Online Collaboration and Self-Regulated Learning in Online Learning Environment

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Abstract

This intervention study explored the development of self-regulated learning skills in virtual university students, focusing specifically on an online collaborative group project with a wiki. Participants of the study were male and female students (n=28) on a Master of Business Management (MBA) Programme of the university. Students participated in an online collaborative group project though wiki for 10 weeks during one semester. Students' self-regulated learning (SRL) skills were assessed through MSLQ (Motivated Strategies for Learning Questionnaire), developed by Pintrich, Smith, Garcia, & McKeachie (1993). MSLQ was utilised as pre- and post-test, to measure changes in SRL skills of the students, before and after working in online group project. For the analysis of quantitative data, paired sample t-test was calculated. Results showed that students scored high on post-test as compared to pre-test, specifically difference was significant (t= -5.253, p=0.00) for the 'resource management strategies' with a large effect (0.71), and for the 'metacognitive self-regulation' (t= -1.90, p=0.02) component with a medium effect size (0.34)which indicated that the SRL skills were developed among students during participation in online group project. It suggested that online collaboration with peers can enhance students' SRL skills and make them independent learners in an online learning environment.

Keywords: Online learning environment, Self-regulated learning skills, Online collaboration, Wiki

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Introduction

Online distance learning programs have become a widespread method for providing education at both graduate and undergraduate level since the 1990s. Various claims about the rate of increase are made such as the online distance learning programs have been growing rapidly at a rate of more than 50% per year (Laister & Kober, 2005; Wallace, 2003). The widespread access to and extensive use of the Internet has increased the opportunities for interaction and collaboration in distance education. Emerging technologies and different software companies provide user friendly applications for instructor-student and student-student interaction in online learning environments (Godwin-Jones, 2003).

Among them, discussion boards, chat rooms, and email are categorized as first-generation Web tools, while the second generation Web tools, podcasts, blogs, and wikis promise to take the interactivity to the next level (Godwin-Jones, 2003). The introduction of these Web tools and social software into the online distance learning education system, potentially enable learners to collaborate with their fellows, to be more actively involved in their learning, and develop higher order cognitive skills (Birdsall, 2007; Bransford, Brown, & Cocking, 1999).
Moreover, many scholars have highlighted the importance of self-regulated learning skills for learners in online learning environments(Hartley & Bendixen, 2001; Dillon & Greene, 2003).Due to the absence of teacher in distance education and online learning environment, students are autonomous, and to empower them and make them independent learners, scholars suggested the importance of self-regulated learning skills, which can help them to learn and succeed in the online learning environment (Bandura, 1997; Dabbagh & Kitsantas, 2005).

Literature review

Information and communication technologies (ICT),and its networked applications& tools have changed the worldwide learning scenario of the twenty-first century. This change is because of the evolving attributes, needs and demands of the learners (Laister & Kober, 2005; Resta & Laferrière, 2007). Keeping in view the access to information, students are no more the passive learners, rather they are actively involved with redesigning and reproducing their current comprehension with new information (Perkins, 1992; Schunk, 2008).

Online Collaboration: Collaborative work in online learning environments is the main principle qualities of the networked economy

(Laister & Kober, 2005). That is, working with individuals who one has never met, and framing dynamic groups & teams across the globe to solve problems, is now commonplace in many multinational companies and organizations (ibid.). Collaborative learning refers to the situations where two or more than two people interact and learn together, which involves co-construction of knowledge and mutual engagement of participants (Dillenbourg, 1999; Lipponen, 2002).The expectations of collaborative learning are that through the process of exploration, shared goals and meaning making, knowledge is to be co-constructed, which result into the development and enhancement of higher order thinking skills among individuals (Palloff & Pratt, 2005; Brindley, Walti, & Blaschke, 2009).

