
INTERNATIONAL STUDENTS' BEHAVIOUR IN VIRTUAL COLLABORATIVE LEARNING ARRANGEMENTS

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Abstract

This paper presents a case study comparing the behaviour of students from different countries in a common Virtual Collaborative Learning course based on web analytics statistics. Using the open source web analytics engine Piwik (<http://piwik.org>), browsing behaviour of students from Germany and Jordan in a closed learning social network was tracked and analysed. The results show differences in students' browsing behaviour and usage preferences in terms of students' engagement and students' preferences. They provide implications for design adjustments of the Virtual Collaborative Learning arrangement to enhance the learning experience of students in both countries.

Introduction

Understanding students' behaviour is important for effective design and implementation of technology enhanced learning scenarios (McKenney, 2013). It helps course designers to enhance its didactical and organisational structure to increase students' engagement and the learning impact. In collaborative learning settings, where students' social interaction is crucial for successful group learning, facilitating communication and coordination conditions should be considered to allow effective knowledge building and exchange (Soller, 2001; Kapucu, Yuldashev, Demiroz, & Arslan, 2010; Kreijns, Kirschner, & Jochems, 2003).

In Computer Supported Collaborative Learning (CSCL) settings, Computer Mediated Communication (CMC) plays an important role in students' interaction. With the lack or absence of social cues like gestures, students can face communication and collaboration difficulties (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999). This is even more challenging in international courses with students from different countries and cultures, due to probable variations in learning styles, contexts, and usage behaviour (Olaniran, 2009).

Virtual Collaborative Learning (VCL) emphasises the virtual classroom's role to integrate students from different locations in a distributed, yet inclusive social learning environment using social software (Tawileh, Bukvova, & Schoop, 2013). In addition to CSCL benefits of increasing students' motivation and active participation, it facilitates learning as a situated, socially transmitted process, where students can get actively involved in the virtual collaborative learning community (Schoop, Bukvova, & Lieske, 2009). Comparing students' online behaviour in international Virtual Collaborative Learning environments helps course

designers to adjust the learning arrangement and facilitate effective communication, coordination and collaboration.

This paper compares browsing behaviours of German and Jordanian students in a closed learning social network to identify differences that may affect their interaction in a common Virtual Collaborative Learning course. The next section described the study design. The result are then presented and discussed in the third section and the final section draws conclusions and recommendations for future research.

Study design

The course *Collaboration in the Virtual Classroom* is a regular master's module at the faculty for business and economics at the Technische Universität Dresden. It is offered as a Virtual Collaborative Learning arrangement where students from Germany collaborate with students from partner universities abroad. The course offered in summer term 2015 included eighteen business students (10 Female and 8 Male) from Germany and eight computer science students (4 Female and 4 Male) from Princess Sumaya University for Technology in Jordan. It was selected as a case study to investigate students' behaviour in the learning environment based on web analytics statistics tracked and analysed using piwik, the open source web analytics engine. Beside users' location, based on their IP address, no further personal data was forwarded from the social network to the analytics platform.

The students were divided into five interdisciplinary groups of 5-6 members and asked to register in the prepared closed learning social network. This was built using elgg (<http://elgg.org>), the open source social network engine and offered the central communication and collaboration platform for all teams. The project-based learning scenario required the students to virtually collaborate in the teams and solve a given problem addressing critical incidents of intercultural communication in business virtual collaboration. The anticipated learning objectives included enhancing students' media competence through using Web 2.0 applications, self-competence through effective contribution to the group's solution, professional competence through negotiating and presenting a common solution, and intercultural awareness through working out intercultural critical incidents with peers abroad.

The intensive virtual collaboration phase was started by a kick-off videoconference, lasted for four calendar weeks (20.04.2015 - 18.05.2015), and was finished by a final videoconference. Each group developed and recorded an executive presentation of its solution. One instructor led the course supported by two qualified e-tutors from Germany, who followed-up with the groups for organisational, collaboration and group dynamics questions. Students' activity on the platform was tracked with their permission using the web analytics tool. This could recognise 93.6% of all visits and 98.1% of all actions tracked during the virtual phase to be from Germany and Jordan. The recorded statistics were segmented and compared to identify variation in the browsing behaviour between students from Germany and Jordan. The results are presented and discussed in the following section.

