

# Sense of Virtual Community in Wikipedia Online Community for Technology-enhanced Learning in Higher Education

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**Abstract.** Currently, global crises along the digital revolution challenge the organization of higher education (HE) world-wide. Hence, there is an urgent need to better understand how Web 2.0-technology with their online communities can support learning in HE particularly in distance mode. This article investigates technology-enhanced learning (TEL) in HE, taking place in the Wikipedia online community. Particularly the study focuses on the role of sense of virtual community (SOVC) in the social process of learning. Therefore, this study investigates the student perceptions of purpose and benefits of the Wikipedia community, as well as the perceived SOVC while being an active contributing participant in the community. The study was carried out in one university course, where technology intervention was carried out by using Wikipedia in a learning assignment of collaborative writing. The case study results illustrate that mainly students perceive the purpose and benefits of Wikipedia being cognitive, although only less than one-third of the students experienced SOVC as active participants. The article contributes to the field of TEL in HE, more specifically to Wikipedia-enhanced learning and the significance of SOVC in Wikipedia community during learning assignment as active community participants. The presented case study provides insights into the SOVC in online communities for HE-learning during technology interventions.

**Keywords:** Sense of virtual community, Sense of community, Technology-enhanced learning, Wikipedia-enhanced learning, Online community, Higher education

## 1 Introduction

Pandemics, armed conflicts and other global crises, alongside digital revolution challenge the organization of higher education (HE) world-wide. Hence, there is an urgent need to better understand how 2.0-technology with their online communities (Faraj et al.) can support learning in HE, particularly in distance mode. This article investigates technology-enhanced learning (TEL) (Price and Kirkwood; Bayne; Passey), more specifically Wikipedia-enhanced learning taking place in the Wikipedia online community. Although enhanced via technology, inherently learning is a social process

(Vygotsky; Visvizi, Daniela, et al.). Accordingly, for the social aspect of learning to occur in the online communities where the students participate for learning, they should experience a sense of virtual community (SOVC). However, SOVC is a complex concept containing an individual's feelings, that has antecedents of community-type action such as helping others, as well as needs to be fulfilled. Although in previous studies SOVC has been detected in online communities both via reading and posting actions, posting actions seemed to enhance SOVC better (Tonteri et al.). Thus, being an active participator instead of lurking in Wikipedia could potentially enhance student learning with the fortification of SOVC. However, the role of SOVC in learning has not been previously studied among TEL with Wikipedia in HE. Therefore, this study investigates the student perceptions of Wikipedia's purpose and benefits, as well as the extent the students perceive SOVC in Wikipedia community in one university course, where technology intervention was carried out by using Wikipedia in a learning assignment of collaborative writing.

The article is structured as follows: First drawing from the literature, technology-enhanced learning, Wikipedia as an online community, and aspects of SOVC in online communities, such as Wikipedia, are presented. Then a case study of technology intervention with Wikipedia in HE institution is described. The case study results illustrate the student experiences from the purpose and benefits of Wikipedia and SOVC in its community while creating knowledge in Wikipedia. Following the results of the case study, theoretical contribution and practical implications are presented and future research directions are proposed.

## **2 Theoretical background**

### **2.1 Technology-enhanced Learning**

The term "technology-enhanced learning" (TEL) is used world-wide yet lacks a unanimously accepted concept definition in the educational literature. The use of the TEL term has proliferated, as the concept is extended beyond its original scope to encompass teaching, for example. We delimit our study on TEL that is solely focused on learning. (Kirkwood and Price; Bayne; Passey) Learning focused TEL has its characteristic practices and underlying principles and deals with how technology supports cognition and metacognition. (Passey) Rationales behind technology interventions in Higher education (HE) include not only replicating or supplementing existing teaching but transforming teaching and/or learning processes as well ways to transform learning processes include, for instance, redesigning activities to provide active learning opportunities and to support qualitatively richer learning among students. Therefore, the design of TEL intervention studies should extend beyond the technology itself: outlining the intervention goals, designing the evaluation, and interpreting the results. (Kirkwood and Price) Furthermore, surpassing the technology layer, the versatile contemporary TEL-studies incorporate the social aspect of learning (Visvizi, Daniela, et al.), particularly regarding the social media, such as in the study of Twitter-enhanced teaching and learning (Visvizi, Jussila, et al.). Yet, there is a growing need to research the phenomenon of technology-use in education, specifically evaluating learning by using

descriptive and explanatory studies. (Lai and Bower). This article answers the call by conducting a descriptive and explanatory study of TEL in the context of Wikipedia online community.