Self-regulated and socially shared regulation of learning: Self-regulated learning is defined as an "active, constructive process, whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation and behaviour, guided and constrained by their goals and the contextual features of the environment" (Pintrich, 2005, p. 453). Conventionally, individual perspective was the focus in the practices of research into self-regulation, however, with increasing interest in collaborative and social learning, the concept of co-regulation and socially shared regulation emerged (McCaslin, 2004; McKenzie, Jackson, & Hobfoll, 2000).In socially shared regulation, individuals work together in groups and regulate their learning and task collectively (Hadwin & Oshige, 2011). Shared regulation occurs in the tasks on which learners work together cooperatively and collaboratively by co-constructing goals and standards for a task performance or doing problem solving together (Roschelle & Teasley, 1995). Socially shared regulation is central to collaborative success, without shared goals and shared task representations, collaborative work may become dissatisfying for the learners (Hadwin, Järvelä,& Miller, 2011).

Web 2.0 tool Wiki: Distance Education system always faced the challenge of isolation of its learners during their studies. Nevertheless, the advent of technology and web 2.0, the social web, enabled online distance education to address the problem of isolation of learners, and implement the student-centered approach into their system. Online social networks enable learners and instructors to socially connect with each other, and to engage them in meaningful, recurring experiences with other individuals as well. This will help them to form social connections

with others through collaborations, involving the sharing of ideas, creation of products, construction of identities and the receiving timely feedback (Dron & Anderson, 2009). Web 2.0, the social Web, is a move towards a more interactive and collaborative Web, that connects people and puts information into their hands (Augar, Raitman, & Zhou, 2004; Parker & Chao, 2007). Wiki is an efficient Web 2.0 tool for collaborative work in virtual learning environment (Parker & Chao, 2007). By utilizing this tool, teachers can generate a virtual space for their students to engage them into different projects and group activities (Elgort, 2007; Toth, 2010). Where, the students can give their ideas, thoughts, and share information for the development of collaborative work (ibid). Moreover, for students, during working on these collaborative tasks, wiki spaces could be effectively utilised for taking notes and learn from each other's ideas (ibid). Further, wiki spaces provide students the feature of editing the content, so that they take ownership and sense of control over their own creativity and experiences, as compared to the teacher led learning experiences based on pre-structured study material (Augar et al., 2004; Elgort, 2007; Toth, 2010).

Therefore, the current study aims to explore how the online collaborative group work promoted the self-regulated learning (SRL) skills in the virtual university students. Currently, its students are learning individually without having any contact with their class fellows.

Statement of the Problem
New technologies potentially can create learning environments where it is possible to have multiple social interactions, eliminating the problem of learners' isolation in distance education (Mourad, Tarik, & Pascal, 2015). For this reason, the introduction of social software tools such as wikis, blogs etc, make it possible to have interaction, collaboration and sharing among the learners in online learning environments (Dron& Anderson, 2009; McLoughlin & Lee, 2010). In today's world, students have access and exposure to every kind of information both in educational institutions and at home, therefore, changes the teaching learning paradigm to student-centred from traditional teacher-centred classroom practices (McLoughlin & Lee, 2010). It is assumed that this shift in paradigm will allow students to have a control on his/her learning, and to facilitate him/her to become independent and life-long learner (ibid).Therefore, the focus of current research was to explore the extent to which self-regulated learning skills were developed among students, during working on an online

collaborative group project, in the virtual learning environment of a virtual university of Pakistan.

Research Question

For this purpose, the following research question was formulated:
To what extent do students self-regulate their learning during online collaborative work, with their class fellows, using a wiki as online collaborating medium, at a virtual university in Pakistan?

Methodology

To address the research question, an exploratory intervention study was conducted where 28 students (six female and 22 male) of a virtual university, worked collaboratively online on a group project utilizing a Wiki as an online collaborating medium. All participant students were divided into groups having four or five students in each group, for according to the literature, four or five members is the best composition of a group, because a larger group may hinder the opportunity of each member to participate actively in group tasks (Järvelä, Naykki, Laru, & Luokkanen, 2007; Leung & Chu, 2009; Resta & Laferrière, 2007). Students were assigned a mini-research project, on which they collected the data while working collaboratively online in groups. They utilised a wiki as online collaborating and communication medium. At the end of the project, they generated a group report on Wiki. This was ten week long project, divided into different activities.

