Investigating Student Collaboration within SelfOrganised Learning Environments (SOLEs)

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Abstract.
This paper investigates the extent to which 28 children in a primary school in Saudi Arabia collaborated within groups within a Self Organised Learning Environment (SOLE). Students with access to the internet were asked to answer a series of big questions but with minimal teacher intervention. Data was collected using observations, student and parent questionnaires and teacher interviews.
 After taking into account the duration of the study (1 session a week over ten weeks), it was clear that some collaborative skills did develop as the sessions progressed. However, conflicts occurred between students within different groups causing serious concern about teamwork and this required additional teacher interventions. This paper will, therefore, suggest a number of strategies that teachers can use both prior and during a SOLEs session to help ensure that students understand more about how to collaborate and also the importance of continuously developing their collaborative skills.
Keywords: Collaborative learning, SOLE, teachers' role, primary-school students

1. Introduction

Preparing students for modern professional interactions is an essential piece of education. Collaborative learning (CL) supports this preparation and it is the fundamental pedagogy to develop interactions skills. CL is an educational approach whereby students are encouraged or required to work together to accomplish shared learning goals. Numerous studies have demonstrated that CL can promote academic and social educational outcomes. (see for example, Le, Janssen, & Wubbels, 2018; Robert E Slavin, 1987, 2011; 2015). Skills such as negotiate, compromise to resolve conflicts, positively contribute to groups, explain, listen and collaboratively make decisions to reach positive outcomes have a substantial impact on the group's interaction (Ferguson-Patrick, 2018). Developing CL skills at an early age will help pupils to become effective communicators as they approach adulthood. However, there is strong evidence that CL is not utilised effectively in schools (Ferguson-Patrick, 2018). According to Le et al. (2018), the main reasons for this are challenges relating to students' experiences such as unequal individual participation in group tasks and students' lack of communicative and collaborative skills. Indeed,

other researchers including Slavin (2015) emphasise that the success of CL is largely dependent on the cohesiveness of the group and the quality of the group's interaction.

Many educational researchers (e.g.,Gillies & Boyle, 2010; Hertz-Lazarowitz, 2008; Järvelä et al., 2015) agree that the teacher's role is crucial in structuring and scaffolding these social skills. They believe that establishing and sharing clear procedures with students relating to collaborative skills early in sessions will set the structure for positive interactions and aspirations later in the same sessions. This will also proactively address any anxieties or misconceptions that students may have (Topping, Buchs, Duran, & Van Keer, 2017). Further, the teacher's intervention is crucial because relationships among group members may require mediation or facilitation by an external source because of conflicts or power differences. Moreover, some scholars (e.g., Ballantine & McCourt Larres, 2007) argue that to increase group solidarity in the classroom, team skills should be explicitly taught. Cohen (1994) explains that if the task is challenging and interesting, and if students are *sufficiently prepared for skills in group process*, students will experience the process of groupwork itself as highly rewarding.

There is no optimal or universal role for the teacher in the classroom as s/he can switch between roles to facilitate the achievement of specific goals. Schwarz (2002) defines facilitator role when working with a groups as a process in which a person who facilitates interaction and has no decision-making authority, intervenes to help a group of students improve the way they identify and solve problems and makes decisions in order to increase the group's effectiveness. More broadly, Heron (1999) highlighted that the effective facilitation could be supported by switching between different strands of learning and the facilitator him/herself determines the style depending on students' needs. The supportive strategies, as Heron proposed, are incrementally removed when they are no longer needed and the teacher gradually shifts more responsibility over the learning process to the student.

2. Self-Organised Learning Environments (SOLEs)

CL has started to gain more attention in modern teaching and learning approaches. One of these approaches is Self-Organised Learning Environments (SOLEs), in which CL is dominant. The idea of SOLE is to provide students with an unsupervised environment, where they have the chance to organise their own groups, collaborate and learn by themselves while using the internet to answer big questions without the teacher intervention (Mitra, 2014a). By the end of the SOLE sessions, the groups present their finding and the teacher facilitates the presentation and feedback. This learning approach was developed from the 'Hole-in-the-Wall' experiment (i.e., the unsupervised use of the internet by a group of children) carried out by Mitra in 1999- 2006 which had remarkable and highly controversial results (Sowey, 2013). Mitra argues that there is no need for the teacher to intervene in the classroom as children can obtain knowledge and skills by working independently in groups while using the internet connection. However, Harmer (2014) and Sowey (2013) emphasised that teacher absence in SOLEs session can result in social exclusion and isolation during the process due to the lack of instruction, facilitation, and evaluation, even

During a SOLEs session, children are given a question and asked to research the answer. They form their own groups, allowed to talk within groups and also with other groups, free to move around, change groups and share information at any time. Noise levels can vary and chaos is permitted. At the end of a given time period, usually between 30 and 45 minutes, each group is asked to present their findings and reflects on what went well and what they could do differently next time (Mitra and Crawley, 2014). Teacher intervention is limited. No explanation or instruction is offered. They may help by providing open and supportive questions and very importantly, instructive feedback.

