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Learners' Agency and CSCL Technologies: Towards an Emancipatory Perspective

Abstract

This squib continues the ongoing conversation about the direction and future of CSCL, initiated by Wise and Schwarz (2017) and the ijCSCL editors. It argues that CSCL should take an emancipatory perspective to learners' agency and its technological substratum. The implication is that learners should be empowered to select, change, inter-operate and/or adapt not only the software applications they use, but more generally, the support they obtain from these technologies. This raises many exciting questions and challenges for CSCL in terms of educational, social, design and technical considerations.

Keywords

Learners' agency; emancipation; adaptability; design of computational artifacts.

Introduction

This article is a squib that proposes an emancipatory perspective to learners' agency and its technological substratum, and studies the implications of such an approach for research in Computer Supported Collaborative Learning (CSCL).

The objective of this study is to shed further light on possible desirable futures for CSCL. At the initiative of the International Society of the Learning Sciences, specific action was carried out to "take stock of the accomplishments and challenges in the field thus far in order to imagine, probe, and question desirable paths for the future" (Wise and Schwarz, 2017). Wise and Schwarz built on an iterative and generative consultation with members of the CSCL community to propose a narrative review of the field, which can be used to initiate a dialog with members of the CSCL research community and provides a substratum to envisage the future of the field. The present article responds to ijCSCL editors' request for squibs that continue this effort by elaborating positions and raising new controversies (Ludvigsen et al., 2017).

The rationale adopted in this squib is to consider CSCL technologies from a non-canonical perspective and examine how this analysis can help to identify a desirable future, and the challenges to be faced.

The canonical approach to considering and analyzing CSCL technologies is to prioritize how they support collaboration and knowledge building. This perspective leads to focus on the features that have been proved to be instrumental in attaining these goals. These include the following examples: supporting the collective elaboration of artifacts (e.g., texts or models) with dedicated editors offering predefined semantic constructions, highlighting the different learners' contributions or allowing drafts, annotations and versioning; supporting knowledge-generative interactions such as explanation, justification, negotiation, regulation, argumentation or conflict resolution with communication applications that suggest sentence openers, visualize argumentation, dissociate roles or manage turn-taking; offering awareness and monitoring information using Natural Language Processing or Learning Analytics techniques. This has been highlighted in Wise and Schwarz's synthesis.

In this squib, I explore a perspective with a different primary matter of concern and starting point, namely learners' agency and, more precisely, an emancipatory perspective to learners' agency. After a brief reminder of the importance of considering learners' agency, some of the issues, alternatives and underlying challenges that appear when taking a learners' agency perspective are discussed. The overall analysis is then reframed and discussed, and finally the conclusion suggests a number of possible research avenues.

To avoid any misunderstandings, it is important to note that this study does not aim to discard or disregard the interest of the canonical perspective mentioned above; considering if and how technologies support collaboration and

knowledge building must remain the central perspective. The point made here is that (1) learners' agency and emancipation are important values for CSCL, (2) adopting them as primary concerns suggests some changes in the way certain CSCL educational and technological issues are envisioned, and thus (3) such analysis will be beneficial for the elaboration of desirable futures.

In keeping with the squib structure, the text is focused on the specific matter of concern; references to existing CSCL systems (mostly related to scripts and communications topics, which I am more familiar with) are used to illustrate arguments, and not as an alternative review of the community's achievements; the style is somewhat straightforward and, in some places, controversial.

Learners' agency, technology and emancipation

Learners' agency, i.e., learners' capacity to act in their current environment, is a core issue of any educational setting. However, it is of specific importance in CSCL given the central importance of considerations such as motivation, engagement or self-determination (Wise and Schwarz, 2017; Stahl, Koschmann & Suthers 2006).

The agency of learners engaged in CSCL settings is supported and/or restricted by an area of factors (e.g., psychological, educational or institutional factors), including the technology used by learners. This is particularly the case when learners are engaged in computer-mediated elaboration of artifacts and/or computer-mediated communication. As mentioned by Stahl, Koschmann & Suthers (2006) in their analysis of the historical development of the field, "*In CSCL contexts, the group interactions among individuals are mediated by computer environments. (...) The technology side of the CSCL agenda focuses on the design and study of fundamentally social technologies. To be fundamentally social means that the technology is designed specifically to mediate and encourage social acts that constitute group learning and lead to individual learning*".