Selection and subscription of a wiki

After comparing the features of the different wikis available, the one for this study was selected from www.wikimatrix.org. The PBwiki was selected because it offered all the desirable features as explained below. As all the participants were divided into six groups, it was necessary to create six folders in the wiki, i.e. one folder for each group for the collaborative work. To make sure that only group members could have access to their specified folder, folder level security was required. Although the basic edition of PBwiki was free, however, it did not support the creation of folders for groups, therefore, PBwiki's Classroom Edition was utilised for the purpose. The Classroom Edition of PBwiki supported collaborative group projects of students with the provision of 40GB storage. The other features of this edition were, page formatting, editing, commenting on group work, uploading of videos and pictures,

and tracking of page history etc. In addition to the creation of individual group folder, it provided the page and folder-level security as well, which were important considerations because it protected students by allowing them to take ownership of their wiki without public interference.

Data Collection

For the collection of data, the Motivated Strategies of Learning Questionnaire (MSLQ) (Pintrich et al., 1993), was utilised, which assess self-regulated learning skills of learners on seven point Likert scale type question items.

The MSLQ

Pintrich and his colleagues developed the MSLQ in 1993, based on the social-cognitive view of motivation and strategies of learning. The MSLQ also took into consideration research on self-regulated learning including an interface between motivation and cognition (Schunk & Zimmerman, 1998; Zimmerman & Schunk, 1989). It has been used in many research studies, not only in traditional face to face classroom situations, but has also been found to be an effective tool for assessing student's motivation and learning strategies in relation to web based and online learning environments (Artino Jr, 2005; Hancock, Bray, & Nason, 2002; Niemi, Nevgi, & Virtanen, 2003), hence, demonstrating its credibility as a tool across a range of contexts. There are 81 items in the MSLQ, which are scored on a 7-point Likert-type scale, from 1 (not at all true of me) to 7 (very true of me), (Duncan & Mckeachie, 2005).

The MSLQ consists of a motivation scale and learning strategy scale. The motivation scale has three main components: value component, expectancy component and affective component. The learning strategy scale also has three main components: cognitive and metacognitive strategies, resource management strategies, and meta cognitive self-regulation. Detail of all components is presented in Table 1.

Table 1
Scales and components of the MSLQ

Scale		Components
Motivation scale		Total items: 31
	1.	Value Component
	2.	Expectancy Component
	3.	Affective Component
Learning Strategy Scale		Total items: 50
	1.	Cognitive and Metacognitive Strategies
	2.	Metacognitive Self-Regulation
	3.	Resource Management Strategies

The MSLQ has been translated into many languages, and widely used in many research studies. This extensive use of MSLQ proved that it has good reliability and validity for assessing motivation and learning strategies used by students (Artino Jr, 2005).

For the purpose of this research, keeping in view that the MSLQ was being used for the first time in Pakistan, it was important to find out the 'internal consistency reliability' of the instrument in this context. The internal consistency reliabilitywas calculated through Cronbach's alpha, which is termed as the alpha coefficient of reliability (Cohen, Manion, & Morrison, 2007). For this purpose the MSLQ was administered to 389 university students (both male and female) in Pakistan, prior to carrying out the main research. The Cronbach's alpha was calculated for the scores of the entire MSLQ, for its two main scales; the motivation scale and the learning strategy scale. The Cronbach's alpha coefficient value for these participants' scores on entire MSLQ was 0.90, which is robust (Cohen et al., 2007; Pintrich, Smith, Garcia, & McKeachie, 1991). The Cronbach's alpha values for the motivation scale and learning strategy scale were 0.83 and 0.86 respectively, as given in Table 2. These coefficient values show that the MSLQ was satisfactorily reliable for use in this research in the Pakistani context.

Table 2

Cronbach's alpha coefficient values for the entire MSLQ and its components

Scale	Cronbach's Reliability	Alpha
Entire MSLQ	0.90	
Motivation Scale	0.83	
Learning Startegy Scale	0.86	

The MSLQ was administered to students before (pre-test) and after (post-test) the online collaborative group work. The significant difference between the scores of the participants obtained on pre- and post-administration of the MSLQ, was found out through a paired sample t-test.

