Go with Gagne when you Go Online:

An exploration of taxonomies and advocacy for Gagne's Nine Events of Instruction in online course design

Dr. Brooke Litten

Online Division, Rowan College South Jersey

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Abstract

Taxonomies have been a longstanding tool for developing curricula, courses, and assessments. Bloom's taxonomy is the gold standard in terms of commonly used best practices in course design. Still, as we examine the goals of online courses based on theory like the community of inquiry and government regulations like substantive teacher interaction, Gagne's nine events of instruction may hold the key to more robust student engagement and career-ready assessment processes. The first half of this article will provide a historical overview of taxonomies and delve into the development and theory of Bloom's taxonomy and Gagne's nine events of instruction. The article will close by addressing why Gagne's theory is more aligned with current online course design and institutional goals.

Keywords: taxonomy, Benjamin Bloom, Bloom's taxonomy, Robert Gagne, Gagne's nine events of instruction, distance education, online learning, the community of inquiry, active learning

Understanding Taxonomies

Effective learning is facilitated by outlining a process or a pathway of stepping stones that can guide first-year students from understanding a lesson to leading them into exploration and analysis. While Aristotle laid the groundwork of this philosophy, Dewey formalized and popularized this ideology in his text *Logic* by identifying the importance of building relationships between understanding, inquiry, and the processes that connect stages of learning (Dennes, 1940, p. 259). Denne's (1940) review of *Logic* described Dewey's approach to logic as developing it as a discipline that outlines learning according to various stages rather than following the understanding of logic as a concept, and this became the groundwork for most taxonomies like Gagne's Nine Events of Instruction and the infamous Bloom's Taxonomy. While both Gagne and Bloom create an effective pathway for learning, Gagne's Nine Events of Instructions is more ideal for building an online learning environment for the community college demographic.

The denotative meaning of taxonomy is simply a scheme of classification, but for educational purposes, it can be defined as different cognitive actions during the learning process. Numerous educational psychologists and education theorists have concluded that individuals process information differently, such as memorization, comprehension, and analysis, based on levels of cognition (Darwazeh, 2017 p. 13; Gagne, 1977). Also, the constructivist lens of education advocates for opportunities to "activate" the learner and allow for social collaborative learning, making the entirety of the learning process more student-centered (Struyven, Dochy, and Janssens, 2010; Vygotsky, 1978). Pulling these ideologies together forms the concepts of taxonomy in education. Each of the stages of learning provides the learner an opportunity to use a predetermined cognitive process that works purposely towards a larger goal. For example,

many taxonomies have a stage involving understanding a concept (a lower-level cognitive activity), but without understanding something a student cannot analyze a concept (higher-level cognitive activity). Critical thinking cannot be attained without lower-level cognitive understanding through activities like reading fluency. Taxonomies in education are characterized as a multilevel scheme featuring various stages for varying cognitive-level activities building toward critical thinking (Bloom, 1954; Darwazeh, 2017; Gagne, 1977).

Dewey's Theory of Inquiry

Stemming from Aristotle's approach of combining philosophy and science, Dewey's 1939 work *Logic* tried to analyze the relationship between the conceptualization of "knowledge" and "truth" (Kaufman, 1959, p. 826). He concluded that settling on one single truth was an act of conformity that resulted in making any further inquiry pointless (Kaufman, 1959; Hart, 1965). If a "truth" was identified, why would it be questioned? And if it could be questioned, how could it be identified as a single truth? Dewey also questioned whether conclusions were determined by truth or methodology. A conclusion was determined inadequate or false based on the method, not necessarily because it was found to be true (Dewey, 1939). What is identified as a single truth could be disproved through the reconstruction of established conclusions, so his philosophy of understanding a concept shifted from the answer itself to the process of finding the answer (Dewey, 1939 Kaufman, 1959; Hart, 1965).

Dewey's theory of inquiry was derived from the scientific method, so at its core is the idea of several stages: questioning an existing problem, observing the potential causes of the problem, hypothesizing a solution, and implementing the solution (Harris, 2014, p.304). He also felt that this process was not linear and accepted the potential for flawed outcomes by indicating these stages can and most likely will be repeated. (Dewey, 1939, p. 113; Harris, 2014, p.304). A

philosophical approach to science scrutinizes the idea that something objective and logical could only have "yes" and "no" answers. "The existence of inquiry is not a matter of doubt," it is a deconstruction of what we know with what we potentially could learn (Dewey, 1939, p. 102).

