From Information Processing to New Knowledge Construction: How Teacher Librarians Bridge the Gap between the School Library and Classroom

By Carol A. Gordon

> *To instruct someone . . . is not a matter of getting him to commit results to mind. Rather, it is to teach him to participate in the process that makes possible the establishment of knowledge. We teach a subject not to produce little living libraries on that subject, but rather to get a student to think mathematically for himself, to consider matters as an historian does, to take part in the process of knowledge-getting. Knowing is a process not a product* (Bruner, 1966, p. 72).

The Information Search Process and Bloom's Revised Taxonomy

Jerome Bruner's view of learning as process rather than product is one of the most important shifts in our understanding of how people learn. Nested in the constructivist philosophy of John Dewey (1944), learning as process has shaped concepts such as learner-centric instruction, personalised learning, authentic, or performance-based assessment, competency-based learning, and learning by doing. Discovery learning, teaching through objectives, the role of information literacy in self-directed learning, and even the idea of maker-spaces have evolved from these 20th century educational concepts.

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For school libraries, Kuhlthau's (1983) Information Search Process (ISP) makes the information-to-knowledge connection (Figure 1). This research-based information behaviour model identifies predictable stages for the cognitive, affective, and behavioural dimensions of processing information.

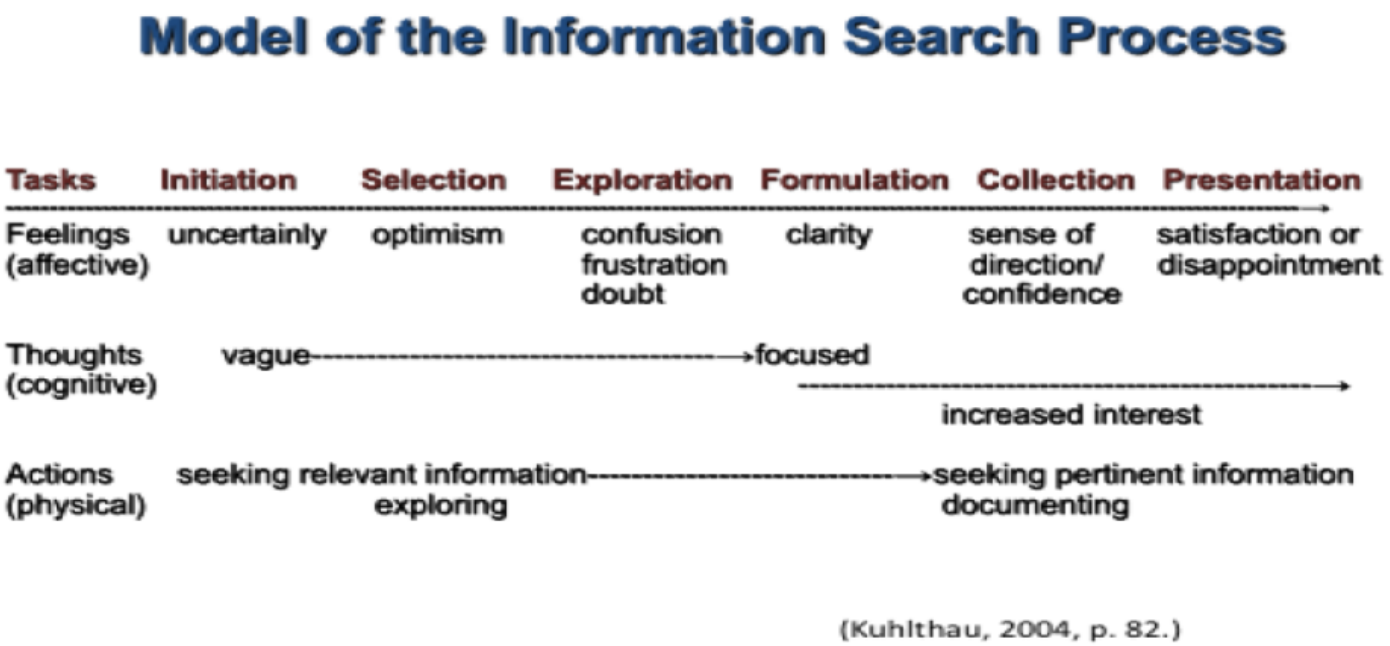

Figure 1. Model of the Information Search Process. (Kuhlthau, 2004)

Kuhlthau identified John Dewey's work as a theoretical foundation for the Information Search Process.