The two sides to the long-lasting debate related to CSCL scripts and learners' agency is well summarized by Wise and Schwartz. On the one hand, there is the question of learners' autonomy. Arguments include ethics and general educational values, the respect of learners' collective self-determination and, for some researchers, the fact that autonomy is a *sine qua non* condition for authentic collaboration and learning. On the other, there is a well-known pedagogical issue: unless supported, learners often do not develop fruitful and learning-generative collaborations. When collaboration and knowledge building are considered the primary concerns, the scripting line of thinking tolerates the occasional restriction of learners' agency by structuring their activities via instructions (e.g. definition of sub-tasks or roles) and technologies. As examples of CSCL-specific technologies, i.e., technologies designed *for* CSCL: applications dedicated to jigsaw scripts implement specific roles, data- and/or work-flows to create "expert groups" and then "jigsaw groups"; applications dedicated to argumentative interactions offer specific sentence openers, argumentative constructions and/or visual representations; etc. (Dillenbourg & Hong, 2008; Weinberger et al., 2010; Fischer et al., 2007). These technologies suggest to learners that they should act in a way which is expected to be beneficial to them, but is defined by an external authority.

However, when considering learners' agency concerns, CSCL scripts and CSCL-specific technologies are just a few of the elements that prevent us from seeing the big picture. Actually, most CSCL settings, including scripted settings, are implemented using "basic technologies" that are now commonplace. They include generic communication applications, drives, data-sharing infrastructures, mobile devices or synchronizing applications. Yet "basic" does not mean "neutral". Neutral technology is an oxymoron: any software application presents specific interfaces or features, carries some values, is in line with certain expectations or behaviors and not with others, and thus impacts agency.

I therefore call for a holistic, systematic and fundamental consideration of learners' agency concerns and, in particular, of the role played by technology.

In this squib, I attempt to progress in this analysis by adopting a radical and straightforward strategy in which learners' agency concerns are the primary concern and starting point for analysis (thus considering support for collaboration and knowledge building from this perspective), and identifying the implications thereof. The discussion section returns to a more general perspective, reframing and questioning these implications.

Moreover, given the objective of envisaging the future and, preferably, the desirable future, I conduct this analysis from an emancipatory social science perspective. I have borrowed this concept from the sociologist E.O. Wright and his work on "Envisioning real utopias" (Wright, 2010). According to Wright, an emancipatory social science seeks to generate scientific knowledge relevant to the collective project of challenging various forms of human oppression and creating the conditions for human flourishing. It requires elaborating a systematic diagnosis and criticism of the world as it exists, envisioning viable alternatives and understanding the obstacles, possibilities, and dilemmas of transformation. Of course, in the context of CSCL technologies, "oppression" may be too strong a term, and emancipation may be redefined as being freed from controlling influences or structures.

In the following section, I explore how this a perspective can inform about CSCL and CSCL technologies (here again, I emphasize that as regards learners' agency, technology is just one of the factors).

Considering CSCL technologies from a learners' agency perspective

In terms of learners' agency, a general diagnosis and criticism of the world as it exists would be that it is just not possible to impose specific software on learners to support their activities. Whether technologies have been designed for CSCL or not, they constrain learners to act in a way that is defined by an external authority, i.e., that of the designers and/or promoters of the technology. Learners are not just *a factor* in CSCL setting enactment, they are *the actors*. They should be empowered to self-determine the media, and thus the software applications, that they want to use as a substratum for their activities.

By considering the implications of this general position, we can identify issues and envision possible alternatives and underlying challenges for CSCL. I hereafter address three of them: (1) Offering learners the possibility to select and inter-operate software applications; (2) Offering learners the possibility to adapt software applications to their individual needs; and (3) Offering learners relevant information and feedback to help them make informed decisions. These three matters of concern are different but of course overlap, like their implications. Their dissociation is simply a means to study them as such. In order to conserve a streamlined argumentation, I will make a full analysis of the first point, and for the two others mainly focus on how they complement the overall perspective.

