Team Syntegrity in a Triple Loop Learning Model for Course Development

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Abstract

This paper starts with a presentation of experiences from a joint project where courses in informatics have been developed together with industry partners. The industry partners were of various size. Some of them were producers of for example cars and aero planes and also making Technical documentation for their products, while other companies were subcontractors for the Technical Communication. A problem that occurs in the Technical Communication sector is that companies have big problems to find and employ staff with a suitable competence. Therefore the project aimed to analyze the need for competence development within organizations dealing with Technical Communication, in order to develop suitable courses for students to obtain employability. A model for course development based on Triple loop learning has been developed and is presented. The steps in the model are: *State of the art within the area of Technical Communication; Identification of requirements and quality requirement for Technical Communication; Identification of need of competencies; Identification of existing courses and training; Course Development; Realization of courses; Evaluation of courses and effects of the courses; Further development of courses.* The first step and part of step two was conducted as a literature study, while the other part of step two and step three was accomplished with help of interviews with different stakeholders. The course development and the realization of the courses were carried through together with the industry partners in the project.

When it comes to co-operation between academia and industry everyone is convinced that it is a good thing. Our experience is also that there is much benefit in collaboration. However the ways of communication have to be considered. Balancing differences between different companies needs and balancing differences between the academic requirements on higher education and industry partners desires regarding the courses have to be considered.

A conclusion from the project is that it is difficult to in one hand catch all needs and requirements from the stakeholders from different levels in the companies and on the other hand get a balance between different stakeholders interests. A method of working with those problems is Team syntegrity. The difference between syntegration and other group work is that the participants are evenly and uniquely distributed and will collectively have the means, the knowledge, the experience, the perspectives, and the expertise, to deal with the topic. Team syntegrity also aims to balancing between all different interests. The pre-

sented course development model is therefore complemented with Team syntegrity as a method of catching and balancing requirements.

One conclusion is that it is necessary with a triple loop learning model to be able to develop and maintain courses that are up to date with the needs of the industry and coming students

Another conclusion is that the use of Team syntegrity as a balancing method seems to be promising for the balance as well as for catching as much as possible of the stakeholder's ideas.

Keywords: course development, Triple loop learning, Team syntegrity, industry partners, collaboration

Introduction

A problem that occurs in the Technical Communication sector is that companies have big problems to find and employ staff with a suitable competence. A technical communicator need to be able to communicate technical advanced concepts to different target audiences which requires technical, linguistics as well as skills in using computer tools. Löfstedt and Nyström (2008) have shown that the companies within the technical communication sector are forced to hire staff lacking relevant education and therefore need to arrange the education themselves. This is experienced as both too expensive and ineffective. The regular staff is needed in the production but have to act as internal educators. The staff engaged in internal education may also have difficulties in handing over the education to others when changing work tasks or leave for a new employer.

According to the goal of the Bologna declaration 1999 students should be employable after education at a university. Forrier and Sels (2003) state, that employability is a multi-faceted construct. Rothwell and Arnold (2007) add that it has both internal and external dimensions. Andrews and Higson (2008) express that there are some serious concerns about the gap between the students' skills and capabilities, and the requirements and demands of the work environment. On the other hand there are critical voices about focusing on employability. According to Harvey (2000) there are some that argue that employability is about "erosion of academic freedom and as proposing higher education should be about training graduates for jobs rather than improving their minds" (Harvey 2000 p.3). Further Harvey (2000) argues that employability should not be seen as the primary focus of higher education. It should rather be seen as a subset of transformative lifelong learning. Cranmer (2006) concludes that the intentions from the academics to enhance graduates employability have limitations and employer involvement and employment-based training and experience have a positive effect on graduates' employability.

In spite of the different opinions about focusing on employability the problems with finding people with suitable competence to employ still remains. To develop an education that takes into consideration aspects and ideas from both employers and (future) employees, there is a need to find a method that involves both groups in the process. It is though difficult to catch all requirements and to balance between different needs. The aim of this paper is to improve the course development process by the use of a Team Syntegrity in a Triple Loop Learning model.