> *The axiom 'learning by doing' is often attributed to Dewey. However, that is only half of the equation. The other, critical half is thinking or reflecting. Learning takes place through a combination of acting and reflecting on the consequences, which Dewey called reflective experience or reflective thinking*. (Kuhlthau, 2004, p. 15).

Teacher-librarians have used ISP to guide their selection of teaching strategies, such as activating the learner's prior knowledge and using digital tools, such as mind mapping (Figure 2).

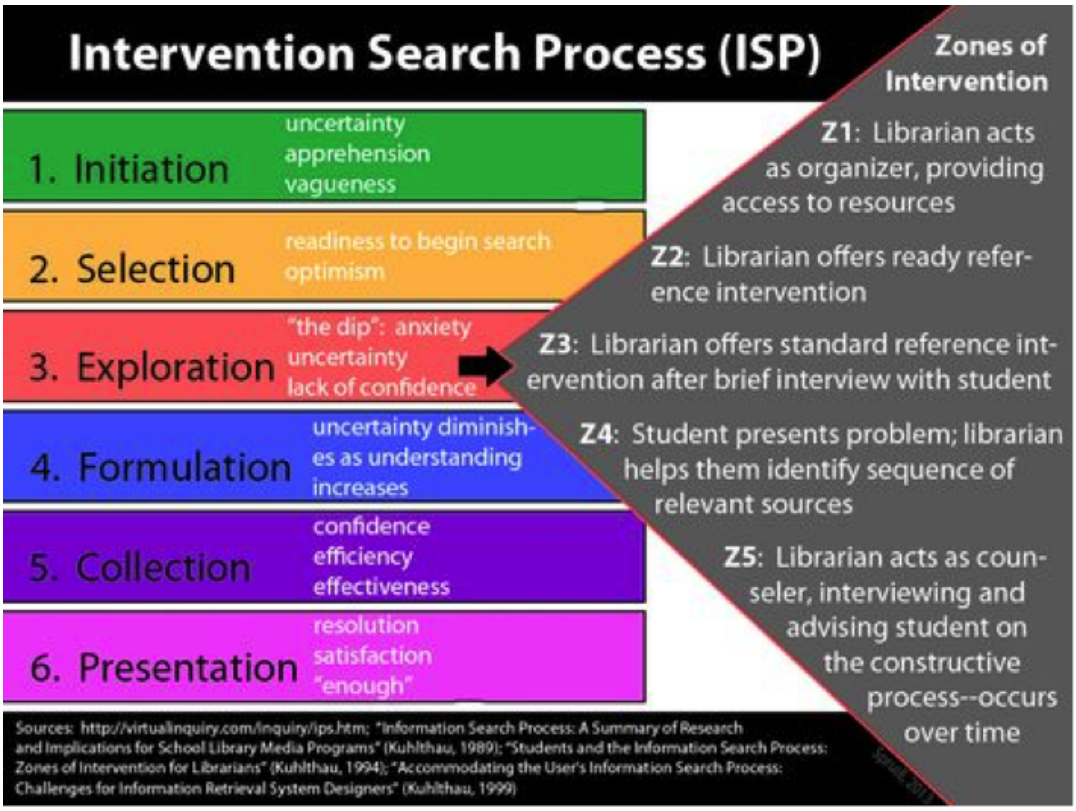

Figure 2. Zones of Intervention in the Information Search Process. (Retrieved from https://www.pinterest.com/pin/163607398942358612/)

Without intervention, learners may get stuck in any given ISP stage . . .

The Information Search Process indicates a diagnostic teaching methodology whereby the teacher librarian identifies zones of intervention to meet learners' needs – cognitive, affective, and behavioural – as they progress through the stages listed in Figure 1. Without intervention, learners may get stuck in any given ISP stage, unable to move forward to reach the Presentation stage when they create an artifact, e.g., an essay, video, or image that represents the new knowledge they have constructed from information. The type of intervention depends on how the learner learns best and the nature of the difficulty he or she is having. In some cases, teacher-librarians can anticipate difficulties within each ISP stage and incorporate intervention tools such as photographs or videos to elicit and share prior knowledge.

