



# SOUTHWESTERN OREGON COMMUNITY COLLEGE

## Bloom's Taxonomy Revised

### Purpose

Bloom's Revised Taxonomy accounts for the new behaviors, actions, and learning opportunities emerging as technology advances and becomes more ubiquitous. Bloom's Revised Taxonomy accounts for many of the traditional classroom practices, behaviors, and actions, but it does not account for the new processes and actions associated with advanced technologies and increased computing.

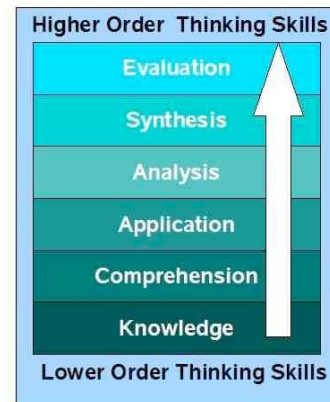
### Bloom's Taxonomy

In the 1950s Benjamin Bloom developed his taxonomy of cognitive objectives, Bloom's Taxonomy. This categorized and ordered thinking skills and objectives. His taxonomy follows the thinking process. You cannot understand a concept if you do not first remember it, similarly you cannot apply knowledge and concepts if you do not understand them. It is a continuum from Lower Order Thinking Skills (LOTS) to Higher Order Thinking Skills (HOTS). Bloom described each category as a noun. They are arranged below in increasing order, from lower order to higher order.

#### Lower Order Thinking Skills (LOTS)

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

#### Higher Order Thinking Skills (HOTS)



### Bloom's Revised Taxonomy

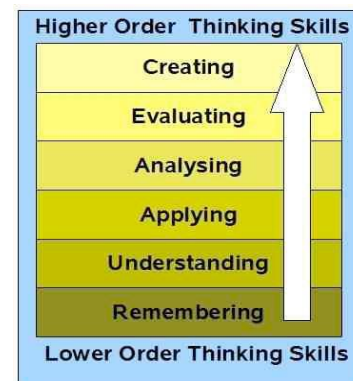
In the 1990s, a former student of Bloom, Lorin Anderson, revised Bloom's Taxonomy and published this—Bloom's Revised Taxonomy in 2001.

Key to this is the use of verbs rather than nouns for each of the categories and a rearrangement of the sequence within the taxonomy. They are arranged below in increasing order, from lower order to higher order.

#### Lower Order Thinking Skills (LOTS)

- Remembering
- Understanding
- Applying
- Analyzing
- Evaluating
- Creating

#### Higher Order Thinking Skills (HOTS)



### Bloom's Revised Taxonomy Sub Categories

Each of the categories or taxonomic elements has a number of key verbs associated with it.

#### Lower Order Thinking Skills (LOTS)

- **Remembering:** *Recognizing, listing, describing, identifying, retrieving, naming, locating, finding*
- **Understanding:** *Interpreting, summarizing, inferring, paraphrasing, classifying, comparing,*



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*explaining, exemplifying*

- **Applying:** *Implementing, carrying out, using, executing*
- **Analyzing:** *Comparing, organizing, deconstructing, attributing, outlining, finding, structuring, integrating*
- **Evaluating:** *Checking, hypothesizing, critiquing, experimenting, judging, testing, detecting, monitoring*
- **Creating:** *Designing, constructing, planning, producing, inventing, devising, making*

**Higher Order Thinking Skills (HOTS)**

The elements cover many of the activities and objectives, but they do not address the new objectives presented by the emergence and integration of Information and Communication Technologies in the classroom and the lives of students.

This revision is fundamentally based on the revised taxonomy proposed by Anderson et al, but is more inclusive of digital technologies and digital cognitive objectives.

**Bloom's as a Learning Process**

Bloom's in its various forms represents the process of learning.

