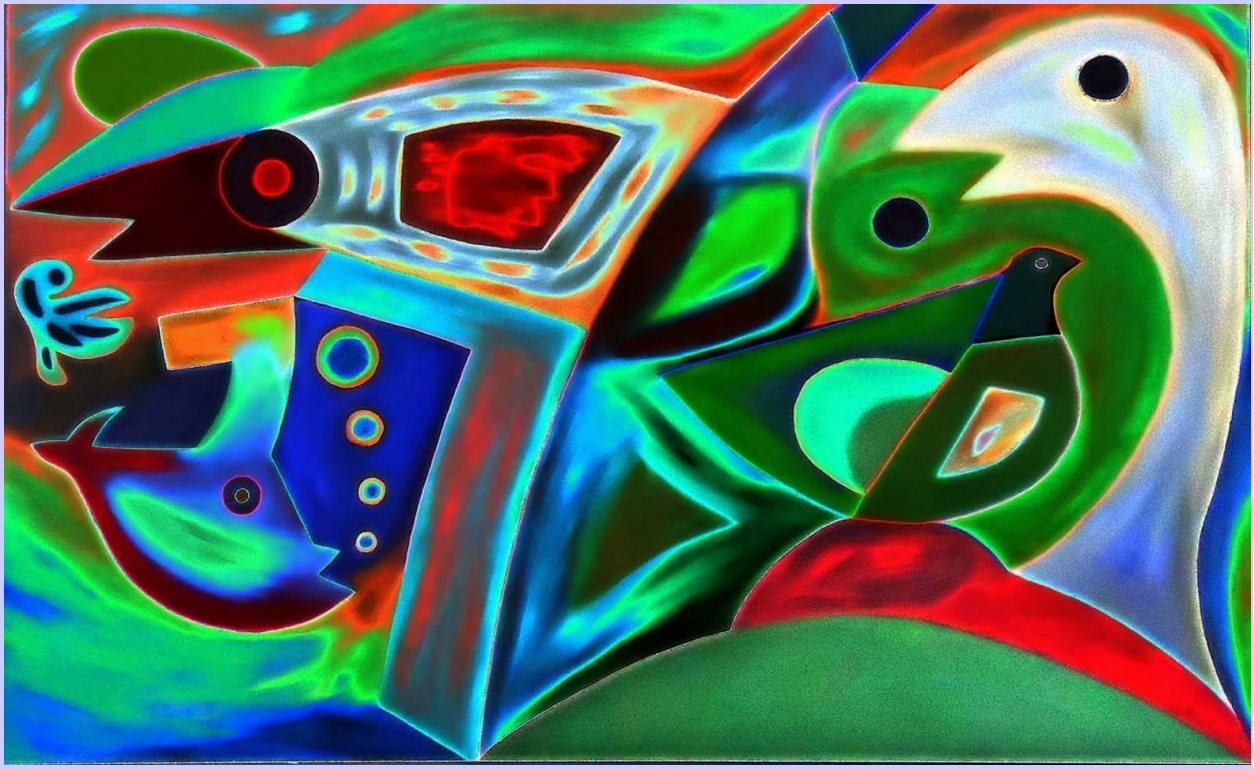
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Social Computing for Collaborative Learning in Higher Education

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Abstract. This study aims to investigate the use of the specific social computing tool (Wiki) for collaborative learning, and study students' perceptions in higher education. The participants of the study were a higher education student cohort in Bahrain. The data was collected through questionnaire and interviews. To demonstrate the intricacy of the investigation topic, a mixed methods data collection method was employed. Wiki as a social computing tool significantly enhances student collaboration, according to the preliminary questionnaire results and interviews with selected respondents. As a social computing tool, a Wiki has the potential to play a significant role in the future of learning settings, according to the study's findings.

Keywords: Social computing, Wiki, collaboration, social media.

1. Introduction

The interactive and social components of internet activities are defined as social computing. Using a computer for social purposes is known as social computing. The Web 2.0 notion refers to the technological architecture for applications that support its practices, which is closely related to the concept of social computing. [1–4]. A broad category of online technologies (platforms and applications) that encourage user interaction, communication, collaboration, and data sharing are collectively referred to as social computing. [1], [4].