Results

The reason of analysing and comparing statistical browsing data in this case study is to understand how students from different countries use the provided learning environment and how probable variation in their use can be addressed in the course design to enhance students' Virtual Collaborative Learning experience. For this purpose, indicators of *students' engagement* and *students' preferences* were extracted from the web analytics platform.

Students' engagement

While it is frequently used to measure students' interaction with learning materials and tasks in a Learning Management System (LMS), students' engagement in this study represents interaction in the Virtual Collaborative Learning environment, which requires regular visits and frequent activity in the online community

Online presence

The first indicator of students' engagement in the Virtual Collaborative Learning course is the regular visit to the virtual classroom. The number of students' visits to social network during the virtual collaboration phase is comparable to number of their physical class attendance during a classical course. Figure 1 shows a comparison between the total visits registered from Germany and from Jordan and exposes a common trend between students from both countries over the course duration. The peaks on 27.04.2015, 04.05.2015, and 11.05.2015 identify the start of the three major tasks. A slight decrease in the number of visits from both countries can be observed as the course proceeds, which can indicate an increasing students' orientation in the platform, as they tend to perform directed rather than exploratory visits and accomplish their intention in fewer visits.

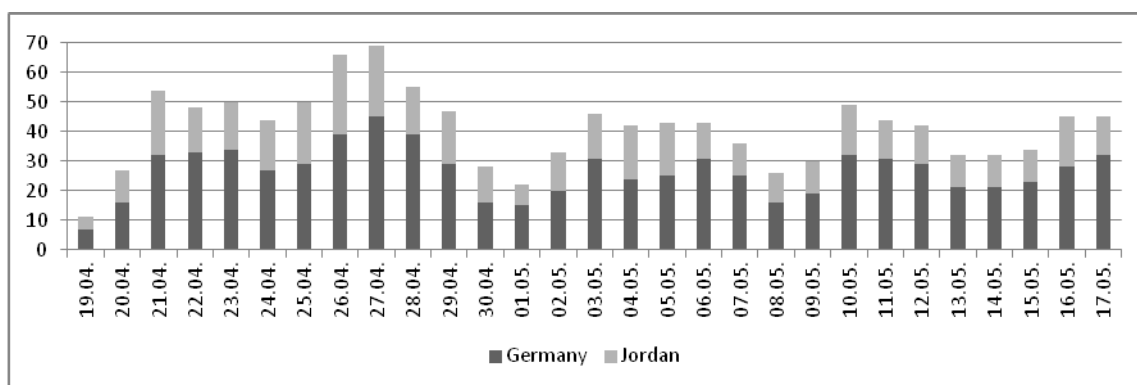


Figure 21. Absolute total number of visits over course duration

The displayed variation in the total number of visits corresponds to the different number of participants from each country. More representative investigation of visits' frequencies by location requires a relative metric, like number of visits per user. However, this was not available in the course due to anonymized tracking. To compensate the difference in number of participants, the number of visits from Jordan was multiplied by a correction factor of 2.625 (representing the proportion of German students). Figure 2 shows the normalized number of

visits from both countries and illustrates a higher number of visits from Jordan all over the course duration.

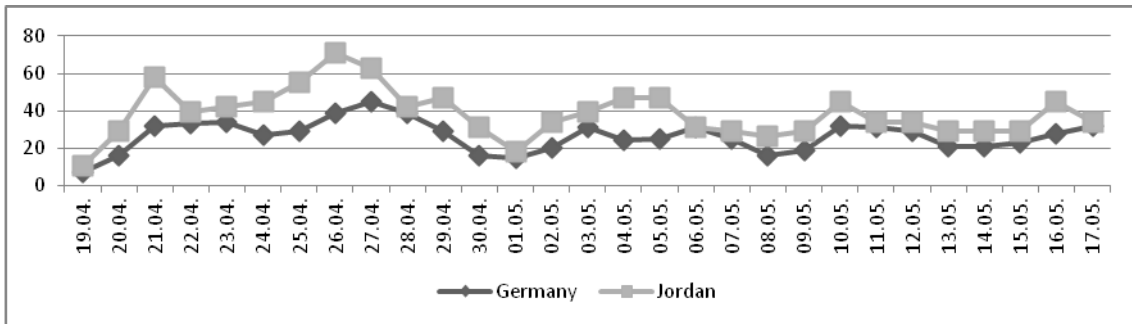


Figure 22. Normalized total number of visits over course duration

The high number of visits may reflect the interest of Jordanian students to “check-out” the platform frequently, while German students spent, in average a longer time on the platform during their visits as displayed in Figure 3.

