



## Creativity in cooperative face-to-face and online settings – What are the criteria that matter?

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*The ubiquitous presence of web-based services and tools for communication, collaboration and learning raises the question whether and under what conditions these tools have the potential to foster creativity. In this paper we first elaborate a person-centered notion of creativity. Taking this notion into account, specific functional and non-functional requirements on web-based tools are given from a software engineering perspective. Subsequently, we propose preconditions for creative settings and illustrate them by sample scenarios. It will be argued that creativity - in a person-centered sense - can be supported by web-based tools only, if certain inner and environmental conditions are met, such as openness to experience, a non-judgmental attitude, and freedom of symbolic expression. The paper is intended to support decisions pro and contra the use of web-based tools*

*on the basis of investigating both the human and technological conditions under which we are most likely to be creative.*

## 1. Introduction

In a time with constant and rapid change we are often faced with new situations, i.e. situations that we encounter for the first time and for which previous learning is inadequate to provide a solution (Holzkamp 1995). We cannot believe that any portion of static knowledge, however big, will suffice to deal with the novel and uncertain, dynamic conditions of the future (Rogers 1983). Hence, dealing with new situations creatively, and creating new situations, certainly constitutes an essential goal for present and future education and life.

Since the web and the tools operating in it have become our widely used companions, it is more than justified to ask the question: Under what conditions do web-based tools promote or even impede our creativity? We assume that many of the readers of this paper, like ourselves, have had experiences in which they felt that web-based activities have had most fruitful effects on creating outcomes and meaning. For example, mailing, chatting, collaborating on a text, or producing/sharing some artifact with others was perceived as creative. It was rewarded with a feeling of expansion, joy, pleasure, richness of meaning or any other sensation making us perceive that something creative had been formed that did not exist before. We equally assume that any reader has had a distinctly negative experience with web-based tools, evoking responses such as: "what a waste of time", "how complicated is it to express my thoughts by typing text only", "what endless forms/steps do I need to follow in order to achieve the simplest transaction", etc. In this article, we discuss the affordances of web-based tools and whether they are likely to foster creativity or rather than frustrate their users.

In this context, a major goal of this paper is to illuminate some conditions for designing and using (or, at times, not using) web-based tools in ways

that are most likely to promote creativity. For this purpose, chapter two first elaborates on a notion of creativity based on the person-centered approach (Rogers 1954; 1961) and proceeds by extending it by relational aspects (Barrett-Lennard 2005; Motschnig-Pitrik 2008, 2008b) . Subsequently, we derive functional and non-functional requirements on web-based tools that serve to support creative processes. Based on the humanistic perspective on creativity and on the technological requirements, chapter four discusses the potential of web-based tools in relation to specific pedagogical principles and scenarios that underpin the use of web-based tools in a way to support person-centered creativity in teaching and learning. Chapter five presents case examples extracted from courses conducted at the University of Vienna, where students' reactions to three person-centered courses were investigated in terms of the association of creativity and technology enhanced learning. The final chapter summarizes and discusses the findings and points to further research.

Initial results indicate that, from a person-centered perspective (Rogers 1961), creativity will emerge if the participating persons are sufficiently free to choose their way of involvement, are not judged prematurely, feel safe to express themselves and are sufficiently open to a wide range of aspects of their experience. From the software perspective, some preconditions and thus decision criteria are that the software must be easy and straightforward to use, must allow one to produce artefacts effectively, has to be appealing to the users, and must make it easy to establish and maintain relationships with persons as well as artefacts.

While much work has already been done in the area of creativity, open source, and social software (see, for example, Cheliotis 2009; Gloor 2006; Hornung-Prähauser and Luckmann 2009; Jung and Kang 2010) the *person-centered* perspective on creativity, as proposed by Rogers (1961) was rarely explicitly addressed in connection with computerized tools (Motschnig and Pitner 2009). Thus, the thought expressed in this article is original in nature and intended to spark further ideas and research to find out in which way the specifically human dimension of creativity can be

supported by appropriate technology. While this article focuses on education, its findings are equally valid for more general application of digital tools, such as those for socializing, cooperating, and entertainment including informal learning.

