What is SOLE?
SOLE is an inquiry-based learning methodology. The SOLE process is designed to foster autonomy and student-driven learning by creating a collaborative environment that promotes innovation, discovery, and lifelong apprenticeship. At a post-graduate level of instruction, SOLE can be utilized to apply higher-order thinking skill (HOTS) such as synthesis, evaluation, analysis, and application.

SOLE is a three-stage process: question, investigate, review. The process provides structure for advance study, reflection and preparation for in-class, flipped, or online learning exercises. It can be conducted for the duration an instructor determines appropriate for the topic of investigation. The SOLE process can be conducted in a single class period or completed by segments over a period of days in-class, online, and individually. Below is a graphic explaining the process that can be adjusted to fit any schedule, space, and specific circumstance.

![SOLE Process Diagram](image)

**What you ask and how you ask it is crucial for the SOLE process - be clear and concise.**

**Frame the question as a genuine process of discovery to promote HOTS; you can refer to the verb list under “Asking the right questions.”**

**Organize the class into small groups.**

**Have each group collaborate and search for answers.**

**Have the groups generate tailored follow-on questions to guide deeper investigation.**

**Encourage negotiation and resolution to have the group to come to a mutual understanding of the concept.**

**Stand back and trust your students!**

**Observe and document the SOLE: take notes and photos to monitor change over time; use your observation to provide instantaneous formative assessment to help further the investigation.**

**Invite each group to present their collective discovery; they observe similarities/differences between other groups and links between other areas.**

**Facilitate a discussion about the question itself and their investigation process.**

**Engage students in their own review by asking what they would do differently next time, both individually and collectively, and what they think they and others did well.**

**“The right answer to a trivial question is also trivial, but the right question, even when insoluble in exact form, is a guide to major discovery.”**

- E. O. Wilson

**TIP**
This knowledge integration process can be incorporated in individual class sessions, a particular course module or periodically in support of iterative project-based learning or capstone projects. Students need to practice the process with smaller assignments and jigsaw exercises prior to applying to larger research or capstone projects.

**NOTE**
Depending on the complexity of the question, investigation and review may require more time.
Asking the right question

Below are verbs related to higher cognitive levels of Bloom’s Taxonomy for students to use to construct their SOLE questions. This is an iterative process designed to engage students in deeper levels of inquiry, knowledge integration, application, and meaning-making.

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<th>APPLY</th>
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<th>EVALUATE</th>
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**SAMPLE SCENARIO**

**Question**: How can the information provided by satellite images (remote sensing) be used?

Each group identifies its own path for inquiry and research. One group may investigate satellite images and determine what critical information they are able to see; another group may research the evolution of satellite imagery for military use.

Tailor the research by using the HOTS verbs to generate more specific questions. List all questions under this column to track the group’s investigation pathway.

Furthering investigation will lead the group to a deeper understanding of primary modalities of remote sensing, such as visible imaging, infrared imaging, radar imaging, and laser scanning.

At the completion of research, collaboration and discussion in their own groups, each group can present its findings and review with the whole class and instructor. The groups can also analyze and evaluate similarities and differences between each other’s findings.

**REFERENCES**


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