## 2.2 Wikipedia as part of new learning and network collaboration paradigm

Wikis are an example of social media that uses Web 2.0-technologies and regarded as part of the new learning and network collaboration paradigm (Albors et al.; Prasarnphanich and Wagner). However, all social media is not equal, and varying classifications of social media have been carried out in the last decade. Kaplan and Haenlein classified Wikipedia among “*Collaborative projects*”, distincting it from e.g. “*Social networking sites*”, such as Facebook (Kaplan and Haenlein). Furthermore, different types of social media focus on various functional building blocks defined in honeycomb-framework. Honeycomb-framework has seven building blocks of identity, conversations, sharing, presence, relationships, reputation, and groups, that explain the engagement needs of the social media audience (Kietzmann, Hermkens, et al.; Kietzmann, Silvestre, et al.). Moreover, according to 5C-model, Wikipedia belongs to the “*Collaborating: collective content creation*”-category, that has a different basic purpose than e.g. “*Communicating*”, which includes discussion forums and “*Connecting*”-categories, which includes Facebook and LinkedIn, for example (Vuori and Jussila). Additionally, although Wikipedia is regarded as an example of a social media platform, it is not a social networking platform, since the primary aim of the the engagement is not at forming relationships with like-minded individuals or groups (Lama).

Wikipedia is considered the most successful application of wiki technology (Carver et al.). It is the world's largest reference website, a collaborative encyclopedia, attracting 1.5 billion unique visitors monthly, with over 6 million articles in English and 38 million registered users reported in March 2020 (*Wikipedia*). Reshaping the creation of collaborative knowledge, the essence of wikis is a generally open practice of content addition and revision in a dynamic process of a large number of individuals, constantly displaying the status quo of collaboration (Elgort et al.; Evenstein Sigalov and Nachmias; Prasarnphanich and Wagner). Furthermore, the Internet and social media are considered vehicles for knowledge acquisition that are actively used in working life settings, but underused in university learning (García-Peñalvo et al.). In reality, Wikipedia has been the de facto standard for a knowledge base in business (Albors et al.). From learning viewpoint, the Internet and social media promote learner agency, autonomy, and engagement in online communities and social networks, thus shift control from teacher to learner (McLoughlin and Lee). Recent studies of Wikipedia use in HE has covered e.g. patterns of use according to student perceptions (Selwyn and Gorard) as well as Wikipedia’s influence on the course design and students’ learning process (Meseguer-Artola, Antoni Rodríguez-Ardura, Inma Ammettler and Rimbau-Gilabert). Furthermore, in a recent study, an acculturation process to the virtual community was detected while utilizing Wikipedia community in HE (Brailas et al.) However, the role of the Wikipedia online community(Faraj et al.) or the sense of virtual community for HE students has not been thoroughly researched.

### 2.3 Sense of virtual community in Wikipedia online community

Online communities have no universally accepted definition, but they are understood e.g. “as web-based online services with features that enable members to communicate with each other”, which focal challenge is the user participation and thus the vitality of community (Malinen). Sense of community (SOC), is a shared emotional connection and individuals’ feeling of belonging in a group (Blanchard and Lynne Markus), which is also experienced in online social groups as a sense of virtual community (SOVC) (Malinen; Tonteri et al.). SOVC is defined as “*human experience of a community feeling in a virtual environment*”, which can be experienced both with reading and posting in an online community (Tonteri et al.). As a relatively new research domain, SOVC as a concept is not fully developed. However, it is established as a complex, individual-level concept, that incorporates feelings, with antecedents of community-like behaviour and expectations i.e. need fulfilment (Tonteri et al.). Tonteri et al. have operationalized SOVC with five dimensions of individual’s feelings: 1. membership and one’s rights and obligations in the community, 2. influence in the community and of being influenced by the community, 3. among the individual members of having a distinct identity in the community, 4. having a common social identity and identifying with the community, and 5. a strong emotional connection among the community members. These feelings that compose SOVC is differentiated from the preceding community-level phenomenon of community-like behaviour that takes the form of participation (Tonteri et al.).

