Does the Innovation Really Work?

Effectiveness of self-organized learning environment (SOLE) in the classroom

Learners' content knowledge is no longer as valuable as their content navigation skills, and teachers' expertise is no longer beholden to didactic instruction. The self-organized learning environment approach offers a promising pathway through which to engage 21st-century learners.
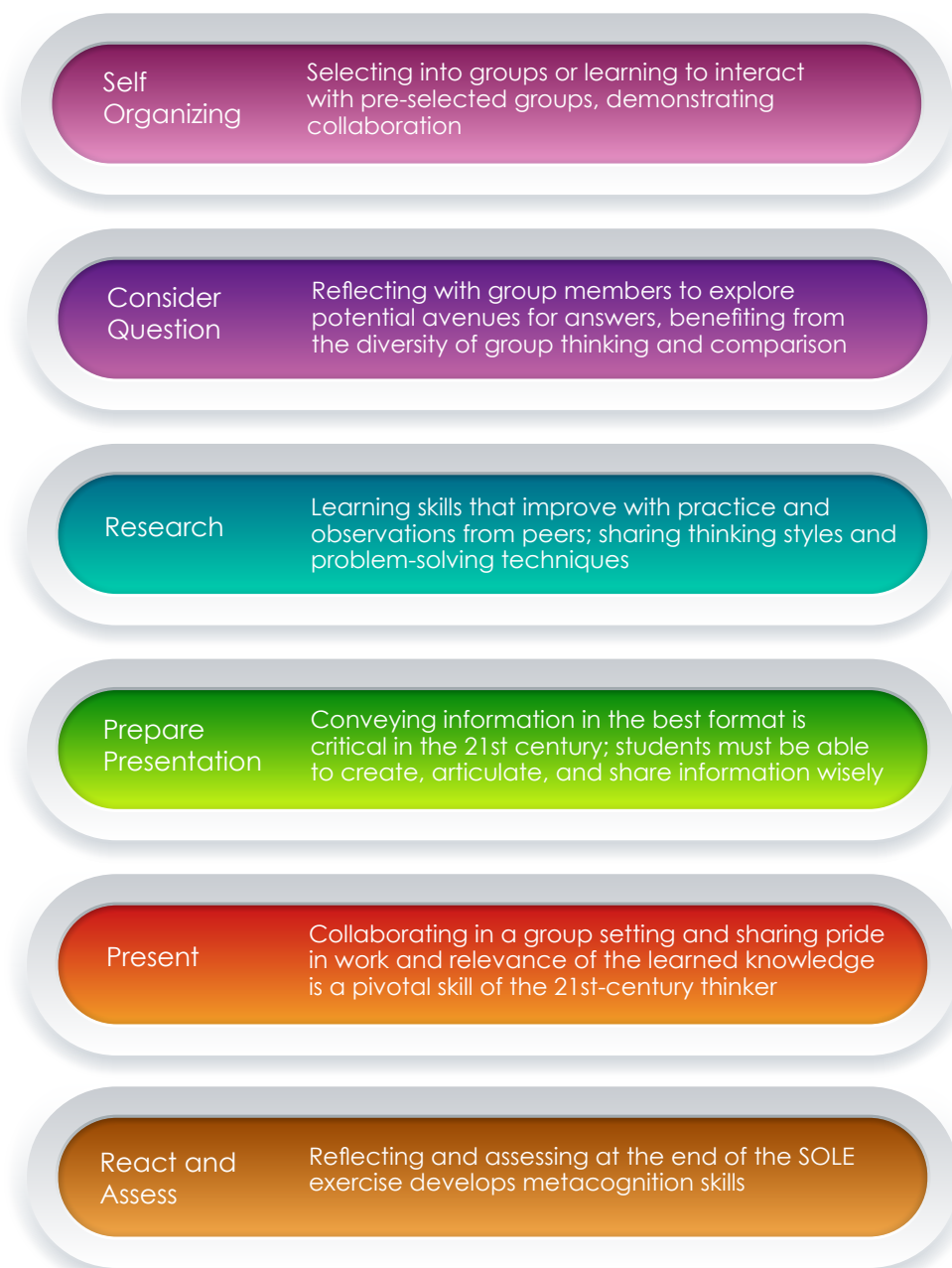
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SOLE is an innovative pedagogy designed to facilitate student development of 21st-century learning skills. Briefly stated, groups of students participating in a SOLE activity identify and explore a research question, which can be provided by websites such as startsole.org, by the teacher, or by the students themselves. Although the name "self-organized learning environment" implies that students organize themselves into groups, the actual process for organizing varies. Some teachers allow students to create their own groups, some teachers assign groups, and some teachers negotiate with the students to determine the groupings.

