

# Peer production & peer support at the Free Technology Academy

Citation for published version (APA):

Potters, H., Berlanga, A., & Bijlsma, L. (2011). Peer production & peer support at the Free Technology Academy. In Gerrit C van der Veer, Peter B Sloep, & M. C. J. D. Van Eekelen (Eds.), *CSERC '11: Computer Science Education Research Conference* (pp. 49-56). Open Universiteit Nederland. <https://dl.acm.org/doi/10.5555/2043594.2043598>

## Document status and date:

Published: 07/04/2011

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

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# Peer Production & Peer Support at the Free Technology Academy

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## ABSTRACT

The Free Technology Academy (FTA) is a programme of master-level courses on Free Software and Open Standards that publishes all of its materials as Open Educational Resources. The FTA is run through a virtual campus, entirely based on Free Software and implemented as part of a European project. The goal is to make the production of course materials economically sustainable. We surmise that peer production is an alternative that will foster the sustainability of the FTA. Our ultimate goal is to identify how peer production can be fostered and supported. To that end, in this paper we first describe the FTA educational methodology as well as the characteristics of peer production. Next, we present some evidence that shows the motivation people have to participate in peer production, mainly in Free Software, as well as the importance of Learning Networks in this context. Thereafter, we discuss our initial thoughts about what lessons can be drawn. Finally, we present conclusions and future work.

## Categories and Subject Descriptors

K.3.1 [Computer Uses in Education]: Collaborative learning

K.4.1 [Public Policy Issues]: Intellectual property rights

## General Terms

Design, Economics, Human Factors

## Keywords

Free software, Open Educational Resources, Peer Production, Peer Learning, Instructional Design, Social Capital.

## 1. INTRODUCTION

In this section we first describe the history and the initial ideas of the Free Technology Academy (FTA), then discuss its curriculum and virtual campus and, finally, we explain the challenges the FTA is facing in the near future.

### 1.1 The background of the Free Technology Academy

The Free Technology Academy (FTA) is an international consortium consisting of the Free Knowledge Institute (The Netherlands), Open University of the Netherlands (OUNL), Open University of Catalunya (UOC) and the University of Agder in Norway. The Free Technology Academy offers a distance

learning programme with specific modules about Free Software (FS) and Open Standards (OS) for an international audience.

The main goals of the FTA were, first, to set up a virtual campus that offers course modules on Free Software and Open Standards, staffed by teachers from the participating institutions; second to become a showcase of a virtual campus based on FS, OS and the use of Open Educational Resources [11]

The initiative for setting up the FTA was taken in 2008; it was built up with support from the European Commission (Lifelong Learning Programme).

The FTA is growing very fast. In 2010 the programme ran 8 courses which had 163 registered learners. In 2011, the programme will be extended to 26 instances of 14 different courses. Ever more parties are joining the FTA to collaborate, such as the Free Software foundation, P2Pfoundation, Gleducar, URJC (Universidad Rey Juan Carlos) and SEED.

In April 2010 an international Taskforce was set up to design an international master programme. Since January 2011 the FTA is supposed to be financially independent.

## 1.2 The Educational Methodology

### 1.2.1 The curriculum

The vision of the FTA partners is to continue building a shared curriculum that can be the basis for national accreditations of master programmes by partner universities.

In 2010 a Taskforce was set up to work on an international master programme on free software. According to the Open Educational Resources vision, the course material can be downloaded for free and a print on demand service is also available at cost price.

When a learner wants to follow a course he enrolls in it by filling in a registration form and paying the course fee. Every course has its own class-forum, where discussions and debates related to the course's content are being held. A tutor is engaged and also guest speakers are invited. However, if they so want, course participants can also work at their own place, in an asynchronous way. This makes the learning experience very flexible and convenient for working people and, in view of time zone shifts, for people all over the world. During the course the learner has to complete a number of assignments, so-called the Continuous Assessment Activities (CAA). Also tutors evaluate the participation of learners in virtual class activities [16].

Figure 1 shows the FTA-programme in January 2011(for an actual programme we refer to the website <http://ftacademy.org/courses/programme>).