Triple Loop Learning

Double or even Triple, Loop Learning has to a certain degree influenced the development of TI courses and study programs. Our comprehension of Triple Loop Learning (TLL) takes its point of departure in three basic questions:

Q1. Are we learning things in the right way? (How)
Q2. Are we learning the right things? (What)
Q3. Is rightness buttressed by mightness or vice versa? (Why)

In Single Loop Learning (SLL), according to Flood and Romm (1996) just one of those essential questions is considered. Regardless which of the three questions is selected this leads to a fixed, or trapped, quest without evolution. The consequence will be a non reflexive learning with isolationism and stagnation as a consequence. Here identification of and the best way to achieve them is not considered problematic. Flood and Romm (1996) further argue that well known methods like Business Process Reengineering (BPR) and Total Quality Management (TQM) are typical examples of SLL.

In Double Loop Learning (DLL) normal the two first questions are considered with a certain reflection between them (Flood and Romm, 1996). The risk is, however, that one of the questions is considered the dominant one. That means that the reflexive looping ends and is replaced with a double vision and blurriness (Flood and Romm 1996). In Argyris (1977) the distinction between single and double loop learning is described as that double loop learning include questioning the underlying policies and goals as in question two, are we learning the right things. This double loop learning includes reflections of your own learning process.

In TLL, at last, there is a continuous looping between the three questions. Those three loops lead to an overall awareness. The task oriented approach of SLL is replaced by a new reflexive consciousness with actors continually looping between the three questions. Yuthas, Dillard and Rogers (2004 p. 239) define triple-loop learning as "a continual reflection on the learning process, the contexts within which learning occurs, and the assumptions and values motivating the learning and influencing its outcomes." It is thereby striving at trying to see beyond the current situation and try to avoid ad hoc manner.

Other fundamental issues are raised by Espejo et al. (1996) who discusses the relations between individual learning, team learning, and organizational learning. While they speak solely of SLL and DLL (not TLL) they combine SLL-DLL with Individual and organizational learning into a two dimensional model for individual learning in an organizational context, I.e. the OADI-SMM model.

Collen (2003) at last, discusses in what ways the learning cycle may be integrated with the generic research cycle. Of special interest in this context is his list of practical decisions to be made at each phase of the general research cycle. Obviously most of those decisions are also relevant when designing a study program.

As seen already by this short overview, the source of relevant research insights is very rich. However a lot of effort have been put into research concerning for example the use of double loop learning within courses as for example as described by Schön (1987). The goal is to reach a reflective practitioner. Another example is Argyris (2002) that present a method that can be used to help participants diagnose and increase their competence into become more effective leaders and learners.   In what they this wealth has been applied in the practical course design will be demonstrated in the following sections of this paper.

The Technical Information Center project (TIC)

Technical Information Centre (TIC) is a project funded from EUs structural funds. The project is managed by Mid Sweden University in close collaboration with the Swedish Material Administration (FMV) and industry partners. The industry partners, a variety of companies, are geographically widely spread. The project started in 2007 and ended in January 2011.

The project aimed to strengthen and expanded activities within Technical Communication in the region. In this ambition, TIC worked mainly on four fronts. New and more effective routines for knowledge exchange and result dissemination between research and industry were developed. Forms for a continuous competence development constituted another focus area. Identification,

test and evaluation of new technologies for Technical Communication were a third area. Finally a network between the actors in the TIC project was established.

Course of Action

During the process of developing courses in collaboration with the Technical Communication companies a method consisting of eight steps have been used (see also Figure 1).
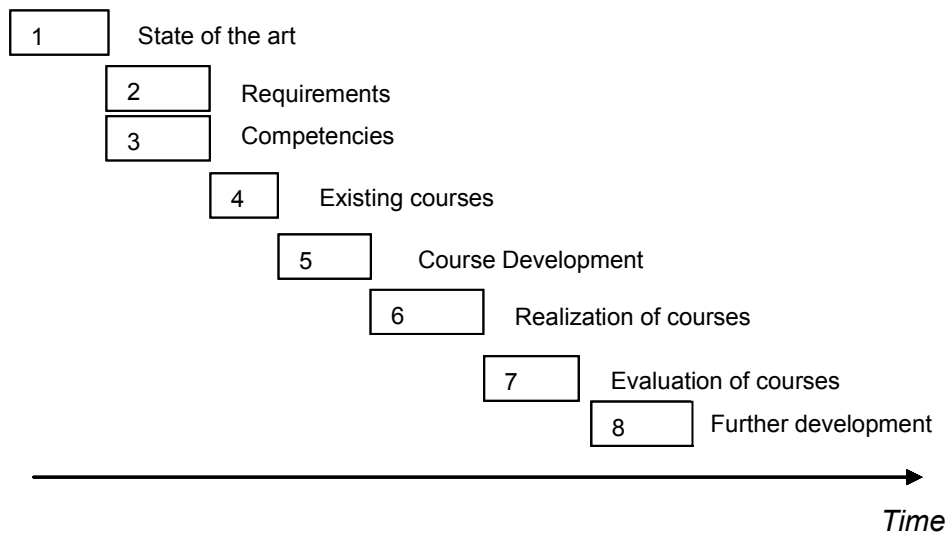

