Leveraging Educational Blogging to Assess the Impact of Collaboration on Knowledge Creation

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***Abstract*—The landscape of education has changed drastically over the past two decades. There has been an ongoing shift from traditional classroom teaching practices to cope with the changing circumstances and requirements of today's learners. The catalysts for such advancements have been the rapid adoption and use of internet-based technologies, which have dramatically transformed both teaching and learning. One such advancement which has excellent potential to be utilized as an effective learning tool in higher education is blogs. Classroom blogging presents a unique opportunity to not only deliver a form of distance education, but also encourage collaboration and participation among learners. This study explores the potential of educational blogging in higher education as a supplement to the current pedagogical practices. More specifically, it aims to gauge from a learner's perspective the perceived benefits blogs can provide in scenarios where traditional learning practices are not feasible as a consequence of individual convenience or other forms of restriction due to pandemics, and natural disasters. This study further presents an effective design for a blog highlighting some salient features which can enhance the effectiveness of blogs for the learners followed by a discussion, which serves to highlight the several benefits of classroom blogging and presents arguments to show how the integration of this innovative tool into the curriculum can result in enhanced experiential learning, and development of soft skills.**

***Index Terms*—Collaboration, educational blogging, knowledge creation, online learning**

I. Introduction

The term "blog" originated from the term "weblog", first introduced in 1997. This was shortened by Peter Merholz to its modern-day form "blog" by breaking the word weblog into the phrase "we blog" [1]. It refers to a webpage that contains a running log of commentaries, multimedia, and hyperlinks, with modern-day incarnations containing features including the ability to provide feedback and interactions in the form of comments, follows, tags, and reactions among others [2]. A total of 120,000 new blogs are created every day worldwide, representing about 1.4 blogs every second [3]. Given the popularity of and the ease with which users interact with blogs, in addition to the fact that today's student is exposed to all sorts of digital devices in their daily life; blogs present an excellent opportunity to capitalize on student interest on the internet. Blogging provides immediate, "click-to-publish" results, while a student's work is also available immediately for peers to review or for others on the World Wide Web to comment and post feedback. Furthermore, a blog can serve as an online portfolio to showcase student work while providing the "silent student" a voice by allowing the opportunity to write on topics of interest [4]. All of these factors can be motivating for students to learn. Educators can then be encouraged to integrate technology into their classrooms. In light of the benefits that blogs can provide, it might well be assumed that educational blogging provides an alternative to the regular practices of teaching but, this study aims to argue that rather than viewing educational blogging as a standalone technological tool which is one in a list of candidates trying to compete with the pedagogical practices, they should be seen as an additional method that aims to complement the already established practice and that must be brought into appropriate alignment with particular pedagogical and disciplinary practices [5]. Educators in the current market would be wise to consider them for teaching purposes.

Classroom blogging has tremendous potential to be utilized as a tool for teaching and can play a vital role in assisting teachers in enhancing the learning experience for students by using methods that are—on the one hand—distinct from the typical pedagogy while—on the other—also maintaining an aspect of familiarity, owing to the innate quality of blogs and prominent use of social media by the target audience. Educational Blogging thus provides the unique opportunity of tapping into a student's interest in social interactions by employing the internet to offer learning opportunities. This study aims to investigate ways in which blogs can prove to be a helping aid to learners to deliberate about concepts outside of class, interact with peers to share their ideas, and better their learning. The objective of this study is to examine the benefits of blogs in educational sectors, in terms of supporting knowledge creation and collaboration; particularly on capturing the influence of blogs in increasing collaboration among participants and the role this collaboration plays in achieving learning objectives.

The subsequent sections of the study have been delineated like so. Section II provides an overview of the background and related works, highlighting some of the relevant domain-related literature while also stating what the research gaps are. These inadequacies provided direction to the research and helped narrow down the extant literature, which assisted the researchers in finding and analyzing writings within the scope of the research material present under the umbrella of educational blogging. The material so studied and the findings and the results from those studies have been presented in the methodology and review protocol in Section III. In Section IV, the design of the current study has been explained in detail along with the results. Finally, in Section V, the paper concludes with a discussion about the shortcomings and the potential for further research.