During the past century another important idea shaped teaching and advanced our understanding of learning. Bloom's Taxonomy breaks down the learning process into a hierarchy of critical thinking levels. Figure 3 shows how the model has evolved since 1956.

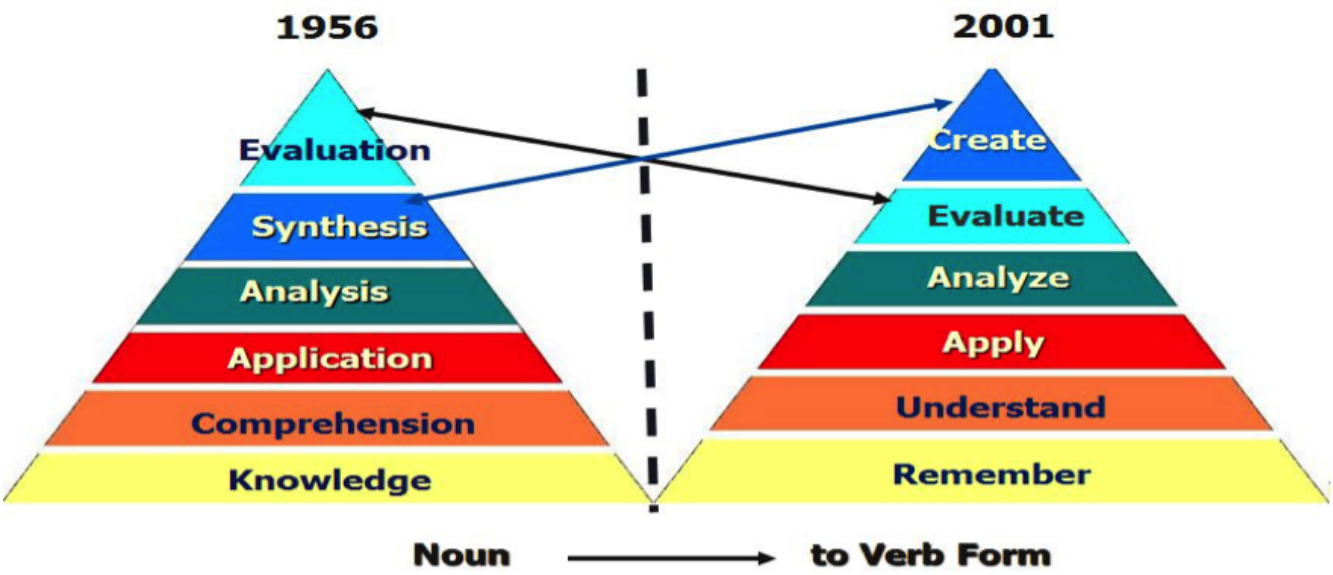

Figure 3. The Evolution of Bloom's Taxonomy. (Wilson, 2018. Accessed from https://thesecondprinciple.com/teaching-essentials/beyond-bloom-cognitive-taxonomy-revised/)

To create is to put the elements of what is learned into a coherent or functional whole . . .

Expressed as verbs in the revised model (Figure 3), the taxonomy defines critical thinking as a hierarchical process. This model re-defines the cognitive domain as the intersection of the Cognitive Process Dimension and the Knowledge Dimension. In this model, to know is to remember and be able to retrieve information. To understand implies the ability to construct meaning from information. To apply is the ability to use new knowledge in new situations. To analyse is to break down what is learned

so that its structure can be understood. To evaluate is to determine the value of what is learned. To create is to put the elements of what is learned into a coherent or functional whole through the inventions of new patterns or structures. Synthesis was the term used in the 1956 model for creation. This level of creative thinking includes writing or other forms of expression that result in a unique representation of knowledge.

