

CRITICAL THINKING AND INQUIRY IN ADVENTIST EDUCATION



“True education is not forcing instruction on an unready and unreceptive mind. The mental powers must be awakened, the interest aroused.”¹

Seventh-day Adventist educators recognize that “Every human being, created in the image of God, is endowed with a power akin to that of the Creator—individuality, power to think and to do. . . [and that] It is the work of true education to develop this power, to train young people to be thinkers, and not mere reflectors of other people’s thought.”²

This is *our great calling and our challenge* as Adventist teachers. It is vital, therefore, that we intentionally employ strategies by which we can guide young people to become *reflective thinkers and independent learners*, who become *responsible for their own learning journeys*, who are capable of *doing their own thinking and planning*, who become *responsible, collaborative, lifelong learners*, and who will *demonstrate their individuality* in service to God and humanity.

Before further exploring the challenge placed before us, however, there are at least two other issues to consider: the place of a standards-based curriculum in teaching and learning, and 21st-century skills.

Standards-based Curriculum and 21st-century Learning and Teaching Skills

In many countries, 21st-century educators increasingly observe and experience the implementation of national³ and system⁴ standards-based teaching and learning curriculum frameworks for developing and assessing students’ understanding, knowledge, and skills. One common purpose of these initiatives is to provide equity in preparing students for further education (university, college, and technical), careers, and the challenges of global citizenship in an increasingly technological advancing, mobile, and globalized world.⁵

Generally, educational standards describe

what young people should learn as they progress through schooling.⁶ In some countries, such as Australia, standards also describe the extent of learning, and the quality, depth, and sophistication of understanding and skill development at each stage of schooling.⁷ Educators are expected to provide students with experiences and learning goals that are consistent across the nation, linked to authentic experiences, and which seek to prepare young people for the 21st century.⁸

In addition to a standards-based curriculum, educational leaders and teachers have likely been exposed to a number of models for teaching and assessing 21st-century skills,⁹ which seek to support students in developing independence of thought and becoming responsible, collaborative, lifelong learners. These skills have been categorized as describing “*ways of thinking, ways of*

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working, tools for working, and skills for living in the world.”¹⁰ Most lists include variations of the following attributes: creativity and innovation, *critical thinking* and problem solving, communication and collaboration, decision making and learning, using information and communications technology (ICT) and information literacy, as well as developing citizenship, life, and career skills, and personal and social responsibility.¹¹

Adventist educators could use the skills listed above to extract and create system-developed Christian standards, values statements, and frameworks that embed the Adventist worldview throughout the K-12 curricula,¹² and assist students in preparing for a life of Christian service and character development for this life and the life to come.

The Challenge

How then do educators rise to the challenge outlined above, the challenge to train our young people to be independent thinkers?

To assist their students in becoming independent and critical thinkers, teachers can refine their own understanding of cognition and metacognition by taking a deeper look at the powerful teaching and learning frameworks in the current educational climate that incorporate cognitive and metacognitive learning and teaching skills and strategies, and which encourage the use of rich assessment practices.

Such frameworks include: Inquiry-based Learning, with models such as Kath Murdoch’s Framework¹³; Understanding by Design (Wiggins and McTighe)¹⁴; Project-based Learning¹⁵; Webb’s Depth of Knowledge Framework¹⁶; the Structure of Observed Learning Outcomes Taxonomy (SOLO)¹⁷; and the Transformational Planning Framework¹⁸ (upon which the Australian *Adventist Encounter* Curriculum is built). Teachers should also consider the valuable and seminal work of researchers Ron Ritchhart, Mark Church, and Karin Morrison from *Harvard Graduate School of Education: Project Zero Visible Thinking Routines*.¹⁹ Such frame-

works and strategies provide educators with the opportunity to use inquiry-based teaching and learning practices, rich assessment strategies, and engaging thinking routines to develop in their students the capacity to think critically.

When educators are considering the *why*, *what*, and *how* of integrating critical thinking skills into their teaching and learning practice, they need to consider the difference between cognition and metacognition. *Cognition* is defined as the “mental ability or process of acquiring knowledge by the use of reasoning, intuition, or perception,”²⁰ while *metacognition* is defined as the “knowledge of your own thoughts and the factors that influence your thinking,”²¹ or put simply, thinking about thinking. Teachers should ensure that *both* of these types of thinking become part of students’ learning experiences.

