

IMPACTS OF MEDIAWIKI ON COLLABORATIVE WRITING AMONG TEACHER STUDENTS

Said Hadjerrouit

University of Agder, Kristiansand, Norway

ABSTRACT

The very nature of wiki-based collaborative writing around a topic-related content is the interaction of wiki functionality, content, and collaborative learning, and how the functionality is used to create the content collaboratively. This way of looking at wikis provides a theoretical model that helps researchers and educators to identify a number of category actions that can be carried out on wikis when students perform collaborative writing activities. This work aims at using the proposed model to evaluate the impacts of MediaWiki on collaborative writing among students in teacher education. Pedagogical implications are drawn from the results and future research actions are envisaged to enhance the quality of wiki-based collaborative writing in teacher education.

KEYWORDS

Collaboration, collaborative learning, collaborative writing, category action, MediaWiki, wiki

1. INTRODUCTION

Wiki was invented by Ward Cunningham in 1994 (Leuf, & Cunningham, 2001). It is as a type of social software that offers new opportunities to create and edit web page content collaboratively. Wikis have been promoted as collaborative writing tools in educational settings and society at large. In fact, wiki technology matches the evolution of the networked society that requires team work, collaborative learning, and collaborative writing skills. Universities and educational institutions have therefore the responsibility to engage students in collaborative learning and writing. A large body of research exists on wikis and their effect on collaborative writing. In teacher education, the research literature reports on a number of wiki-based collaborative writing applications, such as online coursework, teacher evaluation, class project, joint article, digital stories, and many other application examples (Austin et al, 2010; Deters, Cuthrell, & Stapleton, 2010; Chao, & Lo, 2011; Every, Garcia, & Young, 2010; Grant, & Mims, 2009; Mindel, & Verma, 2006; Parker, & Chao, 2011; Witney, & Smallbone, 2009). However, the claim that wikis support collaborative writing has not yet been evidently confirmed in educational settings, despite studies reporting on successful experiences (Karasavvidis, 2010). The main goal of this work is to use a theoretical model to analyse the impacts of wikis on students' collaborative writing in teacher education. The model results from the interactions of wiki functionality, wiki content, and collaborative learning, and includes a taxonomy of category actions that can be carried out on wikis. The main data collection and analysis method is the wiki history log. In addition, the work uses a survey questionnaire and comments posted on the discussion page as supplementary methods. Pedagogical implications are drawn from the results. Research actions for the near future are also envisaged to enhance collaborative writing in teacher education.

2. THEORETICAL MODEL

Wiki-based collaborative writing emerges from the interactions of wiki functionality, wiki content, and collaborative learning (Hadjerrouit, 2013a). Wiki functionality is used to structure the content of the wiki by means of a simplified HTML language (Lamb, 2004; Tetard, Patokorpi, & Packalen, 2009). It includes a discussion page for written communication and reflections, and a history log that tracks all students' actions

carried out on the wiki. Among a plethora of wiki tools, MediaWiki was chosen as a platform for collaborative writing as it incorporates all features mentioned above. MediaWiki is restricted to university members, making it appropriate for education. Wiki functionality enables students to create a wiki that can be evaluated using usability criteria. Collaborative learning, which describes a process generated by student groups, enables the collective creation of wiki content. The content dimension is important for many reasons. It may stimulate students to be engaged in collaborative learning. It may also motivate them to critically discuss and use wiki functionalities to create and edit the content collaboratively. Finally, it may challenge students to take into account the characteristics of the target users. Figure 1 shows the interactions of wiki functionality, wiki content, and collaborative learning.