Each group, consisting of four to five students, typically has access to at least two devices with internet connectivity. Students spend approximately 30 minutes as a group researching information relevant to their question. After the research period, students spend approximately 20 minutes preparing a presentation. The presentations can be some sort of visual display or even artistic efforts such as plays or songs. Each group presents to

Figure 1:
Student SOLE
Activities
Translated Into
21st-Century
Learning Skills

Self Organizing	Selecting into groups or learning to interact with pre-selected groups, demonstrating collaboration
Consider Question	Reflecting with group members to explore potential avenues for answers, benefiting from the diversity of group thinking and comparison
Research	Learning skills that improve with practice and observations from peers; sharing thinking styles and problem-solving techniques
Prepare Presentation	Conveying information in the best format is critical in the 21st century; students must be able to create, articulate, and share information wisely
Present	Collaborating in a group setting and sharing pride in work and relevance of the learned knowledge is a pivotal skill of the 21st-century thinker
React and Assess	Reflecting and assessing at the end of the SOLE exercise develops metacognition skills

Key 21st-Century Skills	Definition as Observed Within the Context of This Study
Problem solving	Finding solutions to difficult or complex issues using knowledge, skills, and various competencies leads to economic success, personal development, and societal well-being.
Collaboration and leadership	Collaboration and leadership can occur in several ways: 1) students practice social skills, such as participation and reciprocity; 2) schools provide forums for community activity; and 3) through civil education, students learn how to participate responsibly in their society.
Agility and adaptability	Increased youth adaptability is directly correlated to an increased sense of self-mastery, self-esteem, and a sense of belonging as well as the capacity to cope with adversity.
Initiative and entrepreneurship	Students who set their goals and evaluate their progress experience greater academic success than students who rely on external goals and evaluations.
Effective oral and written communication	Effective oral and written communication are skills that improve from multiple interactions. These skills are essential for social interactivity and employers are looking for these skills in their job applicants.
Ability to access and analyze and information	Learning to find information relevant to a problem or situation is a critical new skill of the digital native, as the amount of new information increases daily.
Curiosity and imagination	Imagination and curiosity stem from seeing what is not there and realizing the possibility of the missing factors' impact. From these skill sets, students can create meanings, applications, and inventions.

Table 1: Seven Skills Sets That Are Critical to Students' Future

the class and usually then answers questions from their classmates. After the presentation, students may have opportunities to reflect and self-assess; sometimes, teachers provide feedback on one or more aspects of the process.

Each SOLE activity helps students develop 21st-century learning skills in various ways (see Figure 1). Questions also may be aligned with teaching objectives (Start SOLE has a question bank that aligns the questions with teaching objectives as well as an app to support teachers).

The Need
To help students develop 21st-century skills, it is critical that we shift the emphasis of our learning and teaching paradigm away from individual effort and toward group achievements with distinct contributions from each member. Students want to be engaged and

to use their strengths as they actively contribute to their own learning. It is also important to acknowledge the role of the internet in our lives. It is our playground, our shopping center, and a prominent learning tool.

In the 21st century, the nature of work has changed and so have the skills that are essential for success. To provide students with the skill sets they will need, we must pursue very different kinds of learning than were typically seen in traditional classroom settings. The seven skills sets listed and defined in Table 1 are critical to students' academic and future work success. These skill sets form the foundation for 21st-century learning.

Twenty-first-century work requires more complex communication and expert thinking and less reliance on routine cognitive and manual skills. Innovation, digital literacy, and life and career skills are necessary to thrive in the 21st century. The activities and framework of the SOLE pedagogy provide a valuable context and set of tools that develop *Habits of Mind* that will support their academic success and future workforce plans.