3. Context of the current study: Saudi Arabia

In Saudi Arabia (SA), the Ministry of Education (MOE) completely controls the educational system as it has the power to design and assign educational curricula in all schools from K-12 stages at the national level. Recently, The MOE realised that curricula were a teacher- led and followed 'the teaching to test' approach, which did not meet individuals' and national needs in the 21st century and, thus, introduced new changes (Al-Abdulkareem & Hentschke, 2014). These changes emphasise student-centred learning and encourage CL as a strategy in active learning methods. However, based on a review of a large number of empirical studies in Saudi schools, Al-Hareth and Al-Dighrir (2014) found that "lectured style" remains the common practice in those schools. This is also what was reported by Almuntasheri et al.'s (2016) study, which found that the system is still based on teacher-centred approaches relying on the textbook as the cornerstone of the process of teaching and learning. Therefore, despite the recent changes introduced and MOE initiatives to develop the education, CL is still not applied effectively. This paper reports the findings of a study investigating whether primary school children in SA can indeed learn and develop collaborative learning skills through SOLEs without teachers' intervention.

4. Methodology/Approach

This study used an action research approach within a case study design to investigate the impact of SOLE on developing collaborative learning skills for primary school students. This research approach has gradually become the preferred approach of researching the introduction of technological innovations into lessons (e.g. the use of the internet to search for big questions) (Stemberger & Cencic, 2014). It allows the researcher to plan, develop and facilitate interactions among participants. Additionally, it helps in understanding the variety of participants' (students) perceptions and how these can influence the implementation of new learning environments (SOLEs in Saudi primary schools) (ibid).

 The chosen methodology was applied at one primary school in Saudi Arabia with 28 students (10- and 11-year-olds). After obtaining consents as appropriate, the SOLEs environment was prepared in the school's learning resource center. Following this, students attended 1.5-hour weekly sessions for 10 weeks. Multiple methods were used to investigate students' interaction skills and their development over the course of the study and their perspectives and perceptions about CL within SOLEs. These are classroom observations and reflective diaries for all sessions as well as What IS Happening Inside This Class (WIHIC) questionnaires (Fraser, McRobbie, & Fisher, 1996),

SOLEs-Traditional Classroom Comparison (STCC) questionnaires (Dolan et al., 2013) and Pupil View Templates (PVTs) (Wall & Higgins, 2006) used twice during the study. Finally, questionnaires with participants' parents and an interview with their classroom teacher were conducted based on the assumption that students who participated in SOLEs sessions expressed their views in front of their parents and teachers.

The researcher has a multiple roles in this action research study. The identity of the researcher shifted throughout the research processes between researcher and experience teacher (Thomson & Gunter, 2011). She adopted various insider/outsider positions (ibid). In addition to being an action researcher, she adopted many different roles at various stages of the process, including those of planner leader, catalyzer facilitator, teacher designer, listener observer and synthesiser reporter.

5. Findings/Results

Students formed five or six groups during SOLEs lessons, depending on the number of participants' (4-6 students in each group). Active participation by students throughout all sessions was observed, resembling what Figure 1 conveys for most of the time. This was true during the search time, as well as presentation preparation and delivery.

Figure 1: students' active participation during a SOLE session

Group conflicts seemed to rise sometimes, but also to self-resolve within the group as the sessions progressed without the need for the intervention of the facilitator (the researcher). The teacher-researcher kept reminding students about the rules of SOLE, relating to changing groups, without intervention to solve the problem as much as possible. In the searching stage, some students appeared to participate less because, as one student dictated, another typed, leaving the other students just watching. Yet, all group members participated more during the presentation. Careful

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observation of the student groups during the SOLE sessions, showed varying levels of discussions taking place and took on various roles between themselves within the groups.   Because of the nature of the SOLE big questions, which are considered to be challenging, students relied on their peers for support, especially with minimum teacher scaffolding. There were a few instances' where students did not function positively with each other, but with some guidance provided by the teacher, the group settled and became more productive. On the other hand, in some cases, there was no need for intervention from the researcher.