Web services that are simple for users to use that allow for the reading, creation, sharing, and recommendation of content are included in social computing. [2]. Social computing suggests the freedom to access all types of information and transform the user from reader to content creator. Social media such as wikis, Blogs, microblogging, RSS, and instant messaging, are just a few examples of social computing [1].

Wiki advances and facilitates online collaboration and provides more possibilities for engagement between students, knowledge generation, and cooperation [5], [6]. It can be argued that using a Wiki in education is important; however, the appropriate pedagogy should be taken into account, together with careful planning and consideration. [6], [7].

Likewise, studies on the potential on students' perceptions on the use of a Wiki for collaborative learning in education were explored [8]–[12]. However, there is a need for further research on students' perceptions on the use Wiki as a collaborative social computing learning in higher education [7], [13]. This study aims to investigate the use of the specific social tool (Wiki) for collaborative learning, and study students' perceptions in higher education institution in Bahrain.

What follow is the section two where the literature review of the study is presented. Section three represents the data and methodology of the research including the qualitative and quantitative methods. In section four the results of the

study are presented and in the last section a brief discussion of the results, and recommendations, future work and concluding of the study are highlighted.

2. Literature Review

The academic world has been introduced the importance of social computing tools in education. The rapid growth of social computing use in our daily lives, has resulted in higher education institutions' warm reception of social computing [1]–[4].

Social computing is beneficial for different cooperative or collaborative purposes, such as planning work and enabling real-time learners' interactions [1], [2]. Social computing such as Wikis, is another example of social media commonly used in education for collaborative learning [1]. Leuf and Cunningham first launched the Wiki in 1995. It was developed as a collaborative Internet tool [14].

A wiki is a website where users can simply and collaboratively create and amend pages [6], [13]. A well-known example of a Wikis is Wikipedia [15]. Wikis are useful tools for collaborative learning, writing, knowledge generation, and management, especially in higher education contexts, according to studies. [6], [10], [13], [16]–[19]. The responsibilities and actions of users and, concurrently, the distribution of work among group members form a pattern that develops through time and with repeated use of Wiki [5], [10].

On the other hand, the literature, which emphasized that students do not always learn more efficiently when using the Wiki alone and without appropriate direction, corroborated this claim. Instead, there should be a balance between face-to-face events and using a Wiki [5], [10], [19]. A significant difference was observed in the perception and reception of the Wiki among the students, even though it was assumed that using Wiki would promote critical thinking among students. [5], [19], [20].

3. Data and Methodology

To demonstrate the intricacy of the investigation topic, a mixed methods data collection method was employed. [21]. The students' perceptions on using Wiki for collaborative learning was gathered through a questionnaire and interviews.

Dokuwiki was chosen because it offered a wide range of features, such as integrating and utilizing other social computing tools, user authentication, tracking contributions, and version control [22]. Fig. 1 shows the default Dokuwiki interface.

A Dokuwiki is an open-source Wiki that simplifies independent Wikis' construction and subsequent development and the hosting of the Wiki was done on a personal server. In the study, students were offered brief introduction on how to use Wiki and work collaboratively in their projects, included basic exercises related to the course content, for example, writing, editing, proofreading content, raising questions, and replying in the form of discussion.

