the role that context plays in terms of strategic change (Pettigrew & Whipp, 1993). An intervention is influenced by, dependent on, and in turn influences its context (Ray Pawson & Tilley, 1997). Given a complex environment, understanding the individuals and their interrelationships becomes even more important (Nicholas A. Christakis & Fowler, 2010; Stacey, 2011). Pawson and Tilley (1997) stress the importance of describing the capacities of individuals, interpersonal relationships, the institutional setting, and the wider infrastructure when evaluating interventions.

I began this project analyzing change attempts at a world-renowned medical university in Stockholm, Sweden. At the time of Study II, Karolinska Institutet (KI) was generally considered to be one of the more conservative of the six medical schools in Sweden and thus representative of the "traditional" or "established" medical school (Mårtenson, 1989). Originally founded in 1810 by royal decree to meet the need for barber-surgeons during the Napoleonic wars, research quickly became the dominant activity (Lagerkvist, 1999; Rocca, 2006). This relegation of education from the center to the periphery mirrors a general trend among academic medical centers to focus on research and specialized clinical care (Korn, 1996; Pizzo, 2008; Watson, 2003). This focus has helped place KI among the top ten universities in Europe (Forslöw, 2009). The university offers over 20 undergraduate and graduate programs, all within the health professions and health sciences. Understanding this context was essential for being able to explain the results and outcomes of Study II. It also helped me to more quickly understand the context of the Linköping Health University in Study I.

To avoid an undergraduate and medical school bias, I studied the application of the AR process in three different contexts: undergraduate medical and nursing (Study II and Study IV), graduate psychiatry specialist training (Study III), and continuing nursing education (Study IV).

The understandings of and experiences from working in all of these contexts were complemented with and contrasted to documents, articles, books, conference presentations, and formal and informal interviews and discussions with students, faculty, and administrators at meetings in Europe and the United States. The literature offers many descriptions of change processes in medical and health professions education. In Part 1, I have attempted to describe the content, process and context at a level of abstraction that echoes with familiarity in the ears of those engaged in curriculum reforms abroad and with that reported in the literature. I have included descriptions of the roles and motivations of the individual actors in the form of the seven introductory role descriptions. Historical and socio-political descriptions of the context were presented in Part 1 and their consequences reviewed in chapters 4 and 5. These were included to afford the reader the opportunity to gauge my understanding of the context and the change processes.

An overview of the different methods used in the individual studies is provided in Table 6. The table illustrates a deepening exploration of the question of change in medical education and of how AR is experienced and can be understood from different perspectives. This understanding was developed by using methods appropriate to the research questions. A conceptual analysis of a case reconstruction based on secondary data sources complemented by informant validation helped me understand the context and process of a specific innovation (Study I). Based on the explanatory case analysis of Study II, I was interested in looking deeper at the experience of the teachers (Study III) and used therefore a thematic analysis of semi-structured interviews (Braun & Clarke, 2006; Kvale, 1996). In Study IV, I looked at how the AR process was experienced by students in the context of a course on education, leadership and informatics and in a situation where power gradients are turned upside down. In keeping to the theme, it was a natural fit to involve the former students in a content analysis of their own reflections (Graneheim & Lundman, 2004). Having better understood that the AR process is effective in helping participants develop courses and having understood more about how the process is perceived, a mixed methods approach including both qualitative and quantitative data such as survey results is of interest for subsequent studies, especially to look at post-intervention effects and for comparative studies.

A.3.1.2 Reflexivity

In the beginning, I found it necessary to view the action research as two parallel and interdependent streams. One involved the development of the "product," i.e. a new teaching and learning activity or course. The other stream involved a meta-learning about the AR process – how it worked, how it was experienced, and how it could be improved. This allowed me to both immerse myself in the facilitation while simultaneously maintaining a continual critical and skeptical process of review.

There is a chronological aspect of the research and the journey I have made. Through the use of examples and reflection as well as metaphors and anecdotes from the literature, I have attempted to both describe and help the reader understand the paths I have explored. There is also the drama and tension in the context, between the actors, and expressed in the content. As a researcher, it is important to understand this drama, to see it, to meet it with empathy while maintaining a professional integrity – the dispassionate objectivity we traditionally subscribe to the researcher.

The repeated abductive iterations were a way to ensure that I as a researcher strove to maintain an open mind and avoid a confirmation bias. I used the evidence from the individual meetings, from the analysis of the qualitative data, and through continual review of the literature to constantly and in a disciplined fashion "challenge the validity of prior assumptions" (Kay, 2010, p. 176).

In exploring different approaches to facilitation, I came across the work of David Bohm by way of Peter Senge (Bohm, 2004; Bohm & Nichol, 2004; Senge, 1990). Bohm suggests the importance of being aware of impulses and thought patterns based on our assumptions. It therefore behooves the researcher not to try to change anything, but rather to become aware. This might sound paradoxical, especially in a thesis about change, but were I to begin to

consciously manipulate the environment, my findings, the process, I would lose not only my integrity as a researcher, but end up following the governing variables of the model 1 theory-in-use. Aware of the impact of the hidden curriculum, I had to be conscious that I exhibited the same behaviors as I was hoping to encourage and engender (Hafferty, 1998).