From 45 groups formatted over the ten sessions of this project, it was noticed that there were only three groups that seemed to lose effective communication. For example, in the fifth session, one group of six members established dialogue to regulate their collaborative behavior; this seemed to result in the students working seriously with their chosen peers. However, later on, the same group split during the preparation of the presentation into pairs, but they continued to share the table. Each pair of students worked separately, while some students stopped participating. After the unsuccessful repair attempts by the group manager, intervention by the teacher was needed to help the students return to work collectively.

As an observer, it was difficult to capture the details of the group dynamics during the SOLE sessions. Barriers to effective communication seemed to manifest when the group members were unable to self-resolve their conflicts and refused to participate; however, when group members worked harmoniously together, it was not clear which roles the students played in their individual groups.

Although it appeared that some groups were not working hard to answer the question, most groups by the end of sessions used to finish the task and present interesting and insightful information. This performance might be interpreted as a reflection of good communication and teamwork within the groups. Only on three occasions, three different groups could not present as they either did not do the search or did the search but could not reach findings. This failure to present in addition to the poor performance of some groups during presentations were observed to be mostly due to a breakdown of communication between group members. For example, one group of six members in session six did not produce a presentation due to the continuous disagreement between a dominant student and the rest of her group members. This led four students to leave the group and the remaining two students failed to present.

When it comes to social outcomes, the data collected showed that the students benefited from using SOLE environments. From all SOLE sessions, groups were operating at different group composition, with different levels of engagement. It emerged from the observation that some of the students were not accustomed to working with other students, specifically at the beginning of the study and needed time and opportunities to learn collaborative work strategies. However, this situation changed later on during the sessions as students started to cooperate better within groups and these observations were supported by findings from the other methods used in the study. More specifically, the PVT results showed that SOLEs improved students' interpersonal relationships.

For example, in the second PVT, more students referred to how SOLEs helped them cooperate better with their group members. What Layan said in the first and second PVT would clarify this further. In PVT1, she said *"I prefer to work by myself because they always fight when we research... I don't enjoy working in groups"*. However, in PVT2, she said *"the session has become more interesting ... I have more friends now ... I enjoy the research so much now ... I learned a lot ♥"*. Another student also commented in PVT2 that *"I like how the students have become more collaborative and helped each other to look for the information. I really like SOLE"*.

These findings from the PVT generally showed that over sessions, students became aware of how SOLE developed their interpersonal relationship. Indeed, this finding is supported by the STCC questionnaire results and specially students' response to the statement *"I work well with my friends"*. The results' related to this statement are presented in Table 1.1.

Table 1.1: Students' response to "I work well with my friends" statemen

I work well with my friends	SOLE	Traditional class
STCC 1	10	19
STCC 2	23	6

The table shows that in the first STCC questionnaire, more students believed that they worked well with their friends in traditional classrooms than in SOLE sessions. However, in the second STCC questionnaire, the majority of students started to believe that they worked well with their friends in SOLE sessions. While it is not clear why students indicated that they worked well with friends in traditional classrooms in the first STCC as students in traditional classrooms sit in rows, they do not work together and conversation is prohibited (they might be punished if they do so), it is possible that they were referring to what they do after the lesson. On the other hand, in SOLE sessions these rows disappear in the group which encourages students to know, talk to and work with each other. Students at first probably struggled to build relations with others during SOLE sessions perhaps as an effect of the traditional classroom environment and based on this they stated that they work well with friends during these sessions. However, by time students developed these skills and this is reflected in the increase of participants who stated that they work well with friends during SOLE sessions.

The development in the interpersonal relationships was also clear when most of the students thought they got help from other students. This was clear in the WHIC questionnaire when students responded to '*in SOLE class, I get help from other students*' statement. The results for this statement are summarized in the following Table 1.2. It can be seen that about a third of students thought they seldom got help and this decreased in the second WHIC questionnaire to less than a quarter, with the rest of participants believing that they got help sometimes or always.

Table 1.2: Students' responses to the 'in SOLE class, I get help from other students' statement.

In SOLEs, I get help from other students.	Almost Always	Sometimes	Seldom
WHIC1	2	16	10
WHIC2	7	15	6

Furthermore, it was observed that SOLE helped students improve their communicative skills and conflict-solving skills. Three of the students who struggled to work with other group members early during SOLE sessions managed to integrate well in different groups later on. This might be a sign of development in their communication skills. This conclusion is supported by Algwhara comment in the PVT2: "*this is a good experience. There are no collaborations sometimes but, by time, I learned how to adapt with others and how to corporate with my friends*". Additionally, parent's views expressed in the questionnaires were consistent with this statement. One parent, for example, stated:

> "*SOLE experience beyond basic knowledge, students learn to take initiative and responsibility, solve problems, self-organise, help them articulate effective ways for interaction and communicate ideas… Thank you for initiative in developing the education … Good bless you*".