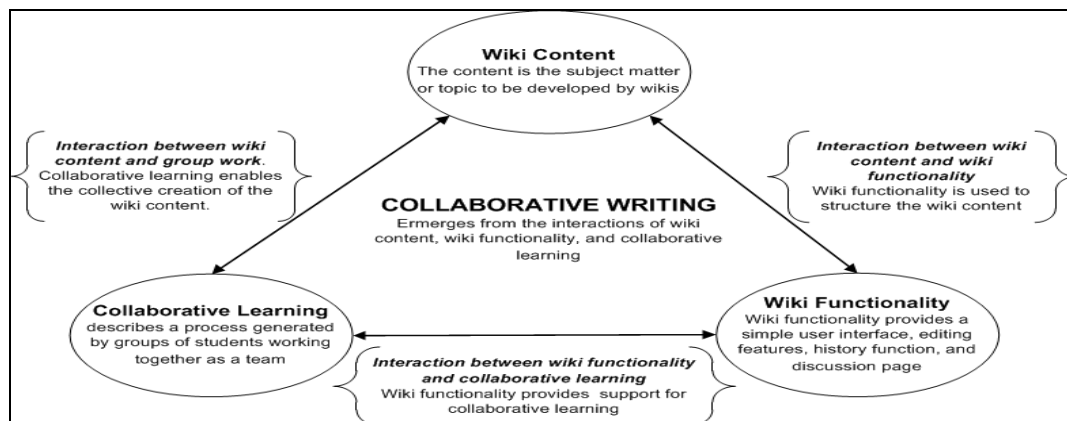


Figure 1. Collaborative writing results from interactions of content, functionality, and collaborative learning

Students carry out actions on the wiki when they perform collaborative writing. Figure 2 shows a taxonomy with originally 13 category of actions, of which the following 10 are used to analyse collaborative writing activities (Pfeil, Zaphiris, and Ang, 2006, pp.101).

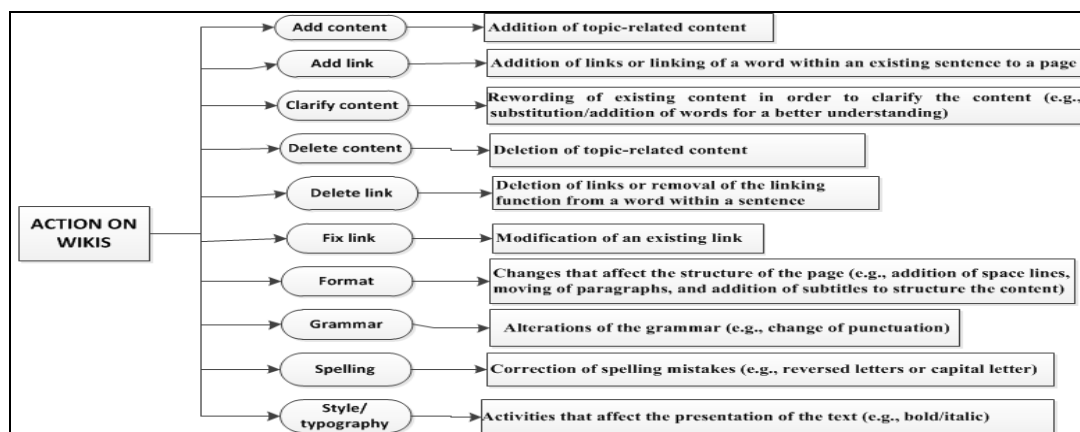


Figure 2. Taxonomy of category actions

Genuine collaborative writing is a matter of changing, clarifying and reworking each other's contributions to the wiki (Hadjerrouit, 2013b). In contrast, work where participants divide the wiki task in subtasks among themselves, and develop the content independently of each other without changing the content produced by peers, cannot be considered as genuine collaboration (Ibid). The wiki history log provides in-depth information about the types of actions that the students carry out on the wikis. The log is an instrument that helps instructors to assess students' collaborative writing activities in terms of work distribution, type of actions across the categories of the taxonomy described above, and timing of contribution as well.

3. RESEARCH QUESTIONS

This work aims at evaluating the impacts of MediaWiki on students' collaborative writing in teacher education. On the basis of the results, pedagogical implications and future research actions are suggested. The work addresses three research questions:

- 1) What are the impacts of MediaWiki on teacher students' collaborative writing activities? To investigate this question, it is necessary to account for three sub-questions:
 - What is the level of work distribution among members of each student group?
 - What are the categories of actions carried out on the wikis?
 - What is the timing of contribution of each student group?