Figure 1. FTA Programme retrieved from the virtual campus-website 23 January 2011

### 1.2.2 Virtual Campus

The Virtual Learning Environment (VLE) of the Free Technology Academy is called *the virtual campus*. The virtual campus is freely accessible for everybody who wants to participate in the FTA (<http://campus.ftacademy.org>). The virtual campus consists of FTA Community Portal, the FTA Wiki and communities' spaces of the courses, the so-called virtual classrooms. In the FTA Community Portal different tools are available. One can fill in a profile and portfolio, join a group, or even start a new group, making friends, by inviting them, a system comparable to LinkedIn. Figure 2 shows a screenshot of such a personal site of the virtual campus.

This Community Portal can be seen as a way both to facilitate learning as well as to make participation in FTA projects and activities accessible to more people [16].

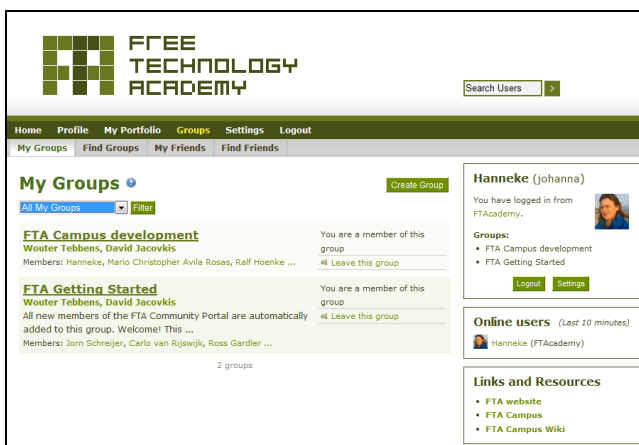


Figure 2. Screenshot from the virtual campus

## 1.3 Challenges

At the start of this paper, we formulated two questions we wanted to address.

1. How can the production of course materials be economically sustainable?
2. How can we foster peer learning and peer support in the virtual campus?

In the next two paragraphs we will elaborate these questions.

### 1.3.1 How can the production of course materials be economically sustainable?

For the development of educational materials, Benkler [1] [2] discusses three different economic models, the intra-firm model, the market-based model and peer production. It seems that, given the context, **the peer production model** should be superior to the other two models. The reasons for that are (1) the lack of transaction costs as no contracts need to be managed and there is no hierarchy, (2) the non-monetary motives people have to participate and (3) the availability of the results of the collaborative effort to all participants under equal conditions.

The FTA already started with the introduction of the peer production model by the project of designing a new curriculum for a master on Free Technology [22]. The other courses are still produced by the FTA-curriculum development team. Via an annotation tool, participants of the courses can give feedback on the material of the course.

In general the principle of peer production in the FTA works as follows: The FTA invites relevant experts and institutions in a particular field to participate in the development of a new course, including the authoring of course materials. The structure of the course is then discussed with the interested parties and the workload of developing the materials is distributed. The resulting Open Educational Resource (OER) produced this way is enriched by the discussion that led to its conception, and each participant invests only a fraction of the total resources. Figure 3 shows the workflow of the peer production process.

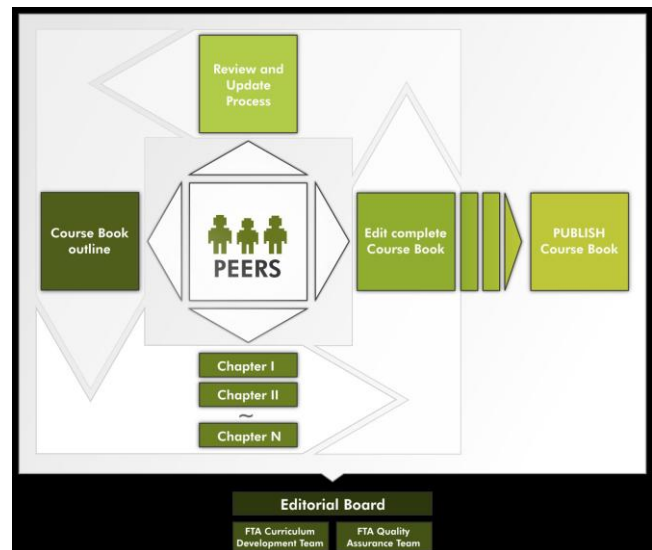


Figure 3. Peer-to-peer model [22]

But is this model of peer production the best solution for FTA? In the Free and Open Source Software world it is quite common that users of software also are producing and improving the software. Does this principle also work in a curriculum setting like the FTA? Besides the invited parties, are the members of the virtual campus indeed willing to contribute for free?