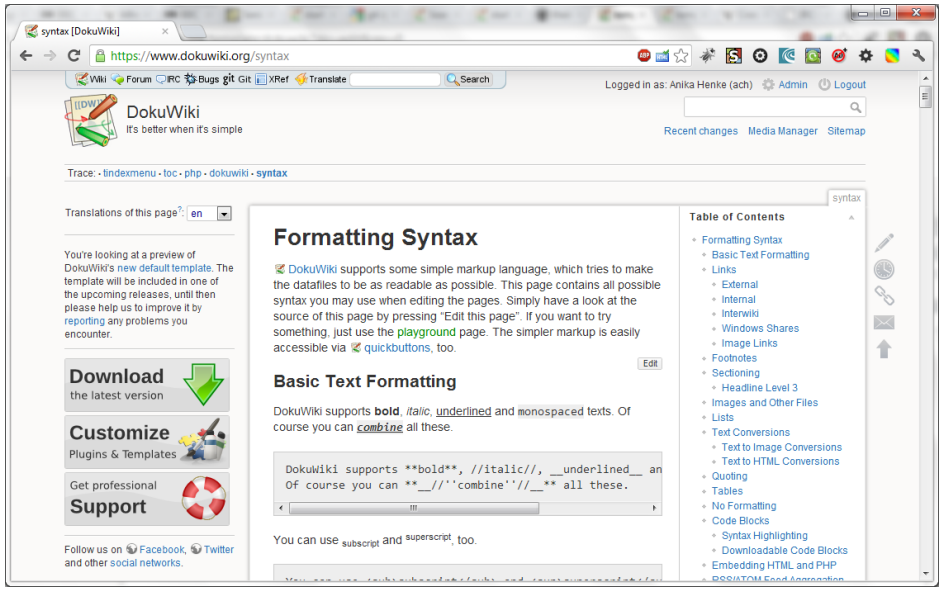


Fig. 1. The default Dokuwiki interface (adapted from Dokuwiki [22]).

It is worth mentioning that only registered users could edit the Wiki course; this way, the aim was to prevent vandalism and track the use of the Wiki. Fig. 2 shows the course Dokuwiki collaborative project website.

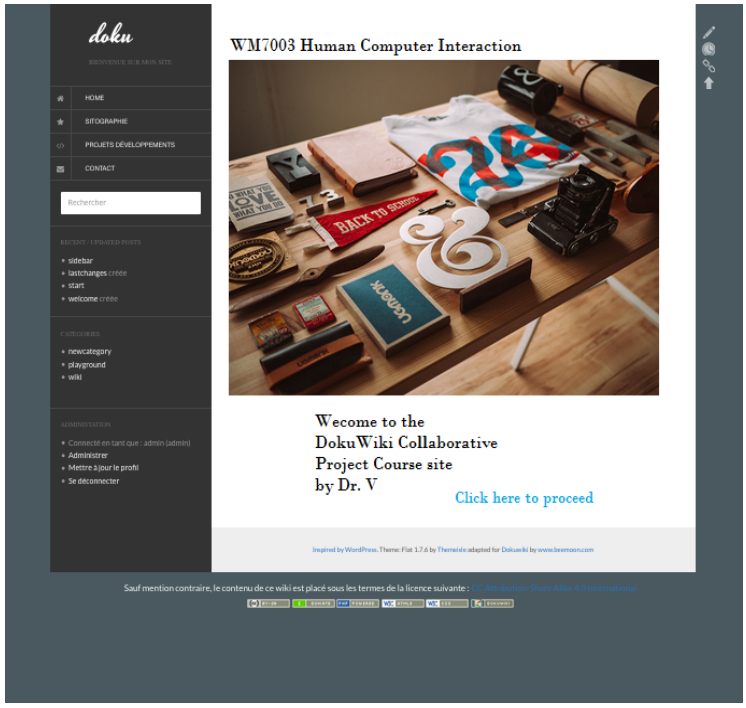


Fig.2. The course Dokuwiki collaborative project website.

Moreover, students were assigned to work in small groups to research and share information on the assigned topic. This promoted student collaboration using the Wiki as a learning environment, where the students used the Wiki to support a mutual understanding of the subject. The Wiki provided a learning environment for students to collaboratively store, organize, display, post, revise, edit content and respond to each other's questions.

The dataset n= 40, 34 females (85%) and 6 males (15%) consisted of undergraduate students studying in a higher education institution in Bahrain.

Students' perceptions of utilizing Wiki for collaborative learning were obtained using a questionnaire and interviews with the chosen participants at the end of the study in line with the prior experiment by Alexakis et al.[5]. The questionnaire was assessed using Likert scale [21] and aimed to gather the students' perceptions on using Wiki for collaborative learning as represented in Table 1.