The revised model of Bloom's Taxonomy identifies major types and subtypes of knowledge, including factual, conceptual, procedural, strategic, and metacognitive knowledge that are specific to a variety of disciplines such as history, mathematics, and science. Metacognitive knowledge is 'knowledge of [one's own] cognition and about oneself in relation to various subject matters . . .' (Anderson, Krathwohl and Bloom, 2001, p. 44). The development of metacognitive knowledge is critical to the learner's progression from information processing to constructing new knowledge to using new knowledge to reach higher order thinking.

Bloom's revised taxonomy provides a framework for determining and clarifying learning objectives that give structure to teaching. Learning activities designed to meet objectives often involve both lower order and higher order thinking skills, as well as a mix of concrete and abstract knowledge.

Bloom's Taxonomy and Educational Objectives

The revision of Bloom's Taxonomy facilitates the use of the taxonomy to write educational objectives that help educators determine and communicate three important facets of teaching:

1. What do we want our learners to learn?
In this phase of collaboration between teacher-librarians and classroom teachers, mutual intent and shared outcomes can be made explicit so that the tools of information processing, using the ISP, and the tools of knowledge construction, using Bloom's revised taxonomy are viewed as a continuum. To facilitate this collaboration, the ISP and the revised taxonomy (Figure 4) overlap so they can structure collaborative planning. The learning tasks that take place in the school library are connected to learning tasks that are subsequent to information processing when learners and their teachers return to the classroom to address what is to be learned in the context of the discipline being taught.

2. How will they best learn it?
Figure 4 can also indicate the strategies and tools that teacher-librarians and classroom teachers apply to the processes of information behaviour and knowledge construction. In many cases tools such as journaling in print spaces or digital environments, such as blogs, can be used continuously through the information to knowledge journey as it moves from the library to the classroom.

3. How will we know they learned it?
Both the ISP and Bloom's revised taxonomy include assessment that can be formative and summative. Formative assessment aims to support learners to self- and peer-evaluate in order to continuously improve their work. Summative assessment occurs when the rubric established at the top of the learning task is applied to student work, which represents what we wanted them to learn.

Examples of educational objectives that support the learner's progressing from remembering to creating, or stages 7 through 12 as shown in Figure 4, can be viewed at https://teaching.uncc.edu/teaching-guides/course-design. These objectives can be modified to align with the information processing that learners experience in the library prior to engaging with in-depth knowledge construction in the classroom as reflected by stages 1 through 6 of the ISP (Figure 4). The point of intersection is the most critical stage when learners move from stage 6 of the ISP to stage 7 of Bloom's revised taxonomy in the classroom.

In other words, learners construct knowledge by creating a product in the library that reflects what they have learned. The normal course of events is that this stage is considered the end of knowledge construction. When teachers use student work from ISP stage 6 as foundational to the application of stage 7 in Bloom's revised taxonomy, they open the door to engaging students in deep and meaningful ways with content area curriculum and standards. Thinking moves to higher levels of evaluation, re-creation that comprises reflection and revision of work.

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Implication of the Synthesis of the ISP and Bloom's Revised Taxonomy

Figure 4 synthesises the ISP and Bloom's Revised Taxonomy that shows the continuum for progressing from information processing to using new knowledge to ultimately reach the highest level of critical thinking.

