

Summary

Finding ways to engage and extend the learning of high potential learners can be a challenge. SOLO Taxonomy (Biggs and Collis, 1982) can be a useful tool in understanding the complexities of thinking required by a task. This advice sheet is aimed at teachers, and parents who home educate. Its objective is to help ensure that high potential learners receive appropriate challenge in their education tasks.



Introduction

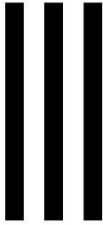

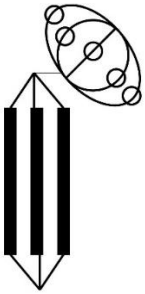
SOLO Taxonomy (Structure of Observed Learning Outcomes) is a way of describing how a learner's understanding develops from simple to complex, when learning different subjects or tasks.

It was proposed by educational researchers John Biggs and Kevin Collis in 1982 as an alternative to Bloom's Taxonomy. The SOLO model describes levels of increasing complexity in a learner's understanding, emphasising the importance of deep learning in ensuring a sophisticated and fluid understanding. It is used to enable an assessment of a student's work in terms of quality of thinking, rather than how many facts are right. It can be used to plan for differentiation, giving and receiving feedback, developing self-assessment skills, thinking strategies and reflection on learning processes. It can help in the design of the curriculum in terms of the level of learning outcomes intended, as well as determining the next steps for learning. "SOLO Taxonomy provides a simple and robust way of describing how learning outcomes grow in complexity from surface to deep understanding". (Biggs & Collis, 1982)ⁱ

The 5 Hierarchical Levels of SOLO Taxonomy

SOLO Taxonomy is divided into 5 levels which assess understanding, ranging from inexperience to expertise.

Pictorial	Level	Description
	Prestructural	At this level, nothing is known about the task.
	Unistructural	A single basic concept or idea is known.

	Multistructural	The learner knows a number of concepts but is unable to make connections and conclusions, therefore understanding is limited.
	Relational	The learner has connected ideas and is logical. They are able to make connections and link ideas, therefore understanding is solid.
	Extended Abstract	The learner has formed logically connected ideas and can discuss areas beyond this. They can make connections beyond what is taught.

How Is SOLO Taxonomy Useful in Educating High Potential Learners?

High potential learners often process information more quickly than their peers. Research by Dr Linda Silverman noted characteristics of children with high learning potential include learning rapidly and not enjoying repetitionⁱⁱ. These learners can condense simple content and quickly move on to a higher-level context. High potential learners tend to learn more like experts than novices. They are capable of advanced thinking skills and can be practised in problem solving, critical and creative thinking.

These skills should be encouraged in the classroom in order to prevent boredom and encourage deep and meaningful learning. Effective education of these learners is not achieved through ‘more of the same’ activities. Indeed, to some, this can be seen as a punishment. High potential learners enjoy opportunities to build connections in their learning. Through building these connections and seeing relationships, profound learning takes place.

By planning activities that allow learners to analyse, explain, reflect, criticise and hypothesise, educators enable students to take their ideas to the next level. Through reference to SOLO Taxonomy, teachers can develop all children’s skills further as independent and aware learners. Some schools, where SOLO Taxonomy has been implemented successfully, report that the abilities of all children to learn has been improved due to an awareness of what deeper learning involves and what their next steps should be.

SOLO Taxonomy in the Classroom

Although there are schools who use SOLO Taxonomy to direct their students' reflection on their learning, the use of SOLO Taxonomy in the classroom does not have to be explicit. SOLO Taxonomy can be used implicitly in the way work is planned, taught and assessed. The following suggestions and ideas encourage deeper level thinking, leading to more opportunities for high potential learners to engage in relational and abstract extended thinking. For some high potential learners, with a deeper understanding or awareness, their entrance point for some curriculum tasks may be at one of the more advanced SOLO Taxonomy stages.

Cover Simple Content Quicker

High potential learners are often quicker than their peers in understanding simple information. Therefore, it is advisable for teachers to condense lower level content for these individuals and move on to higher level content. Using the stages of SOLO Taxonomy, a teacher should plan questions and tasks that directly encourage the skills required for higher level stages.