Before going into detail, I would like to clear up a possible misunderstanding. Considering that learners should be empowered to select, inter-operate or adapt the applications they use does imply withdrawing the objective of supporting learners with CSCL-specific technologies. The central aim is to identify how giving control to learners impacts the way technologies should be envisioned, designed and provided. While some implications are basic, others lead to fundamental research questions.

Issue#1. Offering learners the possibility to select and inter-operate software applications

General principles

Considering the technological offer as a set of software applications, different general principles may be put forward.

First, learners should be able to use software applications that respect the values that are important to them. In the early ages of CSCL, settings were built on *ad hoc* prototypes designed by researchers. Access to and the use of technologies supporting collaboration are now commonplace (and ironically, the issue for many teachers is indeed to *prevent* learners from using these technologies in the classroom). From an emancipation and agency perspective, acknowledging that learners may empower themselves by using available technologies is fine. However, it may be worth recalling that due to social pressure more than to technical reasons, communication and social networking services to date are more or less monopolized by private business companies. As a consequence, many CSCL basic practice settings are/will be implemented via applications whose known (and hidden) features are designed by corporations with their own (more or less explicit, and questionable) goals and policies. Typically, many applications are advertised as free but request personal information. In terms of values and emancipation, this may be regarded as a serious issue. The "if you don't like it, don't use it" response is not acceptable: learners must be offered effective alternatives, i.e., technologies that respect the values that are important to them, and which are accessible and easy to use.

Second, learners should be able to change the technology they use. Activities evolve, and the applications initially chosen may no longer be adequate once the activity has developed. Seamlessly skipping from one technology to another requires data export/import and, more problematically, the re-organization of personal and group data, which may involve maintaining a model of the effective individual/group activities. This raises difficult educational and technological issues, in particular when considering on-the-fly changes as activities develop. These two issues intersect in different ways. In particular, one of the present technical and social ecosystem characteristics is the multiplicity of individual-to-individual and social-network communication services. This is positive insofar that it opens up a wide range of products. However, a common characteristic of most of these applications is that they create specific channels: interactants must use the same application. In comparison, email technology, which emerged in a different social and economic context, is much more open: emails sent via a given email application can be read with any other email application. The use of specific channels is an often underestimated yet highly problematic issue. In euphemistic terms, a business-oriented software company may have little interest in inter-operation and/or easy export of data. Actually, contact management and other less useful features contribute (and indeed are designed to contribute) to the psychological and technical difficulty of moving from one channel to another.

Implications for settings involving basic technologies

We will now consider where these general principles lead us when considering basic technologies, using the example of a group of learners who are collaboratively elaborating a text.

The collaborative editing of texts can be implemented by asking learners to successively work on the text file and send it to each other. When addressing the technological support in such general terms, the word processors used by learners are simply expected to provide text editing tools. From a pedagogical perspective, the fact each learner uses the application he/she prefers (some of which are open access and free whilst others are not) is *a priori* not an issue. From a technical perspective, this is made possible thanks to the capacity of most word processors to manage different file formats.

Today's word processors offer features which are of particular interest for CSCL such as tracking changes, versioning or annotations. Such features, which constituted the design rationale of early CSCL research prototypes, are now commonplace. This is fine. However, "advanced" features are also used by software companies to dominate each other with, as a consequence, little interest for allowing exchange formats. Learners not wanting to use a given application, for ethical reasons or because they do not want to pay the explicit (money) or implicit (personal information) price, have to face dilemmas and issues such as participating whilst benefiting from less support, endangering the group's collaboration or being stigmatized.

Rather than sending a file from one participant to another, nowadays collaborative editing is usually implemented using "drives" and shared access to a common file. Such technologies arguably present many advantages for CSCL, e.g., avoiding multiple modifications on different copies of a given document that cannot be easily merged. However, a characteristic of the current technological offer is to both host data and allow editing, when these two features could/should be dissociated. In other words, they create specific channels and impose their view of editing. This can be a source of problems. For instance, a side effect of the technical basis of some drives (direct synchronous visualization/editing) is that typed characters are directly and immediately visible to the group. In other words, what is made visible is not limited to the learners' contributions. It includes the learners' elaboration of the contribution, which may include spelling mistakes or immediately corrected initial ideas. This is perceived by some learners as inhibiting and, more generally, problematic (which it indeed is: what is at stake is the contribution, and nothing else).