In addition to teaching 21st-century skills, it is also vital that teachers become *intentional* in their use of assessment practices—



particularly the powerful formative assessment strategies—and teach students to understand the role of assessment in learning. “Assessment: The Bridge Between Teaching and Learning” is a paper on the role of assessment as a formative element in learning. The author, Dylan William, emeritus professor of educational assessment at University College London, suggests that assessment—in particular, formative assessment—is a “bridge between teaching and learning”²² through which achievement of deep understanding, knowledge, and skills can be accomplished.

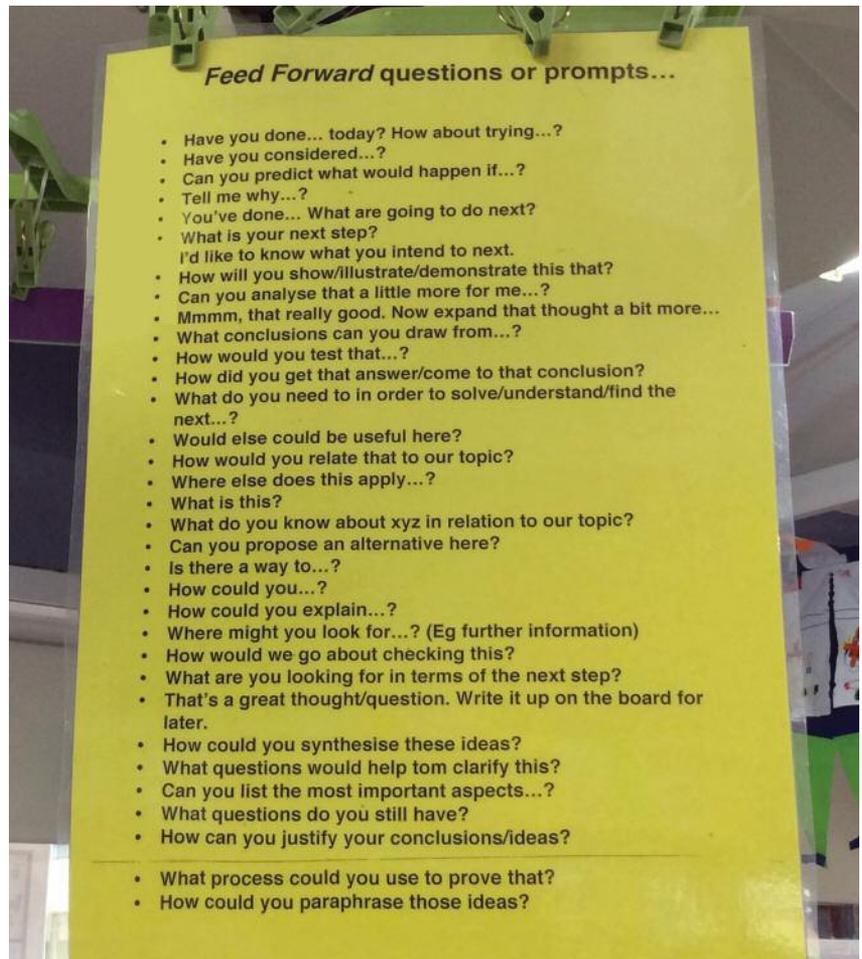
In considering the relationship between inquiry-based learning frameworks, thinking processes and strategies, and formative assessment practices, the questions to keep in mind include the following:

- *How can we assist our students to see themselves as thinkers and learners as well as develop in them a critical awareness of their own thinking and learning?*
- *How can we as educators ensure that we provide our students with well-planned, rigorous learning experiences that enable us to move beyond assuming what they have learned to knowing they have learned?*
- *How can we [both teachers and learners] use formative assessment practices more effectively to strengthen the bridge between teaching and learning?*
- *How can we use these separately or together to give our students voice and choice?*

Teaching and Learning Frameworks and Metacognition Strategies That Work Together

Metacognitive practices and skills can be fostered in learners by designing an effective, engaging, and challenging inquiry-based curriculum. Furthermore, to form that bridge²³ between teaching and learning, the scaffolds used in such rigorous curriculum design, when well applied, also guide the planning for and effective use of formative assessment and visible thinking practices. Together, these have the potential for significant impact on the learning and achievement of all learners.

