

# The SOLO Taxonomy

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## Background Information

The SOLO taxonomy (Structure of the Observed Learning Outcome) was developed by Biggs and Collis (1982). They analysed work from hundreds of students at different ages and across a range of subjects. In doing so, they detected recurring patterns in students' thinking. They found that as students learn, the outcomes of their learning have similar stages of increasing structural complexity. Their study showed that learners display a consistent sequence in the way they go about learning. This sequence applies over a large variety of tasks. This aligns with the work of Piaget in that it recognizes that everybody moves through a series of stages as their learning becomes more advanced, but it is at odds with Piaget in that SOLO is based on the assumption that a person can be performing at different stages in different tasks, at the same time.

In their research, Biggs and Collis measured two main changes in the way people learn: quantitative, as the amount of detail in a student's response increases; and qualitative, as that detail becomes integrated into a structural pattern. Their study found that the quantitative changes occur first, then the learning changes qualitatively (Biggs, 1999).

## Stages in the SOLO Taxonomy

The SOLO Taxonomy identifies five stages:

1. **Prestructural** – the learner may engage in preliminary preparation for learning, but the task itself is not attended to appropriately. The learner does not demonstrate any understanding of what is required or they may have misinterpreted the task.
2. **Unistructural** – the learner will attend to one aspect of the learning task in isolation. They demonstrate minimal understanding of the concept. A unistructural response is typically short and lacks detail.
3. **Multistructural** – the learner demonstrates understanding of several aspects of the learning task but does not relate them to each other. The student understands the boundaries of the learning experience, but has not yet grasped the systems or relationships within it. Curriculum objectives at this level may ask students to classify, describe, list, or narrate (Biggs, 1999).
4. **Relational** – several aspects of the learning task are integrated into a coherent whole and the concept can be applied to familiar problems or situations. Curriculum objectives at this level may require students to understand, apply, integrate, compare and contrast, or explain the cause of something (Biggs & Moore, 1993).
5. **Extended abstract** – extended abstract involves radical restructuring of material or new, higher-order thinking (Biggs & Moore, 1993). Students operating at this stage usually demonstrate more abstract thinking than instructional purposes require. Extended-abstract

objectives may include to generate, hypothesize, theorize, or reflect (Biggs, 1999). Some people never operate at this stage (Biggs & Collis, 1982).

### Uses for the SOLO Taxonomy

The SOLO Taxonomy was originally developed as an assessment tool to construct tests that measure depth of learning. The Taxonomy makes it possible to identify in broad terms the stage at which a student is currently operating in relation to a particular topic (Biggs & Lam, 1989). As an assessment tool, the taxonomy can be used in two ways:

1. to classify responses to open-ended questions according to the levels of the taxonomy; or
2. to structure objective-type items in the ordered-outcome format of the levels of the taxonomy (that is to use a number of assessment tasks at different levels of the taxonomy to determine which level a learner is working at).

SOLO can also be used to formulate teaching objectives, to develop learning outcomes, to guide lesson planning, and to evaluate teaching and learning (Biggs, 1999; Hattie & Purdie, 1998).

### Things to Consider When Using SOLO to Measure Depth of Learning

When developing a 'test' to measure the depth of students learning it is important that:

- the test is based on content that the student has been exposed to at an indepth level;
- if the test is comprised of several questions at different levels of the taxonomy, the answer to a more difficult question is not dependent on getting a lower level question correct.

Assessors must also keep in mind that a low SOLO level does not mean that a student is less intelligent than another who scored more highly on the same assessment task. Rather, this may reflect that he or she was less interested in the task, brought less prior knowledge to the task, or had a different perception of the motive behind the task (Biggs, 1987).

### Example SOLO Rubric

The following is a rubric for Survival that I pulled together using the SOLO Taxonomy as a guide.

#### Assessment Rubric

Prestructural	Unistructural	Multistructural	Relational	ExtendedAbstract
Cannot provide any ideas related to the concept/topic	Can provide one idea related to the concept/topic	Can provide several ideas, examples, supporting points, or non -examples	Can provide several ideas, etc, and show links or relationships between them	Can use links to create new knowledge or ideas related to the concept/topic

## References

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