Online participation is regarded as a dichotomy of passive and active participation. Therefore, becoming an active participant incorporates transformation from consumer i.e. ‘lurker’ to a creator, and entails a transition in the community from the periphery towards the centre. Lurking, i.e. passive yet non-negative participation is detected particularly among online community newcomers with lessened SOVC and membership. (Bryant et al.; Nonnecke et al.; Malinen) In Wikipedia, active participation, i.e. contribution, is mainly driven for the public good, that is altruism and ideology (Nov). SOVC has been explored in different types of virtual communities (Tonteri et al.). However, when Wikipedians start experiencing the SOVC, their perception change: they see it as a community rather than a collection of articles (Bryant et al.).

In their study of SOVC, Tonteri et al. utilized the Nambisan and Baron’s categorization of expected benefits (Nambisan and Baron, Robert; Tonteri et al.). The categorization consists of four types of expected benefits 1. cognitive (i.e. knowledge and learning), 2. social-integrative (i.e. a sense of belonging to a group due to created social ties), 3. personal-integrative (i.e. self-efficacy due to influence), and 4. hedonic and affective (i.e. pleasurable experiences). (Nambisan and Baron, Robert). We also adopted this view while studying the purpose of using Wikipedia from both general and personal views, as well as benefits for using Wikipedia.

## 3 Methodology

Following pragmatism (Morgan) as research philosophy, we chose a case study approach (Siggelkow) to investigate empirically the virtual sense of community in

Wikipedia during university studies. We selected a master level knowledge management course of fall 2019 as our research case. The specific class was chosen due to its idiosyncrasy: it involved students of multiple universities, nationalities, and disciplines, and was offered also with distance learning option. Hence, it can be assumed that the results of the study could be also transferred to different language areas, and disciplines that make use of Wikipedia in learning. We present only the results of those who did not forbid the use of their survey responses in research (n =56) and accomplished Wikipedia learning assignment. Altogether, the study was carried out with three surveys during the course: pre- and post-surveys as well as a survey covering the perceptions of Wikipedia learning assignment. In this article, we present the results of four statements with Likert-scale response options and five open-ended questions regarding Wikipedia's community and the sense of virtual community.

**Table 1.** Demographic information on the students n=56.

<b>Variable</b>	<i>Values</i>					
<b>Sex</b>	<i>Male</i>		<i>Female</i>			
	66,1%		33,9%			
<b>Age</b>	<i>18–24</i>	<i>25–34</i>	<i>35–44</i>	<i>45–54</i>		
	37,5%	41,1%	16,1%	5,4%		
<b>Nationality</b>	<i>Finnish</i>	<i>German</i>	<i>French</i>	<i>Other</i>		
	78,6%	14,3%	1,8%	5,4%		
<b>Highest education degree</b>	<i>Bachelor's degree</i>	<i>Master's degree</i>	<i>Trade/technical/vocational training</i>	<i>Some college credit, no degree</i>	<i>High school graduate, diploma or the equivalent</i>	<i>Some high school, no diploma</i>
	78,6%	5,4%	1,8%	5,4%	7,1%	1,8%
<b>University where enrolled</b>	<i>Course university</i>	<i>Uni 2</i>	<i>Uni 3</i>	<i>Uni 4</i>	<i>Uni 5</i>	
	64,3%	19,6%	7,1%	5,4%	3,6%	
<b>Study</b>	<i>Full time</i>		<i>Full time, but working on the side</i>		<i>Part-time</i>	
	44,6%		35,7%		19,6%	
<b>Employment status</b>	<i>Employed for wages</i>	<i>A student</i>	<i>Self-employed</i>	<i>Out of work</i>	<i>A home-maker</i>	<i>No answer</i>
	42,9%	48,2%	1,8%	1,8%	1,8%	3,6%
<b>Work experience years</b>	<i>1-2</i>	<i>3-5</i>	<i>6-10</i>	<i>10-15</i>	<i>15-20</i>	<i>over 20</i>
	37,5 %	25,0 %	17,9 %	5,4 %	7,1 %	7,1 %