Results

To examine the statistically significant difference between the mean scores of pre- and post-test of the students on the MSLQ, a paired sample t-test was calculated. This indicated the changes in the level of SRL skills of the participants, when they finished working collaboratively online on the group project. More specifically, in order to get detailed insight into the changes in the SRL skills of the participants, this was calculated for each component (six) of the MSLQ, separately.

Table 3 presents the overall results of the paired sample t-tests across all six components of the MSLQ, showing whether there was a significant difference in the mean score of pre- and post-test scores of the students. The first component, the value component, assesses students'extrinsic and intrinsic orientation of goals towards the course, and perception of the course content, in terms of value, significance and usefulness. The t-test results show that the post test scores of this component (M= 5.71, SD=0.72) are slightly higher than the pre-test one (M= 5.58, SD= 0.67), but the difference is statistically not significant (p= 0.48). The second component, the expectancy component, establishes how far a learner believes in his abilities, and certain that he could succeed through relying on his own efforts. For this component the results of paired sample t-test show a slight increase in post-test scores (M= 5.63, SD=0.65) when compared to the pre-test (M= 5.58, SD= 0.79). The affective component gauges how worried and anxious a student is over an exam. According to the t-test results, the difference between the post test scores (M= 3.25, SD=1.54) and the pre-test ones

(M= 3.00, SD= 1.20) is not significant (p = 0.16). The fourth component, the cognitive and meta cognitive strategies scale, is indicative of a student's organization skills and capability of application of previous knowledge to a new situation. Although the post test scores (M= 5.34, SD=0.87) are slightly higher than the pre-test ones (M= 5.21, SD= 0.85), this difference is not statistically significant (p=0.59). The meta cognitive self-regulation scale assessment a cognitive control strategies used by students i.e. goal setting, planning, monitoring and performance regulation. The paired sample t-test calculated for this component show that the post-test scores (M= 5.92, SD=0.69) are higher than those pre-test (M = 5.03, SD = 0.83), the value of p = 0.02 indicates that the difference is statistically significant. Lastly, the resource management strategies scale, measures students perceived self-regulated learning skills regarding the capability of students to manage the time and their study environment, and to collaborate with peers and seek help from them when needed. The results of the paired sample t-test for this component indicate that the difference between the pre-test (M= 4.73, SD= 0.86) and post-test (M= 5.62, SD= 0.47) scores was statistically highly significant, with a value of p= 0.00.

Table3
Paired t-test scores for the pre- and post- administration of all six components of the MSLQ

Scale	Pre-test Mean(SD)	Post-test Mean(SD)	Df	t	P
Value component.	5.58 (0.73)	5.71 (0.72)	27	-0.74	0.48
Expectancy Component.	5.58(0.79)	5.63(0.65)	27	-0.33	0.74
Affective Component.	3.00(1.20)	3.25(1.54)	27	-2.04	0.16
Cognitive and Metacognitive Strategies.	5.21(0.85)	5.34(0.87)	27	-0.54	0.59
Metacognitive Self-regulation.	5.03(0.83)	5.92(0.69)	27	-1.90	0.02*
Resource Management Strategies.	4.73(0.86)	5.62(0.47)	27	-5.25	0.00*

*Significant at 0.05 level.

The results presented in Table 3, showed that though the mean scores of the post test of all the components of the MSLQ increased,

nevertheless, resource management strategies, andmetacognitive self-regulation were the two components, for which the difference was statistically significant.