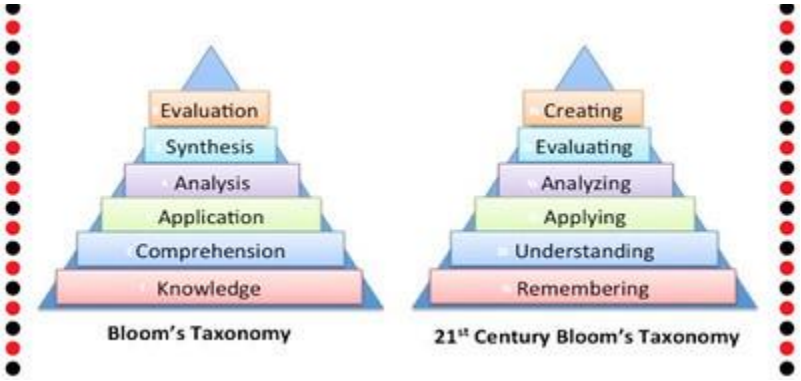
Bloom's Taxonomy

Benjamin Bloom's multilevel pyramid of lower to higher-order thinking skills is one of the most common pedagogical concepts and tools used in every level of education. Bloom's taxonomy is a course design concept that outlines a path for effective learning in six stages: knowledge, comprehension, application, analysis, synthesis, and evaluation. Each stage identifies different levels of cognition to direct the learning process, which can be applied to a single project or an entire course design (Bloom, 1956; Adams, 2015). Bloom's approach is direct, concise, and more linear than the philosophical approach of Dewey. The six taxonomy stages are designed to direct a learner from "basic awareness of a value to the internalization of a value" (Krau, 2011, p. 301). This staggered design connects each stage and goes beyond constructing knowledge to building critical thinking skills. If a student is unfamiliar with a topic, they cannot build on existing knowledge and experiences, so Bloom starts learners with low cognitive stages of knowledge and comprehension. In terms of course design, these activities could focus on reading fluency or information literacy, which are two important skills that lead to critical thinking (Bloom, 1956; Adams, 2015).

In 2001, a student of Bloom's organized a group of academics to revise the taxonomy, specifically in the higher-order thinking levels. Anderson et al. (2001) made multiple changes such as using verbs instead of nouns to indicate an active learning element should be connected to each stage (Anderson & Krathwhol. 2010, p. 64). One member, educational psychologist Merl Wittock, advocated for the change from "synthesis" to "create" embodies critical thinking

more because it goes beyond connecting existing knowledge and new conclusions instead of simply “synthesizing” old and new knowledge (Anderson & Krathwhol. 2010, p. 64). In addition, elements of lower-level thinking were changed from "knowledge" to "remembering" and "comprehension" to "understanding" to make the classifications more active and task-directed. A student can identify when they need to remember something but may find identifying the knowledge needed as a more difficult concept. Also, the revision team concluded there were various interpretations or types of knowledge that used various cognitive levels. For example, factual knowledge is tied closely to the action of remembering, but procedural knowledge, or how to do something" would require higher-order thinking (Anderson, et al. 2001, p. 27).

Figure 1



As shown in the graphic above, Anderson et al. (2001) also moved evaluation lower on the pyramid. Their criteria for this stage included the act of checking and critiquing. By positioning it lower on the hierarchy, the conclusion is not the final point of inquiry or learning which is extremely beneficial to online course design. If an evaluation is a final point, as previously determined by Bloom (1956), then grading is the final step in classroom learning. Placing the evaluation process before creation allows for collaboration and the implementation of feedback

on a project. Beneficial activities like peer review or revision become part of the learning process and it creates opportunities for social learning (Freeman, 2010; Smagorinsky, 2007; Vygotsky, 1978).

