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Higher Order Thinking through Bloom's Taxonomy

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Abstract

The development of higher order thinking skills is crucial to academic success. The use of content as the basis of a SLA classroom promotes the acquisition of these skills alongside language skills. The use of Bloom's Taxonomy as a framework for teaching and assessment is an effective way to structure a lesson, unit, or curriculum. The taxonomy includes both ways to assess knowledge (factual, conceptual, procedural, and metacognitive) as well as develop cognitive skills (remembering, understanding, applying, analyzing, evaluating and creating). Bloom's Taxonomy is the perfect addition to any teacher interested in content based instruction (CBI) or adding cognitive elements to a non CBI situation.

Rethinking the Taxonomy

The role of cognitive skills in a content-based classroom should be self evident. If we are going to focus on the content in a meaningful way, then it follows that we must develop the subsequent cognitive skills that will give our students a chance to create meaningful content. Bloom's Taxonomy is a way in which we as teachers can create better assessments and allow students to explore a greater depth of learning. This paper will focus briefly on the two basic aspects of Bloom's Taxonomy that are applicable to many different SLA contexts and content-based instruction specifically. These are teaching higher order cognitive skills and assessing higher order cognitive skills.

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History of Bloom's Taxonomy

One of the most common complaints amongst educators is that their students lack the cognitive or academic skills to properly handle a curriculum. Although this is anecdotal at best, the teaching of cognitive skills is often overlooked at all levels of education. When it is focused on it, it is usually in the realm of classroom or curriculum design and rarely applied to the learners' direct experience (Anthassiou, McNett, & Harvey, 2003). It therefore becomes important to try to apply these skills so that an acceptable level of transfer may be accomplished. Bloom's Taxonomy is the namesake of Benjamin Bloom, who in 1956 chaired a committee to outline educational objectives and assessments for institutions to use (Bloom's Taxonomy, n. d.). It is in this context that Bloom's taxonomy was implemented into various curricula. The taxonomy itself is separated into three functional categories: *cognitive, affective* and *psychomotor.* Of these three, this paper is primarily concerned with the first category, the cognitive, which consists of six further classifications: *knowledge, comprehension, application, analysis, synthesis* and *evaluation.* Each category has a sub category to describe its function; however, because the taxonomy is not a true taxonomy the process is not always hierarchical. This means that there is no linear path, particularly in the higher levels, to follow and learners can jump or skip levels freely.

The *knowledge* taxa is described as "recalling facts, terms, basic concepts and answers" (wikipedia). This is the foundational level of the taxonomy because it gives the learner the facts upon which the rest of the taxonomy is based. In a SLA context this may be the explicit stating of a grammar rule or a definition. If this level is not appropriately negotiated by the learner, then the taxonomy becomes like a deck of cards and often the product produced in the evaluation stage is without substance. The next level is the *comprehension* level of the taxonomy. It is here that facts include "organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas" (Bloom's Taxonomy, n.d.). This construct is clearly represented through the grammar-translation method. The third level is *application,* where problem solving is introduced. At this stage, one begins to leave the collection of data behind for the sake of using the data. This may be seen in the use of pragmatics during discourse. The fourth level is *analysis* which is the first level of the higher order cognitive processes. It is in this level that the learner begins to see the information in segments that may have separate causes. In SLA, this would be reflected in meta-linguistic processing. This is the first stage in which inferring is used and therefore has relevance to reading as well as listening. The fifth stage of the taxonomy is *synthesis. Synthesis* is taking divergent pieces of information and recombining them to create a new cohesive idea. *Synthesis* is tremendously impor-

tant in production skills such as speaking and writing. The final portion of the taxonomy is *evaluation.* It is at the pinnacle of the taxonomy that the learner really begins to present and defend their opinions and judgments. Learners at this level are able to obtain a level of autonomy because of their ability to make judgments and defend them.

This original framework was later modified by Anderson et al. (2001) to include: *remember, understand, apply, analyze, evaluate* and *create.* The differences in the two versions are apparent, but not as stark as they may appear. The first level in the original taxonomy, *knowledge,* is renamed *remember* in order to make this stage more functional. Students are not only expected to have facts but also to remember them accurately for use. Fundamentally, this new taxa refers to a verb domain whereas the *knowledge* taxa is a noun domain and can be thought to exist outside all the other taxa. *Comprehension* is changed to *understanding* for the simple reason that most educators prefer the term *understanding* instead of *comprehension.* Finally, *evaluation* is moved to where *synthesis* was in the earlier taxonomy and *synthesis* is changed to *create* while occupying the last position. The reason for this change is that the process of the taxonomy is meant in these final taxa to reflect a process by where evaluations are made (mentally) and items are created (production) reflecting previously relevant taxa (Krathwohl, 2002)

