



## WHAT IS IT?

Biggs and Collins (1982) developed the SOLO (Structure of Observed Learning Outcomes) taxonomy as a systematic way of describing how a learner's performance grows in complexity when mastering tasks. Performance levels of learners range from the lower end (Pre-structural) to the higher end (Extended Abstract) as shown in Diagram 1.



## DESCRIPTORS

### SOLO 1: Pre-Structural Level

- The student does not have any kind of understanding, uses irrelevant information and/or misses the point altogether

### SOLO 2: Uni-Structural Level

- The student can deal with one single aspect and make obvious connections. The student can use terminology, recite (remember things), perform simple instructions/algorithms, paraphrase, identify, name or count.

### SOLO 3: Multi-Structural Level

- The student can deal with several aspects but these disconnected. He/she is able to enumerate, describe, classify, combine, apply methods, structure, execute procedures, etc.

### SOLO 4: Relational Level

- The student may understand relations between several aspects and how they might fit together to form a whole. The understanding forms a structure and may thus have the competence to compare, relate, analyze, apply theory, explain in terms of cause and effect.

### SOLO 5: Extended Abstract Level

- The student may generalize structure beyond what was given, may perceive structure from many different perspectives, and transfer ideas to new areas. He/she may have the competence to generalise, hypothesise, criticize or theorise.

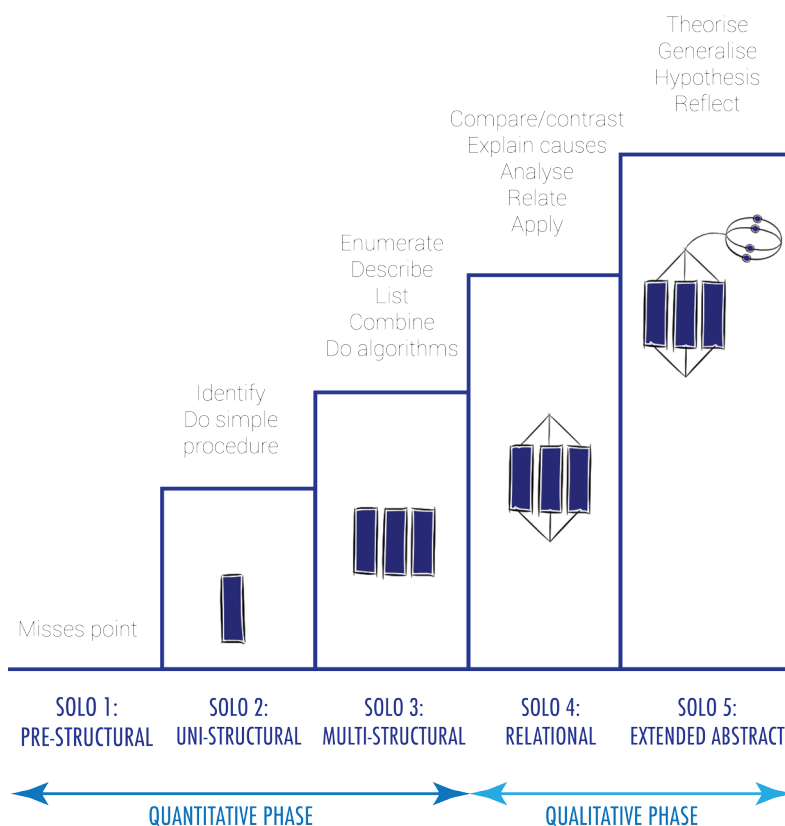


Diagram 1: Biggs and Collins (1982) SOLO Taxonomy levels



## VERBS WHICH CAN DESCRIBE PERFORMANCE AT DIFFERENT SOLO LEVELS

SOLO LEVEL	VERBS
SOLO 1: Unistructural	Define, identify, name, draw, find, label, match, follow a simple procedure
SOLO 2: Multistructural	Describe, list, outline, complete, continue, combine, calculate
SOLO 3: Relational	Sequence, classify, compare and contrast, explain (cause and effect), analyse, form an analogy, organise, distinguish, question, relate, apply, describe
SOLO 4: Extended abstract	Generalise, predict, evaluate, reflect, hypothesis, theorise, create, prove, justify, argue, compose, prioritise, design, construct, perform, explain, apply, analyse



## APPLYING SOLO TAXONOMY

The following is an example of the Intended Learning Outcomes (ILOs) written for a biology class using the SOLO taxonomy. (Note: The term Intended Learning Outcomes is interchangeable with the terms Learning Outcomes and Learning Objectives).

At the end of the course, the student is expected to be able to...

- calculate (SOLO 2) recombination frequencies, segregation ratios, inbreeding coefficients, Hardy-Weinberg frequencies, evolutionary equilibria, heritabilities etc.
- explain (SOLO 4) and apply (SOLO 3) linkage analysis, including mapping of genes on chromosomes – describe (SOLO 3) and analyse (SOLO 4) simple patterns of inheritance (i.e. through analysis of pedigrees)
- describe (SOLO 3) and explain (SOLO 4) the concepts of genetic variation, mutation, inbreeding, genetic drift, and natural selection
- describe (SOLO 3) and explain (SOLO 4) evolutionary processes
- analyse (SOLO 4) the inheritance at several genes simultaneously
- explain (SOLO 4) how inbreeding and population mixture influence genetic structure (Adapted from Brabrand & Dahl, 2009).



## WHAT IF I WANT MORE?

- Biggs, J.B., and Collis, K.F. (1982). Evaluating the Quality of Learning – the SOLO Taxonomy. New York: Academic Press.
- Biggs, J. (1999). Teaching for Quality Learning at University. SHRE and Open University Press.
- Brabrand, C., & Dahl, B. (2009). Using the SOLO taxonomy to analyze competence progression of university science curricula. Higher Education, 58(4), 531–549.
- [Characteristics of Deep and Surface Approaches to Learning](#) – University of New South Wales



## CONSIDERATIONS

While the SOLO taxonomy can help identify levels of progression with learning, Biggs (1999) also identifies characteristics of students that signal whether they are adopting a deep or surface level approach to learning.



## WHAT IF I NEED SUPPORT?

For further support contact  
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