Contextual and Real-Life Learning

High potential learners learn more like experts. They can see the broader picture and enjoy 'fitting in' the pieces to the overall jigsaw. A good strategy to use with them is to explain where the particular concept being learned fits within the overall topic and subject area and what skills are involved. High potential learners are more likely to feel motivated when they can understand the relevance of their learning; otherwise to them it can feel like a waste of time. Chickering and Gamson (1987) undertook extensive research into learning and teaching in the USA, from which they concluded that: "Learning is not a spectator sport. Students do not learn much just sitting in classes listening to teachers, memorising pre-packaged assignments, and reproducing the expected answers. They must talk about what they are learning, write about it, relate it to past experience, and apply it to their daily lives. They must make what they learn part of themselves."ⁱⁱⁱ

This type of learning may take the form of questioning in lessons:

- 'Does it remind you of ...?'
- 'How does it make you feel?'
- 'Do you agree with...? Why/why not?'
- 'What effect would this have on you?'
- 'What would you do ...?'
- 'What did you do when...?'
- 'If x happened, what would you do?'

Contextual learning emphasises problem solving and anchors teaching in the real life context of the pupils. It encourages high potential learners to learn from one another and recognises that teaching and learning need to occur in many contexts, rather than purely in the domain of the classroom. Having a personal response to learning is deep learning.

Real-life learning allows all students to see the broader relevance of their learning to a real life situation. Inviting 'experts' in to demonstrate how their learning has impacted their own career paths, has a real relevance for high potential learners. For example, a surgeon talking to students about their work and the way their knowledge and thinking has helped to overcome problems, is pertinent when learning about the human body. A costume designer sharing the design process, costumes and sketches, highlights art in real life. A structural engineer discussing shape stability

and the processes they use enriches lessons about shapes, design technology and maths. The chance to see how such deep understanding projects into adult working life can provide inspiration, direction and purpose. For some high potential learners, who may have a tendency to become fixated on a particular interest, this is an excellent way to expand their horizons.

Self-Directed Learning

All children need opportunities to develop independent skills. It is particularly important that high potential learners are given this chance in school as they often direct their own learning outside of school. Problem-based independent learning allows learners to reflect, evaluate, predict, imagine and generalise – all thinking skills seen in the relational or extended abstract stages of SOLO Taxonomy. Learners should be provided with the chance to find out things for themselves. This may seem like a risky strategy in the classroom as it can produce unplanned outcomes and may lead where teachers hadn't anticipated going.

However, this is exactly the type of learning freedom high potential learners frequently need, since they can have a strong curiosity and can be keen observers who learn rapidly (Dr Linda Silverman). This ability to comprehend information quickly can rapidly move these students through areas of learning, thus teaching could begin for them at the relational or even extended abstract levels of learning. Strategies could include asking high potential learners to write their own questions, for example, 'what do you want to find out now based on your current knowledge?' or 'what might help you to solve this problem/answer the question?' They should then be supported in structuring good probing questions so that they can pursue the answer. As they pursue their answer, they will also find out further information and connect that to their prior learning. Self-directed learning allows pupils to learn at their own pace; display knowledge that may otherwise be overlooked in class and feel that they have more control over their learning. High potential learners who are disengaged are more likely to feel motivated if there is an element of choice in their work.

This type of learning does have its constraints, in that it requires plenty of resources and a fluidity in the way the classroom is organised. However, these can be overcome to the benefit of students' learning.

Displaying High-Level Examples of Work

Teachers often provide their classes with examples of good work. However, they can shy away from using very high-level examples for fear of demoralising some learners. It is important, though, for high potential learners to regularly see examples of very high-level work. Alongside the display of exemplar work, high potential learners benefit from being shown explicitly what makes the work such a high level, such as evidence of connected points or hypothesising. This allows learners to be more considered and structure this regularly into their own work.

Differentiation and Lesson Planning

It is possible to use the SOLO Taxonomy to plan and differentiate lessons. When planning with reference to SOLO Taxonomy levels, a teacher should carefully consider the level of questioning they are using for different groups or individuals in their class. Lesson planning could include highlighting the progression of thinking skills, probing deeper into the learning objective and enabling high potential learners and others to progress on to more sophisticated applications of

their knowledge. This could be through making connections and allowing for independent learning.

When learners have the chance to build connections with their knowledge, profound and lasting learning occurs. Lesson planning could also incorporate the sample verbs (below), taken from Biggs and Collis' work on SOLO Taxonomy. These verbs are useful in determining what type of thinking is being encouraged. They are a good checking tool to see whether the planned activities will bring out these progressive thinking skills naturally.