These examples illustrate that from a learners' agency and emancipation perspective, technologies that seem basic and "neutral" must be questioned. The advantages of applications (and social pressure) often lead users to overlook, downplay or ignore the disadvantages. Of course, workarounds may allow some of the issues to be addressed, like editing the text on the word processor and then pasting it in the drive. However, there is no reason learners should be forced to use applications they perceive as inadequate or unpractical, or to be stigmatized. In fact, the burden (and the social pressure) often leads actors to either not notice or to accept what is essentially an unnecessary technological oppression that may have an influence on learner behaviors.

Implications for settings involving CSCL-specific technologies

Let's now consider CSCL-specific supportive technologies and use the prototypical case of graphical representations of collective models (e.g., mind maps or science models) or group interactions (for examples, see the systems listed in Wise and Schartz's paper: Belvedere, Digalo/Argunaut, CoolModes, FreeStyler or GroupScribbles).

Taking an abstract and inter-operation perspective, these representations may be seen as comprising: a graph (a nodes-edges data structure); a set of labels for the different types of nodes and relations; a visual representation (the way the nodes, edges, labels, etc., are displayed); and, last but not least, a set of specific features. As examples, these features may include: the implementation of semantics defining which constructions or manipulations are allowed (e.g., how the nodes and edges labeled as "data", "hypotheses", and "arguments" may be connected to each other); awareness features (e.g., highlighting individual productions), hints and feedback (e.g., syntheses); links to external resources (e.g., text book or communication application).

This voluntary and provocatively abstract presentation seeks to generalize the line of thinking we used for "basic" technologies: offering learners different alternative applications requires the disentangling of technologies. It also demands the clear description of their design rationale, the consideration of which aspects are a matter of concern from a collaboration and knowledge-building perspective (and, thus, the identification of contingent aspects), a reasoning in terms of services rather than in terms of applications, and finally the consideration of whether these services can be provided in one or several ways.

Typically, from a collaboration perspective, the fact that an application is free and open access or its look-and-feel may arguably not be a matter of concern (although it could be of importance to learners). Does the visualization have to be absolutely identical for all learners (which practically imposes the use of the same application by all)? This is arguably the case for settings within which learners are engaged in synchronous manipulations of a shared artifact, e.g., a geometrical form with the Virtual Math Teams application (Stahl, 2016). In some other cases, e.g., the graphical visualization of an ongoing argumentative interaction, the graph display (e.g., the nodes, edges or labels

representations) may not be a concern as long as a certain number of constraints (to be listed) are respected. As a more central question: can (and how can) features such as "highlighting authorship", "warning of an unbalanced participation" or "providing a synthesis" be addressed as abstract services, and can (and how can) their semantics be defined by precise specifications, and their implementations and visual renderings vary from application to application?

These questions, and in particular the latter, resonate with Wise and Schwartz's "take stock of the [CSCL research] accomplishments" objective. In a possible future, concerns such as "supporting learners' argumentation" may be though to as addressable by different strategies (whose principles stem from different CSCL research projects and results). These strategies are described in terms of services and properties that are defined using a precise set of specifications (which has experimentally proved to support argumentation) and a range of applications would offer the considered strategy or services whilst differing on other dimensions (e.g., values). This vision questions both CSCL knowledge capitalization and CSCL technologies architectures.

Although they do not fully explore this perspective as such, some existing CSCL works may be reinterpreted in this light. For example, the S-Col system (Wecker et al., 2010), which was designed to facilitate the implementation of a script on different platforms, may be seen as an effort to dissociate supportive features from the software used by learners to achieve the task at hand. Although this platform considers specific technology and limited cases (Web browsers, activities such as internet research or online interaction), it is an interesting conceptual proposal. Works considering how to enable teachers to easily edit and deploy CSCL scripts on different platforms have also considered the technological issues related to mashing up different features or applications (see (Prieto et al., 2013) for an example).

Addressing support in terms of services

For learners' agency, this line of thinking calls for a re-conceptualization of the technological self-determination issues of learners, leading to different fundamental questions. Here are three of them.