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II. Related Work

Bartlett-Bragg *et al*. [6], has in her research introduced various ways blogs can be integrated as a tool in pedagogical practices and also presented a five stage blogging process, through which it is possible to capture the interaction of a participant with technology and how that can influence knowledge creation. Although the ideas have been introduced, the research does not capture the interactions and pursues only from a theoretical standpoint how blogs as a personal journal can help an individual acquire knowledge which makes their study individual driven and does not consider the aspect of blogs in collaborative settings. Walker [7] states that creative interactions help in the creation of new knowledge and its integration with an individual's existing knowledge; this when coupled with the ideas presented by Bartlett-Bragg's research presents a compelling argument to use blogs for knowledge creation and learning.

Sawmiller *et al*. [4] conducts a study to introspect the role classroom blogging can play in scientific learning and concludes that by integrating the weblog into the classroom and incorporating electronic writing into the classroom experience, students can enhance their understanding of science and champions for the use of blogging in classroom studies.

Johnson *et al*. [8] conducts a study to compare the student satisfaction between online and face-to-face learning and reports that participants do not find any difference in the quality of the instruction and hence concludes that online instruction can be designed to be as effective as traditional face-to-face instruction. The ratings given by students suggest that the learning experience is slightly more positive in face-to-face learning, but the researchers attribute that to a personal connection between the instructor and the students, something that may not occur in an online course. These results in combination suggest that online education when utilized as a supplement to the routine pedagogical practices can result in quality education via the integration of technology even outside the classroom. The presented research helps cements the benefits of blogs in education and shows how blogs can be used effectively by an individual to present ideas, archive them and eventually lead to knowledge creation when practiced over a longer duration in conjunction with regular course work under a tightly integrated framework and regulations. The research though does little to address key issues such as the effects of feedback and collaboration and the benefits of blogs to address the issue of non-participation by giving students the freedom to work at their own pace outside of the classroom. Further, although the research suggests that technology should be used in learning, it does not present an effective blog design that can be adopted in a generalized setting.

Owing to the above-mentioned factors, the paper presents a study to find out how educational blogging can be used in conjunction with regular pedagogical practices to increase learning efficiency by utilizing collaboration and feedback. Under the purview of which the following would be investigated:

1) Role of feedback in improving interactions and improving learning among participants.
2) The effectiveness of blogs in facilitating knowledge transfer/acquisition among the members of a learning community.
3) Blogs as a means of providing learners higher chances of participation and if this plays a role in increasing their interest in learning.

As a result of the research, the study aims to create a web-blog design and showcase how the findings can be incorporated in the design to develop a well-rounded solution that is ready to adopt in a generalized setting.

III. Methodology and Review Protocol

In the following section, the methodology and review protocol taken up to conduct the literature review has been explained in detail, followed by the summary of the findings from the review under the related works section.

A. Methodology

In this study, we adopted the survey research methodology, thus we designed a survey, sets of questions to enable us gather quantitative information about the characteristics, opinions and world view of our population. We also followed best practice methods for knowledge acquisition and analysis; furthermore, scientific methodologies from other papers including the ones followed by Volk *et al*. [9] and Ching [10] have been followed. As part of the research, mostly secondary research methods including various survey papers and related academically-oriented online documentation and case studies were reviewed. Based on the information collected from the papers, a study was under-taken to understand the merit and demerits of the introduction of educational blogging and also to discover the important features that stakeholders may require when considering blogging as a tool in the current pedagogy. For this, the attributes which were commonly studied in most of the research papers were considered. These attributes have then been considered in the design of the blog, which has been developed as a part of this study.

1) Participants: Being that the main goal behind the development of our platform is educational, our participants are students. These students are currently enrolled in our database courses. We uploaded the platform on the SQLValidator [11] and sent e-mail invites to enrolled students. No restriction with respect to age group or gender or any ethnic background was imposed. The language of interaction is, however, English. The participants were urged to extensively interact with the platform. The questionnaire feedback was extracted via a Google form linked to the platform.