In addition to the level of collaborative writing, the work aims at answering two supplementary questions:

- 2) Which pedagogical implications can be drawn from the results to foster collaborative writing by means of wikis?
- 3) Which research actions need to be taken to enhance wiki-based collaborative writing?

4. METHODS

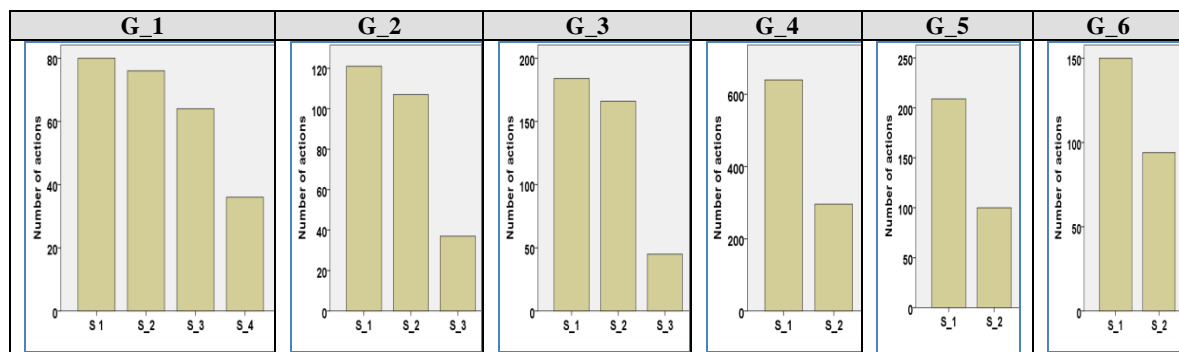
Data came from 16 students enrolled in a course on Web 2.0 technologies in teacher education in 2012. The participants were divided into 6 groups of 2 to 4 students. None of the students had experience with wikis or collaborative writing. The wiki tasks included subjects such as geography, history, mathematics, and science. The main data collection method was the history log that tracks all students' actions carried out on the wikis. Data found in the log was analysed in terms of the category actions described in the theoretical model, that is add and delete content; add, fix, and delete links; format, correct grammar and spelling mistakes, and clarify content. In addition, two supplementary methods were used: a survey questionnaire with open-ended questions, and comments posted on the discussion page of the wikis. The questionnaire was used to obtain information on technical usability of wikis, motivation to use wiki, level of collaboration, and quality of wiki content. To assess their responses, the survey used a five-point Likert scale to measure the extent to which they strongly agree, agree, neither agree or disagree, disagree, or strongly disagree. Finally, the content of the discussion logs were analysed in terms of number and quality of comments provided.

5. RESULTS

5.1 Level of Work Distribution

Table 1 presents the level of work distribution made by each student (S_1, S_2, S_3, S_4) in the respective groups (G_1, G_2, G_3, G_4, G_5, G_6) in terms of number of actions carried out on the wikis.

Table 1. Distribution of work among members of each group in terms of number of actions



The table shows that the workload of the groups was not equally distributed between all members. In groups of 2 students (G_4, G_5 and G_6), the results indicate that one member of the groups assumed nearly 68-61% of the workload, while the other students contributed to 38-32%. In groups of 3 students (G_2 and G_3), two members (S_1 and S_2) assumed more than 85% of the workload, while S_3 contributed to only 11-14%. Finally, in the group of 4 students (G_1), the results show that 3 students (S_1, S_2, and S_3) did most of the work (86%), while S_4 contributed only to 14 %. The results reveal that there is a huge variation in terms of number of actions among the best students in the groups ranging from 640 (S_1 in G_4) to 80 (S_1 in G_1). The analysis of work distribution does not reveal the extent to which students collaborated to create the wikis. A categorization of actions is therefore necessary to analyze the level of collaboration.