## **2. The notion, aspects, and conditions for creativity from a person-centered perspective**

The Person-Centered Approach (PCA) is a branch of humanistic psychology founded by Carl R. Rogers (1902–1987), one of the most renowned American psychologists of the 20th century. Originating in psychology, the PCA has spread to disciplines such as education, social science, international communication, management, conflict resolution, health care and others. In a nutshell, the basic assumption underlying the PCA is that human beings, like all living organisms, have the natural tendency to actualize, i.e. to maintain and to enhance their organisms. The tendency, furthermore, is directed, amongst others, towards differentiation of organs, the use of tools, and socialization. It can unfold best in a climate in which a person experiences, at least to some degree, the genuineness or congruence, unconditional positive regard, and empathic understanding of (at least one) other person. According to Rogers (1961), the actualizing tendency "is the primary motivator for creativity as the organism forms new relationships to the environment in its endeavor most fully to be itself" (351). This points to Rogers' relational understanding of creativity. It is about individuals in relation to their social and natural environment, recalling that creativity comes from forming relationships. We emphasize that creativity, in particular, springs from our striving for forming/cultivating constructive relationships with social others (Motschnig-Pitrik 2008c; Motschnig-Pitrik and Barrett-Lennard 1010; Barrett-Lennard 2005). Living in such relationships equally satisfies our desire to communicate has been identified as a concomitant of the creative act (Rogers 1961). Motivation for the creative act often lies in an interpersonal relationship that is reciprocally enhancing and forming itself. Creativity in this case emerges from dialogue (Bohm 1996) and potential transcendence and may be "documented" or conserved in a creative product.

## 2.1. The creative process and product

Any creative product is a novel construction such that the novelty grows out of the unique qualities of a person in his or her interaction with some entity of the environment. ". . . the creative process is [. . . ] the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other" (Rogers, 1961: 350). The product must be acceptable to some group at some point of time. However, this fact is not helpful to our definition because of fluctuating valuations and the fact that the individual creates because it is satisfying for him or her. Still, it has been confirmed by research in the PCA that when a person is open to all of his or her experience, their actions will be creative and their creativity may be trusted to be essentially constructive. This can be explained by assuming that when a person is open to all aspects of his or her experience and aware of the different varied sensing and perceiving going on in their organism, then the novel products of their interaction with the environment tend to be constructive for him-/herself and others and his/her actions tend into the direction of constructively social living. This appears to be consistent with what Senge (2006) claims for a thorough "sensing" phase of the U-process that is designed to bring about organizational change.

## 2.2. Inner conditions for creativity

Rogers identified three inner conditions for creativity. The first one, as mentioned above, is openness to experience or extensionality. It means a lack of rigidity and permeability of boundaries in concepts, beliefs, perceptions, and hypotheses. It means a tolerance for ambiguity, where ambiguity exists. It also means the ability to receive much conflicting information without forcing closure upon the situation. The second condition is that the source or locus of evaluation is internal. For the creative person, the value of their creation is established not by praise or

criticism of others but by satisfaction to him- or herself. This does not mean that the judgments of others are oblivious, it just says that the primary feeling comes from "me in action" with something emerging. The third condition is the ability to toy with elements and concepts. It includes the ability to play spontaneously with ideas, colors, shapes, and relationships - to juggle elements into impossible juxtapositions, to translate from one form to another, etc. This can lead to exploration and seeing from innumerable possibilities new options that lead to evolutionary forms with better meeting some inner need and/or more permanent value.

### **2.3. The creative act**

The selection of a "product" which is more satisfying and/or forms a more effective relationship with its environment is referred to as the creative act. There is one quality of the creative act that can be described: its selectivity, or emphasis, or attempt to bring out the essence. I bring structure into my relationship to reality until it feels like "This is it!" For example, a writer selects those words which give unity to his expression. Typically, a concomitant to the creative act is anxiety of separateness on the one hand and the desire to communicate and share one's creation on the other hand. We wish to share this new aspect of "me-in-relationship-to-my-environment" with others.