Table 1. Students' perceptions of using Wiki for collaborative learning

	Questionnaire (adapted from Alexakis et al. [5])
Q1	I feel comfortable writing comments on other students' pages.
Q2	I am worried that other students might dislike my comments on their work.
Q3	I feel encouraged to interact with other learners on the Wiki.
Q4	I can get to know my fellow students through the Wiki.
Q5	I feel that there is too much course information on the Wiki.
Q6	I often participate in discussions on the Wiki.
Q7	I have received valuable comments from tutors.
Q8	Other students' comments on my wiki pages have helped me improve my work.
Q9	I find it more efficient to interact with each other via the Wiki than face-to-face.
Q10	I have learned more about my research project from fellow students via the Wiki than via face-to-face collaboration.
Q11	I am now confident in giving and receiving feedback to/from other students.
Q12	Overall, the Wiki has helped promote my initiative to learn independently.

A quantitative survey followed by qualitative interviews. To better grasp the subject under examination, a link between the two methodologies was conducted [21]. The interviewees were chosen at random among the students to participate in the interviews. During the interview, students were free to express their opinions and give explanations of the key elements in the themes. Two stages of data analysis for the interviews were completed. Transcript analysis demands for a scientific mind and thorough familiarity with the text [23]. Stage one involved creating transcripts, identifying themes, concepts, and events, and then coding them to extract information on particular subjects [24]. In order to code the themes, the researcher had to interact with the data and comprehend all of its implications and insights. The context was described in the second phase using the data, and its relationship to the study topics was explained [24], [25].

The interviews were conducted towards the conclusion of the course to allow the researchers to get information about the study subjects without being restricted by the questions. The interviews provide insight into how the participants felt about utilizing the course Wiki.

The nature of the research was clearly explained at the outset of the interview. The assurance that all information will be maintained confidentially was made to the participants before asking for their official consent to proceed ahead.The process of classifying, contrasting, weighing, and combining interview data involves extracting meaning and consequences, seeing patterns, or combining event details to form coherent narratives [25]. In order to cross-reference important identity development and imprint topics, each informant's interview was audio recorded and then transcribed.

4. Results

The questionnaire used a set of questions as listed in Table 1, with the findings shown in Figures 3, 4, 5 and 6. Each point on the x-axis of the figure corresponds to a question in the table.

More specifically, students felt comfortable writing comments on other students' pages (Q1) with a higher frequency of "agree" with 48% followed by "not sure" with 22%. They were not worried about other students disliking their work (Q2) with higher frequency "not sure" 37% followed by "agree" with 26%. They felt encouraged to interact with each other using the Wiki (Q3), with most of the answers stating "agree" and "strongly agree" with the higher frequency 43% and 28% respectively, as shown in Fig. 3.

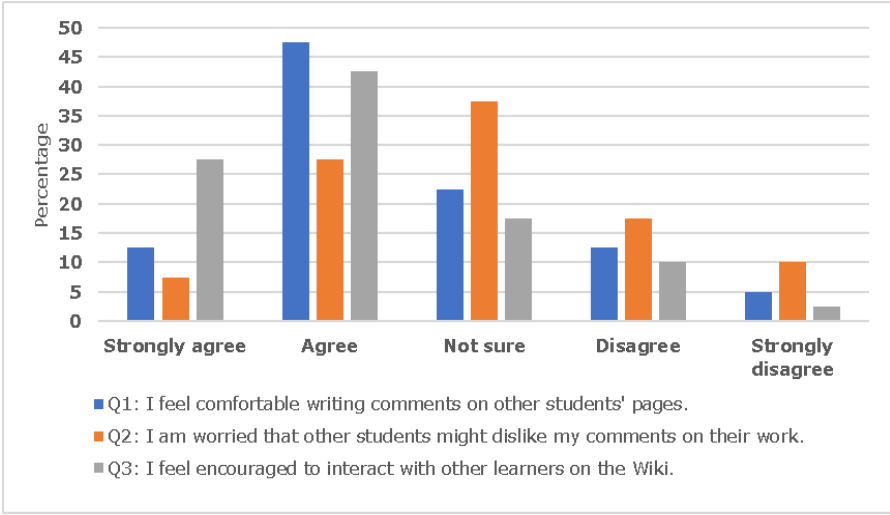


Fig. 3. Students' responses on Q1, Q2 and Q3.