5.2 Category of Actions Carried out on the Wikis

Figure 3 shows the number and percentage of actions that fell under each of the 10 categories investigated. The table reveals that the most common category of action was format (668 actions, 23.69% of all actions), followed by addition of content (589, 20.62%), addition of links (505, 17.68%), clarification of content (334, 12.04%), fixing of links (221, 7.73%), deletion of content (207, 7.25%), style/typography (134, 4.69%), deletion of links (77, 2.70%), spelling (68, 2.39%), and finally grammar being the last common category actions (43, 1.51%). Note that a single edit may involve several actions, such as add content, delete a link, clarify content, or correct spelling mistakes.

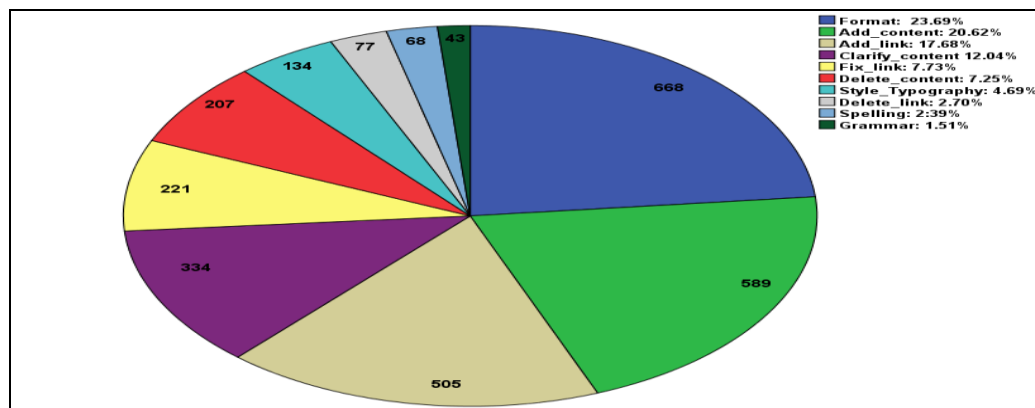


Figure 3. Category of actions in terms of number of actions and percentage of total actions

5.3 Timing of Contribution

Figure 4 shows the timing of contribution of each group in terms of number of actions per week. The results show that all groups worked much as the deadline for submitting their work approached (March, 15), except for group 6. This is reflected in the average number of actions per week carried out on the wikis.

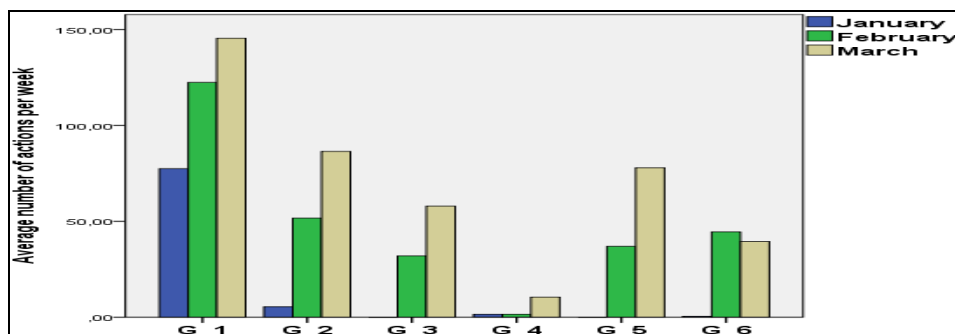


Figure 4. Timing of contribution in terms of number of actions per week

5.4 Summary of Results

A careful analysis of the history log in terms of the category actions described in the theoretical model reveals that there is no evidence that the students truly collaborated. Instead, format, style/typography, add/delete content and links were the most actions that were carried out on the wikis. Furthermore, the workload was not evenly distributed among all members of the groups. The timing of contribution also indicates that all groups worked much as the last day for submitting their wiki approached. Clearly, collaborative writing was performed on a superficial level by formatting the presentation of the wikis, adding content and links. In contrast, genuine collaborative writing by reworking each other's contributions was not a frequent activity. As a result, individual work on the wikis was more evident than collaboration among teacher students.