The appeal of Bloom's taxonomy is in its simplistic and universal approach to developing critical thinking skills. It provides instructors, students, and instructional designers with a pattern of inquiry that helps connect learning with purpose and answers the question "Why am I learning this?" The community of inquiry stresses cognitive presence is a major factor in building an effective online learning environment (Garrison, Anderson & Archer, 2001). By building on different cognitive skills, Bloom's taxonomy helps outline a learning process that can be challenging to communicate outside of the traditional classroom. The results of the taxonomy's effectiveness vary, but one research study indicated the difficulty in tracking student engagement while going through the cognitive stages (Gosku 2016; Verenna, et al. 2018).

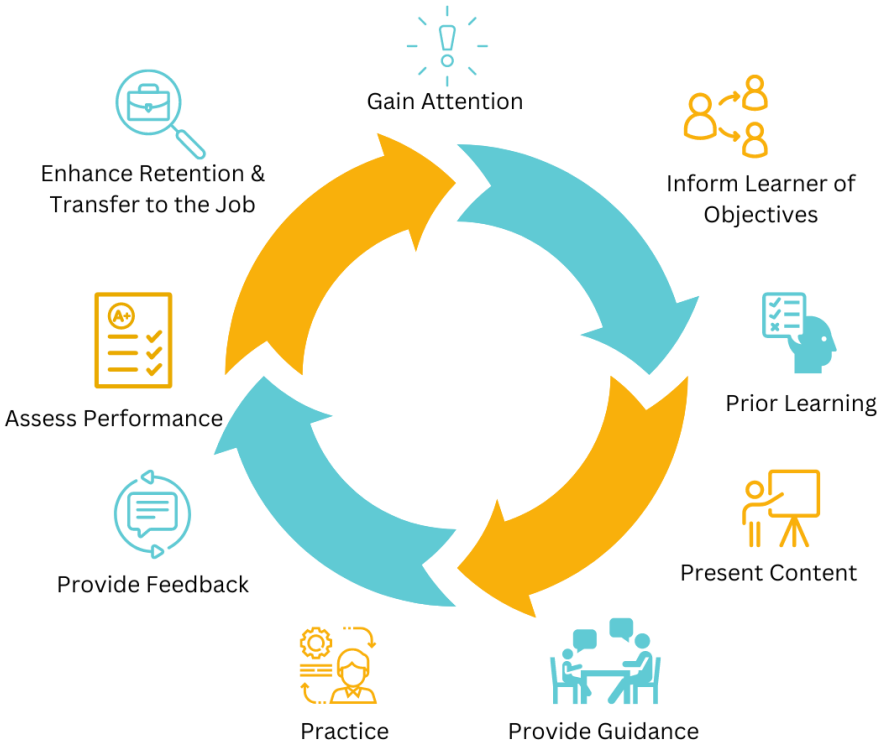
The success of online courses is heavily invested in the level of engagement and cognitive connection between different activities, not just based on a single outcome. The versatility of interpretation allows Bloom's revised taxonomy to be used in a myriad of disciplines today's online course design for community promotes opportunities to "activate" the learner and allow for social collaboration making the learning process more student-centered. Bloom's infamous taxonomy is a continual part of the conversation in professional development and curriculum design, but Gagne's nine events of instruction use a recursive or circular pattern that is more in tune with first-year community college students (Krau, 2011 p. 305).

Gagne's Nine Events of Instruction

Much like Bloom, Gange felt "conditions" were associated with the learning process (Zhu & St. Amant, 2010; Gagne, et al. 1992). But unlike Bloom, he saw them more as events

rather than stages in the process; the connotation of "events" emphasizes the impact of an action, like activities, feedback, or assessment which are continuative to course design (Gökdemir, et. al, 2013; Tough, 2012). Gökdemir, et.al. (2013) asserted that LMSs provide little direction for instructors, which can become challenging for subject matter experts who specialize in their field but not in education or instructional technology. Taxonomies like Gagne's nine events of instructions can provide pedagogical guidance to prevent designing courses that are below academic and student expectations along with catering to multiple learning styles (Wong, 2018, p.49). While both Bloom and Gagne outlined a path for learning in their taxonomies, Gagne's is a behaviorist-centered approach sparked by student engagement, a dynamic often overlooked in novice course design (Tough, 2012).