### **2.4. Conditions fostering creativity**

From the nature of the inner conditions of creativity it is clear that they cannot be forced, but must be admitted to emerge. The likelihood of emergence is maximized by providing a climate of psychological safety and freedom (Rogers 1961: 357). Safety is achieved if a person is accepted as someone of unconditional worth. In order for this attitude to be genuine, we need to have an unconditional faith in the other person. If he or she apprehends this attitude, he/she has less need of rigidity, senses safety, and can be more spontaneous, actualizing. In order to feel safe it

also needs a climate in which external judgment is absent and there is no need for defensiveness. Only then can I recognize the locus of evaluation within myself.

The process that provides the ultimate in psychological safety is empathic understanding. If I accept you but know nothing about you, the acceptance is shallow and it might change if I come to know you. But if I enter your inner world and see it from your perspective, and still accept what you are feeling and doing from your point of view, this will provide additional safety and will permit your real self to emerge and to express itself in known and novel forming. Psychological freedom is present when a teacher or facilitative person allows the individual complete freedom of symbolic expression. This permissiveness gives the individual complete freedom to think, to feel, to be, whatever is most inward within him-/herself. It fosters the openness and playful juggling of percepts, concepts, and meanings which is part of creativity.

Natalie Rogers adds a third condition, namely the offering of stimulating and challenging experiences (Rogers 1993). This criterion is particularly relevant for web services since it needs to be explicitly considered in their design. If a tool is not perceived as stimulating in some way, it will practically not be used.

We summarize the inner and environmental conditions fostering creativity from a person- and relationship-centered perspective in Table 1.



<i><b>Inner conditions</b></i>	<i><b>Environmental conditions</b></i>
openness to experience	psychological safety
internal evaluation	<ul style="list-style-type: none"> <li>• <i>genuine acceptance of the person, unconditional faith</i></li> <li>• <i>empathic understanding: admits the real self to emerge and express itself in known and novel formings</i></li> </ul>
ability to toy with elements and concepts	psychological freedom
<ul style="list-style-type: none"> <li>• <i>produce/find elements</i></li> <li>• <i>arrange in different positions, jungle into juxtapositions</i></li> <li>• <i>translation from one form to another</i></li> <li>• <i>exploration, generating/seeing new perspectives, seeing new options</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>freedom of symbolic expression</i></li> <li>• <i>openness towards playful juggling of percepts, concepts and meanings</i></li> </ul>
selection of product/result, bringing out the essence	offering of stimulating and challenging experiences
desire to communicate and to share one's creative product	dialogue, flow of meaning

Tab. 1. Conditions fostering creativity  
– summarized according to Rogers' chapter  
on "Toward a Theory of Creativity" (Rogers 1961)

### 3. Conditions for creativity from a software-engineering perspective

In this chapter we share some functional and non-functional requirements that Web 2.0 services need to adhere to in order to foster creativity. Furthermore, some of the drawbacks and issues frequently encountered that block creativity when using – or even trying to use – web-based tools are mentioned, in order to alert designers of Web 2.0 services to watch out for these issues when wanting their tools to be applied favorably. This chapter builds on and integrates core aspects of person-centered creativity - as outlined above - with findings of the analysis of different web-based tools from Motschnig and Pitner (2009). Going back to these findings and our extensive research with employing digital tools in academic education (Motschnig-Pitrik 2005; Motschnig and Standl 2014; Motschnig and Pitner 2016), we propose the following specification for web-based tools to support creativity:

Regarding the *basic functionality* of tools, in particular in the light of the conditions mentioned above, the following operations support creativity:

- creation of artefacts
- structuring
- search
- tagging
- authorization: public, private, to assure safety
- production
- interfacing with other tools
- combination, linking, composition of information
- transformation, filtering
- adding perspectives and views
- versioning, storing
- "toying", simulation
- visualization
- personalization, to adopt to personal preferences and to filter information

In order to provide some *extended functionality for sharing*, communication and cooperation, operations are required to support:

- codes of conduct
- traceability
- communication
- notification
- access right mechanisms
- protection