### Motivations for peer producing

Other motives than money may induce people to participate in the production process, the results of the collaborative effort are available for all participants under equal conditions. And because there is almost no hierarchy no costs are being made for managing. Can we find other motives derived from the Open Source Software and Free Software community? We will have a closer look at this in section 2.1.1.

### 1.3.2 How can we foster peer learning and peer support in the virtual campus?

From the evaluation conducted in October 2010 [12] it became clear that the use of the virtual campus as a whole and the support from tutors in the separate spaces could be bettered. A wish of the FTA board is that the community portal must be improved. But as a student stated 'Forums could have been used a bit more by the course participants, but I guess that depends on the participants and not on the electronic environment' (VLE). The FTA-board is already thinking about new tools in the virtual campus, but unlike the student just quoted we think it is imperative to arrange conditions for communities in such a way that they arise within the **overall Learning Network**. A lot of experience has been gained on this issue. Can we learn and use some of this for FTA purposes?

### Peer support

In the same evaluation of the FTA-courses mentioned above [12] a student stated: 'I had expected more activity on the VLE from the teacher'. This expectation of student exceeds what the teacher can deliver. The FTA is growing fast and the workload of the tutors accordingly high. This problem could be tackled by the introduction of a system for peer support. At the moment the tutors are all paid teachers. In the future also members of the virtual campus could contribute<sup>1</sup>. Most of the participants are professionals in software engineering, so a lot of knowledge and experience is available among the participants. The virtual campus should foster and stimulate sharing of knowledge. Because no salary has to be paid for these voluntary contributions, the costs will decrease. Pedagogically it is also favourable that peer support will occur.

In section 2, the first question about peer production will be elaborated. We are going to explore the theory about the motivation factors of members of Free Software communities, because we think that maybe we can learn something from this theory what could be useful for the members of the FTA.

In section 3 we will discuss the second question about peer learning and peer support. We explain characteristics of learning networks and give two examples of two models which have been designed to foster peer learning and peer support.

<sup>1</sup> For accreditation reasons, the final judgment should always be done by a certificated person.

## 2. PEER PRODUCTION

### Peer production

The term was first introduced in Benkler's seminal paper Coase's Penguin. His 2006 book *The Wealth of Networks* expands significantly on these ideas. In it, Benkler makes a distinction between commons-based peer production and peer production. The former is based on sharing resources among widely distributed individuals who cooperate with each other. The latter term refers to a production process that depends on individual action that is self-selected and decentralized. YouTube and Facebook, for example, are based on this kind of peer production [1] [2]. Figure 4 shows these two types of peer production

