

Synopsis of the Thesis Processes of Learning and Bildung in Open Source Software Projects

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1 Preliminaries

1.1 Introduction

In open source projects we find processes of learning that are both productive and ethical.

This is a one-sentence synopsis of my thesis. In following pages I will try to clarify, what I mean by productive and ethical and how the learning processes can be described.

The thesis has two *raison-d'être*. One is that I believe that open source points toward a direction that might be helpful to pedagogics under the present socio-economic condition. The other one is that I believe that a pedagogical approach to open source helps to better understand the dynamics and the adaptivity of open source projects.

1.2 What is open source?

First I will try to present the different views on open source, mainly based on the report on “The many meanings of Open Source” by Gacek and others [3]. These views are meant to be possible descriptions of the open source phenomenon rather than theories that I will build upon. Their purpose is to give a detailed overview to readers that are unaccustomed with open source, and to show how multifaceted the phenomenon is. Open source can be seen:

As a legal framework; explaining the ‘freedoms’ that open source licenses like the GNU General Public License grant the user-developer.

As a mode of production; referring to a marxist perspective as it is put forth by Meretz [10] and the oekonux project (www.oekonux.org). Although I will mention this opinion that open source can be understood as a germinative form of a new society, it is beyond the scope of this pedagogical thesis, to follow these lines of thought.

As a gift-economy; an approach which was first introduced by Raymond [13], whose somewhat ethnological model I will briefly describe.

As a dynamic process of software production; which is basically a ‘flowchart of the open source process’, describing the different elements of the software development and usage process and how they interact. This explanation partially builds upon Raymonds famous article “The Cathedral and the Bazaar” [12].

2 The present condition

Or why a pedagogical approach to open source is helpful to educational science

In recent years pedagogics face a problem that can be labeled as the economization of education. Symptoms of this crisis are attempts to reform scientific and pedagogical institutions toward more efficient and managerial organizational structures. This parallels with the commodization of educational services, that allows to handle education as a good [Lohmann].

I see at least two underlying trends, that should be analyzed in order to better understand the current crisis: The shift to knowledge society and the unfolding of the postmodern condition.

2.1 The knowledge society

The knowledge society can partially be characterized by a change in the axial principle of society in the way that Daniel Bell describes the post-industrial society:

“Industrial society is the coordination of machines and men for the production of goods. Post-industrial society is organized around [theoretical] knowledge, for the purpose of social control and the directing of innovation and change” [1, 20].

We can further state, that in the knowledge society, knowledge has become a means of production, an indispensable resource for innovation and economical expansion [1, 26] [and others].

If society needs knowledge as a technology to administer change and as a means of production, it is no wonder, that its scientific and pedagogical institutions—which produce and transfer that knowledge—are put under pressure to comply with these needs.

This explains symptoms like the current reform of universities but also the PISA study, that tests whether schools fulfill their mandate of transferring needed knowledge to pupils. I label this *the demand to produce productive knowledge*.

2.2 The postmodern Condition

While the knowledge society is about the political and productive function of knowledge, the postmodern condition is about its legitimation.

Following the analysis of french philosopher Jean-François Lyotard [9], the ‘modern’ form of legitimation (which was predominant from the age of enlightenment to approx. the 1970ies) is characterized by an external and unifying legitimisation through “grand narratives”.

The crisis of modern legitimation is triggered by the fact, that these grand narratives fail to legitimate themselves in the modern world that they have created.

The only thing that remains in this crisis is what Lyotard calls legitimation through performativity, which solely aims at optimizing input/output relations, thus at efficiency.

This means that pedagogical institutions cannot legitimate their activities by having recourse to e.g. the grand narrative of emancipation any more. Faced with the demand to produce productive knowledge (sec. 2.1), they have nothing, that they could raise in opposition against the tendency to the economization of education. I refer to this problem as a *legitimatory crisis*.

2.3 Reactions to the present condition, or ‘What to do?’

Opposition: The typical response to this development has been either an opposition to the economization of education which is however heavily relying on old legitimatory dispositives, or an uncritical adoption of neoliberal thinking, where efforts to produce productive knowledge go hand in hand with economizing tendencies.

A postmodern reaction: There is however a lateral approach that has been introduced to educational sciences by Koller. He follows the ethical reasoning that Lyotard has written up in his later work “The Differend” [8], where he tries to answer the question what we should do under the postmodern condition. Lyotard uses the concept of discourse not only to explain speaking but all interaction.

His answer is that, as we cannot rely on grand narratives anymore, we should accept that different regimes of discourse are fundamentally different in what things can be said with them and what goals can be reached with them—a fact that he calls the *differend*. We should therefore abandon unifying tendencies and instead try to do justice to the differend and articulate it, especially when it is hidden under a litigation that is won by one party while silencing the other party.

Koller has adapted this philosophy to pedagogics by transferring the demand “to do justice to the differend” to a goal for learning processes. In a

german tradition he refers to these processes as *Bildung*.

“»Bildung« in this sense would stand for processes, that give rise to new sentences, new families of sentence and new regimes of discourse, which keep the *differend* open, by helping a »something« that was as yet unarticulatable to be expressed.“ [5, 311]¹

While this approach seems to be very valuable to pedagogics under the present condition it lacks two important aspects:

- It is very abstract; thus it is very hard to imagine how such a process of *Bildung* would look like and how to initiate it.
- It only deals with half of the present condition. While it seems to be a viable response to the legitimacy crisis, it does not deal with the demand to produce productive knowledge.

