Journal of Education and Humanities
Volume 3 (1), pp. 18-29, Summer 2020
Original research paper
ISSN 2566-4638

https://dx.doi.org/10.14706/JEH2020312

An observation on the introduction of mobile messenger apps for collaborative online tasks in post-secondary education

Robert Schrenk

University of Applied Sciences Eisenstadt

robert@schrenk.cc

Abstract: *Positive effects of cooperative and collaborative learning have been investigated by a large number of studies. When using cooperative learning in blended or online learning the use of online forums is a popular means to organize the cooperation between learners in order to assist the learning process besides the lessons in presence.*

In the last years the introduction of instant messengers like WhatsApp, Facebook Messenger and such were becoming more popular and enjoy the reputation to be easier to use as they run on mobile phones and are always at hand. It can be expected that students behave differently depending on the device and communication tool that they use. Consequently, this would have an impact on the learning outcomes. Recent researchers claim a negative impact of the use of mobile phones on the students' grade point average (GPA).

Within this article cooperative online assignments were used as instruments to compare the use of an instant messenger compared to communication using traditional online forums. The results show a significant impact on the length of contributions within the cooperative tasks and a significant impact on the working times of the learners. The GPA of learners was not significantly influenced.

Keywords:
Cooperative/collaborative learning; distance education and telelearning; post-secondary education; teaching/learning strategies

Article History
Submitted: 1 January 2020
Accepted: 22 June 2020

1. INTRODUCTION

The positive effects of cooperative and collaborative learning on several aspects of learning have been investigated by a large number of studies (Rahman et al., 2020; Casey & Fernandez-Rio, 2019; Delić & Bećirović, 2016; Bećirović & Akbarov, 2015; Sharan, 2014). Higher learning outcomes can be achieved in settings of small groups rather than a single person working. The terms cooperative and collaborative learning are often used synonymously although there is a different meaning (van Leeuwen & Janssen, 2019). Within this article the abbreviation CL stands for collaborative learning. This means that the learners need a "mutual engagement of participants in a coordinated effort to solve the problem together" (Roschelle & Teasley, 1995, p. 70).

In order to facilitate collaborative assignments, the use of discussion forums is very popular. These are seen as the traditional form of communication in online courses at universities (Bećirović & Brdarević-Čeljo, 2018) or in Massive Open Online Courses (Srba, Savic, Bielikova, Ivanovic, & Pautasso, 2019).

Some researchers experiment with other tools as an alternative to discussion forums like chatrooms, social networking sites or community question answering systems (Jeff, Stephen, Huang, & Indy, 2010; Moorthy et al., 2019; Srba et al., 2019) and as a very new kind of implementation the use of instant messengers, like WhatsApp, for the purpose of teachers' guidance (Raiman, Antbring, & Mahmood, 2017). Especially the possibility to introduce seamless learning scenarios seems promising and allows the creation of collaborative learning outcomes without dependence on location or time (Schmid & Schrenk, 2017).

Although the introduction of such tools seems very appealing, current research has showed a negative impact of social networking sites on the academic achievement. A significant negative correlation seems to be present between the frequency of the students' use of Facebook or the Internet per day for entertainment and their GPA (grade point average) (Feng, Wong, Wong, & Hossain, 2019).

Whereas discussion forums, social networking sites and such are mainly used on personal computers, instant messengers are dedicated to be used on mobile devices like smartphones and tablets. Mobile devices are always at hand and are used very frequently by their users. Therefore, it seems very promising that learners may contribute more frequently and accurately within a collaborative learning process (Bećirović, Brdarević-Čeljo & Zavrl, 2018). Research revealed that within a group of 118 college students more than 57% of messages were answered within less than one minute and 79% of messages were answered within an hour (Rosenfeld, Sina, Sarne, Avidov, & Kraus, 2018).

On the other hand, the use of mobile devices may affect the contribution in a negative way. Research analyzing the impact of the use of mobile devices compared to desktop/laptop computers on the contribution of people in surveys revealed that mobile device users needed more time for their contributions and were more likely to interrupt tasks (Liebe, Glenk, Oehlmann, & Meyerhoff, 2015).

Furthermore, there is a negative correlation between the frequency students used Facebook or the Internet per day for entertainment and their GPA (Feng et al., 2019). Interestingly, according to the statistics of Rosenfeld et al. (2018) more than 90% of instant messages were sent between 8am and 12pm.