B. Review Protocol

This section highlights the steps taken to identify the corpus of relevant literature to proceed with the study. The first step was to come up with the relevant search phrases and keywords to narrow the search to domain-specific literature. The Keywords "Educational Blogging", "Classroom Blogging", "Knowledge Management Systems", "Knowledge Creation", "Collaborative Learning", "Blogging Practices", "Classroom Discussion", "Stu-dent Collaboration", "Benefits of Blogging" were employed. The

important step next was to identify credible sources to collect information from. For this, well-known publishers and academic-oriented databases were selected. Google Scholar, IEEE Xplorer, Elsevier, Science Direct, and the likes were used. For the selection of text, some general criteria of selection were established; they have been mentioned in Table I.

TABLE I: CRITERIA FOR SELECTION OF TEXT

Criteria	Reason
Date of publishing of the paper; typically papers after 2003: preference to papers from 2014–2021	As a general rule, it was understood that more recent research was more relevant and this was an important acceptance criterion for the selection of literature. Specifically, the research papers were chosen to start from the year 2003 owing to the increasing popularity of blogging and similar research starting in 2003.
Papers that presented research based on case studies usually for high school/university students	This paper aims to provide a general study and results which are applicable for most use case scenarios. For this, it was important to analyze results from various case studies and various scenarios to get a holistic idea.

Each keyword search generated numerous results. The papers were filtered out on the basis of the criteria. As a result of the above-mentioned, a total of 35 papers were filtered out of the corpus for the purpose of an in-depth analysis.

C. Results

The analysis provided many useful results and highlighted ways in which educational blogging can be utilized to achieve a number of objectives. There were three main themes that could be recognized, and the same have been discussed in detail here.

1) Peer review and feedback

One of the key takeaways from the case studies was that blogs show a positive effect on peer support by proving the perfect avenue for the students to communicate and engage in discussions [12]. The feedback provided by fellow learners and peer review played a vital role in supporting learning and in many cases increased the level of understanding while at the same time giving the students the chance to understand the perspective of other students and perhaps see the assignment or topic in a new light which the learner had not seen before [13]. It was found that when compared to a control group where learners were not provided feedback, those who were provided feedback acquired more knowledge and improved performance and knowledge application [14, 15]. Another benefit of peer review which was welcome was that it provided a chance for the learners to think critically about tasks, this was a direct result of the fact that reviewing is a task that requires great skill on the part of the reviewer. The feedback would not only assist the receiver to improve their work in subsequent tasks [16, 17] but also enhance the understanding of the subject for the reviewer and later can be transferred to their own work [18].

Thus, providing feedback and peer-reviewing is a practice that is common in the professional world and since blogging provides the chance for the students to engage in this practice at an early stage, more holistic benefits such as the development of a sense of responsibility, independent learning, and ownership are also achieved as a result [19]. Although many benefits of providing feedback were identified, there was no direct correlation between feedback and motivation to learning, as was concluded in the study [20].

2) Collaboration and participation

There is an abundance of research that suggests that in order to enhance learning in an online setting, there is a need for increased participation [21, 22]. As a result, it has been established that interactions both with the teachers and fellow learners are a key factor in affecting the levels of perceived learning by students. Learners who participated in collaborative or group learning were related with high or higher learning outcomes as compared to those in traditional settings [23]. The same was also concluded [24] which suggests that online participation leads to a better learning outcome.

Blogs can be a communication tool and can be used primarily as one which supports collaboration and participation [25, 26]. Their study concluded that an online learning community is a place for self-driven learning, which shows the capability to bring together communities and engage them in information sharing and learning from one another. A properly designed blog then, as a manifestation of this online learning community, can help maximize this collaboration potential while at the same time assisting the students to enhance their collaboration skills and critical thinking and achieve higher cognition and understanding [27, 28].

A very important observation was made [29], who in their research on social and online learning platforms as learning management systems concluded that students engaged more in questioning through Facebook messages directed to the instructor than asking them verbally in the face-to-face classroom. This suggests that online learning platforms can provide a chance at higher participation than in a classical setting and that if implemented properly, blogs can be used as a place where a student could engage to a greater degree and then yield the benefits of increased learning by engaging in a community of practice and transform learning into a more meaningful process [30].

Although blogs can provide a chance for enhanced participation for individuals, it was found in studies that individual participation is unevenly distributed [31], and there are large inconsistencies in the level of individual participation in learning communities [26].

Following the same, Ching and Hsu [10] suggest that the interaction between students may not happen without guidance and say Instructional designers may consider incorporating instructional strategies that promote pair or group work when designing blogging activities.