## 4 Results

### 4.1 Wikipedia survey's statements with Likert-scale response options

In Table 2, the survey responses of four mandatory survey statements with numerical 5-point Likert scale response options regarding Wikipedia as a community and its sense of virtual community (SOVC) are presented.

Majority of the students felt that the Wikipedia community does have the capacity to influence other communities (76,8 %). However, trust to members of Wikipedia was not that high: only more than one third agreed (35,7%), whereas almost half of the students (46,4%) had a neutral stance on the statement.

The effect of contribution to the SOVC was conflicting: contribution increased the SOVC only for one-third of students (30,4%), whereas over the third (35,7%) disagreed that the contribution increased their SOVC, and over one third (32,1%) expressed neutral stance to the effect of contribution. However, reading other user's messages did increase the SOVC of 39,3% of the students, yet a little more, 42,9% had a neutral stance on the effect of reading other people's messages to their SOVC, whereas 17,9 % disagreed, that reading other people's messages increased their SOVC.

**Table 2.** Results of four statements Wikipedia's community and SOVC.

<i>Survey statements</i>	<b>Responses n=56</b>				
<i>5 – Strongly agree, 4 – Agree</i>	5	4	3	2	1
<i>3 – Neither agree nor disagree</i>	%	%	%	%	%
<i>2 – Disagree, 1 – Strongly disagree</i>					
<i>Wikipedia community can influence other communities</i>	21,4	55,4	21,4	1,8	0,0
<i>I can trust members in Wikipedia community</i>	0,0	35,7	46,4	17,9	0,0
<i>Contributing to Wikipedia increased my SOVC in Wikipedia community</i>	1,8	28,6	33,9	26,8	8,9
<i>Reading other users' messages of the revision history in Wikipedia-pages increased SOVC in Wikipedia community</i>	0,0	39,3	42,9	14,3	3,6

### 4.2 The purpose of the Wikipedia community in general and personally and the benefits of participating in community

Table 3 portrays the results of three voluntary open-ended statements in the Wikipedia-survey:

- “What is the purpose of the Wikipedia community in general?”
- “What is the purpose of the Wikipedia community for you personally?”
- “What do you perceive as potential benefits in participating in the Wikipedia community?”

The data is analyzed by the number of mentions in the open-ended responses according to the benefit types of Nambisan and Baron (Nambisan and Baron, Robert). The results

show that the purpose of Wikipedia to students, when viewed through its benefits both in general and personally, are mostly cognitive and particularly knowledge benefits. Similarly, responses to the experienced benefits were cognitive, particularly concerning learning from others and learning to write objective and readable text, paying attention to the references. Personal integrative benefits were not mentioned at all in the survey, but some social integrative and affective benefits could be interpreted from the open-ended questions of the survey.