To no small degree is an action research approach dependent on the judgment of the researcher which is the result of experience, knowledge, and skill. By becoming aware of my own reactions, I could name them and let them go (Bohm, 2004). I could also discuss the reactions, my own and those of the participants, with colleagues versed in psychology and facilitation. By becoming aware of the passions motivating others, I can better understand the context. And by becoming aware of the tensions in the drama, I can better understand when this tension is destructive and anxiety provoking and when it is creative and transformative. This was of particular importance in the beginning of the project, prior to the stabilization of the AR process as applied in Study II. In order to successfully follow the model, I had to "believe" in it. At the same time, I had to be critical and skeptical, constantly observing and questioning what I was doing as I was doing it. To handle these conflicting "interests" I had to be aware and wary of my own intentions – was I focusing on helping a group move forward in the process or was I focusing on testing and improving the process? I struck a balance by moving at what is referred to as "tactical speed" – slow is smooth and smooth is fast. This allowed me to continually engage in reflective double-loop learning, in on and for action (Schön, 1991).

In Study II, I describe how my own failure in fully understanding complexity may have contributed to preventing the spread of the AR approach. I became aware that the paradigm shifts that Thomas Kuhn wrote about are difficult to fully integrate. So, while I might agree with the utility and appropriateness of the complexity paradigm on a detached logical plane, on a behavioral plane, I was evidently still expressing myself with a Newtonian mechanical paradigm.

In Study III, an interviewer external to the project but familiar with the AR approach was another way to mitigate impact on the interview data due to the relationships I had established with the participants during the intervention workshops.

Much of my understanding as an action researcher of the decision, implementation and change processes described in this thesis are influenced by my preunderstandings as well as the understandings and experiences I had working at the institution I was researching (Gummesson, 2000). During the course of my time as a medical student Karolinska Institutet, I sat on many of the committees that deal with educational issues for the medical school as well as three years on the board of education. I participated in three groups who have come with proposals for new curriculum plans for the medical school (coauthoring two of them) and consulted on a fourth. I sat as secretary general twice for the Organization for Medical Student Association Chairs in Sweden (OMSiS) as well as medical education director for the two largest medical student organizations in Europe. As part of one of these projects, I coauthored the first official statement from the medical profession on the Bologna Process which afforded me the opportunity to meet people from all over Europe and discuss as well as debate the topic. As a research student at the Department of Physiology and Pharmacology, I held training sessions for the entire staff of the neurointensive care unit in clinical microdialysis. As a teacher at the Medical Management

Centre, I have designed and taught courses in communication, crew resource management, e-learning, education, group dynamics, health care organization and management, informatics, leadership, patient safety, project management, and research management. This has given me the chance to teach and test ideas and aspects of AR at the undergraduate, graduate, post-graduate, faculty development and continuing education levels for several different programs. This experience was useful when I participated in drafting the educational strategy document for the Karolinska Institutet. As a researcher at the Medical Management Centre, I have had the opportunity of designing research projects and coauthoring studies and grant proposals for projects highlighting many different aspects of learning in health care. In all these projects at all these levels and in all these roles, I have had the opportunity to work closely with an incredible number of competent and passionate colleagues. These experiences have all contributed to deepening my understanding of the challenges, the context, the content, and the process of improvement in health professions education.

A.3.1.3 Member Checks

In general, the data collection process during the AR process involved collecting the results from every meeting in the form of digital photos and meeting notes which could include Post-Its, flip-chart papers, scribbles, matrices, and MSWord documents and then returning these to the participants prior to or concurrent with the next meeting. Every meeting then began with a quick review and reflection over the process up to that point. As the groups progressed and as the possibility of integrating an electronic learning management system became a reality, much of this work was eventually done by the groups themselves. Attempts were made to integrate this data as seamlessly as possible in the process, such as letting the Post-Its remain on the whiteboards and then typing them into an MSWord table with similar colors. Participants could then see both the analog and the digital representation of their work. The Worked well/Do differently feedback and the "Hopes and fears" data (Study II, III, and IV) were also openly shared with the participants because this information could be used to improve the process. In this way, the categories of data in the courses, the emergent patterns, and the conclusions were not only recycled back to the participants, but this was done in real time without any intervening steps involving the process facilitator.

However, in keeping with the idea of two streams, the personal reflection notes made after "pivotal" meetings as identified by the facilitator and the interviews were only shared with the coauthors as these were necessary for the meta-learning process and not essential for the "product development" stream. In Study III, the article was reviewed by one of the project leaders to improve trustworthiness of the analysis. In Study IV, thirteen of the coauthors were the former students who led the first three steps of the AR process with the registered nurses and then completed the rest as part of a course I and the fifteenth coauthor were teaching at the nursing school. This provided a unique opportunity for an emic approach to data collection and analysis. The strength is that the former students were able to pick up on latent meanings in the analysis of the qualitative data. The limitation is that they might not have the necessary distance to the data required for an impartial analysis. I tried to meet this limitation by making sure that each group of students identified meaning units and coded another group's reflections. As first author, I oversaw and checked each step and then discussed the categorization and reached a negotiated consensus with four of the coauthors.