Figure 1 Visualization of course of action

1. *State of the art within the area of Technical Communication*
   A thorough literature review was accomplished in order to identify the areas that are of high relevance for Technical Communication work now and in a future that can be fore-seen.
2. *Identification of requirements and quality requirement for Technical Communication*
   Interviews with persons within Technical Communication companies have been done as well as a literature review.
3. *Identification of need of competencies*
   Interviews with different persons within Technical Communication companies have been done to catch the need of competence both from an employee and a management perspec-tive.
4. *Identification of existing courses and training*
   All Swedish universities and other educational institutions have been investigated to iden-tify education within Technical Communication. On an international basis searches have been done based on keywords.
5. *Course Development*
   Courses have been developed in collaboration with companies in the area.
6. *Realization of courses*
   In the realization of the courses some of the companies have taken part.
7. *Evaluation of courses and effects*
   The evaluation has been done in three parts: evaluation of the development process, evaluation of the course (content and realization), evaluation of the effects for the work.

8. *Further development of courses*
   Based on feedback from evaluations further development of the courses have been accomplished.

The steps follow each other in such a way, that the following step gets input from the one or ones before. In the whole process persons from companies working with Technical Communication have participated. The companies have taken part in the preparation of how to tackle the step, delivering input during the step, and discussing the outcome.

Experiences of the Co-operation

When it comes to co-operation between academia and industry everyone is convinced that it is a good thing. Our experience is also that there is much benefit in collaboration. The companies, that we have co-operated with, express their opinion of the usefulness and we, as a university, surely can see the benefits. However, it is not easy to bring together two parties with so different culture and different goals. In the following some of the experiences and the conclusions drawn are summarized.

Communication: During the process of developing courses together with industry partners most of the contacts have been on the management level. An advantage is that the communication is being held with persons with authority to make decisions which sometimes make the process faster. On the other hand the typical student is not someone from the management level. The experience is that there are differences in what the management present as important compared to what the future students value as importance. One example is that some of the students have expressed desires of more teaching at campus. However, the decision that flexible form should be used was something that all partners involved in the development process had agreed about.

The industry partners (management level) have shown a high engagement for the general picture of the course development, while receiving inputs on a detail level has shown more difficult. Invitations to meetings for more detailed discussions have resulted in low numbers of attendees.

Face-to-face meeting tends to be the most effective channel regarding focus and the level of involvement. Face-to-face meeting is however demanding when it comes to the time aspect. The industry contacts are often tightly booked and physical meetings is also costly due to travels. An alternative that has been tried during the course development phase is the use of tools allowing meeting virtually. Industry partners situated on a geographic distance showed a higher level of involvement at virtual meetings compared to physical meetings.

E-mail is experienced as a smooth way to communicate, especially by the academics. However, the problem is that communication via e-mail often has resulted in low percentage of answers and thereby low level of involvement. Direct telephone calls on the contrary often resulted in higher level of involvement.

Balancing differences between different companies needs: The companies that are involved in the TIC-project are not homogeneous, which has had the effect that there sometimes has been problematic to balance between different stakeholders interests. The circumstance that the meetings often consist of a various set of people has made it hard to get a clear view of the differences in needs. A person could get a lot of power if almost alone representing a certain type of company.

Balancing between the academic requirements on higher education and industry partners desires regarding the courses. One example of this is the necessity to classify all courses in one subject. Within the field of technical communication the traditional subjects that could be part of one 7.5 ECTS course could be all from pedagogy, linguistics, human computer interaction and

information systems. Another example is the contradiction between the academia requirements of general knowledge and the industry desires of special knowledge.

Course Development Model –
with Triple Feedback Loops

The starting point for the process of identification and development of education within the area of Technical Communication was unprejudiced about the outcome. The initial question was to see if there were, on the whole a need for education within the area. According to Triple loop learning terms this means to answer the question *Why*. The relevance was confirmed both in literature and from the participating companies.