**Table 3.** Results of three open-ended survey statements regarding Wikipedia's purpose and benefits.

	<i>The Purpose of Wikipedia community</i>		<i>Benefits of participating</i>
	<i>General n=43</i>	<i>Personally n= 35</i>	<i>n=36</i>
<b>Benefits</b>			
<b>Cognitive</b>	<b>73</b>	<b>26</b>	<b>27</b>
<b>Knowledge</b>			
<i>What: Information source and collection for sharing and creation of knowledge, helping to understand which content is allowed and which not</i>	31	23	7
<i>To whom: Accessibility and editability to all worldwide</i>	16		
<i>How: Continuously checked and controlled relevant, accurate, good quality knowledge for a quick overview or basic knowledge with free and easy access</i>	26	1	
<b>Improving learning opportunities</b>			
<i>Learn what others have found and written, develop in the topic, learn to write objectively and text that anyone can comprehend, be more wary of references, improve language skills, learn how to make additions to Wikipedia, observe and check the revision history</i>		2	20
<b>Social integrative: Social ties between participants</b>	<b>3</b>	<b>2</b>	<b>5</b>
<i>Network and discuss valuable knowledge, the more writers on Wikipedia, the faster the information will increase, get in touch with other professionals in the same field, contacts with specialists, get in touch with others who are interested the same subjects, get constructive feedback</i>	3	2	5
<b>Personal integrative: a sense of self-efficacy</b>			<b>11</b>
<i>Contribution: making own expertise and important information accessible to the general public to improve general knowledge for common good, to help others</i>			11
<b>Hedonic or affective</b>	<b>3</b>	<b>3</b>	
<i>Appreciation to people who maintain Wikipedia voluntarily for free use, making a better world, help in the community</i>	3	3	
<b>Conflicting or negative expressions</b>	<b>2</b>	<b>7</b>	<b>3</b>
<i>Unreliability as a source of information or Wikipedia as nothing special or the community behind being invisible</i>	2	7	1
<i>The negative feeling of community as the contribution was deleted right away</i>			2

### 4.3 The manifestation of SOVC and methods for improving SOVC in Wikipedia

In Table 4. are presented results of two voluntary open-ended questions:

- “In case you felt SOVC while using Wikipedia, how did it manifest to you?”
- “In your opinion, what activities or things could increase your SOVC in Wikipedia community?”

The data is analyzed by the number of mentions in the open-ended responses according to the view of Tonteri et al. (2011), where SOVC incorporates feelings, with antecedents of community-like behaviour and expectations i.e. need fulfilment (Tonteri et al.). The results show that the manifestation of SOVC is more of antecedent, i.e. community-like behavior of seeking influence via communication and feedback, as well as connection, not feelings per se. Unfortunately, rude behavior was also manifested. However, the number of responses were low, thus limiting the validity of the result.

The activities students expressed potentially increasing SOVC are also antecedents of SOVC, i.e. community-like behavior. This behavior is anticipated from both themselves as well as from the community.

**Table 4.** Results of two open-ended statements of Post-Wikipedia survey.

<b>Manifestation of SOVC</b>	Qty n=6
<b><i>Community type behaviour of communication seeking influence</i></b>	<b>4</b>
<i>The positive effect of communication and connection, seeking communication via potential feedback, being aware of other people while editing texts, feeling proud of sustainable input</i>	
<b><i>Negative manifestations</i></b>	<b>2</b>
<b>Activities or things that potentially increase SOVC</b>	Qty n=19
<b><i>Community type of behaviour: Own active participation</i></b>	<b>6</b>
<i>Own regular behaviour by participation: contribution, information adding and communication with other users with comments and conversation</i>	
<b><i>Community type of behaviour: Communication</i></b>	<b>6</b>
<i>Messaging and regular feedback, perhaps even automated after (first) edit or added texts, particularly reasons for deleted or reversed modifications, tips for future, and discussions about the articles, forum</i>	
<b><i>Community type of behaviour: Co-operation</i></b>	<b>4</b>
<i>Co-operation between authors and transparency of the respective authors of their information and how they received it, verification by peer-review</i>	
<b><i>Gamification</i></b>	<b>1</b>
<i>Gamifying: rewarding by points</i>	
<b><i>Community type of behaviour: the behavior of others</i></b>	<b>1</b>
<i>With people being more helpful and not judging instantly.</i>	

## 5 Conclusion

This article contributes to the field of Technology-enhanced learning (TEL) literature, focusing on the Wikipedia-enhanced learning in Higher education (HE) (Kirkwood and Price; Lai and Bower; Passey; Bayne). More specifically, it contributes to the sense of virtual community (SOVC) emergence (Tonteri et al.) in Wikipedia-enhanced learning. In the field of TEL, Wikipedia as a Web 2.0-technology with the online community provides learning opportunities for HE students (Visvizi, Daniela, et al.) as both lurkers and active participants (Bryant et al.; Malinen; Nonnecke et al.). As an online community, there is also the potential for a sense of virtual community (SOVC) to emerge in Wikipedia use that can enhance learning with social interaction between participants. This study investigated the identified purpose and benefits, the degree of perceived SOVC, together with its manifestations, by university students as active participants performing a learning assignment in Wikipedia.

