

Computer-supported learning and free software

Michael Totschnig

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1 Introduction: communicative action - education - CMC

In my paper, instead of talking about the virtual university, I want to explore some relations between three distinct domains: 1) the philosophical theory of communicative action, 2) education, 3) computer-mediated communication. I hope to show that these theoretical relations make a strong point for the use of free/open-source software in computer-supported learning.

2 Habermas and claims of validity

In his "Theory of communicative action" [2] the German philosopher Jürgen Habermas investigated into the grounds of human discourse. He built upon speech act theory, extending its sociological implications. Habermas asks what claims a responsible speaker of a human language implicitly or explicitly makes, when he addresses another person. Essentially Habermas distinguishes three kinds of validity claims that are at least implicitly present in all human communicative action. Each of them finds its origin in one of the essential dimensions in which man orients himself through language: the objective world of perceptual and cognitive facts, the subjective world of emotions and intentions, and the normative world of social conventions. Each of them can become foregrounded in different classes of utterances, but even if they stay in the background they are implicitly present. Each of them can become the object of contestation by the addressee of the utterance.

- With respect to the objective world our communicative action raises the claim of being true, that does not mean that we guarantee the truth of our propositions absolutely, and it does not exclude the possibility of fiction or irony. It means that when we responsibly utter a proposition, we have to be able to explicit on what conditions our belief in its truth is

grounded, or to describe the frame of reference inside of which the proposition can be held for "true". (I hope you won't question me on all the logical problems that this implies).

- With respect to the subjective world our words usually claim to be sincere. The sincerity of an utterance cannot be questioned immediately and absolutely, since the inner world of the speaker is only accessible to him. But it can be doubted on grounds of anterior previous of the speaker, and it often has to be realized in subsequent behavior. (A promise has to be kept)
- With respect to the normative world, our utterances pretend to be just. Living in society means being grounded in a complex set of conventions, and implicitly when we speak, we rely on a subset of them. Our utterance can be questioned, either in its being faithful to a given norm, or by contesting the justice of the norms it is relying on.

What is important for Habermas, is that these claims of validity can be criticized in a rational manner, and his theory tries to analyze explicitly the proceedings of this critique in order to establish a framework for democratic and pluralistic discourse. Even if we have to take for granted these claims in the course of everyday life, only if they can be justified in principle, put into question and renegotiated, our discourse can pretend to give equal rights to all participants. In other words, the definition of the frame, in which we communicate, i.e. the world we refer to, the subjectivity we express, and the norms we accept, has to be, in principle, the result of a rational and social discussion.

There is a fourth class of validity claims, Habermas only mentions in passing because it seems so fundamental that it does not need elaboration. With each communicative action a speaker claims to be understood. My hypothesis is that in mediated communicative action this fourth claim which seemed trivial to Habermas becomes problematic, but that we can use his theory to evaluate claims of understandability of mediated communication. In technologically mediated communication understandability has to be guaranteed by the apparatus of the media. Normally we take it for granted that these apparatus work and that we can rely on them, but we would also insist that the institution that is supplying or controlling the mediating technology is accountable for how it works, and what it does with information generated by our communicative action.

3 data formats as objects of a Habermasian discourse

I think that extending this Habermasian argument to computer-mediated communication we are lead to assert first of all the necessity of open standards for data formats and communication protocols, and secondly the advantages of free or open source software.

CMC depends on a complex interaction of different systems, subsystems, programmes and processes. This interaction works because there are data structures which guarantee that information is transmitted and interpreted correctly. The user normally is protected from this complexity, but in order to ground his claim that what he communicates is understandable by his addressee, he must be entitled to demand a justification for the workings of all the components

of the system, and he should be able, in principle, to give an account to his addressee in what conditions his message can be decoded and understood. That does not mean that each user has to understand all the complexity of computer communication systems, but that this complexity can be publicly examined by experts who can explain to the larger public the implications of these systems.

The argument in question is not the same in respect to open standards and open software: Using open standards in computer communication means that the user when sending a message does not have to force his addressee to use the same computer software as he does, he can instead refer to the open specifications of the standard, and to the multiplicity of programmes that are able to understand that standard. Using open software goes one step further: It gives the user or the expert he is asking for advice the possibility to understand different aspects of his communicative action, take responsibility on them, and to contribute to the discussion about their technological and social quality and to efforts to improve them.

4 software, knowledge, education

I'd like to show in the following how this argument can be applied to computer-supported learning:

When we construct, communicate, question and validate knowledge, we do not only consider its content, but also its form. This is true not only for technologically mediated knowledge, but also for human speech (think of the importance of rhetoric) and writing (think of the elaborate forms in which knowledge is usually presented as articles and books). Learning to work with knowledge doesn't mean only to acquire content, but to master form.

Computer-supported learning uses a great number of new forms for knowledge production, presentation and communication. Think of hypertext, think of data bases, think of mailing lists. Each of them implies the definition of data structures, communication protocols and user interfaces. A user would not want to know the details of their technical implementations, but I want to argue that in order to work with them constructively and responsibly a certain consciousness about these forms is required, and that these consciousness can best be cultivated in open computer systems. I'll speak about the communicability, the construction, and the manipulation of knowledge in turn.