3) Enhanced learning and knowledge acquisition

The results of most of the case studies revealed that blogs can have a positive effect on knowledge construction and acquisition among the participants. In conjunction with other features of blogs, namely collaboration for content sharing and participation, blogs can represent online learning communities that can achieve the objectives of information sharing and learning especially in secondary education [27] Blogging provides the participant with an environment,

which promotes autonomous learning as well as enhances critical thinking and literacy [32]. Further, blogs support self-driven informal learning by providing the unique opportunity to engage in discussions with experts and learners alike and build ideas through supportive collaboration [26]. This was also an observation made in the study whose investigation further suggested that educational blogging is an improvement on the traditional methods of learning and helps achieve better student knowledge acquisition [33].

4) Blogs as a supplement/ alternate to traditional pedagogy

The benefits of blogging in participation and learning have been clearly documented in most of the studies as has been high-lighted above, these findings suggest a legitimate potential of blogs as a supplement to/ an alternative to traditional pedagogy in order to enhance performance.

For instance, instead of traditional presentation in classrooms setting, blogs can be used to share the information in a documented method [34].

The students would then be able to reap all the benefits of blogs, which can lead to enhanced learning and improvement of academic performance [32]. A study conducted by Nisiforou and Eteokleous [35] has shown the potential of educational blogs as an effective tool for achieving satisfactory levels of learning outcomes.

IV. Design and Development

This section highlights the details of the implemented web blog which has been developed keeping in mind the task of improving interaction and collaboration among the participants and achieving success in the eventual goal of enhanced learning outcomes for the participants. The section also presents some recommendations and constructs some user requirements based on learning from the literature survey, which should be noted for the successful adoption of blogging in a learning community.

A. Architecture

There are three main features when implementing a web-based application, these are centralization, replication, and distribution. The blogs page developed for the purpose of this study uses a centralized client-server architecture. Users interact with the blogs page via a web interface and perform actions like creation of posts, commenting, searching posts among others. These actions are complete and provide the necessary inputs to the application for processing them.

B. Recommendations, Use Cases, and System Capabilities

Black *et al*. [36] have mentioned in their research that in order to achieve enhanced learning for learners while performing assessments, it is of critical importance that the criteria on which their work will be judged be made clear, further, what the task hopes to achieve in terms of improving levels of knowledge and how exactly the same can be achieved as well should be highlighted. This leads to the recommendation, the tasks are so defined that, the objectives are clearly understandable and also objectively achievable.

Collaboration and community engagement as a feature can be utilized to help learners coordinate and communicate effectively to achieve a common goal. Interactions are thus a desirable trait when blogs are implemented; to cultivate community learning and enhance collaboration, tasks should be so designed which incorporate communication and not force them on the students as a requirement as it has already been shown through research that when so is not the case, it is unlikely that students will engage in discussions or view each other's work [10].

As blogging is ultimately an online presence and all work is present online for everyone else to view, there is still the issue of confidentiality, privacy, and general lack of confidence in students which can hinder the students from using the blog to its full extent. Students can in such cases benefit from training and guidelines on how to protect their confidentiality and protect privacy online.

As with any new technology, participants require time to understand the purpose of the technology and then become familiar with how to use the technology. This would require some training and guidance as to how to use the blogs and what are the expectations from their work, in terms of writing styles, the content length, and the like.

From a technical point of view, the above recommendations can assist in constructing user requirements:

1) Enable users to create and edit blogs.
2) Simple and intuitive interface for new users to quickly understand the system.
3) Comment feature to enable user feedback and peer review on individual tasks.
4) How to Use tutorial for new users to get hands-on training with the blog.
5) Login system to allow only select authenticated users to access the blogs.
6) Enable users to use custom usernames in their profiles if they wish to remain anonymous and hide their identity from other participants.
7) Ratings and feedback capability for tutors to direct students and help them improve their work.
8) A group discussion forum to provide learners a common space for participation and collaboration.
9) A space for an individual to gather their notes and artifacts which is available to only them and not publicly accessible.