Before we can **understand** a concept, we have to **remember** it

Before we can **apply** the concept, we must **understand** it

Before we **analyze** it we must be able to **apply** it

Before we can **create**, we must have **remembered, understood, applied, analyzed, and evaluated**

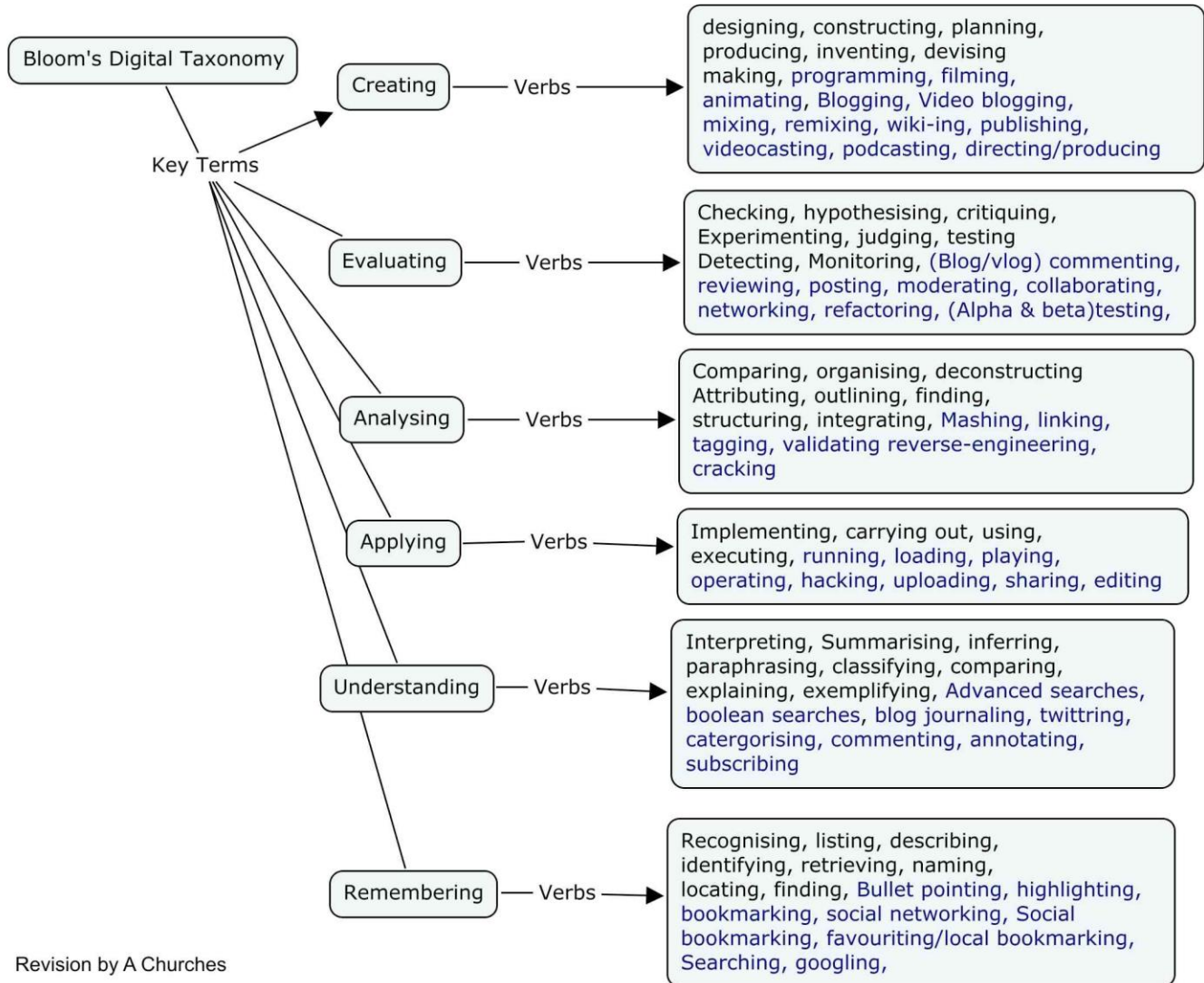
Some people may argue that not all stages are required for each and every task, action, or process; some too may argue about the necessity to reach the creating level for all activities. This is the choice of the individual.