However, the STCC questionnaire revealed that the students argued in SOLE sessions more than conventional classes. This is illustrated in the results presented in Table 1.3 below. The table also shows that the number of students who thought they argued with their friends increased significantly in the second comparison questionnaire.

Table 1.3: Students' argument in Lessons

I sometimes argue with my friends	SOLE	Traditional class
STCC1	12	17
STCC2	23	6

When it comes to students' perceptions about their behaviors in group, although the students seemed to work as a team most of the time, the internal thoughts revealed a mixed feeling about teamwork. On the one hand, some children comments indicated a positive interdependence such as: "what I like about this session is that we think together". Another student wrote "I thought we cannot work in one computer as a group, but we did… we were very cooperative … I wish cross my heart to try this experience again". One parent also supports this as she noted that "my daughter like this program so much… she likes the online research … sharing with her friend to find the right answer… also the idea exchange around the propose topic". Additionally, most students responded positively in two statements related to this in the questionnaire (i.e. "I help other class members who are having trouble with their work" and "in this class, I get help form other students"),the results of which are presented in the following Table 1.4:

Table 1.4: Students' interdependence

WHIC2 (in SOLEs)	Almost Always	Some-times	Seldom
I help other class members who are having trouble with their work.	1	16	11
In this class, I get help from other students.	7	15	6

On the other hand, some students, parents and the classroom teacher had negative perceptions that cannot be ignored. Indeed, many students and parents mentioned commented in the questionnaires that "*there is no collaboration between the groups' members*". One parent even suggested that the teacher should choose the group member by herself to maintain harmony on the effectiveness of group learning *"we hope to implement the program correctly by choosing the group member based on their homogeneity"*. The classroom teacher also mentioned that
"the children like the idea about working in group in SOLE sessions, however the disagreement between girls during the teamwork and the strike is annoying". In the same context, one student raised a very interesting point to summarize this mixed feeling when she stated *"the truth there aren't collaboration, but there are good findings ... I like those who support others... then the work will be much better... thank you for everything."*
 When it comes to interaction among students, the STCC questionnaire showed that the majority of the children believed that they cannot solve problems individually in SOLE sessions (see Table 1.5. This might be because of the nature of SOLE session (big questions), students were forced to interact and communicate with each other to finish the task. However, it was clear that young learner struggle with the idea of sharing information initially.

Table 1.5: Students' responses to 'I can solve problems on my own' statement

I can solve problems on my own	SOLEs	Traditional class
STCC questionnaire2	8	20

In addition, there is a clear misunderstanding of the role of the students in the group. The evidence of this can be clearly seen from the results of the second WHIC. For example, most students chose 'seldom' in response to the "*I work with other students in this class*" statement. However, the majority responded either 'almost always' or 'sometimes' to the statement
"Students work with me to achieve class goals". These results are summarized in Table 1.6 below. This contradiction illustrates the internal dissatisfaction with the role of individuals in group, which initially attests to the misconstruction of collaborative learning. A possible explanation for this interesting pattern might be that children struggle to work out how to participate in the task or they struggle to manage their interactions. Working in device which designed for single users in CL need even more skilled students to resolve the conflict and give the individual accountability. In

addition, perhaps the complexity of working in a large group of four-six may have caused participants to feel somewhat inept socially.

Table 1.6: Students' perceptions of their role

WHIC2 (in SOLEs)	Almost Always	Some-times	Seldom
I work with other students in this class.	2	9	17
Students work with me to achieve class goals.	6	12	10

The internal dissatisfaction about the equity in the participation was also evident when students were asked about the equity in participations in SOLE sessions. The majority of students responded 'seldom' to two related statements in the second WHIC (i.e. "*I get the same opportunity to contribute to class discussions as other students*" and "*I get the same opportunity to answer questions as other students*"), as the results in Table 1.7 below indicate.

Table 1.7: Students' perceptions of the equity in participations

WHIC2 (in SOLEs)	Almost Always	Some-times	Seldom
I get the same opportunity to contribute to class discussions as other students.	0	4	24
I get the same opportunity to answer questions as other students.	0	4	24

When I asked students about the personal involvement, the internal dissatisfaction with the role of individuals in group appeared again. This is apparent when students were asked about their involvement in the group as a considerable number of them felt that they were not involved as they should have been. For example, 12 out of 28 chose seldom about the statement "*I give my opinions during group discussions*" and 14 out of 28 chose seldom for the *"I explain my ideas to other students"*, as results in the following Table 1.8 indicate. Further, Significant number of students thought they not discuss their ideas during group discussion. However, the majority thought their ideas and suggestions, if given, were used during discussions. Clearly, there are a contradiction in the students respond which indicate that they struggle to work out how to participate in the group work in a way that satisfied their aspirations.