The survey questionnaire shows that the students were globally satisfied with their wikis and the potentialities of MediaWiki to foster collaborative writing. However, responses to open-ended questions revealed a number of problems that need to be addressed. First of all, MediaWiki lacks a user-friendly editor that may facilitate collaborative writing. It also lacks advanced functionality that supports the development of more usable wikis. Secondly, most students think that the discussion page is not good enough to promote genuine communication and critical reflections. As a result, students still value face-to-face dialogue, and discussions by means of other communication channels. The low level of collaborative writing revealed by open-ended questions was globally confirmed by the issues addressed in the discussion page. The results achieved so far are in line with similar research work (Cole, 2009; Grant, 2009; Elgort, Smith, & Toland, 2008; Hadjerrouit 2012; Hadjerrouit 2013b; Judd, Kennedy, & Cropper, 2010; Karasavvidis, 2010; Neumann, & Hood, 2009). These studies point out to several hypotheses in an attempt to explain the low level of collaboration when using wikis in educational settings: unfamiliarity with wikis, lack of experience, dominant learning paradigm, limited student contribution, reluctance and resistance to use wiki, lack of motivation and engagement, time management, problem of ownership, and lack of an appropriate pedagogy.

6. DISCUSSION

Research question 1 addressed the impacts of MediaWiki on collaborative writing in terms of work distribution, actions on the wikis, and timing of contribution. The results show that wikis alone cannot make collaborative writing automatically happen, unless a collaborative learning approach to wikis is adopted in educational settings. Based on the results, research question 2 and 3 focus on pedagogical implications and future research actions to help teacher students benefit from using wikis for collaborative writing. These are addressed in the following sections.

6.1 Pedagogical Implications

The benefits of collaborative writing are underpinned by collaborative learning and associated Vygotsky's socio-cultural theory that assumes that learning occurs through collaboration and information sharing in authentic contexts (Vygotsky, 1978). Collaborative learning is basically considered as superior to individual learning (Witney, & Smallbone, 2011). As such wikis enable students to share information, collaborate, and communicate with each other. Wikis may stimulate students to work together to create a collective document, a joint project, essay or article. However, collaborative writing cannot develop fully, unless collaborative learning approaches are adopted in educational settings. Those approaches to wikis will increase the likelihood of students' engagement and participation in wiki-based collaborative writing. Nevertheless, collaborative writing will not work successfully unless students are accustomed to collaborative practices. Therefore, wikis should be developed in collaboration to realize shared knowledge, and not be limited to each individual student (Grant, 2009). To achieve this, students should be given more time and training opportunities to familiarize themselves with those practices.

As collaboration and critical reflections are necessary conditions for using wikis, students should discuss the writing tasks in terms of usefulness of content, relevance of literature, and adaptation of the wikis to the users' needs. Clearly, students should firmly grasp their knowledge in order to make their wikis more attractive for the target users. Furthermore, they should focus less on selecting content from Wikipedia and

other Web sites than critically discussing their ideas. However, some language proficiency is required to improve the quality of collaborative writing and make the writing process easier, especially for students with technical background (Li, & Zhu, 2011).

Another implication is that assessment plays an important role in evaluating students' contributions to the wiki. Both quantitative and qualitative assessment may be used. Assessment forms may be self-assessment or/and peer-assessment on an individual basis or in groups. Also the close integration of the wikis and assessment goals, whether and how the wikis will be assessed individually or in groups, and which assessment forms are used, may motivate students to effectively engage in meaningful collaborative writing (Hadjerrouit, 2013b). In this regard, motivation is an essential component of collaborative writing, and must be seen in relation to the wiki content itself, whether it is intrinsically interesting, highly relevant and meaningful to the students.