Three well-recognized, widely accepted, powerful frameworks that readers may find particularly useful are the following: (1) Understanding by Design—a framework developed by Grant Wiggins and Jay McTighe²⁴; (2) the Depth of Knowledge Framework developed by



Feed Forward questions displayed as prompts to move the lesson forward, provide feedback, and assess understanding.

Norman L Webb²⁵; and (3) The Structure of the Observed Learning Outcomes Taxonomy (or SOLO Taxonomy) developed by John Biggs and Kevin Collis²⁶ and expanded upon by the work of Biggs and Catherine Tang²⁷ and Pam Hook.²⁸

Understanding by Design (UbD) Inquiry Learning Model

UbD, sometimes called “Backward Design” leaves [the planning of] teaching activities until the end²⁹ and is intended to engage teachers in purposeful curricular planning that begins with setting a unit’s learning goals and designing authentic performance and assessment tasks. “Wiggins and McTighe argue that you can’t start planning *how* you’re going to teach until you know exactly *what* you want your students to learn.”³⁰

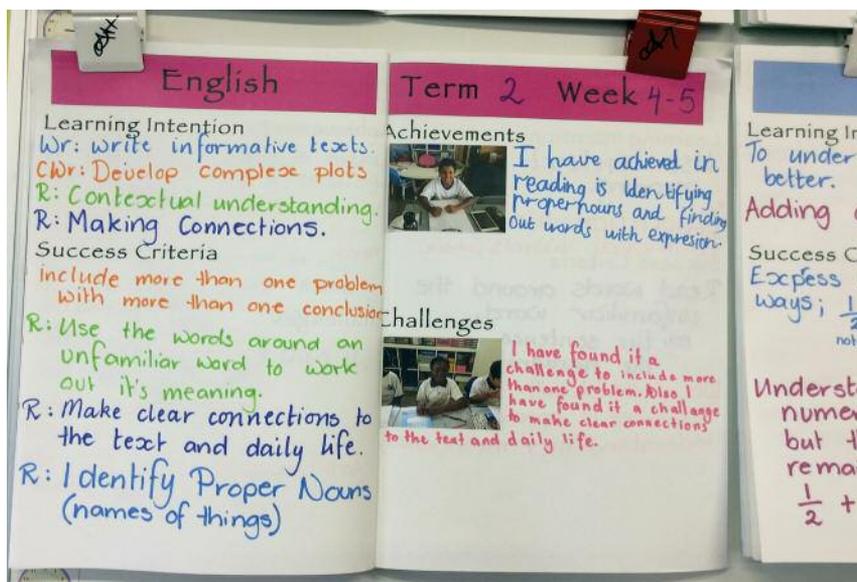
By applying within the framework the recommended series of planning tools, teachers have the opportunity to develop engaging, au-

thentic teaching and learning experiences for students that will engage them in rigorous inquiry for understanding and transfer of learning. The model also promotes the development of complex thinking skills. Learners’ metacognitive skills will be fostered through the meticulous exploration of the big ideas and essential questions set by educator and learner.

UbD has three phases:

- Phase One: Identifying the desired results of teaching and learning;
- Phase Two: Determining acceptable evidence of learning, describing understandings, developing big ideas and essential questions, and outlining the necessary skills to be learned and applied;
- Phase Three: Framing learning activities and experiences.

Because Understanding by Design also



An example of Learning Intentions and Success Criteria used in a Year 4 classroom. Students reflected on their own learning, recorded their reflections, and added them to the class record in a permanent journal.

uses a continuous-improvement approach, it lends itself well to the application of the formative assessment strategies outlined above. For example, goals, understandings, and skills lists can be restated as learning intentions (LI) from which success criteria (SC) can be developed. LI and SC might also be used to develop assessment rubrics, which students can use to self- and peer-assess their progress toward attaining the established goals. And the LI and SC can be used to frame quality interactions (teacher to student, and student to student), to which teachers can refer when providing learners with verbal and written feedback.