Thus, the research question of this work is: which impact has the use of an instant messenger on the length of messages, grades and times of contribution compared to discussion forums? The study is guided by the following hypotheses:

H1: there will be a statistically significant difference between the use of an instant messenger in comparison to a discussion forum regarding the length of messages.

H2: there will be a statistically significant correlation between the use of an instant messenger in comparison to a discussion forum regarding the students' GPA.

H3: there will be a statistically significant difference between the use of an instant messenger in comparison to a discussion forum regarding the times of contribution.

2. METHODOLOGY

For this study students' communication behavior was observed during a blended learning course that implemented cooperative learning scenarios. "Observation allows the description of behavior as it occurs naturally" (McMillan, 2012, p. 164) and "puts you where the action is and lets you collect data" (Bernard, 2006, p. 344). According to Bernard (2006, p. 356) "participant observation makes it possible to collect quantitative survey data".

The quasi experiment as other possible method was considered but discarded. Within an experiment the researcher treats a specific group in a planned way and compares the results to another, untreated group (McMillan, 2012). For this study this approach was not applicable. All participants had to pass all activities using all types of media to pass the course. Therefore, splitting into two groups was no option and the "single-group posttest-only design" seemed to weak as an option (McMillan, 2012).

In quantitative research an observation focuses on particular aspects of behavior and quantifies it in some way. The "researcher strives to be as objective as possible" (Leedy & Ormrod, 2005, p. 180). According to McMillan (2012) this is a "low-inference observation". In this observation only quantitative data is collected automatically and does not need to be interpreted during the collection. The only possible influence of the observer in this study is, that the contributions were graded during the observation. But as grading and giving feedback is a normal part of the learning process the effects to the data are considered to be minimal.

2.1. PARTICIPANTS

This research took place as part of a lecture about "basics of e-Learning" in the master degree program "Applied Knowledge Management" at the University of Applied Sciences in Burgenland (Austria) in the summer semester 2019. In that lecture, the students learned about e-Learning principles and trends that include the topic mobile learning and collaborative learning.

All participants were obligated to execute all tasks to pass the course. As the overall learning outcome of this lecture, the students had to collaboratively design a collaborative online course for a given topic. Before that, they had to undergo two collaborative online tasks themselves to gain experience and practice on collaborative online learning. Based on these two collaborative tasks their communication behavior was analyzed.

2.2. DATA COLLECTION TOOLS AND PROCESS

During the first lecture, students were informed that the two collaborative tasks will be observed for a reflection and analysis. In order to minimize possible influence on the communication behavior, they were not informed in detail about hypotheses or research questions.

For the purpose of this research a special kind of instant messenger, called "eduMessenger", was used. This messenger connects to the learning management system Moodle, that was used for the discussion forums, and stores all messages using the very same discussion forums in Moodle. That way all meta-information related to messages was at hand for the analysis. The main differences between the two types of media was, that the students using the messenger were informed about new messages via push notifications on mobile devices, while the other group was informed via email notifications on the computer. Contributions to the discussion should have been made on the particular device.

As a consequence, the learners using the messenger had to answer on their mobile phones, while the others answered using their computers and a regular keyboard. During the learning process all contributions of the students were constantly graded and feedback was given to propagate their contribution. At the end of the course all students were asked to take part in a short survey, to reflect upon their attitudes towards the used media and lessons learned. At that stage, they were informed about the purpose of the study and were given a possibility to opt-out from the study. After the survey was finished, all contents of the Moodle-forums were exported, the contributions were anonymized and analyzed. The contributions of those students who did not give their consent to be part of the study were removed.

Out of the 33 students, who participated the course, 32 finished the questionnaire and 29 agreed to include their data into the analysis, only 3 disagreed. One participant dropped out during the course and was not able to take part in the questionnaire at all. These data were removed too.

2.3. DESIGN OF THE COLLABORATIVE TASKS

The students were split into 8 groups. Each group consisted of 4-5 students.
In the first task [T1] the students had to discuss the pros and cons of collaborative online tasks based on literature that was given to them. Each group was asked to agree upon the most important three pros and cons as the outcome of the task, but for the grading only the quality of each single message was considered according to the criteria (1) number of contributed pros/cons and (2) if arguments were based on literature. For each message the students could be awarded 5 points, and 10 points as maximum for the whole task. The students had a time range of 14 days for discussion and providing an outcome.