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**Bloom's Revised Digital Taxonomy Map**

In the following taxonomy, the black colored verbs are recognized as the existing verbs. The elements in blue are new digital verbs.



**Remembering**

**Remembering** is recalling or recognizing knowledge from memory. Remembering is when memory is used to produce definitions, facts or lists, or recite or retrieve material.

The following are some of the key terms for this aspect of the Taxonomy.

- Recognizing
- Listing
- Describing
- Identifying
- Retrieving
- Naming
- Locating
- Finding



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This element of the taxonomy does infer the retrieval of material. This is a key element given the growth in knowledge and information.

- **Bullet pointing:** This is analogous with listing but in a digital format
- **Highlighting:** This is a key element of most productivity suits, encouraging students to pick out and highlight key words and phrases is a technique for recall.
- **Bookmarking or favoriting:** This is where the students mark for later use web sites, resources, and files for later access. Students can then organize these.
- **Social networking:** This is where people develop networks of friends and associates. It forges and creates links between different people. Like social bookmarks (see below) a social network can form a key element of collaborating and networking.
- **Social bookmarking:** This is an online version of local bookmarking or favorites, more advanced because you can draw on others' bookmarks and tags. While higher order thinking skills like collaborating and sharing can do make use of these skills, this is its simplest form—a simple list of sites saved to an online format rather than locally to the computer.
- **Searching or “googling”:** Search engines and their use are key elements of students' research. At its simplest, students just enter a key word or phrase into the basic entry pane of the search engine. This skill does not refine the search beyond the key word or term.

### Understanding

*Understanding* is constructing meaning from different types of function whether written or graphic.

The following are some of the key terms for this aspect of the Taxonomy.

- Interpreting
- Summarizing
- Inferring
- Paraphrasing
- Classifying
- Comparing
- Explaining
- Exemplifying

The digital additions and the justifications are as follows:

- **Advanced and Boolean searching:** This is a progression from the previous category. Students require a greater depth of understanding to be able to create, modify, and refine searches to suit their search needs.
- **Blog journaling:** This is the simplest of the uses for a blog, simply a student “talks,” “writes,” or “types” a daily or task-specific journal. This shows a basic understanding of the activity report. The blog can be used to develop higher level thinking when used for discussion and collaboration.
- **Twittering:** Twitter's fundamental questions is, “What are you doing?” This can be in its most simplistic for a one or two word answer, but when developed this is a tool that lends itself to developing understanding and potential starting collaboration.
- **Categorizing:** This allows for digital classification, organizing and classifying files, web sites, and materials using folders, etc.
- **Commenting and annotating:** A variety of tools exist that allow the user to comment and annotate on web pages, pdf files, and other documents. The user is developing understanding by simply commenting on the pages. This is analogous with writing notes on hand outs, but is potentially more powerful as you can link and index these.
- **Subscribing:** Subscription takes bookmarking in its various forms and simple reading one level further. The act of subscription by itself does not show or develop understanding but often the process of reading and revisiting the subscribe feed leads to great understanding.

### Applying



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**Applying** is carrying out or using a procedure through executing or implementing. Applying related and refers to situations where learned material is used through products like models, presentation, interviews, and simulations.

The following are some of the key terms for this aspect of the Taxonomy.

- Carrying out
- Using
- Executing
- Implementing
- Showing
- Exhibiting

The digital additions and their justifications are as follows:

- **Running and operating:** This is the action of initiating a program. This is operating and manipulating hardware and applications to obtain a basic goal or objective.
- **Playing:** The increasing emergence of games as a mode of education leads to the inclusion of this term or word in the list.
- **Uploading and sharing:** This is the uploading materials to websites and the sharing of materials via sites. This is a simple form of collaboration, a higher order skill.
- **Hacking:** Hacking in its simpler forms is applying a simple set of rules to achieve a goal or objective.
- **Editing:** With most media editing, this is a process or a procedure that the editor employs.