First, addressing support in terms of services and/or strategies provides an opportunity to reconsider the dichotomy of allowing any application as long as it enables learners to achieve the task in hand vs. imposing one given (supportive) application on learners. Options include allowing any application as long as it enables learners to achieve the task at hand *and* complies with one given supportive strategy, or with a certain number of principles shared by different supportive strategies.

Second, dissociating support and applications makes it possible to consider group support and individual support, i.e., individualization considerations. Options include group support but individually chosen applications (as suggested here above), and mixing group and individually chosen support.

Finally, a specificity of CSCL is the acknowledgment of both individual and group cognition (Stahl, 2016). The consequence is that the above considerations must be addressed from both individual and group self-determination perspectives for learners. Individual and group self-determination are different processes, and require different conceptualizations.

As an example, allowing learners to collectively consider the supportive strategies or applications they want to use opens different questions, such as: what are the negotiation means offered? What information should be provided to enable learners to make informed decisions? Being coherent with the reason we promote collaboration (collective knowledge building) means that we cannot limit learners to the selection of one technology or another: learners should also be empowered to adapt technologies in a way that meets the group's consensus (see next section).

Issue#2. Offering learners the possibility to adapt software applications

Now we will develop the general diagnosis and criticism claiming that it is just not possible to impose a choice of software on learners, and question the notion of software application.

General principles

When considering learners' agency, the emphasis is on learners as actors. Taking this perspective, software applications must be regarded as purely technological proposals. Learners' effective usage is related to their appropriation of these applications, i.e., if and how they attribute a functional value to these technological propositions and turn them into instruments for themselves (see (Tchounikine, 2017, 2019, 2016) for further detail of the appropriation phenomena).

In CSCL, the learners' appropriation of technology is impacted by an array of factors including their motivations and, therefore, the effective task(s) they consider (Tchounikine, 2016). Positive examples include contributing to the achievement of the task, collaborating with peers, elaborating collective and acknowledged-by-all production, preventing the group from failing in the task or avoiding conflict within the group. Less positive examples include demonstrating one's superiority or not losing face. Motivations, and thus the task(s) considered, can be intertwined and evolve. Moreover, how learners perceive these tasks and address them is defined by an array of considerations including

preexisting cognitive and social schemes or situated considerations: different motivations, different tasks, different activities, different needs.

One of the consequences of appropriation processes is unexpected uses of technologies. When considering a task in an unexpected way and/or considering an unexpected task, actors attribute unexpected functional values to features and develop unexpected uses. A prototypical example we all experience in our professional/personal life is the use of emails for Personal Information Management and, for instance, remembering to-dos or archiving data (Tchounikine, 2019). Let us take a CSCL example. (Moguel et al., 2011) presents a system designed to support collaborative problem solving. At the core of the system is a shared table: a line corresponds to a task to be achieved, a column corresponds to a learner, and the table is used by learners to distribute tasks (the cell can be ticked for learners to indicate "Yes, I will take on this task ") and then edit the result of the task (a numerical value). Learners used the table both as expected and (- not "*but*", "*and*") in an unexpected way. Although they could use a specific chat to communicate, some cells were used to edit short texts and specify their organization, monitor their progress, motivate each other or keep up-to-date with the work of other learners. In other words, they attributed unexpected functional values to the table. Although such function creeps are unfortunately more often presented as anecdotes in informal discussions than documented in research papers, they are far from being infrequent. In particular, communication technologies are particularly prone to appropriation processes, because they serve as hubs and/or means for other activities.

Implications

Taking a learners' agency perspective, acknowledging appropriation processes leads to consider that learners should be empowered to adapt the applications they use to the effective uses they develop. Given the multiplicity, interplay and possible evolutions of learners' motivations and considered tasks, it is just not possible to consider that the way in which system developers imagined and anticipated learners' needs will be sufficient to support them during their effective situated interactions.

Software adaptation may correspond to different realities such as customization (modifying the application by choosing attribute values from a predefined set), integration (adding new features to the system by linking predefined components together), and extension by adding new code (Mørch, 1997). The last option seems to be excluded when considering learners, but the two others make sense. For examples of works seeking to "empower learners with capabilities to customize and even construct their own personal learning environments", see the papers edited in (Wild et al., 2008) and the following workshops.