Tools that provide (some of) the features are, for example, Web-services for collaborative creative works that allow users e.g. to write texts collaboratively, such as Google Drive, various versions of wikis, ZOHIO, EtherPad ... As an example for a tool that, in particular, allows users to share and exchange ideas visually and to connect people consider Cohere (<http://cohere.open.ac.uk>). A tool that supports staying in contact and getting feedback easily is, for example, UserVoice feedback management (<http://uservoice.com>). As another example consider the highly usable tool for giving and receiving feedback as well as for effective classroom engagement: Socrative (<https://www.socrative.com/>)

To facilitate creativity, *non-functional* features, in particular qualities are vital. This is because negative feelings, stress, and dissatisfaction with tools tend to hinder creativity to emerge. We found the most prominent features to be considered for web-based tools to support creative processes to be:

- usability; users at all levels of experiences can benefit
- effectiveness, ease; e.g. make creation, prototyping, and sharing faster
- safety
- proximity to real world experience
- inclusiveness; unlimited freedom in expressing the ideas with *your* vocabulary – both created content and metadata (tags)
- portability
- availability anytime, any device, anywhere
- easy to learn
- easy to enhance
- openness; unlimited freedom in terms of tools, formats
- flexibility
- adaptability (including extensibility – 3<sup>rd</sup> party apps., API)
- appealing design

- time effectiveness; shorten the production lifecycle – shorten the time from the first ideas till the final creative product (e.g. a photo gallery, book, software etc.) is created and published/marketed.

Some drawbacks that tend to hinder creativity on the web include issues such as the following:

- Web services sometimes embody some unreliability (such as slow reply or malfunctioning).
- They require various plugins or even specific versions (mostly Flash) such that there is some initial configuration burden before getting actually started.
- They put quite heavy constraints on layout and do not work in a "What you see is what you get" mode.
- They offer seriously limited functionality at mobile devices, or, at least, the usability and accessibility decline rapidly.
- They do not frequently work well for non-Western character sets, withdrawing users who need these character sets for expressing themselves.
- At times they expose a kind of "alpha-version" behavior – incompatibility or bugs.

In general, we believe that the simple criterion of "liking to use" a web-service or an App provides perhaps the best indicator of whether it has the capacity to promote creativity.

#### 4. Pedagogical principles for creative uses of web-based tools for teaching and learning

In this section we elaborate pedagogical principles of using web-based tools in teaching and learning regarding their potential contribution to fostering person-centered creativity and the production of creative artefacts. There are several *challenges* that need to be taken into account if one wants to facilitate creativity in learning contexts (Motschnig-Pitrik 2005; 2008). These can be seen as a particular kind of any social context in which cooperation and moving forward are aimed at. The pedagogical principles are, in particular:

- *Establishing a constructive climate*, in which a sufficient degree of both openness and psychological safety can be perceived by all participants. This I see as the core precondition for expressing oneself openly and yet constructively within the learning community and, thus, setting off a process in which ideas emerge, are expressed, adopted, played with, and combined to new constructions. In my view, establishing such an atmosphere, in general, is easier and faster in face-to-face meetings than in online-communication due to the richer social presence of direct interpersonal contact. Readers interested in how a constructive atmosphere can

be established may want to consult, e.g. Rogers (1983), Tausch and Tausch 1961/1998, Motschnig and Nykl 2009.

- *Straightforward, easy to use and reliable web-based tools.* If learning to use a tool is time-consuming or data is lost, students try to avoid using the tool at all. It is important that students get a positive initial online experience in such a way that they feel motivated to continue using a tool.
- *Refraining from external judgment while needing to evaluate learning outcomes.* How to deal with the fact that student outcomes need to be evaluated, but external evaluation burdens creativity that needs to *emerge*? A follow up question is: How to define assessment criteria in advance that, nevertheless, include individual contributions and thus reward creative expression within the confines of the course's subject matter. In other words, how to, in some way, streamline creative output?
- *Freedom of symbolic expression versus imposed use of web-based tools.* How can I design a course or workshop in which the way and intensity in which tools are used is not superimposed by course-requirements but rather is self-directed?
- *Clarifying the relationship/contribution of students' engagement* in a course to their own actualization processes. How to provide students or employees with the opportunity and environment that allow their engagement to be in the direction of their actualization while simultaneously meeting the course goals?
- *Creative lived face-to-face experience* as an inspiration to ongoing creativity. If the facilitator succeeds in collaborating with the participants to elaborate a creative course mode, this is likely to spin-off to students being creative in filling their free space by contributing to meeting course requirements. Creative uses of web-technology like chats, combined face-to-face and online-collaboration, stepwise editing of software or reports, etc. often result from the inspiration radiating from a collaborative class dialogue. The whole course setting acts like an incubator and serves as a springboard for creativity.