At the end of each unit, teachers' formative assessments can be combined with the evaluation of the completed performance tasks or assignments to clearly demonstrate for all involved what students know, understand, and are able to do.

Webb's Depth of Knowledge Framework

Standards-based curricula describe the content, concepts, quality, depth, and breadth of attainment, as well as the thought processes expected of learners at each level of their schooling. It is the teacher's task to be sure the instruction, tasks, and assessments unpack the complexity of these expectations.

Questions that must therefore be answered include the following: *How do we*

have learners interact with content? What strategies could be used to engage students and extend their thinking within the content and contexts of their learning? How do we foster complex thinking and measure its development in our learners?

Most teachers will be familiar with, and will have used, Bloom's Taxonomy (which is often characterized as a progression from lower-order to higher-order thinking) to define levels of thinking demanded by various learning tasks. Karin Hess³¹ suggests that Webb's Depth of Knowledge (DOK) Framework is a more effective taxonomy for use in **fostering complex thinking and metacognition** because it asks, "*How deeply does the student have to know the content to be successful?*"

Thus, "DOK is not about difficulty; it is about *complexity*."³² It "provides a vocabulary and a frame of reference when thinking about our students and how they engage with the content. DOK offers a common language to understand 'rigor' or cognitive demand, in assessments, as well as curricular units, lessons, and tasks. Webb developed four DOK levels that grow in cognitive complexity and provide educators a lens on creating more cognitively engaging and challenging tasks."³³

While Webb's Depth of Knowledge Framework provides an overview of each of the DOK levels,³⁴ Karin Hess,³⁵ who has worked

extensively to help make DOK accessible to educators, describes each of the levels and their purposes this way:

The four DOK levels:

1. *Recall and Reproduction*: Demonstrate recall of a fact, term, principle, or concept; or perform a routine procedure;

2. *Basic Application of Skills and Concepts*: Use information and conceptual knowledge, select appropriate procedures for a task with two or more steps with decision points along the way, solve routine problems, organize/display data, interpret/use simple graphs;

3. *Strategic Thinking*: Apply reasoning, develop a plan or sequence of steps to approach a problem that requires some decision making and justification. Often involves abstract, complex, or non-routine reasoning. Investigations may produce more than one possible answer as long as the supporting opinion, judgment, or critique is justified;

4. *Extended Thinking*: Engage in investigations with real-world applications that require time to research, solve problems, and process multiple conditions of the problem or task. May involve non-routine manipulations across disciplines/content areas and multiple sources. More time is needed for inquiries/projects/assignments at this level because it requires more complex thinking.

As when creating activities based on Bloom's Taxonomy, verbs may be used as stems to create tasks or project descriptions, for example, "**Describe** the habitat of a bush wallaby." With DOK, however, the depth of rigor does not depend on the verbs but on what comes after them. For example, while *Describe* is the verb used in the following samples, it is what follows that deepens the level of rigor in the task.

- DOK Level 1: *Describe* the process of _____. (Requires basic recall of facts. There is a right answer.);

- DOK Level 2: *Describe* how _____ and _____ are alike and different. (Requires application of ideas, in this case to compare and contrast);

- DOK Level 3: *Describe* why these steps were taken to solve _____. (Requires demonstration of decision making and justification of decisions made);

- DOK Level 4: *Describe* the most significant effect of _____. (Requires extended investigation using multiple sources of information and may produce several possible answers).

To help students use more complex reasoning, DOK provides a thorough guide for planning inquiry-based units of work which incorporate engaging lessons and activities that scaffold thinking. Indeed, more complex thinking will usually be fostered when *every* learning experience incorporates all four DOK levels. This is because cognitive capacity and metacognitive skills are being developed continuously, as well as assimilated over time. In addition, when combining the four levels, teachers and students can more easily engage in formative assessment practices because they can frequently refer to the framework's continuum of complexity and cognitive demand.