Finally, wikis as a type of social software can stimulate students to express their ideas better than using another technology. However, students need to be aware of the added value of wikis in terms of collaborative capabilities compared to other communication systems such as LMS. They also need to critically judge the limitations of wikis when communicating with each other. As the wiki discussion page in its present form is not the ideal arena through which to reflect ideas, students still need face-to-face meetings and oral communication by means of other channels, e.g., mobile phone and email, or in conjunction with similar ways of collaborating, including social software such as Facebook and Blogs. As a result, a pedagogical model that combines wiki technology, face-face interactions, and social software may provide the most beneficial communication scenario for teacher students. Nevertheless, current wiki platforms should be improved to include advanced functionality that enables students to express their ideas in collaboration with peers. Clearly, the limitations of wiki technology should not disturb the flow of discussion and communication threads.

6.2 Future Research Actions

Many research actions can be envisaged in the near future to foster wiki-based collaborative writing in education. Firstly, wiki technology needs to be further developed to ensure a smooth interaction with the students in order to free more resources for collaborative writing. Usability aspects are still an important factor for evaluating the value of wiki tools thereby confirming the continued validity of previous research studies (Désilets, Paquet, & Vinson, 2005; Kickmeier-Rust, Ebner, & Holzinger, 2006). Despite some progress in designing the wiki user interface to assist non-technical users, work remains to be done to improve the usability of wikis in terms of user-friendly editors, structure of content, navigation, or visual presentation format. Clearly, technical problems should not constitute a source of frustration for students (Jones, 2010). A smooth interaction with the wiki tool requires not only a user friendly editor, but also extended functionality and advanced features, e.g., communication and management capabilities. Likewise, future wiki tools in education should be designed to support teaching and learning processes, and not only commercial purposes (Wichmann, & Rummel, 2013).

Another research action is the development of a wiki-based pedagogy to ensure a better use of wikis in education (Cole, 2013; Hadjerrouit, 2013b). The question, which faces researchers and educators today, is not why or whether to use wikis, but when and how, that is issues of wiki pedagogy (Walsh, 2010). In this regard, the importance of a socio-cultural learning approach to wikis based on Vygotsky's ideas cannot be underestimated, since putting students together does not automatically result in collaboration. Extending wiki to include a socio-cultural approach to learning requires the integration of wikis into a pedagogical strategy that supports genuine collaborative learning. A pedagogy that suits wikis can engage students in collaborative work and group dynamics to a greater benefit for all members of the groups. This approach to wikis requires a thoughtful interweaving of content, technology, and collaborative learning as described in the theoretical model to the benefit of collaborative writing. In a wiki-based learning environment, students have to actively engage in design practices and inquiry as they develop their wiki. In this environment, the role of the teacher is to create an atmosphere of confidence that stimulates students to collaborate for the benefit of the groups, as well as provide specific guidance to assist them in the writing process. Ultimately, the process of creating a wiki of high quality needs to be carefully planned by teachers to sustain, manage, and motivate student participation in collaborative writing activities (Allwardt, 2011; Huang, & Nakazawa, 2010).

Finally, following the socio-cultural approach to wikis, a near-future research action is to help students become more familiar with wikis and more skilled in collaborative learning and writing (Harsell, 2010). Indeed, a critical factor of success is the students' preparation for collaborative writing, and familiarization activities with wikis (Minocha, & Thomas, 2007). In the networked society that is grounded on team work, training in collaborative learning and acquisition of collaborative skills cannot be restricted to wikis alone, but will be possible using appropriate methods, such as allow students with different backgrounds discuss and integrate different aspects of a topic-related content or develop mutual understanding of complex issues of the topic, and thereby add to each other's knowledge. Another way to foster collaborative learning may be the discussion of students' summaries through the study of wiki-related topics (Tetard, Patokorpi, & Packalen, 2009). Group-based tasks and similar work may provide opportunities for wiki-based collaborative learning and writing. But still, it is likely that students will need constructive feedback and guidance in seeing collaborative learning as a part of their work (Wake, & Modla, 2012).