Fig. 1 depicts the use case diagram in which are three main actors, the student owner, the student visitor, and the tutor. A participant in the form of a student or a tutor can interact with the system by performing actions that are suitable for their roles. As shown, there are many capabilities that are only role-specific, and not every actor can perform them. Based on the system of the least privileges, the student visitors can search for and view blogs authored by student authors, they can also add and manage their comments; they can also download posts for reading later and sharing offline, The student owners in addition to the capabilities of student visitors can also create and edit the post. A tutor has higher privileges and can manage all the posts and comments on the system; further, he/she/they can provide ratings and feedback individually as well as globally on all posts.

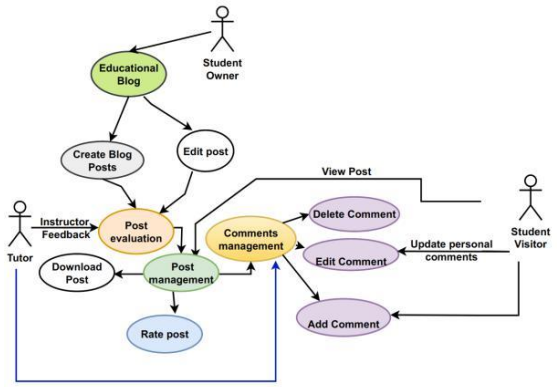

Fig. 1. Use case diagram.

C. Results and Discussion

The blogging system as a part of this study once developed was presented to participants, students enrolled in our faculty courses, to interact with and provide feedback. They were given a time window of two weeks to test the system completely and revisit the system as often as they are pleased to mimic regular use. The participants were given no prior training, they were however given a brief textual description of what the system was and why it was being implemented. User feedback was the primary evaluation tool used to understand the perceived effectiveness of the system. For the collection, the feedback form was integrated into the blogging system to make it easier for the users to revisit any sections of the blogs and fill the form directly when they felt fit to answer. The questions in the feedback form were developed to collect responses for questions on various aspects including general design and overall working of the system, ease of use. There were many targeted questions, which helped collect responses on topics essential for answering the research questions present in Section II of this study. The questions provided response options to most questions on a 5 point Likert scale (1= strongly disagree, 5 = strongly agree), (a few questions provided options in a 3 points scale). The Likert scale has been chosen as the study aimed to assess the general feeling of the participants towards the system, and the questions had more to do with user sentiments and how they felt the system was and could be useful. Since the Likert scale provides ordinal data, the analysis can be done in such a manner which highlights the trend of general positive or negative attitude and as such mathematical averages and calculation of a score based on the distance between points as no meaning [37].

D. Evaluation

A total of 46 participants provided responses to the feedback form. The feedback was then analyzed, and the findings have been presented here.

It can be generally acknowledged that if a system is captivating, it would lead to greater interactions and more time spent interacting with the system. Fig. 2 shows the duration spent by users during a 45 minutes session. Out of the 46 respondents, 41.3% people spent approximately minutes on the blogs, of these 41.3%, 28.3% spent approximately 10 minutes, and 13% spent approximately 5 minutes on the system. A further 30.4% spent approximately 20 minutes while 28.3% spent more than 20 minutes, indicating that the platform is engaging.

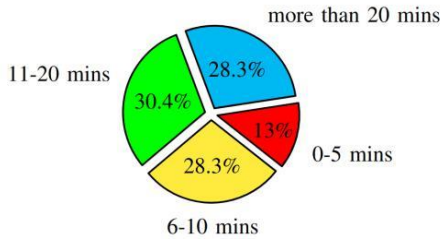

Fig. 2. Time spent on blogging system.

On questions related to ease of use and complexity of the design of the blog, Fig. 3, the participants portrayed a positive attitude. 87% respondents indicated that they found the blogging system easy to use and that most people according to them would be able to understand how to use the blogging system very quickly. Furthermore, when asked to rate the complexity of the system and if they believed the system was well-designed, Fig. 4, almost 70% of the participants indicated that they experienced no difficulty using the platform. This was an important result, since it had been identified from the literature review that unnecessarily complex systems can deter the users from actually engaging with the system [38]. This result also meant that users understood how to use the system and therefore actually engaged with the system as was intended and did not have to spend all their time only trying to figure out how to use the intended functionalities. The effectiveness of the blog in capturing the attention of the participants was also evident from the fact that an overwhelming 87% responded that they found the blog informative and captivating to read. On questions pertaining to knowledge discovery and understanding, a total of 94% participants were positive in their response when asked if the blogging application helped them discover new topics during their engagement on the blog Fig. 5. Furthermore, 98% participants responded positively when asked if they believe that participants will get motivated to conduct further research once they were introduced to them. Also a total of 89% indicated that the blog system helped them acquire new perspectives on the topics being discussed Fig. 5. On being asked if they believe commenting was a useful method to participate in the discussion, 85% responded positively, while 15% was neutral.