Based on Rogers Theory of Creativity, the principles listed above need to be practiced if web-based tools shall foster rather than extinguish creativity. If these principles are not met, it may result in a decrease of creativity, either through confusion and worries/fear or through tasks being externally imposed rather than being in line with a person's inherent actualizing process. In the following, we present data that stem from educational courses in which, in our perception, the above principles have seriously been considered and met – at least to a certain degree. Note that it is not the web-based tool alone that fosters creativity, but the

tool embedded into an educational setting that is likely to let creativity emerge (see also Motschnig-Pitrik 2005).

## 5. Methodology

The study is in line with qualitative research, which "involves an interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural setting, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 2009: 3). The "thing" we study, herein, is creativity and we do attempt to make sense of the relationship between creativity and educational technology in terms of meaning that students of several courses bring to this relationship.

The data and findings presented below stem from a total number of three academic, experiential learning courses: A course on organizational development conducted at the University of Vienna, Austria, a course on communication and soft skills, facilitated at the Masaryk University in Brno, Czech Republic, and a course on International Person-Centered Communication that took place at the University of Vienna, Austria.

All courses were held at the Faculty of Computer Science of the respective universities. – A total number of about 55 students (20 plus 20 plus 15) attended the courses and more than two thirds of the participants were male. The age range of students corresponded to that of master students, the average age being about 24 years, precise demographic data are not available. Interestingly, about 20% of students (and one co-facilitator) of the course on organizational development were international students so that the course was conducted in English. The same applied to the course on International Person-Centered Communication in which about half of the participants were Austrian, the other half being of Czech or Slovak origin and the co-facilitator was American. The digital tools used were selected to allow for creativity from a software-engineering perspective (see section 3). The courses were facilitated in a student-centered way

(Rogers, 1983) to enable person-centered creativity in teaching and learning (see section 4).

Data collection, merely, focused on the reactions sheets from participants of the courses and group discussions. The reaction sheets (Motschnig-Pitrik 2014) have the format of free forms, introduced by a sentence like: "Please share your reaction to the previous workshop, in particular, what you liked, what you did not like so that it can be improved and what you think you take with you from the workshop." They are visible to all course participants and the instructor. Honest and open communication needs to be established in the face-to-face workshops if it is sought to appear in the written reactions. In the first sessions, the offering of working with reaction sheets and their meaning and potential effect on follow-up course units is discussed with students and it is argued why non-anonymous reactions are preferred: They can be discussed directly in face-to-face sessions and furthermore counted as active participation amenable to consideration in grading.

Renate read the reactions with much interest and excitement about how students perceived the workshop unit and how this compares with my own perception. The reaction sheets then were discussed with students in the face-to-face workshops. The group discussion in face-to-face workshops functions as another means of data collection. Group discussions also attended to the students' interest in the reactions of their peers and, almost as a rule, the most essential learning is that students' perceptions are different. In this respect, the reaction sheets and group discussion convey the different perceptions and make multiple perspective-taking explicit.

Research ethics have been considered to the extent that the data was transcribed and we used nicknames to report on what students have voiced in reaction sheets and group discussion to ensure anonymity.

## 6. Findings & Discussion

The following thematic areas have emerged through the analysis of research data. Students showed three dimensions of person-centered creativity while using web tools in cooperative face-to-face and online settings.

### 6.1. Co-Construction of meaning

#### **6.1. Co-Construction of meaning**

Small teams ( 3-5 persons) cooperate on a project that is selected from a list of proposed topics or is self-defined and approved by the instructor. Criteria of evaluation of the project are elaborated collectively. In this way, students may work on authentic problems within the course's context and the way they use (or do not use) the Wiki is decided by themselves.