After having established the relevance for education, the next question to answer was *What*. What should the content of the education be? A wide range of desired knowledge content was listed. The list was reduced with respect to importance. After having decided upon the most important courses it was time to answer the question *How*.

During the whole process and in the evaluation phase we made some observations and experiences. The first issue is the differences in culture between industry partners and academia. The formalities of academic education are necessary. This has to be made clear from the start. The long and complicated process to establish new education is an issue to improve within the universities. There is also a need to balance the ways of expressing course content in terms that are adequate and precise, but understandable for potential students and their employers.

The next issue to handle is the differences between the participating companies. Though the companies are all working with Technical Communication they have different tasks and use different tools and methods to cope with their mission. This difference was most noticed when ranking the importance of courses.

The third issue had an effect on the outcome of the courses. In the whole development process mostly persons from the management level participated. They also strongly marketed the courses to their employees. The employees' interests and points of view were in some cases not in accordance with the management level. Persons from the management level, however, sees the companies need for a special competence. To deal with this disagreement there is a need to recruit persons from different levels in the companies to the course development process.

Based on Triple loop learning and the experiences from the currently accomplished process a model for course development s presented here (see figure 2).

The model in its entirety is founded on the three questions *Why, What* and *How*. When starting with a new knowledge area, the process starts at 1, *State of the art*, or in case the state is known with 2, *Requirements*, and 3, *Competence needs*. In these steps, answers to the *Why* and *What* questions will be achieved. The *How* question will be answered in the steps 5, *Course development* and 6, *Realization*. Step 7, *Evaluation* will indicate what measures need to be taken. A well grounded course will most likely only need some improvement in loop 1 (*How?*) for the first few years. After two-three years, loop 2 (*What?*) and loop 3 (*Why?*) need to be performed. There will probably have been changes in the foundation for the course such as new needs, new technologies, and ways to do the work. Those changes will affect the course content (*What?*) or even the existence of the course (*Why?*).

The model is meant to be able to apply both at course level and for whole programs.
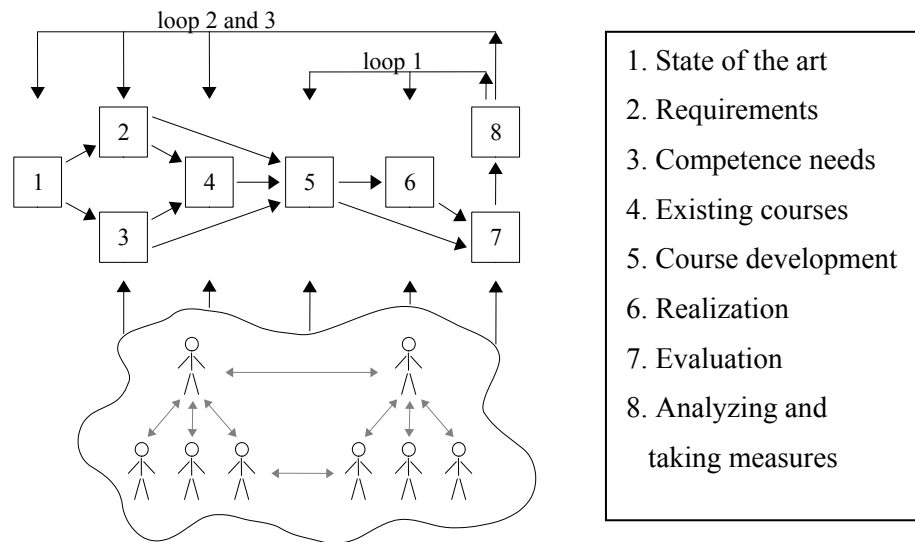
Figure 2 A model for course development based on Triple loop learning

As expressed earlier as a conclusion of the experiences from collaborating with stakeholders in course development there is a difficulty in finding a balance between different stakeholders, i e between different companies, between people from different levels within a company and between companies and university. It is also an unbalance in how different people get their voice heard. A method to deal with these kinds of problems is Team syntegrity. Asproth (2010) have discussed the advantages of Team syntegrity for catching requirements.