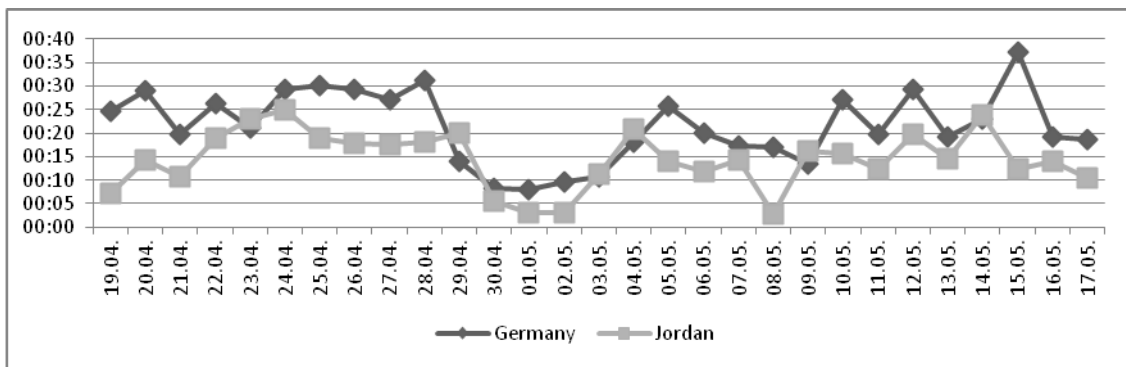


Figure 3. Average times per visit (in minutes) over course duration

Online activity

The quantitative web analytics data can provide an indicator of the presence quality in the number of users' actions during their online presence. While counting new visits to a website when users visit it for the first time or after a minimum of thirty minutes from a their last page view, piwik record more detailed statistics of users' activity during their visits as actions (page views, searches, downloads, etc.). Figure 3 compares the average number of actions conducted per visit from Germany and Jordan.

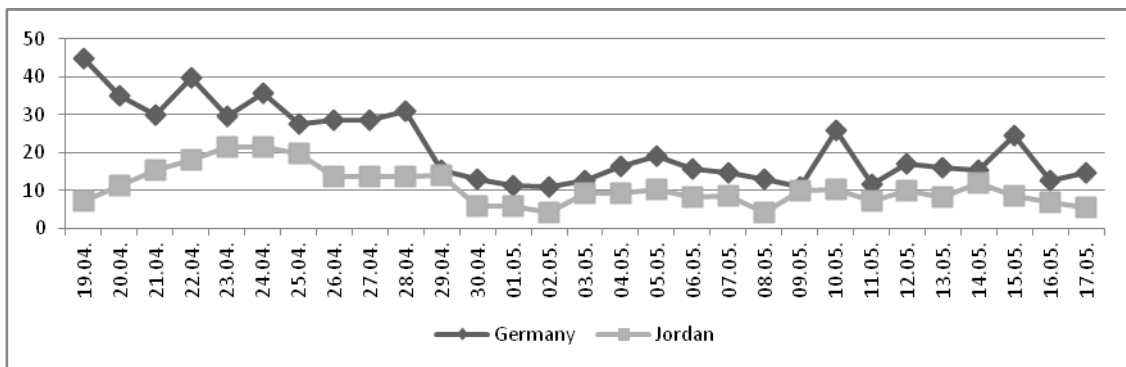


Figure 4. Average actions per visit over course duration

It is clear that German students always conducted more actions during their visits than their Jordanian peers all over the course duration. In the first ten days of the course, activity from Germany promptly dropped to the much lower level of activity from Jordan. This may reflect a disappointment of German students by the inactivity of their peers from Jordan, which they faced by decreasing activity from their side. The overall trend of decreasing actions per visit from both countries supports the assumption, that students get better orientation over time and can accomplish their intention in fewer actions.