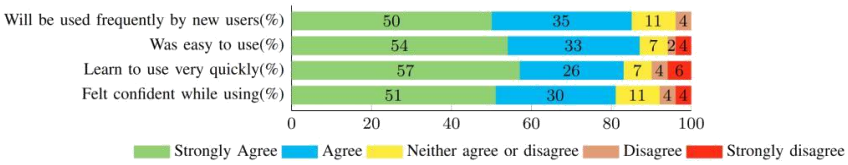

Fig. 3. Item 11, team project questionnaire.

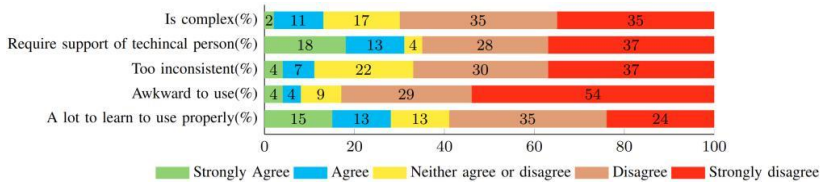

Fig. 4. Difficulty of use.

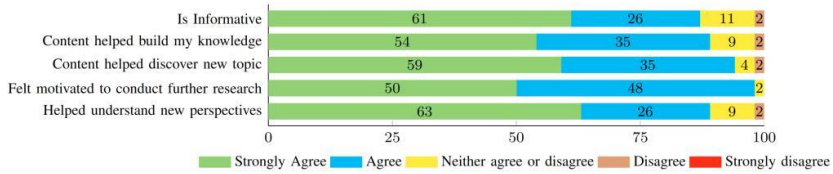

Fig. 5. Increase in knowledge.

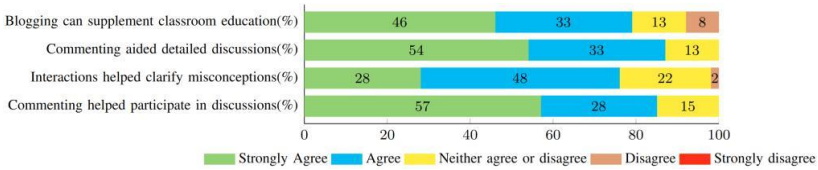

Fig. 6. Participation through comments.

This question had no negative response Fig. 6. This was an important result, as it had been previously discovered that reading comments and blogs can also help participants feel engaged in a conversation and discussions, and the same was confirmed by the participants in this study. These results go on to confirm what was discovered from the literature survey that participants can benefit a great deal from feedback and peer reviews in improving their knowledge, as well as seeing new perspectives because of what others have said/or blogged themselves. One of the questions in Fig. 6 the users asked if they believe blogging could go on to supplement classroom education of which, 79% responded positively while 13% participants expressed a neutral response. Interpreting this observation is challenging, given that this the first study we conducted towards evaluating the impact of blogs in a teamwork context. But what can be said is that there is an overall positive sentiment towards using newer methods to study and although there is some aversion, that is to be expected given the general lack of understanding of the concept and resistance to change from the accustomed. Finally, participants were also asked some questions like the usefulness of votes and rating, downloading option, a specific search which are related to the usability of features. A good number of the participants found the features to be useful. Moreover, the overall experience of using the blog was also uniformly given as positive, which strengthens the objective of utilizing blogging for knowledge creation.