In the second task the students had to develop an own collaborative task [T2a], and provided feedback to at least two colleagues [T2b]. The feedbacks ought to contain (1) if the designed tasks engage collaboration among learners, (2) all aspects of Salmon's eTivity-concept (Salmon, 2002) were fulfilled and (3) additional hints were given. T2a was awarded 10 points at maximum, in T2b each feedback could be graded with 5 points. T2 in total had a maximum of 20 points. The feedback had to be done within a time range of 21 days.

In both tasks the students had the choice to contribute with few high quality posts or with a higher amount of posts with minor quality.
By design the students were asked to use a certain type of media for a certain task.

Table 1 Disposition of groups, tasks and type of media

Groups	T1	T2a	T2b
1-4	eduMessenger	Free choice	Forum
5-8	Forum	Free choice	eduMessenger

The purpose of this was to give all the students the opportunity to use a messenger and a discussion forum at least once during the course.
For each task a dedicated discussion forum was provided and the groups were separated using the "separated groups"-feature in Moodle. This means that the groups could not see the other groups nor their process. Consequently, an influence between the groups was prohibited.

Unfortunately, many students did not follow the guidelines and used both media types within all tasks. Whatever seemed more appropriate for them in a particular situation was used.

3. FINDINGS

3.1. H1: LENGTH OF MESSAGES

H1: there will be a statistically significant difference between the use of an instant messenger in comparison to a discussion forum regarding the length of messages.

Figure 1 shows the average length of messages of forum posts compared to messenger posts. Posts contributed using the messenger seem to be shorter than those contributed using the forum.

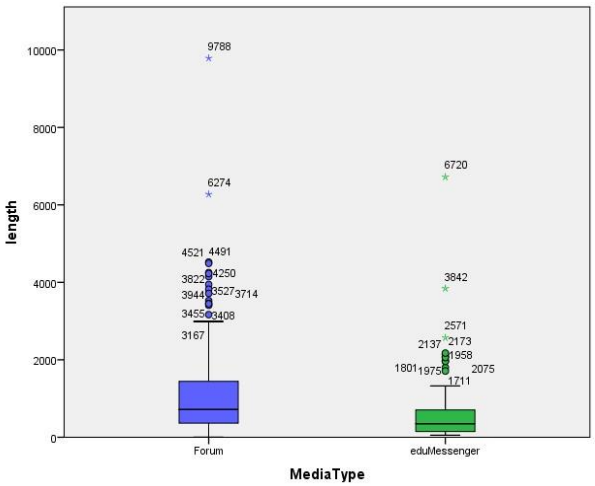

Figure 1: MediaType and lengths of contributions

An independent samples t-test was conducted to compare the length for messages created by the messenger or the forum.

Table 2 T-test of MediaType on length of contribution

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
length	Equal variances assumed	22,439	,000	4,799	346	,000	555,011	115,643

Equal variances not assumed	5,132	336,311	,000	555,011	108,152

The t-test shows a significant difference in the lengths of contribution for forum (M = 1143.66, SD = 1241.68) and eduMessenger (M = 588.65, SD 768.268); t(346) = 4,799, p = 0.000.

3.2. H2: IMPACT ON GPA

H2: there will be a statistically significant correlation between the use of an instant messenger in comparison to a discussion forum regarding the students' GPA.

As mentioned in section 3.3, students mixed both types of communication for a natural use of their communication channels and did not follow the guideline to use the predetermined type of media for one assignment, and the other type of media for the other assignment. Consequently, it was not possible to analyze the effect on the GPA by a comparison of the two assignments.

Therefore, a new variable "MediaTypeRatio" [MTR] was introduced to determine a correlation between the MTR and GPA. MTR indicates the amount of posts written using the messenger as a percentage of the amount of posts written using the forum. If, as proposed by H2, the use of an instant messenger has a negative impact on the GPA there must be a correlation of this ratio compared to the graded results.

Both assignments had a cap of 30 points as maximum. Because of that cap, the correlation was tested with and without a cap of 30 points.

Table 3 Correlation between MTR and GPA

		MTR	GPA without cap	GPA max. 30
MTR	Pearson Correlation	1	-,007	,056
	Sig. (2-tailed)		,969	,771
	N	29	29	29

**. Correlation is significant at the 0.01 level (2-tailed).

There was no correlation between MTR and GPA without cap r = -0.01, n = 29, p = 0.969.
There was no correlation between MTR and GPA with cap r = 0.06, n = 29, p = 0.771.