Teaching of Higher Order Thinking Skills

Content-based instruction differs from traditional methods of instruction in the SLA context in that the content is the focus of the lesson and the language is the tool used for access and production. The concepts of content-obligatory language and content-compatible language is essential in using content in a second language teaching context. Content-obligatory language is essential for learning the content whereas content-compatible language supports the lesson in a more general way (cultural associations, metalinguistic information) (Coyle, Hood, & Marsh 2010). In this way it could be said that the language is scaffolding the content in this method. The acquisition of both the language and the content becomes part of the overall pedagogy for teacher and students alike. If this is the case, then it is of equal importance to give the learners the ability to express their thoughts on the content in a way which is accurate, reflects depth of thought, and is transferable across a range of contexts, genres or discourses. Bloom's taxonomy, more specifically the revised taxonomy, addresses this situation very explicitly and concisely for both the learners as well as the teacher. In the new taxonomy, there is an accompanying set of verbs that correspond to each taxa (as there was in the older version). This can be seen as:

- **Remembering —** *recognising, listing, describing, identifying, retrieving, naming, locating, finding;*
- **Understanding —** *interpreting, summarising, inferring, paraphrasing, classifying, comparing, explaining, exemplifying;*
- **Applying —** *implementing, carrying out, using, executing;*
- **Analysing —** *comparing, organising, deconstructing, attributing, outlining, finding, structuring, integrating;*
- **Evaluating —** *checking, hypothesising, critiquing, experimenting, judging, testing, detecting, monitoring;*
- **Creating —** *designing, constructing, planning, producing, inventing, devising, making* (Bloom's Digital Taxonomy, 2012)

For an instructor creating both materials and tasks, this list could become an invaluable tool. For the learner who is tasked with creating something for a class, this list can serve as an important scaffold for evaluating the purpose and consistency of their project. This is not meant to be a taxonomy in the literal sense however, because the taxa of creating can happen anywhere within the taxonomy. Likewise, evaluating can occur post *creating,* giving the model some flexibility. The unit of study that accompanies this paper includes content-obligatory vocabulary for astronomy (planets, moons, stars) and content-compatible vocabulary (mass, large numbers, orbit) that all fit into the *remembering* taxa. This is the foundational level for the rest of the skills derive content and because this is not a strict taxonomy, any of the other taxa can follow.

In the case above, *analyzing* was the next step in the created lesson. The students was asked to compare different planets and decide what it might be like to stand on the planet. This may have been considered *synthesis* in the older taxonomy because the students are using a heuristic reasoning to put themselves on the planets (they cannot violate their intrinsic concepts of how a planet would function) and therefore are performing a *passive* synthesis (Iser, 1980). In a university classroom, students may be expected to construct a solar system of there own. This type of activity would require the students to use knowledge acquired during the semester to *apply, evaluate* and *create* with it.

This is a brief example of how the taxonomy can be used in the pedagogy of the classroom, but from a very practical point-of-view, the materials used in the class can be geared to reflect the taxonomy by use of the accompanying verbs. For example, when designing a task within the unit of study, it is important to clarify the purpose of the task (are students being asked to analyze or are they being asked to evaluate?). Once the purpose is known, the appropriate verbs can be chosen in order to facilitate that skill. An activity trying to elicit *understanding* may ask the

students to *summarize* what they have read or the lecture they have just heard. Inside a content based classroom, this may be facilitated within a group activity.

Assessing Higher Order Cognitive Skills

The previous section briefly dealt with some of the pedagogical possibilities for using Bloom's Taxonomy in a content-based classroom. This logically leads to the assessment of the materials, the instruction and the students. Within Krathwohl's revised version of the taxonomy there is an re-envisioning the *knowledge* taxa to include four separate dimensions. These include factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge. (Anderson et al., 2001) In assessing which part of the taxonomy to use, it is important to consider what kind of knowledge is necessary to complete the task. This is crucial for the instructor when he or she is going to choose materials to teach the content. Since content is the focus, by dividing the knowledge into these four areas, one can have better understanding of how to present or modify materials. Factual knowledge will include hard facts that are essential to access the material at a basic level and can therefore be thought of as content-obligatory vocabulary.

The second dimension of conceptual knowledge may include knowledge of the theories, models and structures (2001). These are concepts that will be applicable to the lesson as well as to the student's projects (assessments) because they are content obligatory concepts. Not all aspects of this dimension need be content-obligatory because there will be related conceptual models that have some transfer conceptually and can be thought of as content-compatible. This kind of knowledge can be used by the students to understand the interrelationship between facts and how they are used.