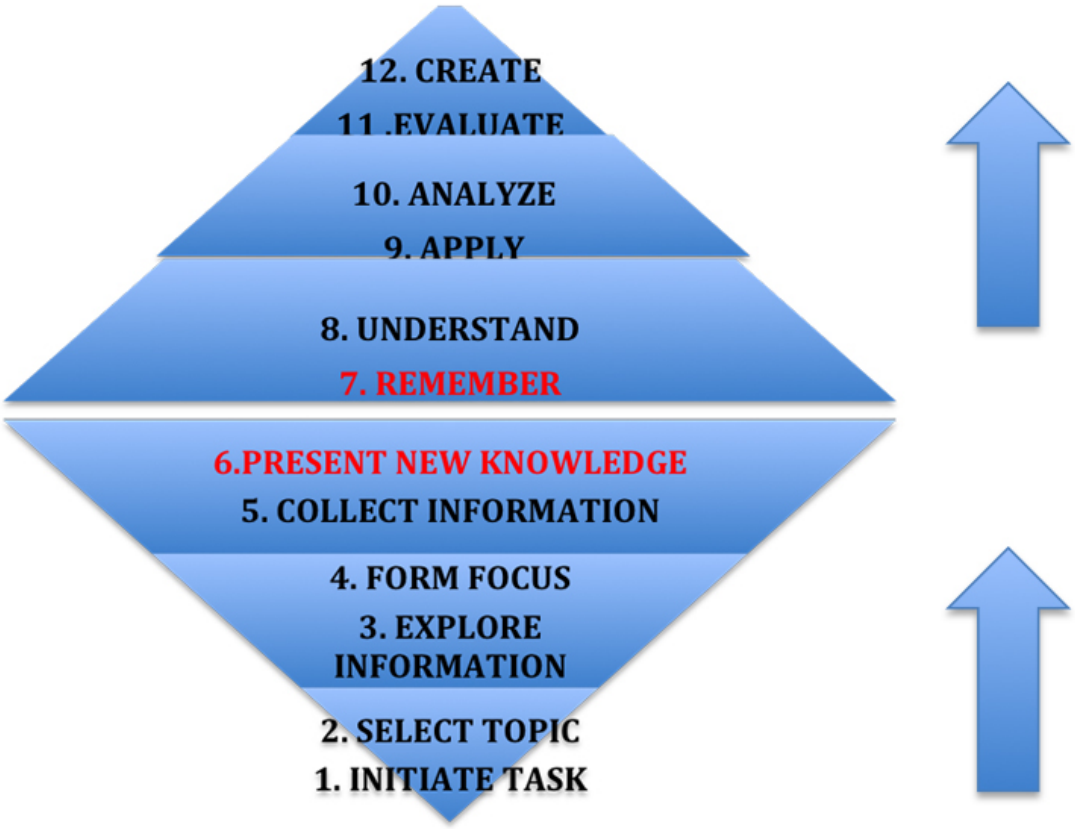

Figure 4. A Continuum of Information Processing and Knowledge Construction

What are the implications for conceptualising information processing instruction in the school library as foundational for knowledge construction activity and the development of higher order critical thinking in the classroom? How does such a strategy affect the perceptions and practices of teacher-librarians, classroom teachers, and school administrators?

- Teacher-librarians develop an in-depth understanding of content area curricula and standards, so they can use the ISP to its fullest potential to develop the cognitive dimensions of information processing;
- Classroom teachers develop an in-depth understanding of information processing curricula and standards so that they can use Bloom's revised taxonomy to its fullest potential to develop the cognitive dimensions of knowledge construction;
- Teacher-librarians work closely with classroom teachers prior to the planning process to develop their understanding of the content areas so that they can make informed decisions about selecting educational objectives, tools that support intervention, and student products that represent what has been learned during the ISP stages;
- Classroom teachers work closely with teacher-librarians prior to the planning process to develop their understanding of information processing so they can make informed decisions about selecting educational objectives, tools that support intervention, and student products that represent what has been learned during the stages of Bloom's revised taxonomy;
- Teacher-librarians convey what they want learners to learn to teachers, so they can support these objectives in all steps of the information to knowledge experience;
- Classroom teachers convey what they want learners to learn to teacher-librarians so they can support these objectives in all steps of Bloom's revised taxonomy;
- Teacher-librarians and teachers acknowledge that the assessment of information processing objectives is as important as the assessment of knowledge construction objectives. This means that the information literacy curricula grow from the content area curricula.
- Teacher-librarians and teachers collaborate on the purchase of resources and learning tools that are relevant to what they want learners to learn and how they can best learn it;
- Teacher-librarians and teachers view the ISP and Bloom's revised taxonomy as two sides of the same coin when they determine educational objectives for curricula and standards, plan teaching strategies, and create assessments;
- Teacher-librarians and teachers see that the school library and classroom are connected by an information to knowledge curriculum;
- Teacher-librarians and teachers go beyond the cognitive dimension of information processing and knowledge construction to include the affective and behavioural dimensions of learning;
- Principals and other administrators accept the integral part that the teacher-librarian and school library play in the educational process of developing information processing competencies seminal to knowledge construction and critical thinking.

The synthesis of the information processing in the school library and knowledge construction in the classroom holds the potential to position the school library as an essential component in the education of today's youth.

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