3.3. H3: TIMES OF CONTRIBUTION

H3: there will be a statistically significant difference between the use of an instant messenger in comparison to a discussion forum regarding the times of contribution.

All produced posts were categorized according to the hour they were written as (1) before 8 am, (2) between 8am and 4pm, and (3) after 4pm.
Figure 2 shows the allocation of messages over day times.

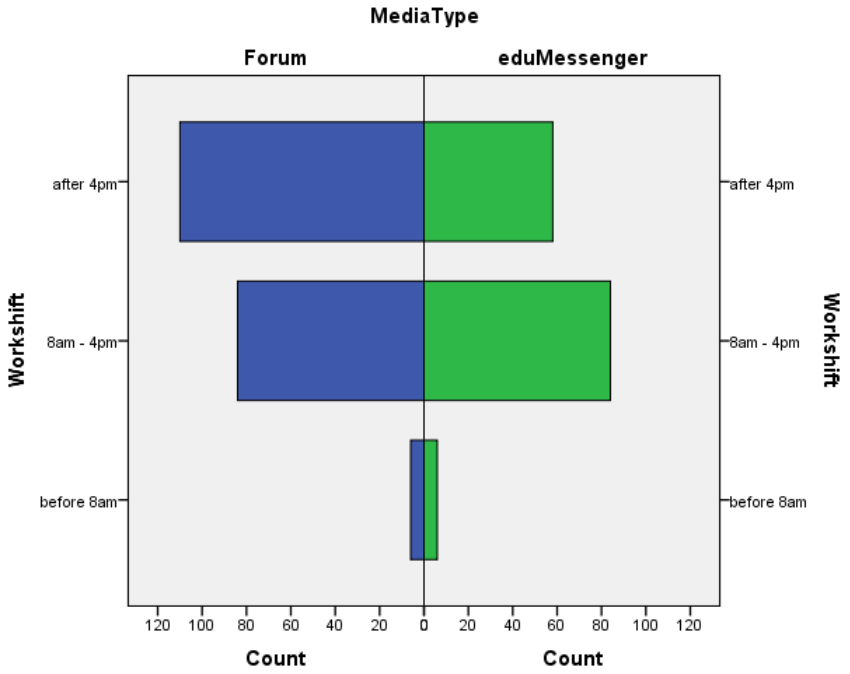

Figure 2: MediaType and times of contribution

An independent samples t-test was conducted to compare the times of contribution for messages created using the messenger or the forum.
The t-test showed a significant difference in the times of contribution for the forum (M = 2.52, SD = 0.56) and the messenger (M = 2.35, SD 0.56); t(346) = 2.79, p = 0.006.

Table 4 T-test of MediaType on times of contribution

		Levene's Test for Equality of Variances		t-test for Equality of Means			t-test for Equality of Means	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Work-shift	Equal variances assumed	,829	,363	2,789	346	,006	,16865	,06048
	Equal variances not assumed			2,789	316,897	,006	,16865	,06048

4. DISCUSSION AND CONCLUSIONS

The results of this study reveal that the use of an instant messenger on mobile devices significantly reduces the length of written messages in comparison to messages that are written on a computer. This may be misinterpreted as a decreased quality of the learning outcomes. This is not necessarily true, if the assignment is designed accordingly.

Therefore, it must be assured that either the length of contributions does not predetermine the points awarded, or learners can compensate shorter contributions with higher frequency and quantity. For the purpose of collaborative assignments, this can even be advantageous as it raises the flow of the communication in the learning process. Qamar, Riyadi and Wulandari (2019) reported similar experience when they introduced the popular messenger WhatsApp to a Blended Learning.

Learners who contribute in a discussion will think about the subject and reflect on the outcomes more frequently. Consequently, it can be expected that they identify themselves more with the outcome of the collaborative work and are overall more actively concerned with the learning.

Furthermore, the combination of traditional digital communication channels like forums and new channels like messengers allows to expand the times of contributions of the learners. They stick to the learning on a more frequent basis instead of providing punctual contributions. So, the learning happens perpetually on a seamless basis. This means that learners can learn whenever (Sinanović & Bećirović, 2016) and wherever they want, also during breaks or holes in their working schedule.