SOLE demonstrates how teaching aimed at each student's learning environment and knowledge, when combined with coaching and collaboration all the way through the process, will increase the likelihood of deep learning. This pedagogy gives students the opportunity to use what they have learned in the classroom to create actual change and for teachers to become the new frontier leaders for academic success in the 21st century.

Evidence of Effectiveness for Students

Each semester for two years, our research team studied the implementation and effects of SOLE on students and teachers in five schools and one STEM-focused after school program. In total, we observed over 500 SOLE groups in about 100 classrooms, conducted focus groups with teachers, surveyed teachers, and interviewed school administrators.

Our results show that by using SOLE, students are taking control of their learning and developing new skills (e.g., communication, presentation, leadership, teamwork, research, and technology skills) they can use to address research questions. Teachers report seeing their

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students develop these skill sets over the course of the first academic year using SOLE. Once developed, they are able to apply these skills in other academic contexts. At that point, as one teacher in a focus group put it, "Students are in charge of their own learning."

We observed that almost all of the communication during SOLE sessions is student-to-student, as opposed to a more traditional teacher-to-student pattern. Further student participation is broad, with 90% of students speaking at least once during a five-minute observation period.

During the second year of SOLE, students display more complex mental and relational constructs, such as self-reflection and meta-cognition. As a result, students have transformed their relationship to learning to become better critical thinkers, more aware of their own strengths and weaknesses as learners, and better able to develop their own strategies for improvement. For example, one teacher reports that "the kids are good at coming up with their own SOLE questions. If they are doing a [non-SOLE] lesson and something comes up that they don't know, they automatically make a SOLE question out of it." Our observations also indicate that students have a greater ability to go into depth on a topic, elicit peer interest, build upon previous knowledge, exhibit self-reflection, and engage in individual and collective meta-cognition.
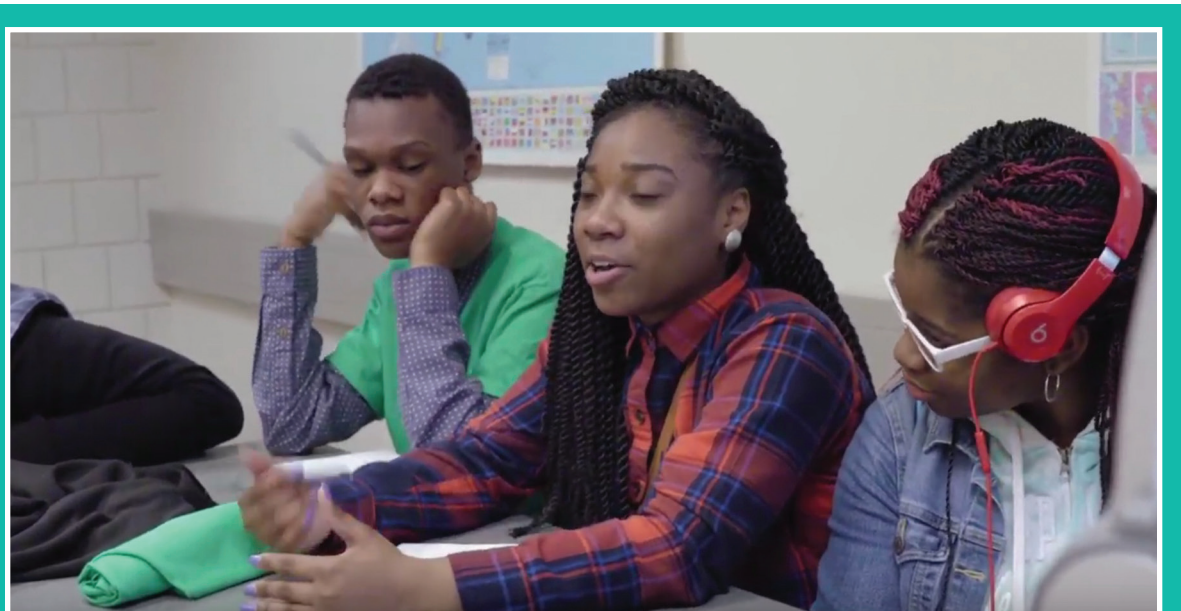
Evidence of Effectiveness for Teachers

We find through our focus groups that teachers go through a distinct but complimentary type of trajectory with SOLE. They begin the process by introducing SOLE to their classrooms. During this introductory period, they are more concerned with logistics and processes, sometimes wrestling with the habit of exerting more control in the classroom. One teacher says that she is "a control freak and it's hard for me to let go but now it's easier for me to let go, having seen what SOLE has done and what the students can do."