98

A.3.2 Exploitation of Participants

Action research entails its own ethical considerations. While it is intended to be collaborative, there are power gradients at play, especially in hierarchical settings such as in health care (Fulop, 2001). In Studies II and III, I was younger than the majority of participants, with a comparably lower rank in the hierarchy. I found that an introduction which imparted credibility at the start of the process made a difference. In Study IV, I began as one of two teachers, i.e. at the opposite side of the power gradient. Here it was important to diminish this gradient by treating the students as knowers and colleagues (See Figure 4). We began by welcoming the students as you would do at any professional meeting, greeting each of them and shaking their hands. But regardless of where I was in the power gradient, I worked to continually reinforce a collaborative community of learning by avoiding behaviors which would reinforce the objectivist myth and by continually repeating the questions of the AR process.

While action research is performed *with* and *for* the participants, there remain aspects of research *on* the participants (Meyer, 1993). In the meta-learning stream, this was very much the case. Throughout the different projects, I have strived to serve the good of the whole organization, treat participants as the ends (i.e. not the means to research findings by viewing participants as subjects or resources), and acted to minimize power gradients between participants in the research setting (Löwstedt & Stjernberg, 2006). At its extreme, change can be perceived as threatening and anxiety provoking which may lead to expressions of emotion directed towards other participants, individuals or organizations external to the participants, or at the researcher. All of this must be met in a professional, calm and competent manner. This behavior is in agreement with the democratic philosophy of action research to promote "individual welfare in a humanistic way" (Bargal, 2008). It is also important that the project be externally reviewed by a body such as the Swedish Ethical Vetting Board which concluded that the project did not involve data sensitive enough to require ethical approval.

A.3.4 Generalizability of Findings

This refers to the transferability of the findings from the context studied to other contexts. It involves studying and understanding the particular and then abstracting from that particular. In order to do that, the descriptions of the cases need to be rich in detail, accurate and as much as possible impartial. It also must be presented in a fashion that makes it accessible (Fulop, 2001). Member checking plays an important role in ensuring an authentic description of the case as does the use of triangulation and understanding reflexivity. At the same time, many of the insights and analyzes are based on making explicit tacit understandings as well as present new alternatives to understanding familiar phenomenon such as the use of the complexity paradigm. This can be problematic (Argyris & Schön, 1978; Schön, 1991). It can also, as described in the parable of Flatland, wake strong and vivid reactions (Abbott, 1885). In the end, as per usual in qualitative research, the relevance of the findings and their application in other contexts lies in the hands of the reader.

The data does not allow for generalizations to population. However, the action research approach does allow for the possibility to make theoretical generalizations from the cases by identifying general principles and variables and developing theoretical explanations for their relationships (Sharp, 1998). The explanation can then be tested against empirical observations.

It is also possible to determine the transferability by making the presentation of the action research process as transparent as possible. This is another reason for the structure and presentation of this thesis.

A.3.5 Lack of Theory Development

Due to the focus on the needs of the research "clients," action research has been criticized for not presenting information of value to a wider audience due to the focus on "action" (Fulop, 2001). By combining the analysis of several different interventions, a cross-case analysis, I have tried in chapters 4 and 5 to arrive at more rigorous conclusions. I have tried to further strengthen the findings and the conclusions by continually comparing and further illustrating the observations with examples and theory from the literature.

A comment needs to be made on the danger inherent in using different research domains and combining them. Traditionally, a researcher chooses one road and keeps to that road, learning the methods and language of the chosen research field. This project originated with the desire to look for an evidence base outside of medical education for how to develop effective improvement processes for application in health education development. Change became the phenomenon of study. Eventually I became aware that many research fields study the same phenomenon, but because they describe it in different ways, using their own domain specific language there are few who make the connections. I suspect that this is partly a function of the need to create a communal identity. I did notice that complexity science differs in this respect from many other fields in that its members have actively sought out researchers from many different domains and gathered them to talk about and identify common patterns (Waldrop, 1992). In bridging roads, it can be tempting to pick (consciously or not) that which fits with and reinforces one's current paradigm. The application of complexity thinking in management is a very good example of this (Stacey, 2011). In trying to grasp and summarize a field, there is a very real danger of abstracting to a level of inconsequence and finding connections where they in fact do not exist. I have tried to avoid falling into this trap by immersing myself in the context of medical and health professions education, as a student, as a member of several committees, as a teacher, through involvement in national and international discussions, but most of all, through a continual reevaluation of what I know by actively interacting with others and continually asking questions and learning.

A.4 QUESTIONS FOR FURTHER EXPLORATION

During the time I have spent compiling, (re)writing, and (re) editing this thesis three questions have emerged which I believe bear further exploration. The first has developed out of a realization that many teachers lack a reliable and consistent approach to quality improvement. The idea was first tested in Study IV and has now been expanded in the METIS project described in Study III. In my own teaching I began to complement the standard end-of-course evaluation questions with a question for each learning outcome asking the participant to state how well they feel they have achieved the learning outcome. It was answerable with a six-point Likert scale. However, by replacing the scale with the revised Bloom's taxonomy, a more actionable response may be gained. This remains to be tested beyond a pilot project.

The second question has developed out of a reaction from a participant at a workshop who had done her thesis on interprofessional communication in health care. In the middle of the workshop she backed away from the group and stood still, watching everyone. As it turned out, she had become fascinated by the dialogue patterns she was hearing. This made me wonder if a method such as discourse analysis (Marshak, 2005) would be applicable to understand the processes of interaction and the possible creation of shared mental models during the AR facilitation as well as better understanding possible couplings with complexity.