It seems like open source could be a phenomenon that would fill these gaps. It is as concrete as an empirical fact can be, it seems to be quite productive, and I will try to show that it embodies postmodern ethics. This is the first reason, why I propose to have a pedagogical look at open source.

3 A theory of knowledge and learning Or why a pedagogical approach to open source helps to understand open source

While many studies on open source deal with the question why single agents are motivated to contribute to a project, I will not address this issue at all.

As Rossi shows in her resumé of current research on open source [15], the much more intriguing aspects of this phenomenon are the interaction between the participants and the adaptiveness of the institutional structure of open source projects.

3.1 Software development as a knowledge driven process

The software development in open source projects can be understood as a knowledge intensive process. Knowledge that concerns the software is created, changed, propagated throughout the community and inscribed into the

¹Translated from German by CK.

software. This approach has successfully been used by Edwards [2] or Reinhardt [14] who both use Lave and Wengers concept of communities of practice and that of learning as legitimate peripheral participation [7].

Legitimate peripheral participation refers to the idea that newcomers to a community start by participating peripherally in the common practice of the community, and then slowly grow to fully engaged members. The participation is legitimately peripheral if not having the rights of a full member parallels with the fact that the learner does not have all of his duties, that his being a learner is an accepted role [7, 35f]. From Lave and Wengers perspective knowledge is not a thing, that gets transferred from masters to apprentices, but a relationship, a network into which apprentices slowly grow.

3.2 Project adaption as a knowledge driven process

Lanzara and Morner have proposed a theoretical framework for open source projects, that fits well into this concept of knowledge as a relationship, but goes one important step further. They state, that the interaction in the software development process is not structured by formal or informal organization, but through technology [6].

For example the ways how a user can get into contact with the developers of a program are not so much shaped by explicit or implicit rules, combined with governance mechanisms that can enforce them. It is rather the technology of mailing lists or support-forums that shape these ways

Lanzara and Morner describe these technological governance mechanisms as artifacts into which knowledge is inscribed.

In the above example there is knowledge about efficient user to developer interaction inscribed into the technology of the mailing list. The (very simplified) concept "If the question is forwarded to many people, there will most likely be one to answer it" is inscribed into the mailer daemon, who is 'told' by its programmer to forward a message to all subscribers of the mailing list.

That means that governance of open source projects is a knowledge intensive phenomenon as well. An adaption of this governance takes place in a process of creation, change, transmission and inscription of knowledge into the technology. This is very similar to the process of software development described above.

In the same mailing list the members of the project will discuss (a) changes to the program they develop, and (b) the technology they use for this development. The result of such discussions can thus be either (a) an implementation of a change in the program, or (b) an adaption of a development tool, or both.

This means that in open source projects we find two equally knowledge driven processes, that account for different types of changes. This is confusing. Luckily Bateson, to whom Lanzare and Morner already refer, offers a way to clarify this.

3.3 Batesons degrees of learning

Like Lave and Wenger Bateson understands knowledge as a relationship. He defines knowledge as “a difference that makes a difference that makes a difference” which can be translated into: Knowledge is the embeddedness of data into contexts of contexts. A change of this embeddedness can then be called learning. Depending on the contexts that the change refers to, Bateson distinguishes between learning 0 (no change), learning I (change within a context), learning II (change of the context but within a second context) and learning III (change of the context of contexts).²

With these concepts we can distinguish between learning II, that in the case of open source refers to the creation of knowledge that is helpful to the development of the software, and learning III, that deals with the context in which that development takes place; thus the project goals, the culture of the community, its implicit and explicit rules and the technology used to apply them.

It should be readily apparent, that we can then link learning II to knowledge production or the productive aspect (2.1) and learning III to Bildung and the ethical aspect (2.2).

I shall therefore now present two analyses of the open source development process. One will be focusing on Learning II and knowledge production, and the other one on Learning III and Bildung.

4 Processes of knowledge creation or learning II in open source projects

I will describe some current research projects and summarize their findings with the proposed theoretical concept, and show to what extent they describe learning processes that fulfill the demand to produce productive knowledge. The projects in question are:

²This list could be extended endlessly as even learning III occurs within a context. But Bateson notes that learning IV is probably never achieved by single organisms.

- Two case studies of the Apache (www.apache.org) and the Mozilla project (www.mozilla.org) by Mockus and others [11].
- An analysis of agents, artifacts, rules, resources, activities, practices and interactions in two projects: Apache (www.apache.org) and the Linux Kernel (www.kernel.org) by Lanzara and Morner [6].
- Reinhadts ethnographic investigation of the K Desktop Environment Project (www.kde.org) [14].

5 Processes of Bildung or learning III in open source projects

Here I will present my own research project [4], in which I have analyzed the Thorvalds-Tanenbaum-Debate. I will show that flames can be understood as a means of articulation of a differend, and that forks can be understood as a last resort to do justice to the differend.

6 Conclusion

At this point I will (hopefully) have shown that the analytical distinction between learning II and learning III helps to understand the adaptivity of open source projects. The fact that we find both processes of learning II, in which productive knowledge is produced, and of learning III, which conform to postmodern ethics or 'Bildung', opens up a perspective for educational science. Further research could therefore try to adapt the principles of open source to education.

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