V. Conclusion and Future Work

As was highlighted at the beginning of this study, the landscape of education is changing. Thus, the need for hybrid learning methods for education purposes. It is not enough to find methods that are supplementary to the traditional pedagogy, what is also necessary is to make certain that any such alternative provides a similar learning outcome as is achieved in a traditional classroom setting. From the result of the findings which have been summarized in this research, it can be concluded that educational blogging presents itself as a suitable candidate to achieve this result. When planned and executed properly, educational blogging has the potential to be seen as a great tool for achieving satisfactory learning outcomes and also improving collaboration and participation. For the future works, we plan to integrate a personalized exercise task system for our collaborative programming projects. We also plan to integrate a lecture hub for the elicitation of students learning activity provenance.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Victor conceived the study. He also designed and implemented the platform. Dr. David Broneske directly supervised the work. Furthermore, Victor wrote the manuscript while Dr. David Broneske corrected and edited it. Prof Gunter Saake is responsible for funding the research and general supervision. All authors discussed the results and implications and commented on the manuscript at all stages.

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References

[1] T. Mortensen and J. Walker, “Blogging thoughts: personal publication as an online research tool,” 2002.

[2] K. Armstrong and O. Retterer, “Blogging as l2 writing: A case study,” *AACE Review (formerly AACE Journal)*, vol. 16, no. 3, pp. 233–251, 2008.

[3] G. Thevenot, “Blogging as a social media,” *Tourism and Hospitality Research*, vol. 7, no. 3-4, pp. 287–289, 2007.

[4] A. Sawmiller, “Classroom blogging: What is the role in science learning?” *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, vol. 83, no. 2, pp. 44–48, 2010.

[5] M. O’Donnell, “Blogging as pedagogic practice: artefact and ecology,” Asia Pacific Media Educator, vol. 17, no. 3, pp. 5–19, 2006. [Online]. Available: http://ro.uow.edu.au/apme

[6] A. Bartlett-Bragg, "Blogging to learn," *The Knowledge Tree*, vol. 4, pp. 1–12, 2003.

[7] D. Walker, "Writing and reflection," *Reflection: Turning Experience into Learning*, pp. 52–68, 1985.

[8] S. D. Johnson, S. R. Aragon, and N. Shaik, "Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments," *Journal of Interactive Learning Research*, vol. 11, no. 1, pp. 29–49, 2000.

[9] M. Volk, S. Bosse, and K. Turowski, "Providing clarity on big data tech-nologies: A structured literature review," in *Proc. 2017 IEEE 19th Conference on Business Informatics (CBI)*, vol. 1, 2017, pp. 388–397.

[10] Y.-H. Ching and Y.-C. Hsu, "Blogging in higher education: Issues, challenges, and design considerations," *Association for Educational Com-munications and Technology*, vol. 33, pp. 55–61, 2010.

[11] V. Obionwu, D. Broneske, A. Hawlitschek, V. Köppen, and G. Saake, "Sqlvalidator–an online student playground to learn sql," *Datenbank-Spektrum*, vol. 21, no. 2, pp. 73–81, 2021.

[12] Y. Chang and Y. Chang, "Assessing peer support and usability of blogging in hybrid learning environments," *Interactive Learning Environments*, vol. 22, no. 1, pp. 3–17, 2014.

[13] R. Al-Jarf *et al*., "Blogging about the covid-19 pandemic in efl writing courses," *Journal of Learning and Development Studies*, vol. 2, no. 1, pp. 01–08, 2022.

[14] L. M. Given, H. Partridge, and K. Howard, "Supporting collaborative research in information science: The radar program as a model for academic-practitioner team engagement," *Library & Information Science Research*, vol. 44, no. 2, p. 101152, 2022.

[15] V. Obionwu, A. Nürnberger, A. Hawlitschek, and G. Saake, "Learner centered network models: A survey," *International Journal on Integrating Technology in Education*, vol. 11, pp. 71–90, 06 2022.

[16] C. Moore and S. Teather, "Engaging students in peer review: Feedback as learning," *Issues in Educational Research*, vol. 23, no. 2, pp. 196–211, 2013.

[17] V. Obionwu, V. Toulouse, D. Broneske, and G. Saake, "Slide-recommendation system: A strategy for integrating instructional feedback into online exercise sessions," in *Proc. the 11th International Conference on Data Science, Technology and Applications*, pp. 542–549, 2022.

[18] A. Affandi and F. H. S. Sally, "Exploring the possibility of blogging to be normalized as an integral part of everyday teaching practice," *JTechLP: Journal of Technology in Language Pedagogy*, vol. 1, no. 2, pp. 185–201.