Figure 2



Gagne's Nine Events of Instruction

The circular pattern (shown in Figure 2) of the nine events presents learning as a recursive process. While Bloom starts with the collection of knowledge, Gagne leads by gaining the learner's attention and stating the learning objectives, the latter being a component of cognitive presence from the community of inquiry (Akoyl & Garrison, 2011; Connoly, 1994; Gökdemir, et. al, 2013; Tough, 2012). Bawa's (2016) literature study indicated that students are more likely to drop out of an online course in the early stages of the semester, but strong student engagement can combat that challenge (p. 9).

By identifying events or activities over cognitive stages, Gagne has produced a pathway for active learning. Before the pandemic, online courses had a 10% to 20% higher retention rate

than traditional courses, but research repeatedly shows strong student engagement can combat retention (Bawa, 2016, p. 1; Caruth, 2018; Armellini & De Stefani, 2016). This means an instructor and course designer will need to explain learning goals, course objectives, and assessments, and ensure the student is fully engaged. That is a lot to process for a first-year student, but when aligned with Gagne's nine events that can be presented in two progressive events that are followed by tying previous learning to the course content. This reflects the cognitive stage of the community of inquiry by addressing why a student is learning something and how it can connect to personal experiences. (Akoyl & Garrison, 2011).

While several events can easily tie to assessments or course activities, Gagne's nine events provide two clear guidance and feedback stages that can be collaborative between students or just the student and instructor. These events allow for improving future comprehension and "allow participants to maximize potential" (Wong, 2018, p. 47). But it is the final stage, "enhancing retention and transfer to the job" that is imperative to course design at a community college (Gagne, et al. 1992). Career Pathways or career-based learning with additional student support is a current trend at many community colleges. Paradise Valley Community College (AZ), Maricopa Community College (AZ), Ivy Tech Community College (ID), and Lane Community College (OR) have found significant success by driving the curriculum to align with career goals (Woods, 2015). In addition to job-related success, Lane Community College found that more than 20% of students completed associate degrees and continued to complete postsecondary degrees on the same path (Woods, 2015). All of these elements build an ideal learning environment and a path to success after the course ends.

Course learning objectives answer the question "Why am I learning this?" and most course review rubrics like Quality Matters indicate the need to get specific and list objectives

with each activity or lesson (Robinson,& Wizer, D. R.,2016, p. 23-24). Gagne's method takes students from understanding cognitive presence on a micro-level within a course to the macro-level of their future academic path or career.

Bloom vs. Gagne in Online Course Design

The nine events of instruction were introduced in 1992 and the revised, more action-based, Bloom's taxonomy was presented in 2001 (Anderson & Krathwhol. 2010; Gagne, et al. 1992). This does not indicate fierce competition in the taxonomy community but provides the correlation for a pedagogical paradigm shift towards active learning as seen in online courses using universal design for active learning are composed of multimodal content and a variety of activities to support a variety of learning styles (Schrieiner, 2013). Furthermore, Gagne believed "learning environments could be constructed by working backward from the final learning objective" which connects with the commonly used online practice of backward course design (Gökdemir, et al., 201; Reynolds & Kearns, 2017). In this practice, the instructor identifies the learning objective, usually with a cumulative assignment, and works backward by identifying activities that would help a student prepare for the project--what they need to know to succeed (Reynolds & Kearns, 2017). This backward approach is also commonly used in Quality Matters reviews; an instructor will need to associate each task or series of activities with a particular learning objective to ensure everything tracks back to the course and institutional goals (Robinson,& Wizer, D. R.,2016, p. 23). Bloom is outlined as stages moving forward, but all of the recursive components of Gagne's nine events show the effectiveness of a circular designed taxonomy (Gagne, et al. 1992).

Another connection between the nine events of instruction and current online education best practices can be seen through the emphasis on social and teacher presence, as recommended

in the community of inquiry (Akoyl & Garrison, 2011; Gagne, et al. 1992). “Provide learning guidance" and "provide feedback" are two mid-point events that provide an opportunity for students and instructors to exchange feedback, and more importantly, allow the student to implement the final events of "assess performance" and "enhance retention and transfer to the job" (Gagne, et al. 1992). According to Gutiérrez-Santiuste et. al., (2015), social presence provides effective and open communication that creates a "reciprocal and respectful" learning environment (p. 351). Not only should the feedback be consistent and concise, but also career or goal related. “When students understand the connection of feedback to their jobs and careers they often take a harder look at instructor input” meaning feedback makes a bigger impact (Sull, 2022, p. 140). While the philosophy behind Bloom’s taxonomy does not eliviate the need value for feedback, Gagne’s framework clearly states outlines feedback as an event in the process of learning.