A useful indicator of students' interaction with course content can be observed in number of pages called during a visit. File downloads is another indicator of students' interaction with learning materials, that was not analysed separately in this study as the number of learning materials to downloads was very limited. The vast majority of course content (case study, tasks, readings...) was provided in an interactive format (blog, bookmarks, calendar appointments...). Furthermore, PDF documents were displayed in an integrated viewer. So a visit to the viewer page is considered equivalent to a file download. Figure 4 compares the number of pages called per visit. In more than a half of their visits, Jordanian students' viewed less than six pages (18% only one page view), while 47% of the visits from Germany called more than 10 pages per visit. These statistics support the assumption that Jordanian students frequently "checked-out" the platform and left after a short navigation, while German students interacted with course content more extensively.

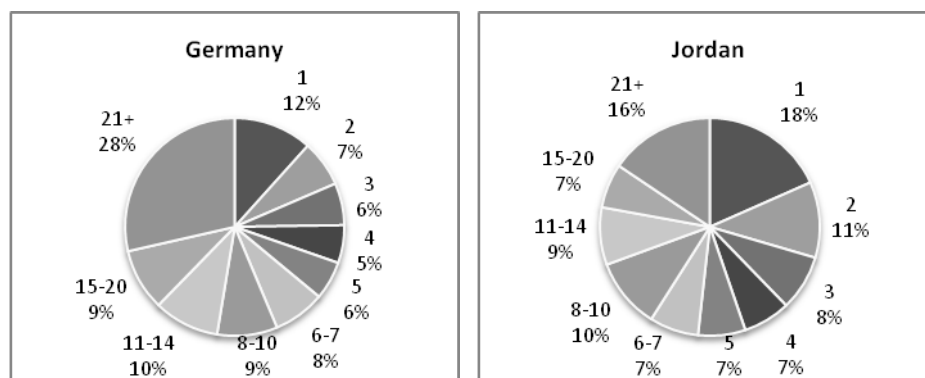


Figure 5. Page views per visit for the whole course duration

Students' preferences

Due to its strong dependence on Computer Mediated Communication (CMC), enhancing students' Virtual Collaborative Learning experience requires an understanding of their connectivity and browsing behaviour. This is important to consider individual and contextual factors in the international setting. In this case study, two aspects had to be considered when analysing students' behaviour on the platform: first, weekends differ between Germany (Saturday and Sunday) and Jordan (Friday and Saturday). Second, masters' study programs in Jordan are usually offered in the afternoon, as many students need to work in full-time to finance the high study costs.

Time management

Figure 5 shows the number of visits from Germany and Jordan distributed on the days of the week. Despite the difference in working days and weekends, a common trend in the visits from both countries can be identified. The lowest number of visits was on Saturdays indicates fewer visitors to the platform on this common weekend day.

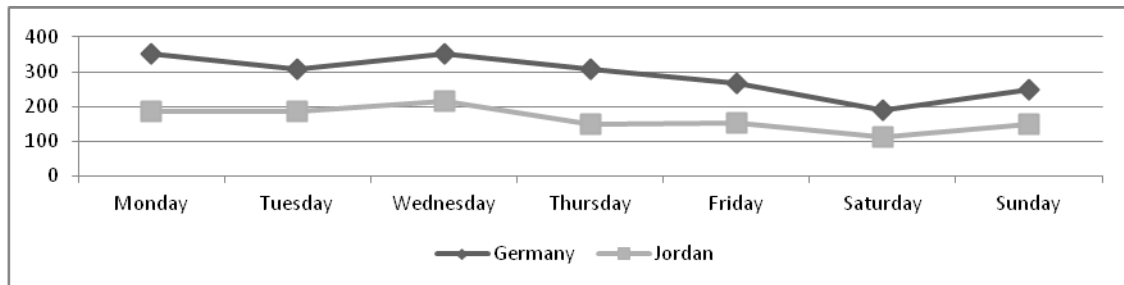


Figure 6. Total visits per day of the week

Figure 7 shows the normalized total number of actions performed from Germany and Jordan distributed on the seven days of the week. A trend of decreasing activity by the end of the week reflects a general students' preference to avoid intensive online participation on the weekend.