Interestingly the use of an instant messenger has another significant effect, that was not analyzed by the initial hypotheses. The analysis focused on the contributions that were required by the assignments. It was very salient that many contributions did not get a grading. Most of these messages were intended to support the social binding of the group.

An investigation into this showed that out of 200 forum posts, only 33 (16.5%) were not intended for grading, but out of 128 messenger posts these were 63 (42.6%). A chi-square test approved a significant association between the MediaType and the purpose of grading, χ^2 (1) = 28.93, p = 0.000 (0 cells have expected count less than 5, minimum expected count is 40.83).

This proves, that the introduction of instant messengers in online learning significantly supports the social cohesion of a learning group in comparison to traditional forms of digital communication. Instant messengers can help to bring close all collaborators of a group in a virtual team, so that collaborators assist each other on a mutual basis. Berewot and Fibra (2020) found a similar impact on students motivation in project learning.

Compared to the findings of Liebe, Glenk, Oehlmann and Meyerhoff (2015, p. 24) and Feng et al. (2019) who suggest a negative impact of the use of instant messengers on the grade point average, no such significant impact could be confirmed in this study. Furthermore, research findings show that willingness

to communicate (Rizvić & Bećirović, 2017) and learning styles (Mašić, Polz & Bećirović, 2020) are significantly affected by GPA.

This makes the introduction of instant messengers to the learning very attractive, although there must still be some awareness about possible negative impacts, that were not discussed in this study (e.g. privacy), and there are certain limitations to the tasks because of the form factor of the devices.

REFERENCES

Bernard, H. R. (2006). *Research methods in anthropology: Qualitative and quantitative approaches* (4th ed). OCLC: ocm60824194. Lanham, MD: AltaMira Press.

Bećirović, S., & Akbarov A. (2015). Impact of social changes on teacher's role and responsibilities in the educational system. JoLIE – Journal of Linguistic and Intercultural Education, 8, 21-35. DOI: https://doi.org/10.29302/jolie.2015.8.2.

Bećirović, S., & Brdarević-Čeljo, A., (2018). Exploring and Assessing Cross-cultural Sensitivity in Bosnian Tertiary Education: Is there a real promise of harmonious coexistence?. European Journal of Contemporary Education, 7(2), 244-256. doi: 10.13187/ejced.2018.2.244.

Bećirović S., Brdarević-Čeljo, A. & Zavrl, I. (2019). Research into intercultural effectiveness in a multicultural educational milieu in Bosnia and Herzegovina. Economic Research-Ekonomska Istraživanja, 32(1), 1336-1351. doi: 10.1080/1331677X.2019.1629329.

Berewot, J., & Fibra, A. (2020). Whatsapp Messenger Among Higher Education Students: A Study on Whatsapp Messenger Usage for Project Learning. Journal of Physics: Conference Series, 1477, 042018. https://doi.org/10.1088/1742-6596/1477/4/042018.

Casey, Ashley, und Javier Fernandez-Rio. „Cooperative Learning and the Affective Domain". *Journal of Physical Education, Recreation & Dance* 90, Nr. 3 (24. März 2019): 12–17. https://doi.org/10.1080/07303084.2019.1559671.

Delić, H. & Bećirović, S. (2016). Socratic Method as an Approach to Teaching. European Researcher, 111(10), 511-517. doi: 10.13187/er.2016.111.511.

Feng, S., Wong, Y. K., Wong, L. Y., & Hossain, L. (2019). The Internet and Facebook Usage on Academic Distraction of College Students. *Computers & Education*, *134*, 41–49. doi:10.1016/j.compedu.2019.02.005.

Jeff, J. S. H., Stephen, J. H. Y., Huang, Y.-M., & Indy, Y. T. H. (2010). Social Learning Networks: Build Mobile Learning Networks Based on Collaborative Services. *Educational technology & society : journal of International Forum of Educational Technology & Society and IEEE Learning Technology Task Force*. *13*(3), 78. ID: alma991000537793303347.

Leedy, P. D. & Ormrod, J. E. (2005). *Practical research: Planning and design* (8. ed). OCLC: 605949147. Upper Saddle River, NJ: Pearson/Merrill Prentice Hall.