One of the most striking findings from Study IV and which was echoed in Study III was the increase in self-confidence. This has raised a question about looking further into the development of self-efficacy during the course of the AR process.

APPENDIX 2: SETTINGS IN WHICH AR HAS BEEN APPLIED

Parts of the process model or the process model in its entirety were developed, tested, or corroborated with several different courses at different educational levels and in different course development settings.

TABLE 7. SETTINGS IN WHICH ADAPTIVE REFLECTION HAS BEEN TESTED, DEVELOPED, AND APPLIED

Settings	Course development workshops	Year	Type/Arena	AR steps
Karolinska Institutet Medical School	Professional Development and Leadership	2003	Undergraduate medical	1-6
	Surgery, Orthopedics, & Anesthesia	2003	Undergraduate medical	1
	Biostatistics	2004	Undergraduate medical	1-3
	"The Doctors' School" for Professional Development	2004	Undergraduate medical	1-3
	Orthopedic Surgery	2004	Undergraduate medical	1-3
	Pathology	2004	Undergraduate medical	1
	Psychiatry	2004	Undergraduate medical	1-5
	Rehabilitation Medicine	2004	Undergraduate medical	1-6
	Social and Psychosocial Medicine	2004	Undergraduate medical	1-6
	Work & Environmental Medicine	2004	Undergraduate medical	1-6
	Insurance Medicine	2005	Undergraduate medical	1-6
Other faculties within Karolinska Institutet	Pedagogy and Leadership	2004	Undergraduate radiology nursing (with e-learning components)	1-6
	Safe Health Care	2004	Undergraduate interprofessional	1-6
	Board of Education and Program Directors' planning meeting	2005	Undergraduate interprofessional	1-2
	Build Tomorrow's Healthcare	2005	Undergraduate interprofessional (with e-learning components)	1-6
	Managing a research group	2005	Graduate	1-6
	Medical Informatics whole-program Workshop	2005	Undergraduate program	1-3
	Pedagogy, Informatics, and Leadership	2005	Undergraduate nursing (with e-learning components)	1-6
	Doctoral student planning retreat for the Medical Management PhD curriculum	2008	Graduate studies program (with e-learning components)	1-3
	Master in Bioentrepreneurship	2008	Graduate program	1-3
	Leading Change and Learning (in Medical Education)	2009	Graduate interprofessional (e-learning based)	1-6
	Organization, Leadership, and Learning	2009	Undergraduate nursing (with e-learning components)	1-6
	How to get decision makers with you in health care improvement projects	2010	Interprofessional continuing education (e-learning based)	1-6
	Going, Becoming, and Leading Lean	2010	Undergraduate nursing education (e-learning based)	1-6
	Project Management and Leadership	2010	Undergraduate public health (e-learning based)	1-6
	Work psychology for nurses working in industry	2010	Continuing nursing education (with e-learning components)	1-6
	Organization and leadership for nurses working in industry	2010	Continuing nursing education (with e-learning components)	1-6
	Delivering the course Organization, learning, and leadership	2010	Teacher training course (e-learning based)	1-6
	What do you need to know about equitability to improve the work environment and health?	2010	Continuing education for leaders in industry (e-learning based)	1-6

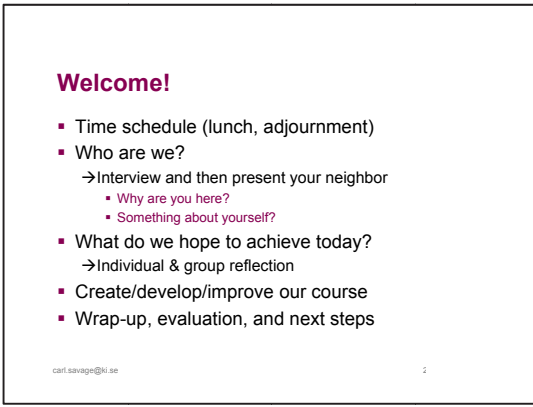|				
	Business for doctors	2011	Undergraduate medicine	1-3
External to Karolinska Institutet	AMEE "Learning Outcomes Made Easy" pre-conference workshop, Edinburgh, Scotland	2004	Undergraduate medicine	1-3
	EMSA/IFMSA Bologna Quality Assurance Workshop, Copenhagen, Denmark	2005	Undergraduate medicine	1-3
	EMSCouncil on Patient Safety, Warsaw, Poland	2005	Undergraduate medicine	1-3
	IFMSA Standing Committee on Education August Meeting, Egypt	2005	Undergraduate medicine	1
	Linköping/Jönköping Workshop on Interprofessional Teaching of Quality Improvement, Wettershus, Sweden	2006	Undergraduate interprofessional	1-5
	University Collaborative for Improvement Science (USF) Workshop, Visby, Sweden	2006	Undergraduate interprofessional	1-6
	Teaching Improvement Science	2007	Continuing education Interprofessional (e-learning based)	1-6
	Improvement Science	2008	Continuing education Interprofessional (e-learning based)	1-6
	Organization and Leadership, Lund University	2008	Executive MBA course	1-3
	Affective Disorders	2008	Residency Program in Psychiatry (with e-learning components)	1-6
	Neuropsychiatry	2008	Residency Program in Psychiatry (with e-learning components)	1-6
	Psychiatry and the Law	2008	Residency Program in Psychiatry (with e-learning components)	1-6
	Psychoses	2008	Residency Program in Psychiatry (with e-learning components)	1-6
	Acute Psychiatry	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Drug and Alcohol Dependency	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Forensic Psychiatry	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Personality Disorders	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Diagnostic Psychiatry	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Psychopharmacology	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Risk and Suicidology	2009	Residency Program in Psychiatry (with e-learning components)	1-6
	Fall and Fall Injury Prevention	2009	Continuing nursing education (e-learning based)	1-6
	Pressure Ulcer Prevention	2009	Continuing nursing education (e-learning based)	1-6
	Pressure Ulcer Treatment	2009	Continuing nursing education (e-learning based) – 45	1-6
	Patient Education	2010	Continuing nursing education (e-learning based)	1-6
	Diabetic Nephropathy	2010	Continuing nursing education (e-learning based)	1-6
	Sepsis	2010	Continuing nursing education (e-learning based)	1-6
	Competencies of a Skilled Residency Supervisor (Kihlstrom et al., 2010)	2010	Recommendations for residency program directors	1-3
	Consultation Psychiatry and Psychosomatology	2010	Residency Program in Psychiatry (with e-learning components)	1-6
	Transcultural Psychiatry	2010	Residency Program in Psychiatry (with e-learning components)	1-6
	Child Psychiatry for Adult Psychiatrists	2010	Residency Program in Psychiatry	1-6