- communicability of knowledge: When we use computers for learning, we might be a solitary student, who keeps his drafts, his essays, his annotations for himself. But today it is widely acknowledged that learning is mostly a collective and social practice. We enhance our learning, when we take part in collaborative projects, where we share our thoughts, get feedback, and might even write collectively. Computer-supported learning as CMC in general is confronted with the problem of compatibility and interoperability. The Internet has been built on open standards that permit a large number of individuals to be connected without depending on one vendor's system or software. But what is true for some fundamental protocols of the Internet, is unfortunately not yet established for specialized applications as document preparation, or educational computing. Open standards for these

applications exist, and I think that the efforts in academic production of documents and software should be concentrated on these open standards.

- construction of knowledge: recent theories in collaborative learning suggest that students learn best when they have the opportunity to integrate knowledge they are confronted with in their own frames of reference. Computer-supported learning can enhance a student's playful interaction with knowledge, if it permits him to combine texts in new ways, to test hypothesis with educational software, to confront different perspectives on a given subject. The forms of knowledge can be hidden from the learner in black boxes, and probably in certain stages it is preferable if he is not directly confronted with them. But in order to evaluate their validity he should be able, in principle, to understand how they work, i.e. to construct perspectives on them that are not given in the user interface of the software he uses. Norm Friesen [1] (referring to recent literature in educational technology) expresses this idea in the term "grey boxes", i.e. "components that would reveal more of their "implementations" to their users." A user working with a system whose informational objects and data formats are open - open for investigation, experimentation and improvement by the user - can define his own way of structuring and presenting knowledge.
- manipulation of knowledge: computerized knowledge has maybe one decisive advantage over traditional media, it can be manipulated in multiple ways. So when we evaluate validity claims of computerized knowledge on its media level, we not only can ask "In what contexts is it communicable and understandable?" or "How has it been constructed?" but also "What can be done with it?" How can it be printed, interacted with, questioned, remodeled, combined, searched through? Again I suggest that open formats are most capable of giving learners the freedom to manipulate knowledge at their will, to print it according to their preferences, to choose the interface they prefer, to highlight its constructedness, to mould it in other formats, to create links to other knowledge, to extract relevant information from it.

5 GNU/Linux and the virtues of ASCII text

I want to conclude this paper by showing how my Habermasian argument for public software in education can be sustained by the GNU/Linux operating system.

On the one hand it seems to me that the actual open-source developer and user communities are examples for productive, virtual learning communities, where knowledge is exchanged on collaborative grounds, in open formats, and constructed in a way to be questionable, combinable and manipulable by every competent individual. The tools used by successful open-source projects (like CVS for version-control and collaborative text management, diff and patch for the economical distribution of updates, texinfo for the production of documentation that can be read both as an online hypertext and as finely type-set manuals) are examples for state-of-the-art systems for collaboration and document preparation (I admit that much can be done to improve the user interfaces to these programs). The information gathered by users in Usenet fora and doc-

umentation repositories as the "Linux Documentation Project" give another striking example of the potentials of knowledge construction communities that are socially and technically open. I do not pretend that every open-source project works on this grounds, and that this ideal communicative practice is not very often more an ideal horizon than an actual practice. But I think that this horizon is effective by animating the brains, the hearts and the fingers of many members of the open-source community.

On the other hand - and I will elaborate more thoroughly on that - working on a GNU/Linux system seems to imply some principles that can be seen as a realization of my theoretical argument. The main principles are the respect of open standards for data formats and the preferred use of ASCII files for data storage instead of binary formats. Both these principles have consequences on the three aspects of digital knowledge mentioned above: communicability, construction and manipulation.

- Learning to work on a GNU/Linux system can imply to learn about the communicability of data. If data formats are defined by open standards, the learner gains access to and can share knowledge with others working in different digital learning environments. If data is stored in ASCII files, it can often even be communicated to people without a specialized interface for a quick examination with every text editor.
- Data stored in ASCII files and in open formats is not only more universally communicable, it can also empower the learner to develop his own way of constructing it. Firstly because he often can choose between different interfaces to these formats, secondly because some open systems allow the user to develop customized formats without sacrificing communicability. This interaction between universal and open formats and individual definition of text and data structures is best exemplified in document preparation systems as Latex or SGML, where the user can decide to stick to well designed and useable document types or to develop his own and still be able to communicate them accompanied by his document type definitions. Evidently this argument applies also to the use of these systems on non-open platforms, but it seems to me that on a GNU/Linux system the computer literacy necessary to use them proficiently can best be developed.
- The user's opportunities to manipulate digitalized knowledge is intrinsically linked with his freedom to communicate it and his choice of tools in constructing it. Open formats for ASCII files can be accessed and manipulated by a large range of tools, developed by users and available in many different online forums.

Working with open standards on an open computer system gives the user the possibility to examine and also to formulate Habermasian validity claims for communicative actions - and I think constructing and sharing knowledge have to be seen as communicative action. It is often objected to this line of argument that this competence is not accessible for the average end user. But I think that this objection can be refuted.

Freedoms always exist in principle, and actual hinderances to make use of them do not reduce their importance. The user of free software can decide to engage in this critical examination by

acquiring the necessary technical expertise. But he can also decide to delegate responsibility for specific questions to trusted experts, and in every community of practice, every member implicitly gives trust to many others. In the case of free software this trust can be a free decision instead of the lock-in that results from closed and proprietary data formats.

Thus, an individual learner can reap the benefits of open-source computer-supported learning systems, if he can take part in a community of learners where the examination of validity claims and the definition of communicable and customized data formats is a collaborative undertaking. Digital knowledge becomes the object of, simultaneously, social debate and individual engagement.

References

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