Liebe, U., Glenk, K., Oehlmann, M., & Meyerhoff, J. (2015). Does the use of mobile devices (tablets and smartphones) affect survey quality and choice behaviour in web surveys? *Journal of Choice Modelling*, *14*, 17–31. doi:10.1016/j.jocm.2015.02.002. McMillan, J. H. (2012). *Educational research: Fundamentals for the consumer* (6th ed). OCLC: ocn690089808. Boston: Pearson.

Mašić, A., Polz, E., Bećirović, S. (2020). The Relationship between Learning Styles, GPA, School Level and Gender. European Researcher, 11(1), 51-60. doi: 10.13187/er.2020.1.51.

McMillan, J. H. (2012). Educational research: Fundamentals for the consumer (6th ed). OCLC: ocn690089808. Boston: Pearson.

Moorthy, K., T'ing, L. C., Wei, K. M., Zi Mei, P. T., Yee, C. Y., Jia Wern, K. L., & Xin, Y. M. (2019). Is facebook useful for learning? A study in private universities in Malaysia. *Computers & Education*, *130*, 94–104. doi:10.1016/j.compedu.2018.12.002.

Qamar, K., Riyadi, S., & Wulandari, T. (2019). Utilization of whatsapp application as discussion media in blended learning. 13, 370–378. https://doi.org/10.11591/edulearn.v13i3.8412

Rahman, Nur Shamsiah Abdul, Lina Handayani, Mohd Shahizan Othman, Waleed Mugahed Al-Rahmi, Shahreen Kasim, und Tole Sutikno. „Social media for collaborative learning". *International Journal of Electrical and Computer Engineering (IJECE)* 10, Nr. 1 (1. Februar 2020): 1070. https://doi.org/10.11591/ijece.v10i1.pp1070-1078.

Raiman, L., Antbring, R., & Mahmood, A. (2017). WhatsApp messenger as a tool to supplement medical education for medical students on clinical attachment. *BMC Medical Education*, *17*(1). doi:10.1186/s12909-017-0855-x.

Rizvić E., & Bećirović, S., (2017). Willingness to Communicate in English as a Foreign Language in Bosnian-Herzegovinian EFL Context. European Researcher, 8(3), 224-235. doi: 10.13187/er.2017.3.224.

Roschelle, J. & Teasley, S. D. (1995). The Construction of Shared Knowledge in Collaborative Problem Solving. In C. O'Malley (Ed.), *Computer Supported Collaborative Learning* (pp. 69–97). Berlin, Heidelberg: Springer Berlin Heidelberg. Doi:10.1007/978-3-642-85098-1 5.

Rosenfeld, A., Sina, S., Sarne, D., Avidov, O., & Kraus, S. (2018). A Study of WhatsApp Usage Patterns and Prediction Models without Message Content. *ArXiv:1802.03393 [cs]*. arXiv: 1802.03393 [cs]. Retrieved March 17, 2019, from http://arxiv.org/abs/ 1802.03393.

Salmon, G. (2002). *E-tivities: The key to active online learning*. OCLC: ocm49239787. London : Sterling, VA: Kogan Page ; Stylus Pub.

Schmid, S. & Schrenk, R. (2017). Grenzenlos Informell-Formell lernen - egal wo und wann. Mit ubiquita¨rer Technologie seamless learning an der FH Burgenland erm¨oglichen. In A. Trink (Ed.), *Pannonia Research Award 2016 Regionale und europ¨aische Zukunftsfragen aus Forschung und Lehre*. Leykam Buchverlagsges. m.b.H. Nfg. & Co. KG.

Sharan, Yael. „Learning to cooperate for cooperative learning.". *Anales de Psicología* 30, Nr. 3 (1. Oktober 2014): 802–7. https://doi.org/10.6018/analesps.30.3.201211.

Sinanović, J., & Bećirović S. (2016). The Determinants of Lifelong Learning. European researcher, 103(2), 107-118. doi: 10.13187/er.2016.103.107.

Srba, I., Savic, M., Bielikova, M., Ivanovic, M., & Pautasso, C. (2019). Employing community question answering for online discussions in university courses: Students' perspective. *Computers & Education*, *135*, 75–90. doi:10.1016/j.compedu.2019.02.017 van Leeuwen, A. & Janssen, J. (2019). A systematic review of teacher guidance during collaborative learning in primary and secondary education. *Educational Research Review*, *27*, 71–89. doi:10.1016/j.edurev.2019.02.001.