		(with e-learning components)	
Eating Disorders	2010	Residency Program in Psychiatry (with e-learning components)	1-6
Affective Disorders (North Stockholm region)	2010	Residency Program in Psychiatry (with e-learning components)	1-6
Acute Kidney Failure	2010	Continuing nursing education (e-learning based)	1-6
Self-care for Patients with Kidney Failure	2010	Continuing nursing education (e-learning based)	1-6
Gastroenteritis	2010	Continuing nursing education (e-learning based)	1-6
Herpes Infections	2010	Continuing nursing education (e-learning based)	1-6
International Classification of Diseases	2010	Continuing nursing education (e-learning based)	1-6
MRSA and Basic Health Care Hygiene	2010	Continuing nursing education (e-learning based)	1-6
Pneumonia	2010	Continuing nursing education (e-learning based)	1-6
Tuberculosis	2010	Continuing nursing education (e-learning based)	1-6
Tracheotomy Care	2010	Continuing nursing education (e-learning based)	1-6
Electrolyte Balance in Kidney Disease	2010	Continuing nursing education (e-learning based)	1-6
Anxiety	2010	Residency Program in Psychiatry (with e-learning components)	1-6
Psychiatry and society	2010	Residency Program in Psychiatry (with e-learning components)	1-6
Rational prescribing	2010	Internship competencies for a national e-learning course for The National Board of Health & Welfare	1-6
Psychotherapy for psychiatrists	2010	Residency Program Guidelines for Psychiatry	1-3
Influenza	2010	Continuing nursing education (e-learning based)	1-6
Hepatitis	2010	Continuing nursing education (e-learning based)	1-6
Serous meningitis	2010	Continuing nursing education (e-learning based)	1-6
Assessment of level of consciousness after head injury	2010	Continuing nursing education (e-learning based)	1-6
(Further development of the course in) Diabetic Nephropathy	2010	Continuing nursing education (e-learning based)	1-6
Nosocomial infections	2010	Continuing nursing education (e-learning based)	1-6
Erysipelas	2010	Continuing nursing education (e-learning based)	1-6
ESBL/VRE	2010	Continuing nursing education (e-learning based)	1-6
Quality improvement in health care	2010	Continuing interprofessional education (e-learning based)	1-6
Sexology	2010	Residency Program in Psychiatry (with e-learning components)	1-6
Sexology	2010	Residency Program in Psychiatry (with e-learning components)	1-6
Sexology	2010	Residency Program in Psychiatry (with e-learning components)	1-6

Total = **86 course development workshops**

APPENDIX 3: HOW TO RUN AN AR WORKSHOP

The following Do-it-yourself guide is based on my standard PowerPoint presentation. I facilitate a group through each step with the PowerPoint slide in the background as a guide. As mentioned previously, I only "reveal" and explain the entire process at the end of the workshop if asked. I have also developed an e-based version of the process which follows the same steps. For a good description of an approach to facilitation, I recommend David Bohm's book, *On Dialogue* (Bohm, 2004). And remember, "slow is smooth, and smooth is fast".

Workshop preparation: Gather a group of "experts" and other representatives of those affected by the course (e.g. students, patients, relatives) including those who will direct and teach the course/program.

Materials: Sticky notes in yellow and two other colors (make sure they are sticky such as Post-Its®!). Flipchart paper, white-board pens. Laptops with internet access, (usually provided by the participants themselves).