The next dimension of knowledge in this model is procedural knowledge. This kind of knowledge is skill or production based (2001). To proceduralize something is to take some sort of explicit process and use it to do something. In the case of the taxonomy, students may be asked to create an advertisement in a media class. Procedural knowledge lends itself to the *creating* taxa specifically, but as with the other aspects of the taxonomy it is not limited but rather compliments all the taxonomy in total. Proceduralization can be thought of operationalizing previously acquired explicit knowledge and is therefore of enormous use for the L2 context as the instructor is hoping to proceduralize language. In content-based instruction, both the content and the language needs to be proceduralized to a communicative level if the student is going to be able to properly be assessed.

The final dimension is metacognitive knowledge where the students gain knowledge about the cognitive processes involved in their own education. This

knowledge can be heuristic in nature as in recognizing patterns in the instruction, tests or evaluations. Students are thinking about thinking in this step or about the process of learning. In SLA, we see this quite easily in metalinguistic awareness. Awareness is in fact a crucial aspect of any meta- process because it is awareness of how things happen that helps us develop rules of operation. Lyster (2007) includes awareness in his fundamental principles of content-based instruction. Awareness is used to gain implicit knowledge (weak or strong) and then use that knowledge to make generalizations about function of linguistic or semantic features (such as grammar, punctuation, pronunciation, meaning in context, etc).

This is a very robust model with which an instructor can now work to assemble assessments. Instructors looking to develop an assessment for a class can now ask themselves whether he or she is looking for the students to state factual knowledge only. If this is the case, then we need only match the *understand* taxa with the factual knowledge dimension and we have a very simple assessment. However, often, instructors are faced with the challenge of creating complex assessments that cover a wide range of skills. For example, if an instructor wants the students to create a presentation on the differences between the legal systems of Japan and Australia, then we must look carefully at what we are requiring cognitively as well as linguistically. The relevant vocabulary will cover the first two taxa and will be necessary for the project. The final goal is to *create* so clearly the final taxa is involved. It becomes clear that all the taxa are going to be used in some way to develop the project. Furthermore, instructors can lead students to look for conceptual knowledge that can aid in their understand as well as allow them to proceduralize both language and concepts by practicing in and out of class. A teacher/group conference can help to assess what metacognitive knowledge is necessary and what metacognitive strategies may be useful in improving the work.

The instructor may choose to focus exclusively on the *evaluate* part of the taxonomy because it is there that the original objective lied. The instructor can then check the list of verbs we have for *evaluate* and ask did the students critique, judge or detect properly in the presentation. This is not all that was gained in the process but it is certainly important to confine the assessment to a concise list. This could include several different aspects from several different taxa. For example, teachers could choose to assess how they *applied* conceptual knowledge or procedural knowledge or *analyzed* conceptual knowledge and *applied* metacognitive knowledge. Anderson et al. refer to this as focused vs. distributed assessment (2001). In addition, Athanassiou, McNett and Harvey (2003) found this way of structuring assessment crucial in demonstrating the level of work they were expecting from the students. Their C-level students were at a loss as to what constituted and A-level paper. It wasn't until they advised the students to consult the taxonomy and its related

verbs that the students were able to make strides in their writing. Therefore, students who are struggling to properly structure a paper or project, can greatly benefit from consulting the taxonomy because it allows the student to understand what cognitive skills may be missing.

Finally, a teacher can use this same tool to assess the effectiveness of their instruction. By taking these tools and asking whether the purpose of the instruction was reflected in the materials or student assessments requires only considering the content produced by the students and whether it falls into the correct portions of the taxonomy. This can also be relevant for analyzing the instruction leading up to the students' assessment. The instructor can ask, Was all factual knowledge available to analyze and was it of the appropriate level? Were metacognitive strategies taught or discussed? Was sufficient time given to conceptual knowledge?

Conclusion

In conclusion, this was a very brief discussion of the possibilities of using Bloom's Taxonomy in the classroom. This was not meant to be a comprehensive survey of the possibilities of connecting the taxonomy to a content-based classroom. Further consideration is necessary to evaluate how the role of language and content knowledge should work together in tandem within the assessment process. In most cases the two will be intertwined; however, one can mask troubles with the other. The taxonomy itself has been said to be "a roof without walls" (Booker, 2008) at times because often the foundational knowledge is ignored in the process. This seems to be a symptom more of poor instruction than a fault in the taxonomy per se. As was stated earlier, factual knowledge (especially in an SLA classroom) is indispensable to gaining the higher skills within the taxonomy. Bloom's Taxonomy presents a chance for teachers to enrich both their instruction and their students' learning. That is a two for one we should not ignore.

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