Effect Size

Along with the statistical significance difference, effect size was calculated for the components of MSLQ. The 'effect size' is a standardized and an objective indicator of the magnitude of the difference between two groups, i.e. it is a measure of the size of an effect (Cohen, Manion, & Morrison, 2011; Field, 2009). The effect sizes was calculated through Pearson's correlation coefficient *r*, because: (a) it is widely understood and frequently used with paired quantitative data, (b) it measures the strength of the relationship between two variables, (c) it is constrained to lie between 0 (no effect) to 1 (perfect effect), and finally (d) converting *t*-values to *r*-values is relatively straightforward. (Field, 2009) and (Cohen, 1988, 1992) suggested the values for assessing whether the effect is large or small should be as follows:

Large effect: r = 0.50,   medium effect: r = 0.30 (medium effect), small effect r = 0.10

Table 4 presents the results of the effect sizes calculated for the 'resource management strategies' and 'metacognitive self-regulation' components of the MSLQ using the results of the paired samplet-statistics calculated above as shown in Table 3. The 'metacognitive self-regulation' component has a significant coefficient for its t-statistics (p=0.03), but has a medium effect size with a value of r=0.39. Prominently, the 'resource management strategies' component, which scored a highly significant coefficient for its t-statistic (p=0.00), has a large effect size of *r* = 0.71.

Table 4
Means, standard deviations, paired sample t-test scores and effect size for the pre and post administration of the MSLQ

Scale	Pre-test Mean(SD)	Post-test Mean(SD)	df	t	P	Effect size *R*	Magnitude of difference
Metacognitive Self-regulation	5.03(0.83)	5.49(0.65)	27	-2.23	0.03	0.39	Medium
Resource Management Strategies	4.73(0.86)	5.62(0.47)	27	-5.25	0.00	0.71	Large

Discussion

This study investigated the extent to which students regulated their learning in socially shared manner during working on a group project utilising Wiki as an online collaborating medium. Changes in the self-regulated learning skills were determined quantitatively through a self-report questionnaire, the MSLQ. The results have revealed that, overall, there was an increase in the mean value of the post test scores of all the components of the MSLQ. Thus, the results indicate a positive general effect of the online collaboration on the self-regulated learning skills of the students.

Keeping in view the focus of this research, that is, the social regulation of learning of the students during the online collaborative group project, the results of the 'metacognitive self-regulation component' and 'resource management strategy scale of the MSLQ' were considered important for this research. For the resource management strategies component, the difference was highly significant regarding the t-statistic, p=0.00, showing that the online collaborative group project (intervention) had an effect on the self-regulated learning skills of the students for this component. The resource management strategy component, involves how much students'can self-regulate their learning by managing their time and study environment. This include planning and scheduling their study time, commitment for the achievement of study goals even in case of distractions and uninteresting tasks. The resource management strategy also involve students' ability to work in collaboration with peers and seek help when needed.

For the other, metacognitive self-regulation component, difference between the pre- and post-test means was also statistically significant with a value of p=0.02. The metacognitive self-regulation component measures the three processes of metacognition; planning, monitoring, and regulating. The results suggest that the students worked on the group project by setting goals for each activity, they planned their activities in the light of these goals, and worked on different tasks of the project in line with these plans.

These findings are akin to those of previous research about the nature of socially shared regulation, which has demonstrated that groups collectively set goals, monitor, evaluate, and regulate their shared social space (Hurme, Merenluoto, & Järvelä, 2009; Iiskala, Vauras, & Lehtinen, 2004; Järvelä et al., 2007; Mäkitalo, Häkkinen, Järvelä, & Leinonen, 2002). However, the previous research concerning socially shared regulation of learning was conducted in face-to-face classroom situations and thus the findings of this research are an extension to this as

it was conducted in an online learning environment where the students had no face-to-face interaction with each other and they socially regulated their learning entirely during online collaborative work.

Conclusion

In conclusion, the outcomes of this research indicate that online collaboration in groups can enhance students' self-regulated learning skills and make them more independent learners in virtual learning environment. In this era of technological advancement when Web 2.0, the social web, has created the opportunities and possibilities for interaction and online connectivity, the group collaborative learning activities could be incorporated into the course work of online distance education. Since the learning environment of online distance education is more open and less teacher guided, there is a need to provide students the opportunities to self-regulate their learning on an individual as well as socially shared level. This research was conducted with the hope that it would help online distance education to improve its quality, and specifically a step towards the improvement of existing practices in the online distance education offered by a virtual university in Pakistan.

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