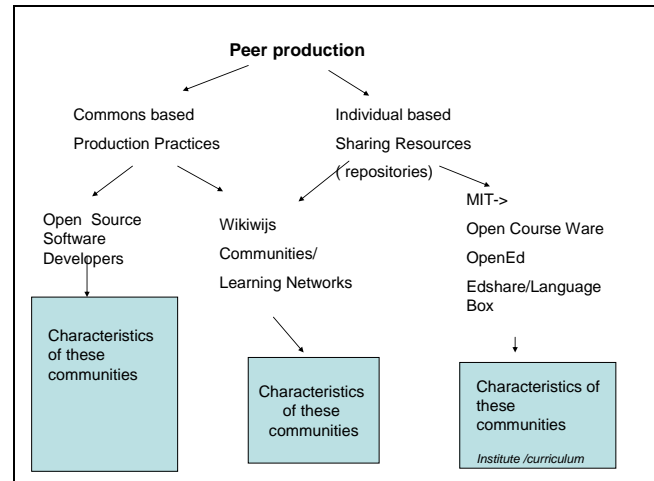


Figure 4. Peer production in relation to various projects and their communities

### 2.1.1 Peer Production among Free Software Developers

As mentioned earlier, the Free Software (FS) community or Open Source Software (OSS) community has been very successful in producing Free and Open Source Software; this is, according to Benkler, common-based peer production. A lot of researchers were wondering why the Free Software communities are such a success. To understand how this can happen, we consider the characteristics of the FS and OSS communities. According to Van Wendel et al. [19], some characteristics of FS and OSS communities are (1) free availability of source code, (2) distributed ownership and control, (3) continual influx of new people, (4) high tolerance for mistakes by software developers, (5) selection through professional attention, (6) selection based on elegance and, (7) the costs are relatively low and the benefits of the members also, (8) the entry cost for a community and the transition costs are very low and, (9) the communities are not hierarchically organized

Von Hippel [7] stated that a part of the success of Open Source and Free Software development is the ability of its communities to include users in the development process.

### Motivation for Peer Producing

A survey [6] of Linux developers held in 2002 made clear that developers spend eleven hours a week on the community. 80 % of

developers perform these tasks in their spare time. Why are they doing this? What are their motivations? The same survey showed that the main motivational factors are to develop new skills, to share knowledge and skills, or to participate in a new form of cooperation. Reputation and making money were less important.

**Table 1. Motivation factors of free software developers according to Hertel et al [6]**

Motivation factors	Percentage
To develop new skills	80%
To share knowledge and skills	50%
To participate in a new form of cooperation	33 %
Reputation	9 %
Making money	5 %

Another investigation into the motivation of Linux developers of the Kiel University is described by Steven Weber [21]. They found six motivation factors:

- *Art and beauty.* ‘Code is a core means of expression’ Source code developers are motivated by the fact that their code represents an elegant solution to complex problems. Of course the solution should in the first place work technically, but then it is more appropriate that the code is beautiful too. Sharing the code is something the developer could be proud of. It has also something to do with reputation.
- *Reputation.* Peer recognition is important in an open source community. The more sophisticated users an open source community has, the higher the reputation of each developer. That relates a third factor.
- *Ego boosting.* Ego boosting within the open source communities is openly acknowledged and accepted. But one can consider also the opposite in the case of hackers. Hackers are usually externally humble and deprecate themselves. As Weber puts it: ‘Hackers act more like a medieval knighthood’.
- The fourth factor the researchers found was *Job as vocation.* Because the job is so challenging the developers are treating their work as a vocation. The open source communities confirmed this behaviour.
- The socialization, the so-called *shared Identity and beliefs system* of the communities is strong. Lakhari [8] is calling this phenomenon an obligation/community based intrinsic motivation factor.
- The sixth factor the researches from Kiel found is the so-called *user driven innovation factor.* The users will innovate more quickly and effectively than the manufacturers of proprietary software. In the hierarchical way the proprietary software manufactures such as Microsoft are organized, it is impossible to change code very quickly. And also the proprietary software manufacturers don’t care about the esthetical value of the code, as long as the code is technically doing what it should do and making profit. In the open source community and especially in the hackers’ community there is a firmly established norm of reciprocity. Raymond described in his book *The Cathedral and the Bazaar* [13] the difference between the free software production process and the proprietary software process by using a metaphor. Building a

cathedral stands for the propriety software industry and the way a bazaar is organized stands for the free software developers.

Lakhani [8] found that hackers mainly are driven by three intrinsic motivation factors to do what they do. Having fun, user need and improving their programming skills. The first one has to do with flow [4]. It seems that hackers often are able to choose a challenge or a task that matches their personal skill. They are able to do creative discovery, resolving problems, and that gives of course a good feeling. There are similarities in the *Job as vocation* as described above. Evidently, when hackers improve their programming skills, the reward will be provided by the community in terms of reputation and ego-boosting as mentioned before.