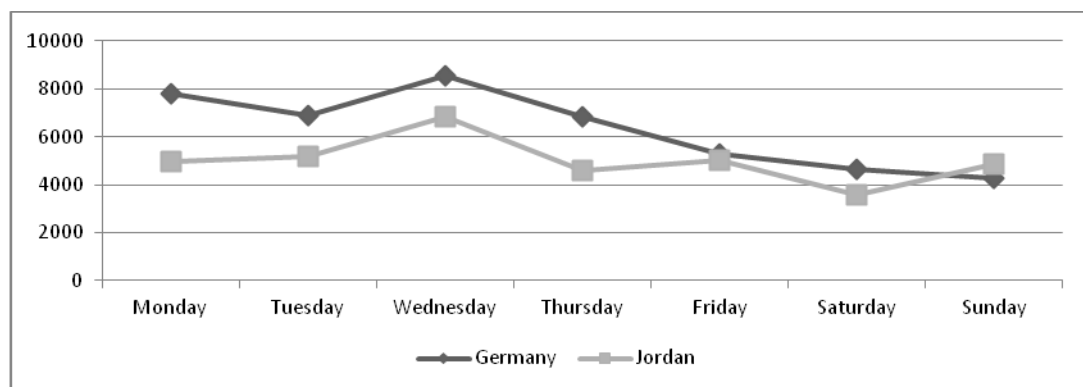


Figure 7. Normalized total actions per day of the week

Individual users' behaviour in a single visit displays an interesting trend, as the highest average number of actions conducted in one visit was on Saturdays for German students and on Fridays for Jordanian students as shown in Figure 8. This can be affected by the required long interaction at the first weekend (orientation) and the last one (the final solution). However, an almost equal distribution of actions' intensity over the days of the week can be noticed in both countries, which indicates constant effort during the visits, even on weekends.

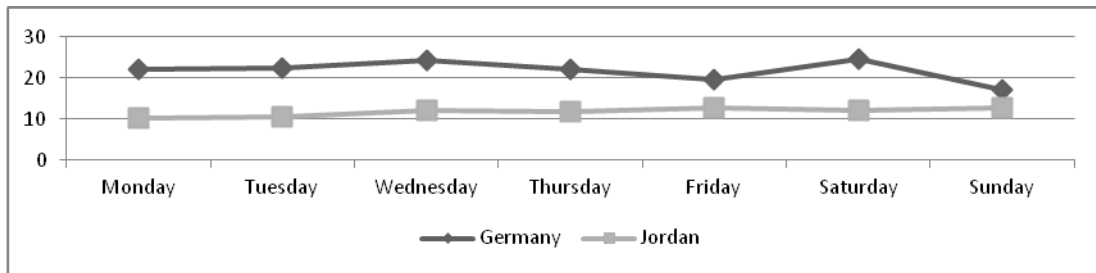


Figure 8. Average actions per visit per day of the week

Another students' preference that can be investigated using web analytics is the time they consider suitable for learning activities. Figure 9 compares the total number of visits from Germany and Jordan by local time. German students performed 56% of their visits between 08:00 AM - 05:00 PM, while 49% of the total visits from Jordan were recorded in this timeframe. Jordanian students visited the platform after midnight till early morning (16% of total visits between 12:00 AM - 07:00 AM) more than their German peers (9%).

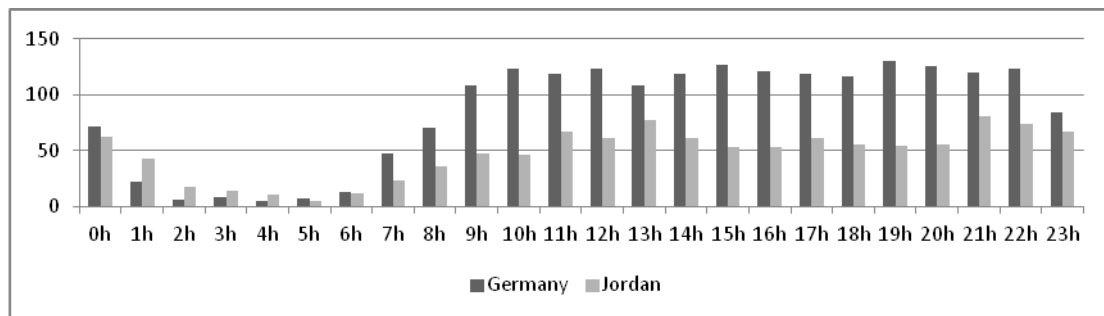


Figure 9. Total visits per local time

Figure 10 shows the normalized total number of actions conducted per time of the day and illustrates a high number of actions performed by Jordanian students between 09:00 PM – 01:00 AM (31.5%). While the highest number of actions performed by German students was at midday and between 08:00 PM - 10:00 PM. This conforms to the work situation of most Jordanian masters' students that require them to learn in the evening and at night.