Team Syntegrity

Team Syntegrity is a new process methodology developed by the management cybernetics Stafford Beer to stimulate collaboration and incite cross fertilization and creativity. The full description is available in Stafford Beer's book *Beyond Dispute: the Invention of Team Syntegrity* (1995). It has roots in cybernetics, and several other branches as logic, mathematics, information theory and sociology. Some of the roots can be found in McCulloch (1989), Ashby (1960), Shannon and Weaver (1962), Sommerhoff (1950), and not least Fuller (1979) and his ideas about geodesics and the interplay of tension and compression. Fortunately, it is not necessary to master all these sources to participate in a syntegration, or to plan and deliver one. Beer observed that conversations concerning attention to the organizations future adaption and development, as they took place in organizations, often were sporadic and fragmented. Good ideas might die because the innovators who proposed them did not have enough political muscle to prevail; important opportunities for synergy among parallel initiatives might be lost because of missing or ineffective transduction between significant players and a lack of cohesion or organizational closure might lead to a lack of direction and poor mobilization of resources. Leonard (1996)

The driving force behind the development of syntegration was to provide a structure for holding purposeful conversations which would be non-hierarchical and democratic but would be contained and not dissipate their energy or insights. Beer chose the form icosahedron with its thirty edges, twelve vertices and twenty sides as an ideal shape on which to map the meetings and manage their variety.

A scientific principle is necessary for enabling productive and effective work in large groups of people. Simply allowing everyone to enter the debate typically results in chaos. Syntegration

opens up a route somewhere between unilateral dictatorship and chaos democracy, based on a reliable mathematical principle.

In a syntegration a participant will be engaged directly in two teams as a member and two teams as a critic which will occupy him or her during four of the six scheduled time periods. In their two 'off periods' participants may observe (but not speak) in another team meeting or may use them as private time. (Leonard, 1996)

The difference between syntegration and other group work is that the participants are evenly and uniquely distributed and will collectively have the means, the knowledge, the experience, the perspectives, and the expertise, to deal with the topic. Particularly when the participators are or might experience themselves as superior and subordinates syntegration neutralizes the differences. An employee or potentional employee might be ignored or feel uncomfortable expressing his or her views in a big group with the employer(-s) present. In a syntegration the group is quite small and all ideas are caught.

Use of Team Syntegrity in the Course Development Process

The triple loop learning model presupposes input from stakeholders or even better collaboration. Stakeholders can supply substantial information in all 8 steps in the model. However, the steps where inputs from stakeholders are most significant in a Triple loop learning process are (yellow marked in figure 3):

    2. Identification of requirements

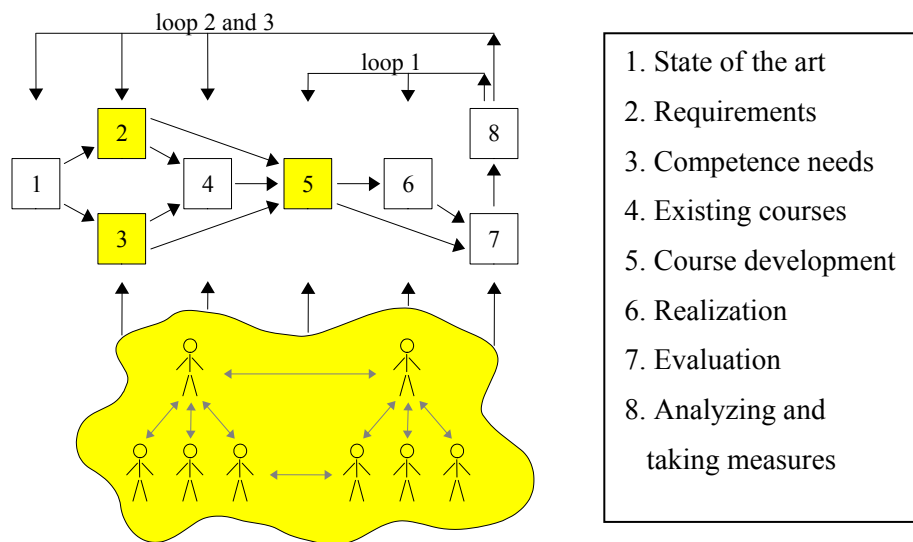   3. Identification of need of competencies

    5. Course Development

Figure 3. Use of Team syntegrity in the triple loop learning model

Step 5 concerns mostly the question of How, i.e. how to mediate the content of a course, while step 2 and 3 concerns the questions Why and What, i. e. why is this kind of course necessary and what should the course contain.