Another study of the motivation in communities of Free Software and Open Source [19] found that the benefits that drive most developers to become involved in communities are: 1. the users’ direct need for the software and software improvement. 2. The enjoyment of the work itself and 3. Enhanced reputation that may flow making high-quality contribution to an open source project

We can conclude that members of the open source communities are mainly driven by intrinsic motivation factors. Peer production in the free software is very common.

### 2.1.2 Peer Production in a Educational Context

Wikipedia is one of the best-known examples of peer production in an Open Educational Resources context. Fifty thousand volunteers successfully co-author Wikipedia. [1] The Open Educational Resources movement started with the Massachusetts Institute of Technology (MIT) offering their courses for free. Soon a lot of other initiatives were following. The Open University of the Netherlands has developed ‘OpenER’ and ‘Wikiwijs’ In the first project self study material of the Open University became available for students for free; in the latter Dutch teachers can find, make and share teaching materials, which are collected in a big repository. Through metadata the materials are easy to make, store and find.

Academics are used to sharing their research work in publications or articles, and to speaking on conferences. There they retain all rights, including receiving fees. Academics are not used to offer their publications for free.

At the same time academics in their role of teachers are not used to sharing their materials and their experience, even though a lot of digital repositories are being set up by institutions to support the sharing of resources for teaching and learning. In the UK the JORUM national repository was established. The University of Southampton did recently research into the use of an institutional educational repository (Edshare) and a discipline-based repository for the UK national language teaching community [5], a so called Language Box. A repository always is accompanied by a users-community. In this research the approach was to ask the teachers to share not some perfectly completed learning objects, but rather the artefacts that make up their everyday teaching. Such as the PowerPoint presentations, the worksheets and the diagrams they have drawn slides and videos they have shot.

They found evidence that users engage with their local community repository to a greater degree than with remote systems. Also, the users perceived a repository as a public bank of

resources, while the builders of the software intended the repository to be a home for their online material. So the ownership was not really felt by the teachers. Another barrier for the teachers to share their learning object was the concern of *the quality*. That is why it is very important that institutional policies support the idea of sharing and that there are clear rules for personal and institutional copyrights.

Margaryan and Littlejohn [10] stated that communities of practice that allow teachers to talk about their use of Learning Objects (LO) in repositories, is an important aspect of extending and improving teaching practice. 'Unfortunately these learning objects repositories are often designed to exploit the capabilities of technology rather than to meet learners needs' [10]. To make peer production through repositories work, it is very useful to look at the characteristics of the repositories themselves and the characteristics of the users or communities.

Both studies discussed above [5] [10] found mismatches in expectations between the users and the developers of the repositories. The users of the repositories wanted to have short-term solutions. A teacher, for instance, wants to find material that he can use with maybe a little adapting in practice. The developers of the repositories often are focused on the repository, while the users wanted to embed the material in their context. Often the teachers are using already a Virtual Learning Environment so it should be better to integrate these different communication channels. The dimensions of the communities should be more aligned with the repositories' dimensions.

Peer production in an educational setting using Open Educational Resources has not such a long history. More and more initiatives are found though in higher education, but also some among teachers of primary and secondary schools, such as *Wikiwijs*. Most of the peer production examples are using repositories. A community of users exists, but often the characteristics of the community and the repositories are not well aligned with each other.

### 2.1.3 Comparison Peer Production in free software developers and educational context

A big difference between educational and software communities is the *culture of sharing*. We have seen that in an open source community sharing is very common. 'A contributor is judged by his work and not as a person' is often the norm with the free software developers. Among teaching academics this is very different. The academics are used to make their own educational materials and are not used to share it with others, certainly not via an open repository. With the arrival of web 2.0 and the idea that a repository is not an archive but more a 'living thing', teachers adapted more or less to the use of OERs. But still time is needed for confidence building.

The *motivation* is different. We have seen that among the Free Software and Open Source community the intrinsic motivation is high, and that, on the other hand, the motivation among academics is low and related to the embedding of the repositories in the educational context and existing VLEs. We also found that it was important that the institutes are supporting the idea of sharing and that there are clear rules for personal and institutional copyrights.