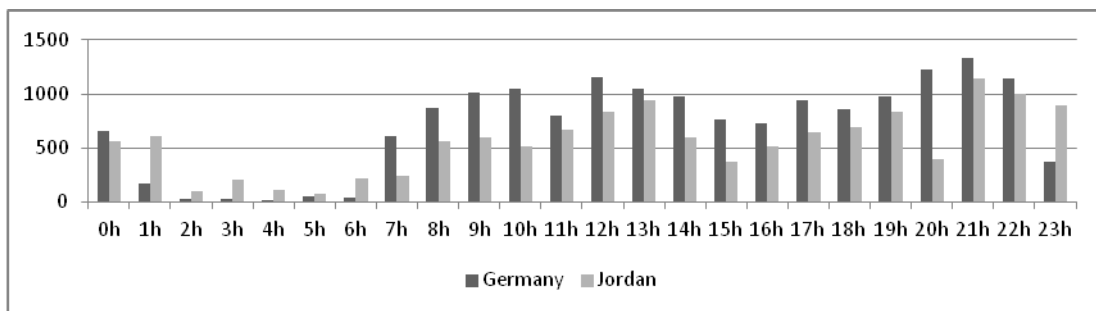


Figure 10. Normalized total actions per local time

Technical devices

Information on technical devices used by the students help to enhance the technical platform for a better browsing experience. In this case study, students from Jordan visited the learning social network from mobile devices (mostly smartphones) much more frequently (40% of total visits from Jordan) than their German peers (27% of total visits from Germany). The number of actions performed from mobile devices was lower than the number of visits in both cases (24% from Jordan and 10% from Germany). In addition to this contrast, the high proportion of total time spent on the platform from desktop and laptop computers (90% in both cases) explains that Jordanian students mainly used mobile devices to check-out recent community activity in very frequent short visits as shown previously in “students’ engagement” section.

Conclusions and future research

The aim of this case study was to understand and compare international students’ behaviour in the social learning environment to enhance their Virtual Collaborative Learning experience. The results show a variation in students’ online behaviour between Germany Jordan. While Jordanian students recorded more frequent short visits to the learning platform, German students spent more time in the social network during their visits and interacted more with the course content. However, the overall trend shows active participation from all students with daily visits and frequent actions even on weekends. It was also demonstrated, how web analytics can help collaborative course designers and instructors to follow groups’ activity and consider enhancements in the learning arrangements. While the focus here was on the overall evaluation and comparison of students’ behaviour from different countries, further studies should consider individual performance evaluation based on user profiled tracking to assess students’ achievement and learning outcomes in a narrower sense of learning analytics.

References

1. Kapucu, N., Yuldashev, F., Demiroz, F., & Arslan, T. (2010). Social Network Analysis (SNA) Applications in Evaluating MPA Classes. *Journal of Public Affairs Education*, 16(4), 541–563.
2. Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: a review of the research. *Computers in Human Behavior*, 19(3), 335–353.
3. Lehtinen, E., Hakkarainen, K., Lipponen, L., Rahikainen, M., & Muukkonen, H. (1999). *Computer supported collaborative learning: A review*. The JHGI Giesbers Reports on Education, 10.
4. McKenney, S. (2013). Designing and researching technology-enhanced learning for the zone of proximal implementation. *Research in Learning Technology*, 21(0). <http://doi.org/10.3402/rlt.v21i0.17374>

5. Olaniran, B. A. (2009). Culture, learning styles, and Web 2.0. *Interactive Learning Environments*, 17(4), 261–271.
6. Schoop, E., Bukvova, H., & Lieske, C. (2009). Blended learning arrangements for higher education in the changing knowledge society. *Proceedings of the International Conference on Current Issues in Management of Business and Society Development, Riga, University of Latvia*, 11–17.
7. Soller, A. (2001). Supporting Social Interaction in an Intelligent Collaborative Learning System. *International Journal of Artificial Intelligence in Education (IJAIED)*, 12, 40–62.
8. Tawileh, W., Bukvova, H., & Schoop, E. (2013). Virtual Collaborative Learning: Opportunities and Challenges of Web 2.0-based e-Learning Arrangements for Developing Countries. In N. A. Azab (Ed.), *Cases on Web 2.0 in Developing Countries: Studies on Implementation, Application, and Use*. Hershey, PA: IGI Global.