Students, who use Wikis, tend to report that it is easier to integrate multiple perspectives and inputs into one document. They comment positively on the capability to use multiple layers of a hierarchy such that they can move between different levels of detail. In this way, it is easy to add information without losing the overview. Also, the fact that in Wikis versioning is provided takes away the fear of overwriting or losing another's text and, thus, encourages students' expression of their inputs. In particular, in the collection and construction phase, Wikis support collaborative construction, in other words the collection, selection and juggling of paragraphs and words, thus constructing meanings together.

*Ted wrote: Talking to Ina about them/me added clarity and meaning of my goals. Based on talking to Ina I rephrased some formulations for accuracy and collapsed two goals into one.*

The way Ina and Ted talked to each other led to the "rephrasing" of meaning in regard to collapsing two goals in one. Runco (1996) has emphasized on relevance of construction of meaning for creativity and pinpointed "that person first obtains one view of some object or picture,



but then obtains additional views [...]. He or she must integrate information and construct new meaning" (12). Here, obtaining additional views and integrating information underline the crucial role of others for the construction of meaning in creativity. Allowing additional views and different information of others points to software functionality identified in section 3, such as combining and linking information as well as integrating additional perspectives and views.

## 6.2. Listening

Findings showed how creative actions for authentic problems in class emerge from listening to and mutually respecting each other. Let us illustrate this by following three sequences of the transcript from online reaction sheets written by students.

Jana writes: *"I liked the way, how the first block was conceived. There was a lot of discussion, but there was also theory and we played games. I expected that the whole block would be in English and [it] would be very hard for me to speak in English. But we discussed the topic English vs. Czech language and settled that we try to speak in English if it would be possible, but complicated topics will be discussed in Czech. After listening to arguments, why somebody wants to speak in English and on the contrary somebody wants to discuss complicated topics in Czech, it was easier to accept the agreement for me than if the teacher had said it without discussion."*

Petr was open towards sharing a critical remark: *"The only issue in which I see a potential for improvement is the dynamics in discussions. Some time consuming interplays [...] were unnecessarily long. I do not know exactly how to avoid that – the only thing that comes to my mind is a larger degree of control during discussions from the side of the instructor."*

Clearly, what was appreciated by Jana, namely to share views, to discuss options and listen to arguments, seemed like a waste of time for Petr, who wanted to get "to the core" faster and have the facilitator to control issues. Interestingly, although Petr's viewpoints were not explicitly discussed in class in the next unit, apparently something changed in the

next block: all participants (students as well as the facilitator) watched out for discussions becoming too unwieldy and cooperated towards a better balanced amount of discussion and topical work. This was perceived (not only) by Petr who had shared the critical remark on the dynamics of discussions after the first block. He wrote:

*"In my first evaluation I mentioned that some progress still would be achievable in upcoming discussions in which the whole group participates. In the second meeting I have not observed any insufficiencies anymore and for myself I must say that I highly enjoyed all group discussions. And even this concerns my role of 'just' a listener as well as that of an active participant."*

This example illustrates how the "role of 'just' a listener" is crucial become open for discussions and see the potentials of discussion. Jana has already embraced "listening to others" in the first course block and Petr has started to "highly enjoy all group discussions" also concerning his role of a listener in the second course block. Petr has internally re-evaluated his meaning of group discussions through enjoying both the *"role of 'just' a listener as well as that of an active participant"*. In that manner, he might have become more open to experience. This feeds in with the inner conditions of creativity such as openness and internal evaluation (Rogers 1961). The aspect of listening in creativity research has also been discussed by Sawyer (2000) in regard to musical creativity. He states that "each musician is listening closely to the other. The performance that results is truly a group creation, a collective social process" (180).