SOLO Taxonomy

SOLO, which stands for the **Structure of the Observed Learning Outcomes**, was first described by John Biggs and Kevin Collis in 1982 in *Evaluating the Quality of Learning: The SOLO Taxonomy*.³⁶ Biggs described SOLO as “a means of classifying **learning outcomes** in terms of their complexity, enabling us to assess students’ work in terms of its quality not of how many bits of this and of that they got right.”³⁷ Pam Hook defines SOLO as “a model of learning that makes learning intentions and success criteria visible to students and teachers.”³⁸

SOLO provides both a structure and a process for learning. It makes both the task and the learning outcome visible, and assists students in understanding how to assess their own learning. Similar to DOK, SOLO can be used to describe the cognitive complexity of the learning assignment. In addition, teachers and learners can use the framework to assess the level of achievement of learning outcomes, as well as the level of metacognition undertaken. Furthermore, learners assessed as functioning at a specific level can demonstrate performance and thinking practices from all of the previous levels.

The SOLO Taxonomy consists of three **levels of understanding**:

1. *Surface understanding*
2. *Deep understanding*
3. *Conceptual understanding*

It also includes five clear **levels of learning outcomes**, represented by a series of symbols (See diagram at right):

1. *Prestructural*: Symbolized by a dot.
2. *Unistructural*: Symbolized by a single bar.

3. *Multistructural*: Symbolized by three unconnected bars.

4. *Relational*: Symbolized by three connected bars.

5. *Extended abstract*: Symbolized by three connected bars with extending lines.

At the *prestructural* level, learners need help to get started because they do not understand the topic of study. They are unable to organize and connect information.

Surface understanding [superficial, isolated ideas] includes the *unistructural* level of outcomes, where the learner has one idea relevant to the topic, as well as the *multistructural* level of outcomes, where he or she has several relevant ideas. At the *unistructural* level, learners are able to define, identify, and perform a simple procedure. At the *multistructural* level, they can define, describe, list, and combine. The move from *unistructural* outcomes to *multistructural* outcomes represents a quantitative increase in understanding.

Deep understanding [connected ideas] incorporates the *relational* level of outcomes, where the learner can take several ideas related to the topic and link them together. At the relational level, learners are able to formulate questions, compare and contrast, explain causes, sequence, classify, analyze from part to whole, relate ideas, and apply what they have learned.

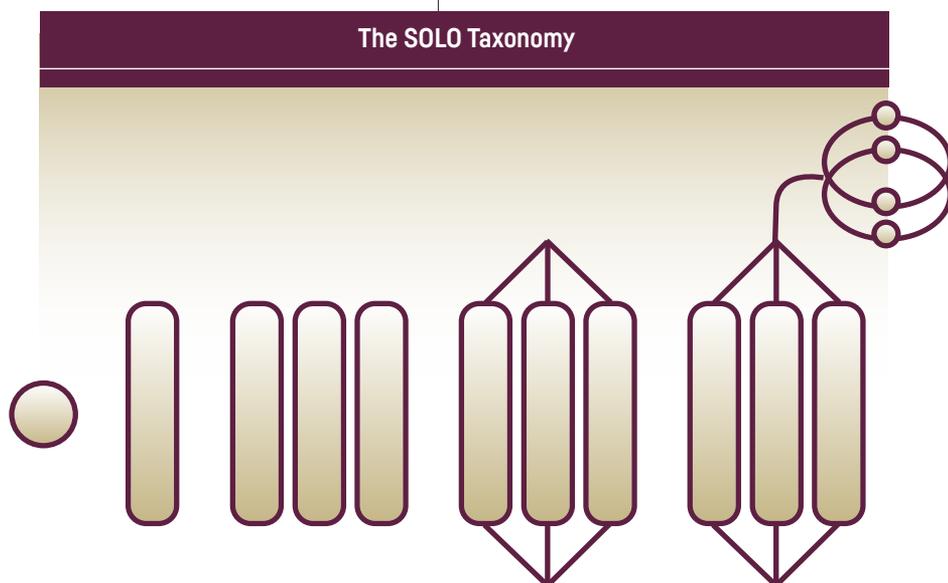
Conceptual understanding comprises the *extended abstract* level of outcomes, where the learner has taken the linked ideas and ex-

tended them. At the *extended abstract* level, learners can evaluate, theorize, generalize, predict, create, imagine, hypothesize, and reflect. The move between *multistructural* outcomes and *relational* and *extended abstract* outcomes represents a qualitative or deepening increase in understanding.