Slides	Instructions	Time[2] (min)
Opening the meeting **Welcome!** ▪ Time schedule (lunch, adjournment) ▪ Who are we? →Interview and then present your neighbor ▪ Why are you here? ▪ Something about yourself? ▪ What do we hope to achieve today? →Individual & group reflection ▪ Create/develop/improve our course ▪ Wrap-up, evaluation, and next steps carl.savage@ki.se	*Begin by welcoming everyone; present the time constraints, then ask participants to reflect on why they have come and what they hope to achieve by the end of your time together. Divide people up into groups of four (optimal group size); ask them to reflect individually (2-3 minutes) and then to present their thoughts for each other and write them all down on a flipchart paper (7 min). Summarize what they say. Remember to save the flipchart papers so that you can return to them at the workshop conclusion.*	20
Purpose of the meeting Our task: "Create/Develop/Impro for _____ a carl.savage@ki.se	*Present the purpose and outcomes of the workshop. If they don't match the group's desire, you need to adjust the purpose of the workshop until everyone is satisfied and in agreement.*	2-10

---

[2] Time is relative. For a quick group, the entire process can take 45 minutes. Times in this appendix are based on a 5-day period and should be seen as a rough suggestion as to where you should be in the process.

Outcome of the Meeting

Outcome

- When we leave we will have created/developed/improved a high quality course which helps students to develop their professional competencies.

Define the outcomes of the meeting so that they are as specific, measurable, addressed, relevant/realistic, and time-bound as possible.

First question

First question:

- Who else should be here?
  - →Invite them the next time we meet!

"The best way to develop motivation and enthusiasm is to let more people become involved in shaping their future. So, invite them!"

1-2

Step 1

What is the big picture?

a shared understanding of the big picture

competencies (knowledge, skills, and attitudes) should a ting health professional (choose profession) have in your subject to be successful in caring for/treating patients?

rm

down one word or phrase per yellow Post-Its (in silence)

in 8-12 columns (in silence)

s, define headings for each column (pink Post-Its)

te your headings for the group

consensus on the headings

Present and execute this slide one point at a time, e.g. once everyone has brainstormed you can then present the next task of grouping in silence.

1.1=10
1.2=10
1.3=10
1.4&1.5= 10-20

Step 2

What is our course mission?

a course mission that concisely summarizes the course tegory headings), is easy to remember and simple to

which headings the course should cover

arize the chosen headings with 1-2 sentences

his something we are passionate about?

his something we can be the best at?   (adapted from Collins, 2001)

his something that is so important that it could d to be applied in daily work?

ack and improve (World café if needed)

This step is very challenging. Be prepared for frustration and questions. Use a World Café approach if groups get stuck and need help/feedback from each other. Sometimes it is enough to have a pretty good definition and then come back to it the next meeting when people have had time to reflect.

15-120

106

Step 3a

Objectives vs. Outcomes?

Objectives   Outcomes

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I use this slide to describe the difference between objectives (goals you aim at) and outcomes, which describe the competencies (knowledge, skills, and attitudes) that the graduate will need in order to be successful in their future place of work.

2

Step 3b

What makes outcomes so SMART?

- Master the care management of the usual and important psychiatric illnesses with a focus on the those most prevalent in society.

- In cooperation with other relevant health care professionals, conduct a diagnostic workup and collect and evaluate the results.

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"In defining outcomes, it is helpful if they are specific, measurable, attainable, relevant, and time-bound. Can you see the difference between the two outcomes?"

2

Step 3c

What makes outcomes so SMART?

- Have the ability for dialogue and an open contact with the patient and his/her relations as well as have the ability for communication, both written as well as oral, with other doctors and coworkers.

- Analyze your approach [attitudes and communication style] to a person with one of the relevant diagnoses, in reference to the person's condition, relationship, background and communication patterns.

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Another example to discuss with the group. "Can you see the difference between the outcomes here?" (In both, the outcome to the left is an example of an outcome which is not S.M.A.R.T., to the right, one that is S.M.A.R.T.er.)
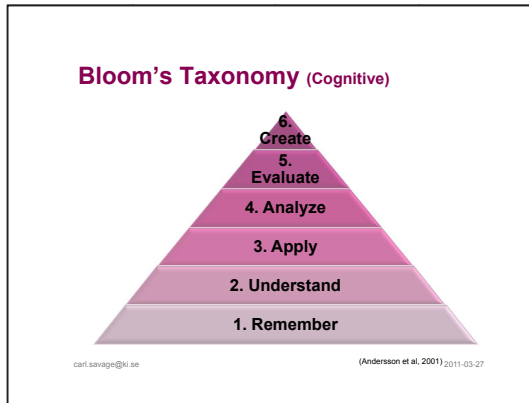
2

Step 3d

Step 3: Which Learning Outcomes?

- Purpose:
  →Define the learning outcomes for the course

- For every chosen heading:
  1. Rewrite each heading as a sentence with an *active* verb (blue Post-It)

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"Now that we have talked about what makes a learning outcome S.M.A.R.T., let's return to our Post-It columns…"

2

Step 3e

Abstract	Create	Generalize	Outline
Analyze	Critique	Generate	Paraphrase
Apply	Deconstruct	Hypothesize	Pars
Attribute	Design	Identify	Plan
Carry out	Detect	Illustrate	Predict
Categorize	Diagnose	Implement	Produce
Check	Differentiate	Infer	Recall
Clarify	Discriminate	Instantiate	Recognize
Classify	Distinguish	Integrate	Represent
Coherence	Evaluate	Interpolate	Retrieve
Compare	Execute	Interpret	Select
Conclude	Exemplify	Judge	Structure
Construct	Explain	Map	Subsume
Construct models	Extrapolate	Match	Summarize
Contrast	Finding	Monitor	Test
Coordinate	Focus	Organize	Translate
carl.savage@ki.se			Use 2011-03-27

"Here are some suggestions for active verbs."