Building on the preceding section, issues and challenges may be conceptualized by reasoning in terms of services rather than technological characteristics: if/how different services may be disjointed, articulated or faded in or out whilst keeping their *raison d'être* and supportive effects, and avoiding harmful effects.

A recent study that may be reinterpreted in this light concerns the implementation and evaluation of adaptable CSCL scripts (Wang et al., 2017). Although built on different premises than ours, the notion of adaptable script is introduced to "grant learners the opportunity to make conscious decisions on (1) what roles to distribute within the group and (2) whether or not they would like to receive and apply activity prompts and thus represents opportunities for regulation processes regarding the groups' learning processes". The adaptable script turned to have a positive effect on learners' acquisition of regulation skills as compared to the unscripted and non-adaptable script conditions. The authors' conclusion is that "adaptable scripts are a promising approach to promote self-regulation in order to maximize the effectiveness of collaboration scripts in CSCL". This experimental study illustrates that offering learners the possibility to decide on, or adapt, the support they use is not a pipe dream, and is not incompatible with effective support and learning gains. In line with our appropriation perspective, another recent study showed the role that socio-cognitive and socio-emotional monitoring processes play in the way different groups appropriated a script (Näykki et al., 2017). (Betbeder & Tchounikine, 2003) report an early attempt to offer learners different means of adaptation as a way to engage them in a reflective activity on their collaboration and their needs. Learners were invited to define their collective organization (sub-tasks and work distribution) and create a suitable "activity desktop" by selecting software components such as a collaborative editor, a chat tool or an access to internet resources.

An alternative to adaptable technologies (i.e., technologies that learners can adapt) is adaptive technologies (i.e., technologies that adapt themselves to the learners and/or their ongoing activities). Adaptive collaborative learning support systems "involve the use of intelligent technologies to improve student collaboration and learning by assessing the current state of the interaction and providing a tailored pedagogical intervention", and differ from intelligent tutoring in that "the goals are to improve the collaboration between two or more students, rather than to support the learning of an individual student" (Rummel et al., 2016); see also (Magnisalis et al., 2011) or (Soller et al, 2005) for early reviews. Indeed, CSCL may benefit from the expertise and technological achievements produced in the field of Intelligent Tutoring Systems (Tchounikine et al., 2010). However, from a learners' agency perspective, adaptive and adaptable technologies are very different in essence. As mentioned by Wise and Schwartz (2017), overly automated adaptation may "rob students of the opportunity to self-regulate and learn skills for future collaboration". I would say it more straightforwardly: automated adaptation is antinomical to an emancipatory perspective. Learners are not to be seen as

passive beneficiaries of a superior control entity. With respect to software adaptations, if Learning Analytics has to play a role, it should be limited to one of awareness and recommendation (see next section).

Issue#3. Offering learners pertinent information and feedback to inform their decisions

Finally, empowering learners requires more than the technical possibility of selecting or adapting technology: learners' decisions must be informed. Informing learners includes static issues (e.g., making the technologies characteristics and design rationales explicit) and run-time issues (e.g., offering learners relevant feedback on their ongoing activity). Since the early ages of CSCL, two strategies have been identified for the exploitation of data produced by learners (Jermann et al., 2001). The first strategy is to show some visualization of this information to the learners, and leave them interpret this data and take actions. The second is to design software components which use this data to assess learners' activities and make decisions on how to moderate the group (adaptive support). From an emancipation and learner's agency perspective, the former is crucially important.

In line with the points raised in the previous sections, different principles can be listed.

First, feedback should be seen as an indicator of learners' activities only. What is important here is to inform and empower learners, not to externally decide what is "good" and "bad".

Second, indicators should be based on explicit reference models and analysis processes. This is both a matter of values and a matter of acceptance of the relevance of these indicators. Like the term "neutral technology", "neutral feedback" is an oxymoron. Moreover, feedback must be explainable and justifiable. As a matter of fact, these criteria are not met by many machine-learning algorithms, which powerfully detect phenomena but act as black boxes. See (Rummel et al., 2016) for a narrative illustration and discussion of the underlying issues.

Finally, a variety of reference models should be provided. This originates in the acknowledgment that (1) learners may consider different effective tasks, including unexpected ones, and (2) learners may benefit from different supportive strategies.