SOLO makes learning visible and can be used in a number of ways for different purposes, including the following:

- Determining learners’ prior knowledge, understanding, and skills;
- Planning cognitively challenging learning tasks that provide for increasing cognitive and conceptual complexity;
- Aligning teaching to learning intentions (outcomes) and success criteria;
- Choosing and applying formative assessment and metacognitive strategies such as giving feedback and feed forward (suggestions for changes that will impact the future), and self-assessment that ensures learners make further progress in their learning.

It is also important for teachers to understand that only after the structures of SOLO are shared with students will they begin to move toward becoming reflective, responsible, and independent learners. Sharing can be done in a number of ways, the simplest of which are (1) to teach learners the symbols of the taxonomy and use them, for example to code learning intentions and activities; (2) to share and use the descriptions that have been developed to illustrate each level of understanding and level of learning outcome;



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and for younger learners, (3) to teach the series of hand signs developed by Hook³⁹ to illustrate each learning outcome level.

More About Metacognition

From birth, learners use their cognitive processes, and educators, during students' years of primary and secondary schooling and higher education, work with their students to nurture these skills. *But what do teachers do about metacognition?*

Simply put, metacognition is thinking about thinking. In her *Metacognition CFT Teaching Guide*,⁴⁰ Nancy Crick, assistant director of the Center for Teaching at Vanderbilt University, cites the meta research of John Bransford et al., published in *How People Learn*, where he recommends that metacognition be used as an effective approach to instruction. By tackling "thinking about thinking" in this way, teachers will foster in learners the ability to transfer and adapt new learning to new contexts and tasks.

Why is it important that educators should put importance on teaching their students to think about their thinking? What does this achieve for the learner? And how is it practiced?

A metacognitive approach to instruction is important because it "helps students become aware of their strengths and weaknesses as learners"⁴¹ across a variety of personal, interpersonal, and social learning contexts inside and outside the classroom. To achieve at a higher level, students must be explicitly taught and "learn specific and correct [metacognitive] skills"⁴² and strategies with which to monitor and improve their learning because in doing so, they become consciously competent learners and thinkers.

Metacognitive skills and behaviors can be taught specifically by applying most formative assessment strategies and by using tools and structures such as the Project Zero Visible Thinking "Introducing and Exploring," "Synthesizing and Organizing," and "Digging Deeper" routines (as described in *Making Thinking Visible*⁴³). For example, by having students access their prior knowledge through pre-assessments, and deciding for themselves how they might go about pursuing new learning; by showing them how to use various formative assessment and thinking routines, tools, and structures to guide and reflect on their learning; and finally, by providing them

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opportunities at the conclusion of each unit to look back and outline the changes to their thinking over time. Explicit teaching and modeling of these skills and strategies helps make thinking more visible to learners and provides them with ways "to talk about learning and thinking, compare strategies with their classmates and make more informed choices."⁴⁴

Conclusion

Christian educators will always have a responsibility to ensure that their students develop independence of thought and action and are well prepared to live responsibly in this world while learning to serve God and others. Educators today find themselves in a climate of standards-based teaching and learning combined with the imperative to prepare students for their futures by ensuring

they learn the 21st-century skills. This article has provided a brief overview of some useful frameworks: UbD, DOK, and SOLO, as well as some formative assessment and metacognitive practices.

Each of the frameworks and practices is designed to support teachers in providing rich inquiry-based learning experiences for learners. Well used, each has the potential to help teachers introduce and reinforce complex cognitive and metacognitive skills. Each (1) offers students voice and choice about their learning; (2) provides both teachers and learners with the opportunity to strengthen their use of formative assessment practices; (3) ensures that learning and thinking are made visible and accessible to all learners; and (4) has the potential to make a significant impact on student achievement.

When we open our teaching and learning "toolboxes" to powerful inquiry-based planning models and frameworks; consistently and intentionally use formative assessment practices; deliberately make teaching and learning visible for our students as well as ourselves through the use of multiple strategies for developing complex cognitive and metacognitive habits—when, indeed, all of these are made central to effective, engaging instruction and the processes of learning in our classrooms, then we will be taking giant steps toward achieving our goal of ensuring our students become reflective, independent, lifelong learners, ready for their place in this world and the world to come. ✍️

This article has been peer reviewed.



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