As shown in Fig. 4, students mentioned that they were able to get to know fellow students through the Wiki (Q4), with most of the responses mentioning "not sure" with 37%, followed with "agree" and "strongly agree" with 30% and 17% respectively. Moreover, from the responses, students "agree" that there is too much course information on the Wiki (Q5) with the highest frequency 45% and "strongly agree" 30%. For the (Q6) I often participate in the discussion on the Wiki, student

replied with the higher frequency "agree" with 45% following by "strongly agree" 22%.

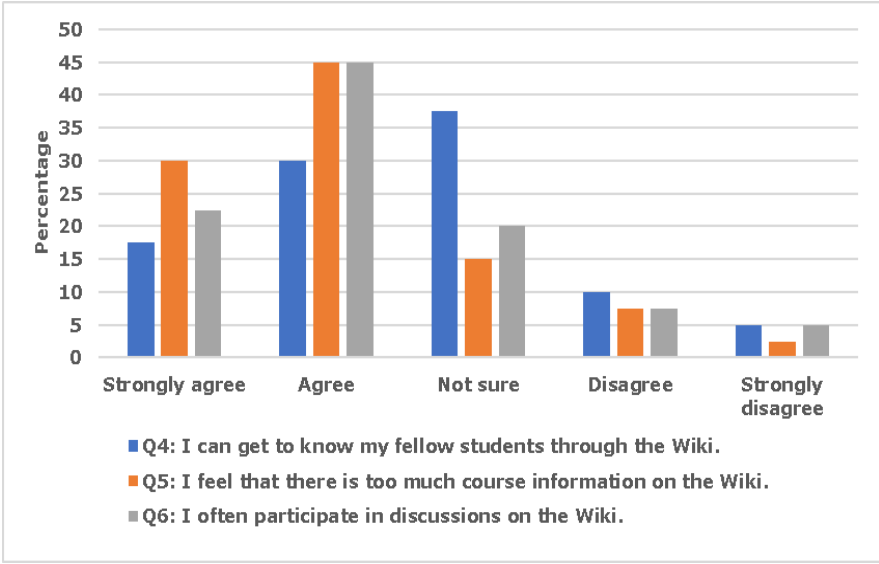


Fig. 4. Students' responses on Q4, Q5 and Q6.

Furthermore, students mentioned that they had received valuable comments from tutors (Q7) "agree" 55% with the higher frequency and 30% "completely agree". Students "agree" with 52% and "strongly agree" that other students' comments on the Wiki have helped them improve their work (Q8). Student replied on (Q9) that they found more efficient to interact with each other via the Wiki than face-to-face, with the higher frequency 51% "agree" and 20% "completely agree", as shown in Figure 5.

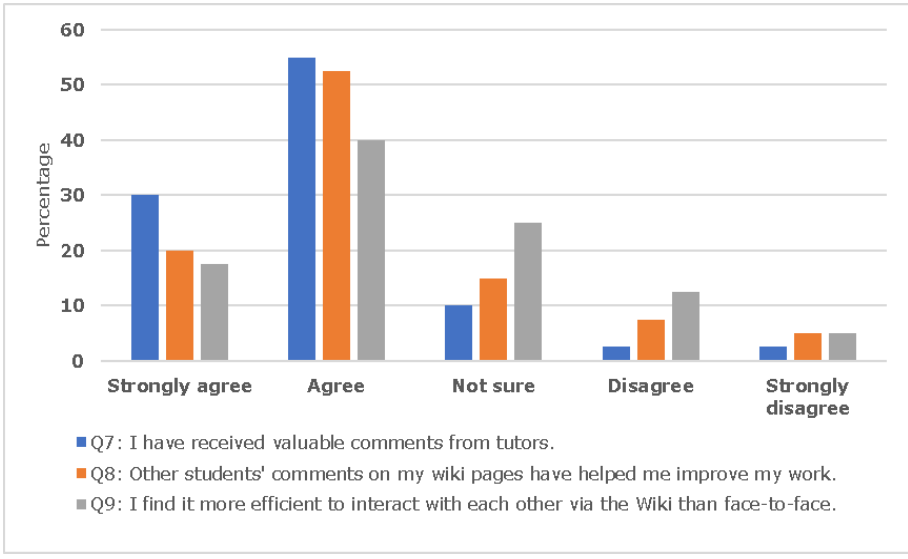


Fig. 5. Students' responses on Q7, Q8 and Q9.