### Analyzing

**Analyzing** is breaking material or concepts into parts, determining how the parts relate or interrelate to one another or to an overall structure or purpose. Mental actions include differentiating, organizing and attributing as well as being able to distinguish between components.

The following are some of the key terms for this aspect of the Taxonomy:

- Comparing
- Organizing
- Deconstructing
- Attributing
- Outlining
- Finding
- Structuring
- Integrating

The digital additions and their justifications are as follows:

- **Mashing:** Mash ups are the integration of several data sources into a single resource. Mashing data currently is a complex process but as more options and sites evolve this will become an increasingly easy and accessible means of analysis.
- **Linking:** This is establishing and building links within and outside of documents and web pages.
- **Reverse-engineering:** This is analogous with deconstruction. It is also related to cracking often without the negative implications associated with this.
- **Cracking:** Cracking requires the cracker to understand and operate the application or system being cracked, analyze its strengths and weaknesses and then exploit these.
- **Validating:** With the wealth of information and the lack of authentication of data, the students of today and tomorrow must be able to validate the veracity of their information sources. To do this, they must be able to analyze the data sources and make judgments based on these.
- **Tagging:** This is organizing and attributing online data, meta-tagging web pages etc. Students need to understand and analyze the content of the pages to be able to tag it.

### Evaluating

**Evaluating** is making judgments based on criteria and standards through checking and critiquing.



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The following are some of the key terms for this aspect of the Taxonomy.

- Checking
- Hypothesizing
- Critiquing
- Experimenting
- Judging
- Testing
- Detecting
- Monitoring

The digital additions and their justifications are as follows:

- **Blog/vlog commenting and reflecting:** Constructive criticism and reflective practice are often facilitated by the use of blogs and video blogs. Students commenting and replying to postings have to evaluate the material in context and reply to this.
- **Posting:** Posting comments to blogs, discussion boards, threaded discussions are increasingly comment elements of students' daily practice. Good postings like good comments are not simple one line answers; rather they are structured and constructed to evaluate the topic or concept.
- **Moderating:** This is high level evaluation, and the moderate must be able to evaluate a posting or comment from a variety of perspectives, assessing its worth, value, and appropriateness.
- **Collaborating and networking:** Collaboration is an increasing feature of education. In a world increasingly focused on communication, collaboration, leading to collective intelligence is a key aspect. Effective collaboration involves evaluating the strengths and abilities of the participants and evaluating the contribution they make. Networking is a feature of collaboration, contacting and communicating with a relevant personal via a network of associates.
- **Testing (Alpha and Beta):** Testing of applications, processes, and procedures is a key element in the development of any tool. To be an effective tester, you must have the ability to analyze the purpose of the tool or process, what its correct function should be and what its current function is.

## Creating

*Creating* is putting the elements together to form a coherent or functional whole: reorganizing elements into a new pattern or structure through generating, planning, or producing.

The following are some of the key terms for this aspect of the Taxonomy.

- Designing
- Constructing
- Planning
- Producing
- Inventing
- Devising
- Making

The digital additions and their justifications are as follows:

- **Programming:** Whether it is creating their own applications, programming macros, or developing games or multimedia applications within structured environments, students are routinely creating their own programs to suit their needs and goals.
- **Filming, animating, videoing, podcasting, mixing, and remixing:** These relate to the increasing trend and availability of multimedia and multimedia editing tools. Students frequently capture, create, mix, and remix content to produce unique products.
- **Directing and producing:** To direct or produce a product, performance, or production is a highly creative project. It requires the student to have vision, understand the components and meld these into a coherent product.
- **Publishing:** Whether via the web or from personal computers, publishing in text, media, or digital formats is increasingly possible. Again this requires a huge overview of not only the content being



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published, but the processes and product.