7. CONCLUSION

Wiki technology alone is simply not enough to foster collaborative writing in teacher education. Rather, wiki-based collaborative writing requires a thoughtful understanding of the complex relationships between wiki functionality, wiki content, and collaborative learning. Based on the results, pedagogical implications and possible research actions for the near future are suggested to successfully foster wiki-based collaborative writing in educational settings. The work will evolve in many directions to further investigate wiki-based collaborative writing. In terms of aims, the work will be extended to include various topics in higher education. In terms of scope, several case studies will be undertaken in the future to explore wiki-based collaborative writing in more details and depth. In addition, case studies with a larger population of students will be considered in future research to ensure more reliability and validity of the results. In terms of theoretical perspective, the model for evaluating the value of wikis for collaborative writing will be refined to strengthen the relationships between wiki content, wiki functionality, and collaborative learning. The interweaving of these three components can create a new form of knowledge that students can bring into play any time they produce wikis for teaching and learning purposes. In terms of methods, the instruments being used, that is survey questionnaire and discussion comments, and the taxonomy of category actions, will be refined by considering more specific questions and issues associated with collaborative writing. Other methods such as focus groups and interviews may be used to support data collection and analysis.

REFERENCES

- Allwardt, D. E. (2011). Teaching Note Writing with Wikis: A Cautionary Tale of Technology in the Classroom. *Journal of Social Work Education*, 47(3), pp. 597-606.
- Austin, et al. (2010). Collaborative Digital Learning in Schools: Teacher Perceptions of Purpose and Effectiveness. *Technology, Pedagogy and Education*, 19(3), pp. 327-343.
- Chao, Y.-C. J., & Lo, H.-C. (2011). Students' Perceptions of Wiki-Based Collaborative Writing for Learners of English as a Foreign Language. *Interactive Learning Environments*, 19(4), pp. 395-411.
- Cole, M. (2009). Using Wiki Technology to Support Student Engagement: Lessons from the Trenches. *Computer & Education*, 52, pp. 141-146.
- Désilets, A., Paquet, S., & Vinson, N. G. (2005). Are Wikis Usable? *Proceedings of WikiSym'05*, October 16–18, 2004, San Diego, CA, U.S.A.
- Deters, F., Cuthrell, K., & Stapleton, J. (2010). Why Wikis? Student Perceptions of Using Wikis in Online Coursework. *MERLOT Journal of Online Learning and Teaching*, 6(1), pp. 122-134.
- Elgort, I., Smith, A.G., & Toland, J. (2008). Is Wiki an Effective Platform for Group Course Work? *Australian Journal of Educational Technology*, 24(2), pp. 195–210.
- Every, V., Garcia, G., & Young, M. (2010). A Qualitative Study of Public Wiki Use in a Teacher Education Program. In: D. Gibson, & B. Dodge (Eds.). *Proceedings of Society for Information Technology & Teacher Education International Conference 2010*, pp. 55-62.