A basic implication is that, here again, objectives should be disentangled, and the design rationale of technologies made explicit. As an example, Dillenbourg & Tchounikine (2007) proposed the analysis of CSCL scripts in terms of intrinsic constraints (the *raison d'être* of script) and extrinsic constraints (contingent design decisions). This is a basis for analyzing activity and adaptations in terms of coherence with the aspects of the script that are supposed to enhance learning.

However, more generally and more fundamentally, the call for a variety of reference models is in agreement with Rummel's (2018) proposal for a concerted effort to "explore and map the landscape of CSCL support". Although not elaborated with respect to agency and emancipation concerns, the taxonomy she proposes is very inspiring. Examples of proposed goals of support include interaction/group processes, outcome/result of the collaboration, individual domain knowledge, social skills (i.e. collaborative competence), affective outcomes (e.g. satisfaction with the collaboration) or motivational outcomes (e.g. learning motivation, attitude towards future collaboration). Unsurprisingly, Rummel's disentanglement line of thinking brings us to consider some of the issues we raised such as adaptability, transparency or control (Rummel, 2018; Rummel et al., 2016).

Discussion

To structure this discussion, I will come back to the broad methodology proposed by Wright (2010): systematic diagnosis and criticism of the world as it exists, identification of viable alternatives, understanding of the obstacles, possibilities, and dilemmas of transformation.

The general diagnosis and criticism I built from is that it is just not possible to impose on learners what software they should use to support their activities.

This criticism, the diagnosis of current technologies and the identification of alternatives lead to clear-cut conclusions. With a fully-fledged emancipatory perspective to learners' agency, learners should be empowered to decide on the choice of media and support from which they benefit. They should therefore be offered (1) a wide range of applications acknowledging different values and offering a variety of support services and strategies, and (2) information and feedback on their ongoing activities, as a means to take informed decisions. It must be acknowledged that learners' motivations and effective considered tasks may be multiple and unexpected, that support may address different dimensions, and that different supportive strategies exist. Learners should thus be offered a variety of supports that they can select and combine according to their individual and/or group needs. If supportive strategies and technologies are envisioned coherently with the approach proposed in this article (i.e., offered and not imposed, based on explicit models and processes, explainable and justifiable), they do not hamper but rather enhance learners' agency and emancipation.

Obstacles to overcome include the disentanglement of CSCL technology principles, reasoning in terms of services, and knowledge capitalization (e.g., supportive strategies or reference models), and attention must also be paid to the technical issues they raise (e.g., inter-operation or adaptation). The examples I have pinpointed and proposals such as Rummel's taxonomy suggest these obstacles are not intractable, and raise interesting CSCL educational and Computer Science challenges.

Dilemmas of transformation raise, as the central issue, possible tensions between, on the one hand, an emancipatory perspective to learners' agency and, on the other, teaching and learning objectives.

Considering this dilemma requires reframing the analysis and returning to a more general perspective. Learners' agency and emancipation are arguably important concerns for CSCL. Nevertheless, they can be considered in different ways. One perspective is that they should supersede any other concerns. Another is that they are intrinsic dimensions of learning and, ontologically, cannot conflict with learning objectives. Yet another vision is that tensions or conflicts may occur, trade-offs may be required, and learners' agency and emancipation may be occasionally restricted, to the learners' benefit. The positions and implications I raised may be mitigated according to the answer given to the educational, philosophical and ethical questions underlying these perspectives. However, we can be certain that learners' agency and emancipation should not be *unnecessarily* impaired. Unfortunately, in the current state of CSCL basic practices and research on both technological and educational aspects, this is often the case. This situation requires taking some steps in the right direction.

Towards a research agenda

As a general orientation, I would consider CSCL to evolve unfavorably if it explicitly or implicitly acknowledges a future where learners only use the basic technologies which are imposed on them and on us all, and where we merely seek to enhance these technologies with Learning Analytics services. Indeed, many CSCL settings may be implemented using basic technologies such as generic communication tools, data-sharing infrastructures, mobile devices, collaborative editors or synchronizing applications. However, the quality of this implementation and the unforeseen issues and shortcomings of these technologies must be questioned. This is worth being said, as studies focusing on "computers as media" and how technological advances allow support collaboration and knowledge building appear to suffer from a kind of disaffection and/or disinterest. The widely accepted acknowledgment that technology is not prescriptive of what will happen, and is not therefore the preferred starting point, does not mean that the technological features offered and their characteristics are not important.