As, both, face-to-face group discussion and the wiki-technology allow for intensive group creation, it seems to be a meaningful way to enable creativity from a person-centered perspective. Moreover, the facilitation of *blending* face-to-face and written online expression established the possibility for writing and reading the reactions in a peaceful moment between the course blocks. So, students had time to listen to others as well as think about and feel how course elements and others' perceptions resonated with them such that they could let their own thoughts and reactions emerge and ripen for some time. In a nutshell, it seems crucial

to bring together the written expressions with the spoken words so that students can listen to a richer repertoire of content.

### 6.3. Sharing

The web may have gained much of its popularity by its enormous power for sharing ideas and artefacts and thereby providing a rich source of inspiration. With proper tools, it is easy to share concepts to relate to them in new ways and thereby extend what is already there by novel creations. It is true that free web-content (other than from scientific organizations) cannot be trusted without careful and critical checking against less flexible but more reliable sources like e.g. books and refereed scientific articles. However, isn't it precisely this act of questioning, of checking issues for accordance with trusted literature sources or with one's own knowledge and experience that promote creativity? In the web, we can share several inputs just on demand and at the time we need them. We can playfully juggle them around and combine them with our own sources to establish creative, new artefacts. Thus, if a course instructor and participants succeed in establishing challenging tasks, the web can offer stimulation and an initial supply of concepts for critical selection, extension, and bringing out the essence. For example, in a course on human-computer interaction students can test web-applications for usability and from this suggest improved, novel solutions based on their knowledge and personal experience from interacting with the applications. Added value in terms of extending insight and improving solutions tends to be gained from sharing with interested others. Thus, students get an opportunity to perceive the effects of swarm creativity. In a course on organizational development in which resources from the web were shared face-to-face as well as in Wikis, students wrote reactions such as the following:

*Argon wrote "I like that kind of lecture where all members of the group can input their own experiences whenever they think that it is important for the group. .... So the thoughts and experiences Stanis shared with us made me*

*think about it in a different way. ... Thanks to every group member for sharing experiences."*

Sharing was possible for "all group members" and made participants "think about it in a different way". The relevance of knowledge sharing for creativity has also been found in other studies on blended learning (Yeh, Yeh & Chen 2012). They concluded that the integration of "knowledge sharing, knowledge internalization, and knowledge creation [...] with blended learning would improve university students' creativity" (253).

## 7. Conclusion

In this paper a person-centered perspective of creativity has been explored emphasizing relational aspects of creativity. Creativity has been investigated in light of web-based tools in order to facilitate settings where creativity is welcome. It has been argued that web-based tools, per se, do not foster creativity: Their contribution to creativity – given the tool design is person-centered – depends on the capacities of persons who use them. A major criterion is whether these persons provide each other with a constructive, non-judgmental atmosphere. In particular, it is important to provide the inner preconditions for person-centered creativity, such as openness to experience, internal rather than external evaluation, and the joyful creation and juggling of "pieces" until something new emerges that takes on new qualities. When these inner conditions are present, usable web-based tools can be applied in a way most likely to contribute and strengthen outer conditions fostering creativity. These have been identified as a safe, resourceful, and understanding environment that not only provides freedom and variety of symbolic expression, but also offers stimulating and challenging experiences and facilitates the forming and exploring of various relationships. Other criteria that may help to enable creativity are the particular usage scenarios of tools and the authentic purposes for employing tools.

The case studies involving blended learning scenarios with Wikis showed specific aspects of creativity. First, students started to embrace listening to each other as something enjoyable. Listening was a crucial aspect of creating collective works. Second, students co-constructed new meaning. Here, the Wiki technology was especially helpful due to the capability to use multiple layers of a hierarchy, the easy ways to add information without losing the overview and the Wikis versioning, which helped to dissolve the fear of overwriting or losing another's text and encouraging students' expression. Third, results showed the relevance of knowledge sharing for creativity.

Conclusively, added value can be achieved by a thoughtful blending of face-to-face and online activities that extend the potentials of Wiki usage for environmental and social relationships. This is because, in sum, they provide possibilities to address more channels of expression than any single medium including immediacy and thus offer a richer basis for creating new concepts, forms and products.

Further case studies, action research procedures and design-based research are intended to be conducted to find out more about the conditions, scenarios, tool- and interpersonal properties that help humans to enable their creative potentials.

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