As shown in Fig. 6, students "agree" with 37% the highest frequency, followed by "not sure" with 28% that they learned more about the research project from fellow students via the Wiki rather than face-to-face collaboration (Q10). The student felt confident in giving and receiving feedback to/from other students (Q11) with "agree" to be the highest frequency 40% and 38% to be "strongly agree". Overall, the students stated that the Wiki had helped them to learn independently (Q12), with "agree" and "strongly agree" having the higher frequency, 40% and 35% respectively.

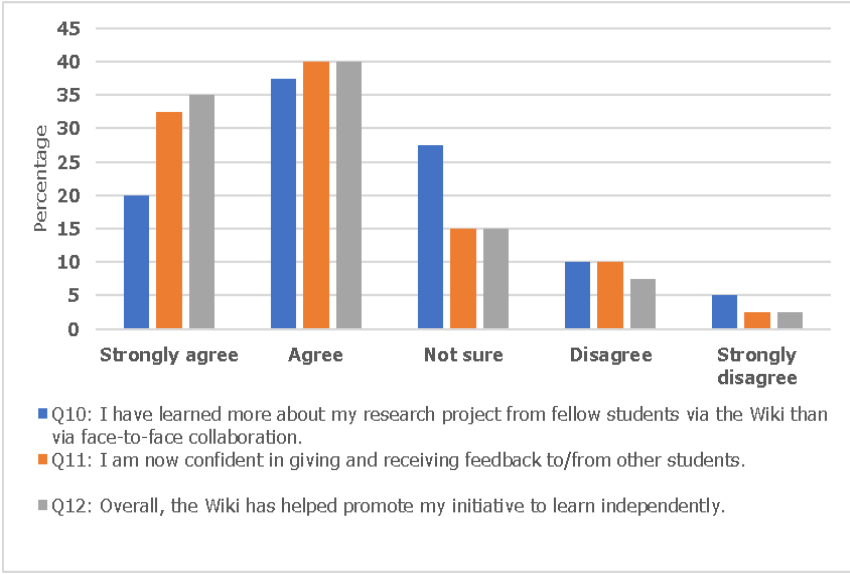


Fig. 6. Students' responses on Q10, Q11 and Q12.

As mentioned earlier, interviews with selected participants were carried out at the end of the course. Following are the topics and key insights related to the research that emerged from the interviews and were subsequently probed and questioned by the researcher.

4.1. Collaboration and feedback

In many cases students faced several problems using the Wiki. A typical reflection of that was mentioned by students "Wiki might be a bit complicated, maybe it would encourage us students more if it was a bit easier to use." and "Perhaps an easier interface to work with... seeing as I found it difficult to try and structure our Wiki page or perhaps customize it the way we wanted". The above comments suggested that probably the study could use a social computing tool with simple interface maybe a blog, however considering the fact that the emphasis of the experiment was on collaborative authoring the choice of the Wiki concept seemed more logical. Woking collaboratively on the same task is always difficult for students even in traditional settings, students found really difficult to collaboratively work on the Wiki and this was mentioned in their feedback "I didn't like the Wiki, even though I know the purpose of using it this semester however, it didn't help us that much as a group". It can be argued that using a new tool added a certain difficulty to the teamwork process.

Some students stated that they received useful feedback from peers in Wiki and stated, "I have learnt more on my research project from other students". Students also expressed that one while using the Wikis was a positive experience, not

all of the students were able to adjust to the tool stating: "I believe it is useful, however the students don't use it effectively which limit its good features". It is worth mentioning that most of the students stated that using the Wiki added to the difficulty of the course, mainly because in the beginning even for simple task in the Wiki they had to spend some time to figure out how to proceed.