The results regarding students' conceptions of the purpose and benefits of the Wikipedia community were mainly cognitive: purpose in general and personally was information and knowledge and benefits particularly regarding learning. Considering Wikipedia as the world's largest encyclopedia, these results are not surprising. However, some students did mention personal integrative benefits of contribution as well as social integrative benefits of the Wikipedia community, which implies that some students experience Wikipedia additionally from the community's altruism and interaction viewpoints. These results add to the literature of TEL, particularly social media-enhanced learning by evaluating Wikipedia via the model of Nambisan and Barron (Nambisan and Baron, Robert), besides the discussion forums previously evaluated by Tonteri et al. (Tonteri et al.) (Tonteri et al.),

The results regarding students perceived SOVC in Wikipedia community were conflicting. Contributing to Wikipedia increased a SOVC only for one-third of students. Interestingly, reading other users' messages did increase a SOVC for almost 40% of the students. This implies that even unidirectional interaction seems to affect perceived SOVC for some students. Yet, these results are conflicting compared to previous results, where posting increased SOVC more than reading (Tonteri et al.). Moreover, the manifestations of Wikipedia's SOVC were more regarding the antecedents of SOVC i.e. community-like behaviour aiming at e.g. influence, than the dimensions of an individual's feelings themselves (Tonteri et al.). Reasons for such conflicting results compared to previous ones may be caused by Wikipedia being inherently different type of social media than discussion forum (Kaplan and Haenlein; Kietzmann, Hermkens, et al.; Kietzmann, Silvestre, et al.; Vuori and Jussila). Wikipedia is categorized as "*Collaborative project*" or "*Collaborating: collective content creation*", whereas discussion forums belong to "*Communicating*" types of social media, perhaps even to "*Social Networking sites*" or "*Social networking platforms*" (Kaplan and Haenlein; Vuori and Jussila; Lama). Therefore, the goal of entering, using and engaging in Wikipedia is fundamentally different, thus most likely affecting also the mechanisms of SOVC emergence. Moreover, the manifestations of Wikipedia's SOVC regarding its the antecedents aiming at e.g. influence via knowledge, are most likely due to the nature of content

creation for universal knowledge. After all, knowledge is power and with knowledge you can influence or be influenced with feedback all over the world. Therefore, we suggest that the SOVC emergence in different types of social media should be studied furthered to reveal their social and community affecting aspects.

One limitation of the study was that the learning assignment in Wikipedia was mandatory for students that did not have previous experience of contributing to Wikipedia. Forcing students to participate in the Wikipedia community can introduce a bias concerning SOVC. Secondly, the experience of contributing to Wikipedia during only a short period may limit the manifestation of SOVC that could develop over a longer period, which implies that for students there is an acculturation process while transforming from lurker to active participant in Wikipedia (Brailas et al.).

We argue, Wikipedia-enhanced learning i.e. learning enhancement aimed particularly with technology interventions with mandatory learning activities in Wikipedia online community as active participants, do not necessarily result in the SOVC and those altruistic benefits that voluntary activity in other social media might. However, the purpose and the benefits of Wikipedia are perceived by students cognitive, i.e. knowledge and learning, despite the lack of SOVC. Thus, we conclude that mandatory Wikipedia learning activities do produce perceived learning, although not all the gains of the online community are fully accomplished. This is due to the social media type Wikipedia as collective content creation platform inherently is and to an acculturation process of students to the online community while transforming from lurkers to active Wikipedia participants.

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