Once they see the enthusiasm of the students as well as the improvements in academic, social, and self-management skills described above, teachers are more comfortable de-centering themselves in the classroom; as they do so, they develop the facilitative skill sets that help their students the most. Since they are no longer always the transmitters of knowledge, they also feel less pressure to know all of the answers, which frees them up to be curious and open to learning with their students. One teacher reported, "I like that I can say I don't know." As they internalize and become comfortable with their new roles as facilitators, we find that teachers pass on the SOLE methodology to other teachers who are not aware of it and reinforce it with those teachers who are using it.

Although teachers are de-centering themselves and acting in a facilitative rather than a directive role, their facilitative skills are critical to student success. For example, when teachers pace the SOLE sessions well, the quality of the presentations is higher. Similarly, when teachers allow time for questions from the class, they create more opportunity for students to develop meta-cognition and self-reflection skills.

Discussion

When students do a SOLE session for the first time, they are excited that they get to use the internet and work with their classmates. It is typical, however, for students working on SOLE for the first time to simply enter the SOLE question into the search engine and copy the information from the first source that is brought up. Over time, however, they learn to break down the question into component parts, evaluate sources, and sift through different and perhaps conflicting information from different sources. Once they gain experience with this kind of inquiry, they begin to understand themselves better as learners and thinkers and they begin to use these transferable skills in other contexts. In so doing, they have changed their habits, disrupted their orientation to learning, and transformed themselves as learners. When teachers do SOLE for the first time,

they tend to be concerned with the logistics and the classroom dynamics. Teachers in focus groups expressed concern on a variety of factors, including how the group dynamics would play out, whether participation would be wide-spread, and how students with a variety of learning styles and abilities would fit in. They also expressed concern with whether the students would be able to answer the question without direct instruction.

Skepticism notwithstanding, teachers do adapt facilitative teaching skills to help students be successful with SOLE. For example, they may help students who are simply entering the SOLE question directly into the search engine and not getting the results they want by asking them how they can break down the question into component parts. Teachers also may help students develop strategies to assess the quality of the sources they are accessing. Once they have been practicing those facilitative skills with SOLE, they apply them to other types of learning. By facilitating student learning instead of directing it, they are creating room for student creativity and imagination as well as assisting students on group dynamics, communication and presentation strategies, and critical thinking skills. In this way, teachers have transformed their relationship to teaching.

However, SOLE does present some challenges in the 21st-century classroom. Sometimes the reliance on technology can result in a failed SOLE session. Second, helping students learn to navigate appropriate sites is a critical skill that teachers must learn in preparation for SOLE activities. Finally, SOLE is most effective when used in a metered dose; otherwise, students will suffer fatigue from the process. Other innovative techniques, such as flipped classrooms and personalized learning, would complement this approach.

Conclusion

SOLE is an innovative and critical pedagogical technique that disrupts the traditional didactic, teacher-centered classroom and provides a framework for a student-centered approach to learning. With this approach, teachers and students become co-navigators in classroom practice.

We are continuing to study numerous questions about the potential impact of SOLE on student outcomes. For example, by providing more opportunities for group work, does it increase social and emotional learning? By increasing critical thinking skills, does it help students perform better on standardized tests? Does it better prepare them for college? Can researchers develop better learning analytics to measure the short- and long-term effects of intermediaries such as the SOLE pedagogy?

For more information:

Please go to STARTSOLE (https://startsole. org) for more information on SOLE, to download the Easy App that allows for Lesson Plan creation with Common Core standards, and to get free CEUs by teaching with the SOLE App.

Resources

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