In a 2021 research study, instructor were interviewed on how to build critical thinking skills in an online environment during the pandemic. Nearly all of the instructors indicated some patten that lead students through the critical thinking process with an emphasis of using smaller activies or discussions with feedback or guidance in between (Hoffman, 2021). The math instructor used virtual sessions to demonstrate math problems, where he would teach a little, they would practice a little, and then encourage questions. The English and Nursing instructors advocated for more of a Socratic method where questions or “stepping stones” our create a pathway to understanding (Hoffman, 2021 p. 77, 78, 81). Gagne’s approach could be applied to a single skill or activity, along with lessons, or perhaps a full course due to its recursive nature emphasizing stages of feedback. This methodology also indicated many first and second-year

courses were empahisizing elements and skills from the bottom two or three tiers of Bloom's taxonomy.

This leads to the final argument in favor of Gagne's nine events of instruction over Bloom's taxonomy may be the simplest. Several of the instructors from the 2021 study felt Bloom's taxonomy is more effective in curriculum design, meanwhile, Gagne is more effective in lesson design (Hoffman, 2021, p. 78-79) The nine events of instruction ensure "an effective and systematic learning program as it gives structure to the lesson plans and a holistic view to the teaching" (Khadjoo et al, 2011, p. 119). First and second-year Community College students are learning the basics skills of their discipline, combined with covering many general education topics. Instructors are focused on laying the groundwork for students to understand subjects and concepts, so their courses are built around the fundamentals of Bloom's first two tiers. In English composition courses, research and citations are taught so they can be applied to future courses. Business and computer science courses provide overviews of common industry specializations to give insight into potential career paths. While some higher-level taxonomy skills are addressed, like analysis and application, the goal is to provide the understanding of academic skills so students can make that shift from high school to the rigor of college, specifically the online classroom room (Caruth, 2018; Dynarski, 2018; Lucas, 2016; Xu & Jaggars, 2011).

For example, business students may be required to take a Management Information Systems course, but each of these students is coming to class with different business goals that will be pursued later in their degree program. Instructors seek to show understanding of the fundamentals of the subject so students know where this skill fits into their area of the industry, but students seeking a marketing specialization will apply the skills differently than someone seeking a technology specialization. While group projects or activities using Universal Design

for learning can help facilitate all the higher tiers of Bloom's taxonomy, it may still be a challenge for an instructor to juggle everyone's skills set and reinforce every level of the taxonomy in one semester, especially when many business (and online programs) can be condensed to five and ten-week terms. First-year community college courses focus on the bottom tiers of Bloom's taxonomy like "knowledge" or "comprehension" to provide a solid foundation, but as the student's understanding grows, the curriculum can build on these skills following Bloom's taxonomy. Gagne's nine events are process-based and are more conducive to building lessons and courses that support the levels of Bloom's taxonomy (Bloom, 1956, Gagne,1992. Ullah, et. al., 2015).

Conclusion

Academics are journeys and taxonomies are the trail map. The need to outline how we process knowledge has meandered from Aristotle, turned a bend with Dewey, and climbed a mountain (or pyramid) with Bloom. Gagne's nine events of instruction change like the seasons; they evolve, give us different challenges, and are slightly different with each turn. The collaborative nature of Gagne's nine events of instruction creates an engaging environment ideal for lesson and course design. Each event triggers a collaboration that pulls ideas and information from the student so instructors can provide better feedback and individualize the purpose of that activity to each student. Its principles also align with the principle online pedagogical framework, the community of inquiry, by containing events that promote social, instructor, and cognitive presence. The scaffolding approach to Bloom's taxonomy builds upon skill mastery which is ideal for curriculum design. Bloom assigns or pushes a certain skill set at each academic level to promote overall academic growth over an entire program. Bloom is king for curriculum but go Gagne when developing your online course.

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