*Quality* Quality matters. Academics are afraid that the educational products they put in a repository are not good enough. Maybe they are afraid to fail in the eyes of colleagues. We found evidence that a high tolerance for mistakes and the selection through

professional attention among the free software developers is the norm.

For the FTA and other OER-communities it should be interesting to explore if and how one can change the sharing culture, explore the motivation factors and tackle the concern of the quality of the Learning Objects made by the participants.

## 3. PEER LEARNING & PEER SUPPORT

Here we will discuss the question of 'How can we foster peer learning and peer support in the virtual campus?' in order to improve the peer production process.

As we have learned in the peer production section, it is important from a design perspective to distinguish between the Virtual Learning Environment (VLE) and the people (users) using the VLE. When a VLE is made available, that does not mean that the users are also willing to use it.

In the case of the Free Technology Academy the virtual campus (VLE) has been built for sharing knowledge and supporting the learning processes of the participants of the courses. Several factors dictate whether a community comes to live.

Learning Network theory [15] sheds light on these factors. In that context, we introduce two examples of design models which have been specially designed to foster peer learning and peer support. The first model is the Ad-Hoc Transient Communities model [17] [18] and the second model is focussing about the issue of Trust and Trustworthiness [14]. The first model specifically addresses the problem of tutors having little time; the second model is relevant for every virtual learning environment where professionals are working together on an equal basis. For lack of space, we ignore other models such as the Online Knowledge Sharing Model [9] or the Knowledge-sharing Strategies for Collaborative Creativity model [3].

### 3.1 Learning Networks

Learning Networks are online social networks specifically designed for the support of non-formal learning. [15][17][18] Learning Networks consist of several communities, which shrink and expand, and come and go.

A Learning Network is specific to a certain domain of knowledge and consists of:

1. Learning Network users: people with the intent to learn and the willingness to share their knowledge in the specified domain.
2. Resources: collections of learning activities that are created and shared in order to exchange knowledge and experience.

Various factors influence the success of a Learning Network:

1. Strength and weakness of the ties of the participants [10]
2. Trust and Trustworthiness relations among participants [14]
3. Motivation of the participants
4. Continuity of the network [15]
5. Ease or difficulty to make connections inside the network [17][18]
6. Heterogeneity of the participants.

## 3.2 Design models fostering Peer Learning and Peer Support

The first model for networked learning we use is the Ad Hoc Transient Communities model [17] [18]; the second one focuses on Trust and Trustworthiness [14]. We chose these two models for their potential to be adapted to the Virtual Campus of the FTA.

### 3.2.1 The Ad Hoc-Transient Communities model

To minimize the time-effort of teachers (tutors) Van Rosmalen [17] [18] developed the Ad Hoc Transient Communities model.

This model automatically invokes peer learners to give support when a student has a content-related question. The setting is a learning environment where students are following diverse courses about a subject (for instance Psychology).

The principle of the model is as follows: A student of the VLE proposes a question. A wiki is then set up and it is automatically seeded with three small documents. Also, the wiki is populated with users who have been selected and invited to help.

To identify the peers the selection is based on a weighted sum of four criteria that are derived from the users' background and performance. The four criteria are: *Tutor competency*, *content competency*, *tutor availability* and *tutor eligibility*. The *tutor competency* could be derived at a rating system on previous answers given by that specific tutor; the *content competency* could be derived from a portfolio or successful completed courses; *tutor availability* could derive from an online diary. Potential tutors who are on holiday or busy with something else could thus be excluded by the system.

Finally, a tutor's *eligibility* is assessed. It is based on similarity in competence level of the users [15]. To users with similar competence levels, it is easier to explain something [20]

Finally, when the problem is solved the wiki disappears. However those participants have become acquainted with each other in an Ad Hoc Transient Community (AHTC), they may want to stay in touch. [15]. Maybe, later they will seek each other for other problems, without the use of the AHTC, but through contacting each other directly. This way, their social embedding has been strengthened.