As an overarching challenge, I would lend particular importance to studying on the one hand, the combining of empowerment of learners in deciding the technologies they use and the support they want to benefit from, and on the other, teaching/learning objectives. Here are a few questions that may be included in the list.

An important matter of concern is probably the consideration of the learning context and the identification of the different factors involved. As basic examples, the age of learners or the time-span of settings (e.g., one hour, two weeks or three months) impact meta-activities such as selecting applications or reflecting on the required services that may be considered. I have already mentioned that the nature of the task may practically impose the use of a common application. As a more complex example, the fact that learners may recurrently use applications which they contextually adapt according to settings and needs will impact usage and appropriation phenomena. Typically, the first uses of an application are often impacted by the way the task at hand was achieved before the introduction of this application, with learners importing their usual behaviors (their mental schemes) to the new setting (Tchounikine, 2017). Repeated uses lead to appropriation phenomena, the rationale and effects of which may be difficult to anticipate. Empirical studies will be needed to analyze impact on learning and/or regulation skills, for example if offering too many options or too much information may, in some cases, turn out to be counterproductive. The study by Wang et al. (2017) can be seen as a first step in this direction.

Another important matter of concern is probably the way settings are introduced. The design rationale of some CSCL settings is to make learners achieve a task which is too complex or lengthy to be addressed alone. The reason learners are expected to collaborate is efficiency. However, rather than or in addition to efficiency issues, most CSCL settings and, in particular, scripted settings, introduce artificial difficulties that force learners to collaborate. Instructions (e.g., roles or group-formation principles) and/or technologies (e.g., interfaces, data flows or work flows) are used to split the task in a way that forces learners to engage in interactions to compensate for the split (Dillenbourg & Hong, 2008; Tchounikine, 2008). In other words, the setting is based on a more or less explicit didactical contract: learners' agency is impacted by a set of implicit and explicit expectations and obligations. I argued in a previous paper that this contract plays a key role in the way learners appropriate and enact CSCL settings (Tchounikine, 2016). I would argue for the study of if, how and when the selection and adapting of technologies according to the support required (etc.) could be made an explicit part of the contract.

Finally, although it may go without saying, the teacher's orchestration of the setting has a role to play when considering learners' agency and emancipation (Dillenbourg, 2013; Tchounikine 2013).

An interesting meta-question is if/how the perspective presented in this squib is specific to CSCL. With respect to CSCL as a specific research domain, Wise and Schwartz indicate that "the rise of social media and a variety of research communities that study the interactions within it raise questions about our unique identity and larger impact on the world." Although I understand this community-based perspective, I would not make this concern mine. As such, the perspective I propose may be seen as addressing the general consideration of computer users' agency and emancipation *in the particular case* of CSCL. This is not untrue, but does not characterize the challenge. The reason for this is that it is difficult (and actually, completely wrong) to imagine a kind of generic set of design principles and/or technologies instantiated for CSCL thanks to specific reference models. It does make sense to consider the general notion of "educational software" and propose general considerations, principles or means of analysis (Tchounikine, 2011). However, general considerations are not sufficient. The rationale for CSCL settings (collaborative learning and knowledge building), the nature of the actors (learners), the context (education and its social, institutional or ethical specificities) and the concerns (collaboration and learning but, also, engagement, motivation, emotions, interactions, etc.) lead to, and require, CSCL-specific conceptualizations. The principles and challenges I have outlined here are to be regarded and interpreted within these conceptualizations. CSCL-specific notions and concerns are the premises and the starting points, they are not adjustment variables.

As a conclusion, considering CSCL technologies from a learners' agency and emancipation perspective sheds some light on possible desirable futures for CSCL. It reframes CSCL technological considerations on the core subject (computers as media) and raises many exciting design, technical, social and educational questions and challenges. These challenges reveal that CSCL is both a unique field and a means for studying more general fundamental phenomena and design issues, which is awesome. And - *the nec plus ultra* - they highlight that Computer Science is (also) a social science.

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