As in the description of Team syntegrity a syntegration will be carried through to catch all requirements and to balance between them. In the end all members have had their voices heard and they have collectively ended up with a solution. To make it work some initial restrictions may be formulated, i.e. quality requirements on university courses and other formal restrictions.

Concluding Remarks

One of the goals according to the Bologna declaration 1999 is employability. To reach this state of employability the conclusion is that it is necessary with a triple loop learning model to be able to develop and maintain courses that are up to date with the needs of the industry and coming students. The triple loop learning model the questions How (1st loop), What (2nd loop) and Why (3rd loop) are to be answered. It can be concluded that it is not enough to perform loop 3 (Why?) only when a course is developed for the first time. Due to rapid changes in the surroundings loop 3 is obligated at regular intervals. Loop 1 (How?) should be performed every time a course is supplied. Loop 2 (What?) should, as loop 3, be performed on a regular basis in order to assure actuality. The cooperation with different stakeholders is necessary to assure relevant answers to the How, What and Why questions. There is also a need to find a balance between different stakeholders. Otherwise there is a risk that more dominant stakeholders tend to get their voice more heard. The use of Team syntegrity as a balancing method seems to be promising for the balance as well as for catching as much as possible of the stakeholders' ideas.

References

Andrews, J., & Higson, H. (2008).Graduate employability, 'soft skills' versus 'hard' business knowledge: A European study. *Higher Education in Europe*, *33*(4).

Argyris, C. (1977). Double loop learning in organizations. *Harvard Business Review*, *55*(September-October), 115-125.

Argyris, C., (2002). Double-loop learning, teaching, and research. *Academy of Management Learning and education*, *1*(2), 206-218,

Ashby, W. R. (1960). *Introduction to cybernetics*. London: Chapman and Hall.

Asproth, V. (2010). *Team syntegrity as a complementary method for requirements analysis*. The International Multi-Conference on Complexity, Informatics and Cybernetics: IMCIC, Orlando, Florida

Bateson, G. (1972). *Steps toward an ecology of mind*. Chichester: Wiley.

Beer, S. (1995). *Beyond dispute: The invention of team syntegrity*. Chichester: John Wiley & So

Collen, A. (2003). *Systemic change through praxis and inquiry*. New Brunswick, NJ: Transaction Publishers.

Cranmer, S. (2006). Enhancing graduate employability: Best intentions and mixed outcomes. *Studies in Higher Education, 31*(2), 169-184.

Espejo, R., Schuhmann, W., Schwaninger, M., & Bilello, U. (1996). *Organizational transformation and learning*. Chichester: Wiley.

Flood, R., & Romm, N. (1996). *Diversity management*. Chichester: Wiley.

Forrier, A., & Sels, L. (2003). The concept of employability: A complex mosaic. *International Journal of Human Resources Development and Management, 3*(2), 102–124.

Fuller, W. B. (1979). *Synergetics*. New York: MacMillan.

Harvey, L. (2000). New realities: The relationship between higher education and employment. *Tertiary Education and Management, 6*, 3-17.

Leonard, A. (1996). Team syntegrity: A new methodology for group work. *European Management Journal, 14*(4), 407-413

McCulloch, W. (1989). *Collected papers.* (Rook McCulloch, Ed.). Salinas, California: Intersystems Publications.

Rothwell, A., & Arnold, L. (2007). Self-perceived employability: Development and validation of a scale. *Personnel Review, 36*(1), 23–41.

Schön, D. (1987). *Educating the reflective practitioner.* San Francisco: Jossey Bass.

Shannon, C., & Weaver, W. (1962). *The mathematical theory of communication.* Urbana, Illinois: University of Illinois Press.

Yuthas, K., Dillard, J. F., & Rogers, R. K. (2004). Beyond agency and structure: Triple-loop learning. *Journal of Business Ethics, 51*, 229-243.

Biographies

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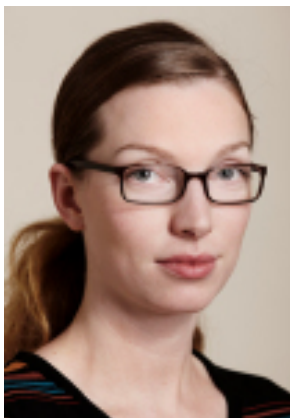
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