### 3.2.2 TWAN-schema about Trust and Trustworthiness

Rusman [14] developed a framework of antecedents of trustworthiness, which can be used to determine which type of information is relevant to assess each other's trustworthiness. Examples of antecedents are: 1. Communalities, 2. Ability, 3. Benevolence, 4. Internalized norms, and 5. Accountability. A test of her trustworthiness schema revealed that the factors Communalities and Ability matter most in the early contact phases. Co-workers are looking for personal characteristics that they have in common. That could be something like a similar goal they want to achieve, a common language or even the same hobbies. It also seems to be important that a peer evidently has certain skills and competences.

Once contact has been established and peers have been collaborating for some time, the antecedent Communalities remains important, but now also Accountability and Internalized Norms have become important. Can a person rely on the other person? Is

the other person keeping sensitive information confidential, and what about respect and honesty?

We think that it is useful to implement an Ad Hoc Transient Communities model in the virtual campus of the FTA. It addresses to the problem of the lack of tutor time of the teachers. Indeed, we think that this model should be used for all members of the FTA (not only the participants of the courses). When a member wants to start a project about Free Software the model enables him easily to find peers and partners to collaborate with. Of course, this only works if all members fill in the portfolio, profile, and diary so that the system can indicate the right people and sources.

We should also derive design principles from the Trust and Trustworthiness-schema as it helps us determine how exactly the profile should be designed.

## 4. DISCUSSION AND CONCLUSIONS

We started this paper by describing the Educational Methodology of the Free Technology Academy. We hold that peer production is an alternative that will foster the sustainability of the FTA virtual campus in economical terms; we compared peer production in the context of Free Software developers and peer production in an educational context. Our ultimate goal was to identify how peer production can be fostered and supported. Motivation and Learning Networks seem to be important to achieve this goal. We formulated two questions we like to address in this paper.

1. How can the production of course materials be economically sustainable?
2. How can we foster peer learning and peer support in the Virtual Campus?

**To answer the first question, we focussed on the economic model of peer production and also consider the motivation factor**

### Peer production

We have seen that the culture and willingness of sharing is an important condition for Peer production. The participants of the courses of FTA, but also other members of the virtual campus, are motivated, otherwise they would not have become a member of the virtual campus. But do they have the right motivation to contribute to the FTA?

### Motivation

We have seen that members of the open source communities are mainly driven by *intrinsic* motivation factors, such as *reputation* and *ego boosting*, but also a *shared identity and beliefs system*. The ties between the members are close. *Users need* is identified as an important driving force among the Free and Open Source Software developers.

FS and OSS communities differ from educational communities in at least three ways:

1. *Culture of sharing*., 2. *Motivation factors* and 3. *Perceived Quality*. We found evidence that a high tolerance for mistakes and selection through professional attention among the free software developers are the norm, while academics may well be afraid to fail in the eyes of colleagues when they put material in a shared repository.

To address to the second question we focussed on the principle of Learning Networks and Two Design Principles models

## Learning Network and Design Principles

We learned that, from a design perspective, one should distinguish the Virtual Learning Environment (VLE) from the people (users) who are using the VLE. Once a VLE is designed, that does not mean that the users are also willing to use it. A Learning Network should be formed to bridge this gap.

From our preliminary analysis we concluded that it is useful to implement an Ad Hoc Transient Communities model in the virtual campus of the FTA. It solves the problem of lack of tutor time for the teachers. Also, we think that this model should be applied to all members of the FTA, not just those following courses. When a member wants to start a project about Free Software the model enables him to easily find peers and partners to collaborate. This requires that all members fill in their portfolio, profile and diary so that the system can properly match people.

We can also derive design principles from the Trust and Trustworthiness-schema. It determines how a profile should be designed exactly.

## 4.1 Future work

The above exercise has been a theoretical one, ignoring the actual motivation factors of the members of FTA. We now plan to carry out an investigation into these among the members by means of interviews or a survey. This will allow us to further test the models discussed and to better design an environment for peer producers of open educational resources and for peer support among users of those resources.

## 5. ACKNOWLEDGMENTS

We want to thank Wouter Tebbens, director of the Free Technology Academy (FTA) and Free Knowledge Institute (FKI) who gave valuable information of the FTA and Ellen Rusman for her explanation of her designed Trust and Trustworthiness-schema.

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