- Grant, L. (2009). 'I don't' Care Do Our Own Page!' A Case Study of Using Wikis for Collaborative Work in a UK Secondary School. *Learning, Media, and Technology*, 34(2), pp. 105-117.
- Hadjerrouit, S. (2010). Wiki-Based Collaborative Learning in Higher Education: A Pedagogical Evaluation. *International Journal of Innovation and Learning* 12(1), pp. 6-26.
- Hadjerrouit, S. (2013a). A Framework for Assessing the Pedagogical Effectiveness of Wiki-Based Collaborative Writing: Results and Implications. *Interdisciplinary of E-Learning and Learning Objects*, 3, pp. 29-49.
- Hadjerrouit, S. (2013b). Collaborative Writing with Wikis: Pedagogical and Technological Implications for Successful Implementation in Teacher Education. In: D.G. Sampson, P. Isaías, D. Ifenthaler, & J.M. Spector (2013). *Ubiquitous and Mobile Learning in the Digital Age*. Springer: Oldenburg, pp. 173-189.
- Harsell, D. M. (2010). Wikis in the Classroom: Faculty and Student Perspective. *Journal of Political Science Education*, 6(3), pp. 310-314.
- Huang, W.-H.D., & Nakazawa, K. (2010). An Empirical Analysis on How Learners Interact in Wiki in a Graduate Level Online Course. *Interactive Learning Environments*, 18(3), pp. 233-244.
- Jones, P. (2010). Collaboration at a Distance: Using a Wiki to Create a Collaborative Learning Environment for Distance Education and On-Campus Students in a Social Work Course. *Journal of Teaching in Social Work*, 30(2), pp. 225-236.
- Judd, T., Kennedy, G., & Cropper, S. (2010). Using Wikis for Collaborative Learning: Assessing Collaboration through Contribution. *Australasian Journal of Educational Technology*, 26(3), pp. 341-354.
- Karasavvidis, I. (2010). Wiki Uses in Higher Education: Exploring Barriers to Successful Implementation. *Interactive Learning Environments*, 18(3), pp. 219-231.
- Kickmeier-Rust, M., Ebner, M., & Holzinger, A. (2006). Wikis: Do they Need Usability Engineering? In Pohl, M., Holzinger, A., Motschnigg, R., & Swertz, C. (2006). *Conference Proceeding of the 2nd Symposium WG HCI&UE*, Österreichische Computergesellschaft, Wien, pp. 137-144.
- Lamb, B. (2004). Wide Open Spaces: Wikis, Ready or Not. *EDUCAUSE Review*, 39(6), pp. 36-48.
- Leuf, S., & Cuningham, W. (2001). *The Wiki Way: Quick Collaboration on the Web*. London: Addison-Wesley.
- Li, M., & Zhu, W. (2013). Patterns of Computer-Mediated Interaction in Small Writing Groups Using Wikis. *Computer Assisted Language Learning*, 26(1), pp. 61-82.
- Mindel, J. L., & Verma, S. (2006). Wikis for Teaching and Learning. *Communications of AIS*, 18(1), pp. 2-38.
- Minocha, S., & Thomas, P. G. (2007). Collaborative Learning in a Wiki Environment: Experiences from a Software Engineering Course. *New Review of Hypermedia and Multimedia*, 13(2), pp. 187-209.
- Neumann, D. L., & Hood, M. (2009). The Effects of Using a Wiki on Student Engagement and Learning of Report Writing Skills in a University Statistics Course. *Australasian Journal of Educational Technology*, 25(3), pp. 382-398.
- Parker, K.R., & Chao, J.T. (2007). Wiki as a Teaching Tool. *Interdisciplinary Journal of Knowledge and Learning Objects*, 3, pp. 57-72.
- Tetard, F., Patokorpi, E., & Packalen, K. (2009). Using Wikis to Support Constructivist Learning: A Case Study in University Education Settings. *Proceedings of 42nd Hawaii International Conference on System Sciences*, pp. 1-10.
- Vygotsky, L.S. (1978). *Mind and Society: The Development of Higher Mental Processes*. Cambridge, MA: Harvard University Press.
- Wake, D. G. & Modla, V. B. (2012). Using Wikis with Teacher Candidates: Promoting Collaborative Practice and Contextual Analysis. *Journal of Research on Technology in Education*, 44(3), pp. 243-265.
- Walsh, L. (2010). Constructive Interference: Wikis and Service Learning in the Technical Communication Classroom. *Technical Communication Quarterly*, 19(2), 184-211.
- Wichmann, A., & Rummel, N. (2013). Improving Revision in Wiki-Based Writing: Coordination Pays Off. *Computers & Education*, 62, pp. 262-270.
- Witney, D., & Smallbone, T. (2011). Wiki Work: Can Using Wikis Enhance Student Collaboration for Group Assignment Task? *Innovations in Education and Teaching International*, 48(1), pp. 101-110.