SOLO Stage	Key Thinking and Learning Verbs
Prestructural	Unsuccessful, missed point, not learned yet, teacher help needed
Unistructural	List, name, memorise, define, identify, do a simple procedure, describe, draw, find, label, match
Multistructural	Define, describe, classify, combine, do algorithms, enumerate, list, outline, combine, follow a pattern
Relational	Analyse, explain, integrate, sequence, relate, apply, compare, contrast, argue, criticise, justify, classify, organise, question
Extended Abstract	Reflect, evaluate, theorise, hypothesise, generalise, predict, create, imagine, formulate, generate, prove, plan, argue, compose, prioritise, design, construct, perform

For example, in a Primary Year 4 lesson about 'sorting living things' a progression of thinking skills could be managed through the following tasks:

Unistructural- List some living things and match them to their group. Identify those that don't fit.

Multistructural- Organise the living things into groups. Describe their common characteristics. Can you combine them in other ways?

Relational- Compare the groups of living things. Classify them further into smaller groups and explain your criteria. Analyse whether habitat dictates the groups that living things are sorted into.

Extended Abstract- Evaluate how living things have changed over millions of years and prove why they have had to change (evolution and adaptation). Create an identification key for your choice of 5 living things. Hypothesise how their habitats are changing and what might happen to the living things. Design how one of your living things may have to adapt to withstand climate change. Evaluate whether this would be possible.

Reflection and Assessment

SOLO Taxonomy can also be used to support learners in reflecting on their own learning. Students are encouraged to consider the stage of thinking their learning has reached and reflect meaningfully on what the next steps in their learning might be. There are many examples online for how different schools have used SOLO Taxonomy explicitly with learners to great effect. While these examples often focus on secondary education, there are some examples of primary schools successfully using SOLO Taxonomy. Pam Hook^{iv}, a consultant in teaching and learning, has worked extensively on using SOLO Taxonomy in the classroom. On her website there are practical ideas for using SOLO Taxonomy to assess students' learning and ways for them to peer and self-assess.

Finally

SOLO Taxonomy can provide a very clear and useful way to address the needs of high potential learners. It explicitly sets out the progression of thinking skills required at each level. High potential learners can be at risk of underperforming in school if they are not given appropriate challenges. Through SOLO Taxonomy it is possible to see that challenge is available in the form of higher order thinking skills. Allowing high potential learners to work independently and direct their own learning can yield surprising results and sophisticated levels of discussion. Extension tasks can be provided in simple and effective ways. A different starting point for a high potential learner can be as simple as moving along the SOLO hierarchy to the Relational and Extended Abstract stages. Allowing a high potential learner to theorise, prove, evaluate, compose, construct or argue can structure opportunities to become critical thinkers and reflective learners.

SOLO Taxonomy is a useful classroom tool for all learners and is helpful in understanding the learning and skills of high potential learners. It can alert teachers to the sophisticated ways that individuals think and learn and it can also help teachers in the way that they plan for extending learners within class tasks.

Further Information

S313 Enquiry-Based Learning	Enquiry-based learning gives learners the opportunity to ask questions and investigate topics through researching and finding out for themselves. This advice sheet supports developing strategies for independent working and structuring of questions.
S104 Characteristics of High Potential Learners	This advice sheet helps identify common characteristics shared by many highly able young people
Sharing SOLO with Students – Reflections of My Teaching	A teaching blog reflecting on how to introduce SOLO Taxonomy to students.
http://pamhook.com/	Website featuring further information on SOLO Taxonomy, as well as useful classroom suggestions and resources.

www.classteaching.wordpress.com	Article entitled: 'Using SOLO Taxonomy to Develop Student Thinking and Learning'. In this article SOLO is explained. Examples are included about how it has been used in the classroom with students.
www.highlandliteracy.com	Use the Search term SOLO Taxonomy for a number of articles and posts ranging from classroom ideas and examples to information about SOLO Taxonomy.
www.leadinglearner.me	Article entitled, 'Redesigning Classrooms: Spreading and Embedding the SOLO Taxonomy'. Article entitled, 'Powerful Feedback the SOLO Way'. Examples of assessing students using SOLO.
<i>Evaluating the Quality of Learning: The SOLO Taxonomy</i> by Kevin Collis and John Biggs, 1982	Biggs and Collis' findings and introduction of SOLO Taxonomy.

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To give feedback on this advice sheet, please go to: www.surveymonkey.com/s/advicesheetfeedback

ⁱ Collis, K., & Biggs, J. (1982). *Evaluating the quality of learning: The SOLO Taxonomy*

ⁱⁱ Potential Plus UK. [S104 Characteristics of High Potential Learners](#)

ⁱⁱⁱ Chickering, A., & Gamson, Z. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin* March 1987, 3-7.

^{iv} <http://pamhook.com/>