15-60

Step 3f

Step 3: Which Learning Outcomes?

- Purpose:
  →Define the learning outcomes for the course
- For every chosen heading:
  1. Rewrite each heading as a sentence with an *active* verb (blue Post-It)
  2. Re-check the yellow Post-Its and see if something is missing
     1. Add additional sentences if needed.
     2. Make sure that each sentence uses an active verb.
  3. Check that each sentence is S.M.A.R.T.
     1. Specific, Measurable, Addressed, Realistic & Relevant, Time-bound

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"Now that you have rewritten all of your headings as sentences with active verbs, go back through them and make sure that they are S.M.A.R.T."

5-10

Step 3g

Step 3: Which Learning Outcomes?

- Purpose:
  →Define the learning outcomes for the course
- For every chosen heading:
  1. Rewrite each heading as a sentence with an *active* verb (pink Post-It)
  2. Re-check the yellow Post-Its and see if something is missing
     1. Add additional sentences if needed.
     2. Make sure that each sentence uses an active verb.
  3. Check that each sentence is SMART
     1. Specific, Measurable, Addressed, Realistic, Time-bound
  4. Identify where each verb falls in Bloom's taxonomy and label the level

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"Great job. Now that we have written S.M.A.R.T. outcomes that describe the competencies that a graduate has developed at the end of the course, let us look closer at how the competencies are related to each other and to competencies developed in other courses."
I*t is important to present Bloom's taxonomy after the learning outcomes have been written. Present them before and participants will start paying more attention to the "status" of the different verbs instead of relevance of the verbs to the real world situations encountered in the workplace.*
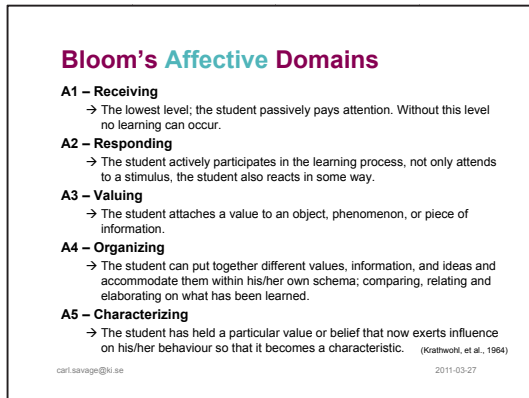
1

Step 3h

Bloom's Taxonomy (Cognitive)

6. Create
5. Evaluate
4. Analyze
3. Apply
2. Understand
1. Remember

carl.savage@ki.se   (Andersson et al, 2001) 2011-03-27

"Bloom's taxonomy can be used as a way to relate to and understand the learning outcomes we have created. It is based on the idea that we can use knowledge in different ways. We will be using it to determine which competencies may require more time to develop than others. To exemplify how the taxonomy can be applied, think of an artery. If we ask a person to describe an artery, they might remember that it has three layers (level 1). They might be able to explain what these three layers do (level 2). The might be able to identify the three layers of a cross section in a microscope (level 3) and differentiate it from a vein (level 4). And if they could create an artificial blood vessel, the idea is that they should be able to do all of these things (level 6). In this way, each 'higher level' encompasses the ones beneath it."

5

Step 3i

Bloom's Affective Domains

A1 – Receiving
→ The lowest level; the student passively pays attention. Without this level no learning can occur.

A2 – Responding
→ The student actively participates in the learning process, not only attends to a stimulus, the student also reacts in some way.

A3 – Valuing
→ The student attaches a value to an object, phenomenon, or piece of information.

A4 – Organizing
→ The student can put together different values, information, and ideas and accommodate them within his/her own schema; comparing, relating and elaborating on what has been learned.

A5 – Characterizing
→ The student has held a particular value or belief that now exerts influence on his/her behaviour so that it becomes a characteristic.   (Krathwohl, et al., 1964)

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"Bloom and associates did the same thing for the affective domain as they did for the cognitive knowledge domain. For our purposes, anything below level A3 does not require that we indicate that after the outcome."

5

Step 3j

Bloom's Taxonomies

Cognitive taxonomy

6. Create
5. Evaluate
4. Analyze
3. Apply
2. Understand
1. Remember

Affective taxonomy

5. Characterizing
4. Organizing
3. Valuing
2. Responding
1. Receiving

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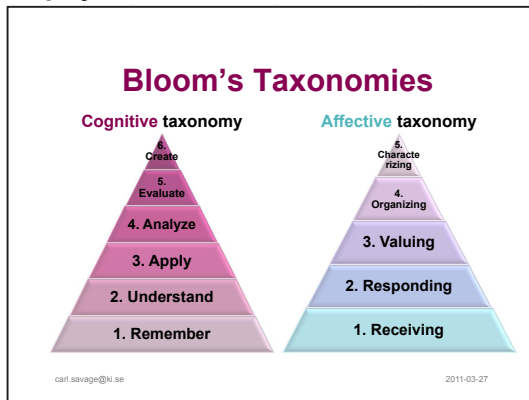
"Our task is now to go through our learning outcomes and find the verbs we have used in Bloom's taxonomy. The verbs on the list were all from Bloom's cognitive taxonomy. If you feel that the outcome requires that the graduate develop a specific attitude or approach, use Bloom's affective taxonomy to denote that."