Table 1.8: Students' perceptions of induvial participations

INVOLVEMENT in SOLEs	Almost always	Some-times	Seldom

I discuss ideas in class	2	15	11
I give my opinions during group discussions	3	13	12
My ideas and suggestions are used during classroom discussions.	5	17	6
I explain my ideas to other students.	5	9	14
Students discuss with me how to go about solving problems.	6	11	11
I am asked to explain how I solve problems.	10	14	4

6. Conclusion/Implications/Recommendations

This study investigated whether primary school children in SA can learn and develop collaborative learning skills through SOLEs without teachers' intervention. We found that, taken into account the duration of the study (10 sessions), the interpersonal relationships, communicative and conflictsolving skills seemed to develop. However, in order to acquire a satisfactory development, these skills need time (Robert E. Slavin, 2015) especially for younger learners who have never been in similar situations before (Almuntasheri et al., 2016). Considering a strict session's time in school timetable, this might waste great opportunities for students to learn from each other and the group's focus might shift to social interaction rather than the task.

On the other hand, the internal thoughts of the students and parents as well as the classroom teacher's comments revealed a serious concern about teamwork. Conflicts among students occurred, which required the teacher to intervene to save the situation. Most importantly, there is a clear internal dissatisfaction with the role of an individual, equity and involvement in the group. Pupils seem to believe that always someone else gets the opportunities. This confirms the finding by Järvelä et al. (2015), who point out that CL using computer designed for single users, without preparing students, was found to experience lower levels of participation and motivation, less group cohesiveness and satisfaction and more conflict and contradictions.

Our findings seem to imply that the pupils found it difficult to engage in collaborative work. They like the idea of SOLEs, however, they clearly lack the skills needed to participate in SOLEs sessions effectively. The results of the present study seem to call for the teacher intervention to rehearsal the CL skills both prior and during a SOLE. Topping et al. (2017), emphasise the need for students' preparation for effective collaboration practically when students lack familiarity with a CL environment and because of the experiences relating to the socialization of individualism and competitiveness in traditional classroom. In agreement with Topping *et al.*'s claim and based on the findings of this study, this paper will suggest a several of strategies that teachers can use to help ensure that students understand more about how to collaborate effectively.

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The findings of the present study have practical implications for the use of CL in SOLEs; however, it should be noted that the SA cultural factors might have influenced some of the results thus indicating that it might be invalid when thinking about applying some of the suggested strategies in other contexts.

First of all, training students in collaborative skills is essential to giving all students a voice, bearing in mind that students need time to become familiar and gain experience with CL (Ferguson-Patrick, 2018). This can be done by various methods; perhaps the teacher could introduce pupils to 'Seven Norms of Collaboration' in a simplified manner for their age (Garmston & Wellman, 2016) and, also, discuss with them the skills they will need in collaborative learning, such as listening to others, encourage others to talk and let others finish to ensure individual accountability.

Another issue the teacher should consider when implementing SOLEs is the group size. The findings of this study showed a negative impact on pupils' interaction when they form large groups. Thus, four children in a single group are ideal (Bertucci, Conte, Johnson, & Johnson, 2010) for group productivity and to make each member actively contribute to the joint efforts and increase group members' feelings of responsibility and accountability. The students still have the choice to format their groups, but the only new is that the teacher should assist them with the number of each group.

In addition, teachers need to continuously develop students' collaborative skills and constantly remind pupils about them before each SOLEs session, monitoring students' interactions during the session and intervening when needed to improve teamwork. For example, in initial stages, teachers might sit with each group, if necessary, and work with them as mediators to increase their interpersonal and group skills (Ferguson-Patrick, 2018). Teachers could discuss and emphasise the good interactions during the feedback for continuous improvement of promotive interaction. This might contradict SOLEs' rules (Mitra, 2014b); however, the children in SA need more support to acquire CL skills.

Finally, educators need to take into consideration that changes might happen during the process of SOLEs and thus, they should respond to each differently (Heron, 1999). While disagreement of some students can be resolved without teachers' intervention, some situations require the teacher to intervene to save time. In either case, educators should consider students' feelings that arise throughout the sessions.

Final note:

The purpose of this paper is not to deny the achievements and potential of SOLE, but to suggest strategies to get the maximum benefit possible for students' learning and collaboration from this or similar approaches.

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