4.2. Motivation

The majority of students stated that the Wiki help them and contributed to the teamwork projects. Some of the student found motivation in from the simple fact that they were introduced to a new tool that could possible improve their performance and thus stated "To me learning a new tool to improve my learning proceed seems fantastic", "becoming familiar with Wiki form the course, now I know how to contribute to Wikipedia, this is great". A big cohort of students stated that "I wish we had more time to practice suing the Wiki" that seems to be representative for the learning curve of the Wiki.

4.3. Privacy and technical issues

A significant concern for the students was privacy, raised during the interviews by some students. They stated: "Wiki has less privacy.", "I do not feel confident with the privacy setting in the Wiki." From the discussion, it was observed that this was mainly related to the fact that students were embarrassed or afraid of making mistakes. The issue was rectified using Wiki's anonymity feature, using usernames.

Many technical problems, frequently encountered with many online tools, were reported by students using the Wiki software platform. Some of the problems were focused on the functionality of the Wiki, stating, "It is not user friendly," "not interactive design, a bad design.", "hard to navigate." It can be argued that these mentioned problems are expected to be solved as part of the evolution of Wiki hosting sites.

4.4. Positive and Negative Reception

As part of the negative reception points, students mentioned that: "Using Wiki is collaborative work, and without team synchronization, it is tough to get things done properly". Some students also did not use the Wiki, stating, "I did not use it", and "I do not think the Wiki is useful". On the other hand, as part of the positive reception part, students mentioned that they appreciate the purpose of using the Wiki, stating, "Having the slides in the Wiki, being able to view my team's progress, receive comments, have learning resources. All these will help me in my learning experience", "It helped me to view the work that my team did and how far we reached with our group work as well as sharing my work on the Wiki for others to view".

5. Conclusions

This study investigated the use of the specific social tool (Wiki) for collaborative learning, and study students' perceptions in higher education institution in Bahrain. To demonstrate the intricacy of the investigation topic, a mixed methods data collection method was employed. [21]. The students' perceptions on using Wiki was gathered through questionnaire and interviews. Wiki as a social computing tool significantly enhances student collaboration, according to the preliminary questionnaire results and interviews with selected respondents.

According to studies, Wiki cannot be successfully used without the necessary prior training, thought and consideration, and planning along with the appropriate

pedagogy. [5], [7], [26]. In particular, this was the experience running the experiment; despite the fact that the students were supposed to get prior guidance and ongoing support during the semester, the quality of their work was frequently compromised by their insufficient skill set.

The literature, which emphasized that students do not always learn more efficiently when using the Wiki alone and without appropriate direction, corroborated this claim. Instead, there should be a balance between face-to-face events and using a Wiki [5], [10], [19].

A significant difference was observed in the perception and reception of the Wiki among the students, even though it was assumed that using Wiki would promote critical thinking among students. [5], [19], [20]. Some students were less keen to use the Wiki,while indications of technophobia were noticed, which explain the elements of unfavorable reception reported.

Cross-sectional research was used in this study to gather data at a specified time, and the decision to use this method was justifiable given the length of time required to conduct the investigation, which was the duration of the course. Future longitudinal studies focusing on various target populations and exploring how students perceive the use of social computing for collaborative learning in various contexts and nations can also widen the area of future research.

The study's findings clearly reveal that Wiki, in particular, can facilitate collaborative learning with social computing. According to the study's findings, Wikis have the potential to be effective social computing tools in the development of learning environments.

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Aims and Objectives

Published online by Institute of Certified Specialists twice a year, **Journal of Digital Art & Humanities (JDAH)** is an international peer-reviewed journal which **aims** at the latest ideas, innovations, trends, experiences and concerns in the field of the digital arts & humanities. JDAH bridges humanitarian, artistic, and scientific disciplines, allowing author(s) to express the views on the subjects studied using modern digital/information technology. It is a nexus for information exchange among academia and industry addressing theory, criticism, and practice. The effective dissemination of original ideas/results generated by the human brain and presented/reflected in articles created using modern information/digital technology is **the main objective of JDAH**.

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