15

Step 4

Step 4: What works *today*?

- Purpose
  - → Identify what works and doesn't work in the current course
1. Make a list of current and future activities.
   1. Begin by listing activities you already have
   2. Add activities that you think might help develop the outcomes
2. Create a matrix
   1. List the activities at the top
   2. List the outcomes in the first column
3. How well aligned are the activities with the outcomes?
   1. Start with the activities and identify which outcomes they address
      1. Mark with a "+"
   2. Go through the outcomes and identify those activities which are more effective at developing the outcome.
      1. Mark with 1-2 additional plus signs ("+")

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"Great, now we have brainstormed about the competencies we feel a graduate should have developed by the end of the course, we have used that information to define the course mission and described the learning outcomes that will help ensure that the mission is accomplished. Now we need to see how what we are doing today helps the students to develop the outcomes. To do that we need to make a list of current and possible future activities…" *Continue by following the instructions on the slide. I usually hand out a matrix that I have created in a Word-document with all the outcomes written in the first column. The low-tech version is to ask the participants to do it on a whiteboard or flipchart paper.*

20-30

Step 5

Step 5: Pick and Choose

- Purpose
  - →Pick and choose effective teaching and learning activities
- Identify which activities work/are most
  - i.e. those activities which contribute to developing the outcomes.
  - →Reject those activities that do not work
  - →Discuss which new activities need to be developed.
- Summarize the activities which will be included in the course.
- Determine the order for the activities.

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In this step, the participants analyze the matrix they created in step 4 and string the activities together into a process (schedule).

Step 6a

Step 6: Construct alignment
- Purpose
  - →Construct alignment between the educational methodologies employed, the examination form(s) and the learning outcomes so that we achieve what we want to achieve

Based on the activities from step 5:

- Choose and adapt a relevant educational method
  - →Which method will be most effective in helping each participant to achieve the outcomes of the course?
    - Case? Lectures? PBL? Connection to real life? Etc.
- Choose the examination forms
  - →A form of quality assurance/quality improvement
  - →Remember to align with the outcomes and the teaching methods

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Participants now work with the details of the learning process they have created, double-checking that they have aligned all the activities and assessment forms with the learning outcomes.

Step 6b

In discussing the choices in step 6, many participants ask questions about the evidence behind the choices they have made. To reinforce their choices, I encourage participants to explore the evidence about best evidence medical education (BEME) that exists, either by suggesting articles to read or discussing some of the topics about how people learn (Bransford, et al., 2000).

Presentation of the Process
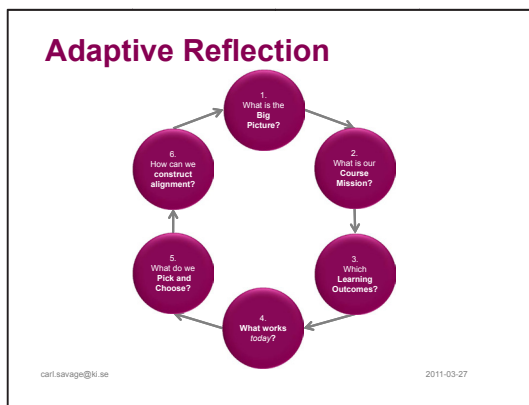
If asked, I will present the Adaptive Reflection model that we have followed at the end of the workshop.

Workshop evaluation

Return to the flipcharts the group wrote up on the first day. Ask participants to read through their comments and then to write down three things they thought worked well (WW) and three things that can be improved/done differently (DD) for the next time. You can always use the feedback to improve your facilitation technique!

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On May 6, 1954, at age 25, Bannister broke the 4 minute-mile barrier. He did it with the help of two friends who together helped him set and keep the right pace in the beginning so he would make it through to the end. The prelude to this thesis was the medical students' annual musical comedy I wrote with Carl Tullus and Peter Grenholm during our second semester of studies. It was during this experience that I realized that medical education can and indeed must be improved. This was one of the most creative experiences of medical school. Little did I realize at the time, through all the jokes and laughter, how pivotal it would be to my life and career path. Thank you.

There are advantages when the apple does not fall so far from the tree. Not only have both my parents and their spouses been wonderfully supportive throughout this journey and freely shared stories about their own experiences, but they have also engaged and widened my perspectives with insights from their respective fields and heaps of encouragement when it was needed the most. Through my cousins and their families, I was not only welcomed to Sweden, but into the research experience at KI. My sister, Sophia, has the ability to do whatever I do, but with the added twist of being able to do it better. I look forward to reading her dissertation.

I made a promise to myself as I began this work never to prioritize so that I would find myself concluding this thesis with an apology for the time it took from the other aspects of life – which is why it is so wonderful to have so many forgiving and supportive friends. If we see life as a conversation between the three marriages instead of a question of balance, we understand how interdependent the happiness of one is on the others. This has been made especially clear as I have had the privilege to get to know Stella, Max, Agnes, Lucas, Edit, and Ruben. I may have written the words, but it was to someone else's music.

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