[19] K. Väyrynen, S. Lutovac, and R. Kaasila, "Reflection on peer reviewing as a pedagogical tool in higher education," *Active Learning in Higher Education*, 2022.

[20] N. Trewick, D. L. Neumann, and K. Hamilton, "Effect of affective feedback and competitiveness on performance and the psychological experience of exercise within a virtual reality environment," *PloS One*, vol. 17, no. 6, e0268460, 2022.

[21] V. Obionwu, D. Broneske, and G. Saake, "A collaborative learning environment using blogs in a learning management system," *European Alliance for Innovation Conference on Computer Science and Education in Computer Science*, 2022.

[22] H.-Y. Hong and Y.-H. Lee, "Computer-supported knowledge building to enhance reading motivation and comprehension," *British Journal of Educational Technology*, 2022.

[23] V. Obionwu, D. Broneske, and G. Saake, "Topic maps as a tool for facil-itating collaborative work pedagogy in knowledge management systems," *International Journal of Knowledge Engineering*, 2022.

[24] J. Chen, J. Tan, and J. Lei, "Exploring learner identity in the blended learning context: A case study of collaborative writing," *System*, 102841, 2022.

[25] N. Michailidis, E. Kapravelos, and T. Tsiatsos, "Examining the effect of interaction analysis on supporting students' motivation and learning strate-gies in online blog-based secondary education programming courses," *Interactive Learning Environments*, vol. 30, no. 4, pp. 665–676, 2022.

[26] H. J. Teo, A. Johri, and V. Lohani, "Analytics and patterns of knowledge creation: Experts at work in an online engineering community," *Computers & Education*, vol. 112, pp. 18–36, 2017.

[27] S. Angelaina and A. Jimoyiannis, "Analysing students' engagement and learning presence in an educational blog community," *Educational Media International*, vol. 49, no. 3, pp. 183–200, 2012.

[28] K. Pradeepa and N. Hema, "Enhancement of learning outcomes through blogging," *ECS Transactions*, vol. 107, no. 1, p. 9043, 2022.

[29] A. E. E. Sobaih, I. A. Palla, and A. Baquee, "Social media use in e-learning amid covid 19 pandemic: Indian students' perspective," *International Journal of Environmental Research and Public Health*, vol. 19, no. 9, p. 5380, 2022.

[30] A. Jimoyiannis and P. Tsiotakis, "Beyond students' perceptions: investi-gating learning presence in an educational blogging community," *Journal of Applied Research in Higher Education*, 2017.

[31] C. Lampe, R. Wash, A. Velasquez, and E. Ozkaya, "Motivations to par-ticipate in online communities," in *Proc. the SIGCHI conference on Human factors in computing systems*, 2010, pp. 1927–1936.

[32] S. F. E. S. A. Fattah, "The effectiveness of using blogs as an independent learning tool to develop reading skills for university students," *Journal of Education and Practice*, vol. 7, no. 32, pp. 65–73, 2016.

[33] A. M. A. Al Yateem and S. Alsayadi, "Designing educational blogs effect on the student's knowledge acquisition in the secondary stage: Case study of ksa schools," *Procedia Computer Science*, vol. 65, pp. 519–528, 2015.

[34] K. N. Cooke, "A study of an educational blogging environment in the context of the ARCS model of motivation," University of Virginia, 2008.

[35] E. Nisiforou and N. Eteokleous, "Defining evaluation criteria in blogging and non blogging: A case study from a pedagogical perspective," in *Proc. 7th International Technology, Education and Development Conference (INTED)*, Valencia, Spain, 2013.

[36] P. Black and D. Wiliam, "Assessment and classroom learning," *Assessment in Education: Principles, Policy & Practice*, vol. 5, no. 1, pp. 7–74, 1998.

[37] Analysing likert scale/type data. [Online]. Available: https://www.st-andrews.ac.uk/media/ceed/students/mathssupport/Likert.pdf

[38] N. Zanjani, "The important elements of lms design that affect user engagement with e-learning tools within lmss in the higher education sector," *Australasian Journal of Educational Technology*, vol. 33, no. 1, 2017.

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