Evidence-Based Learning (EBL) The Eight Key EBL Skills	
Key EBL Skill 2 **Thinking Skills**	
	A 15-minute Teacher Guide
1	This resource first outlines the benefits of developing thinking skills in the classroom.
2	This resource then has research that supports using thinking skills in the classroom.

Our review of over 200 educational research papers identified eight key thinking and learning skills that have been found in common across this research

Our two-year research review identified these eight key thinking and learning skills:

- Collaborative Skills

- Thinking Skills

- Peer Assessment

- Peer Teaching

- Self-Assessment

- Metacognition

- Self-Regulation

- Independent Learning

some of these eight skills are needed in different combinations

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to develop 21st Century thinking and learning skills

Our two-year research review also identified three key 21st century thinking and learning skills:

- Creative Thinking

- Critical Thinking

- Problem Solving

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these three skills need different combinations of the skills above

Introduction to Thinking Skills (1)

Thinking skills are the mental activities we use:

- to process information,
- to make connections,
- to make decisions, and
- to create new ideas.

Introduction to Thinking Skills (2)

We need thinking skills:

- to process information
- to organise information
- to remember things
- to ask questions
- to solve problems
- to make connections
- to make decisions

Developing Thinking Skills
can Raise Attainment

Developing pupils' ability to think more skilfully can lead to better learning and increased attainment.

Far and away the most effective factor in raising attainment was activity that made pupils' minds work.

The Development of Thinking Skills

In 1956, having researched thousands of questions routinely asked by teachers, Benjamin Bloom organised these questions into six categories depending on the thinking skills needed to answer them.

These six categories came to be known as Bloom's Taxonomy.

Different types of thinking take place at each level of the taxonomy. Generally speaking, easier types of thinking are at the bottom and more difficult types of thinking at the top.

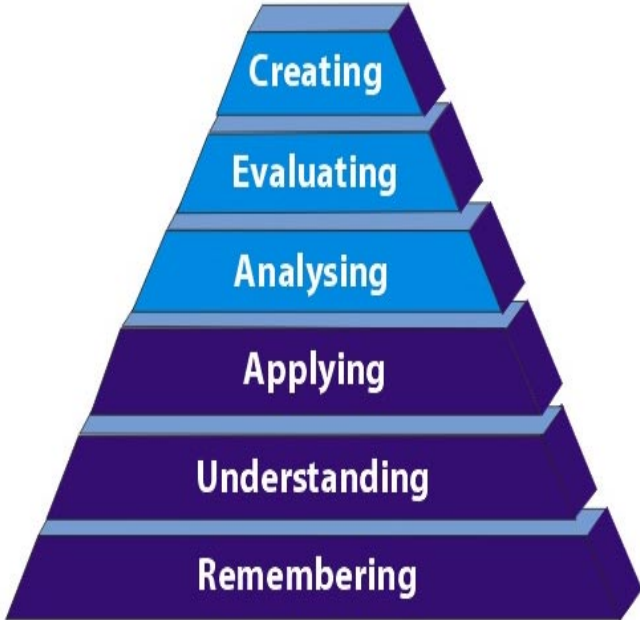| Level 6	● creating	⬆	being able to put things together in a new way
Level 5	● evaluating	⬆	being able to make judgements to help decision making
Level 4	● analysing	⬆	being able breaking things down
Level 3	● applying	⬆	being able to use existing knowledge in new situations
Level 2	● understanding	⬆	being able to explain something
Level 1	● remembering	⬆	being able to recall something previously learned

Bloom's Taxonomy is seen as a
ladder of progression for thinking skills

In 1956, Benjamin Bloom classified different types of thinking into 6 levels to create a taxonomy (a classification) of thinking skills

In 2001, Anderson and Krathwohl revised the taxonomy.

Their biggest change was to use verbs instead of nouns to describe the *action* needed at each level rather than just the **name** of each type of thinking

	1956 Bloom's taxonomy used **nouns** that named the thinking skill at each level	**2001** Anderson and Krathwohl used **verbs** that tells us the action needed at each level
Level 1	● knowledge	● remembering
Level 2	● comprehension	● understanding
Level 3	● application	● applying
Level 4	● analysis	● analysing
Level 5	● synthesis	● evaluating
Level 6	● evaluation	● creating

1956	Bloom's original model

the **1956** model used **nouns** to name the type of thinking at each level

2001	Anderson and Krathwohl's revised model

the **2001** model used **verbs** to describe the action needed at each level

In the 2001 model, *creating* has replaced *synthesis* and this skill is now top of the taxonomy.
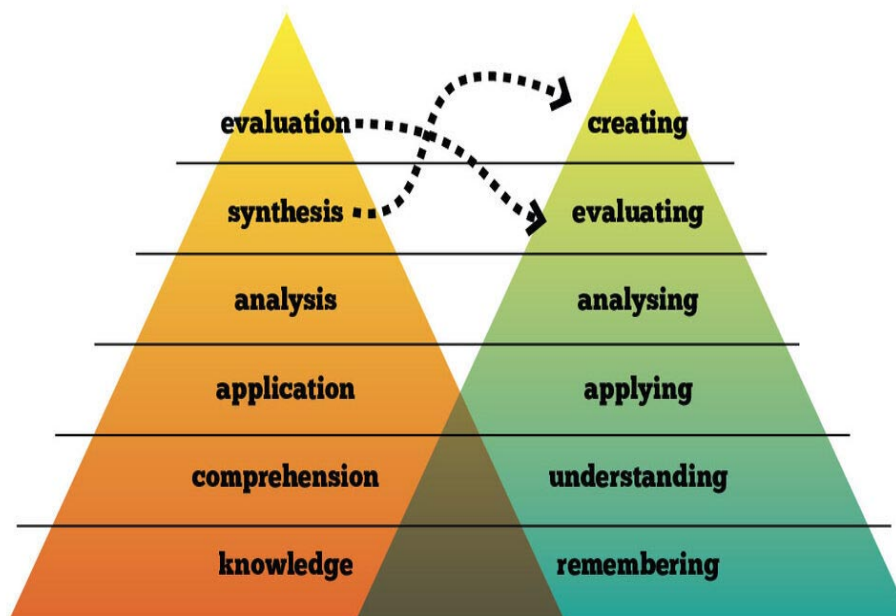
In 2001, Bloom's Taxonomy was
revised - providing learners with clearer
objectives of what was expected of them

In 2001, Anderson and Krathwohl revised the 1956 Bloom's taxonomy model. The Bloom's taxonomy nouns at each level were replaced by verbs - providing learners with clearer objectives for what is expected of them.

What's more, the most important two levels, 'evaluating' and 'creating', were swapped to make creating the main goal of learning.

Anderson and Krathwohl's 2001 model was a
verb-based model that listed the **actions** at each level

| **1956 - nouns name the skill** | **2001 - verbs name the action** |

Bloom's Taxonomy is a model of
20th century thinking skills that was
created in 1956 and revised in 2001

the **2001** model used *verbs* to
describe the action needed at each level
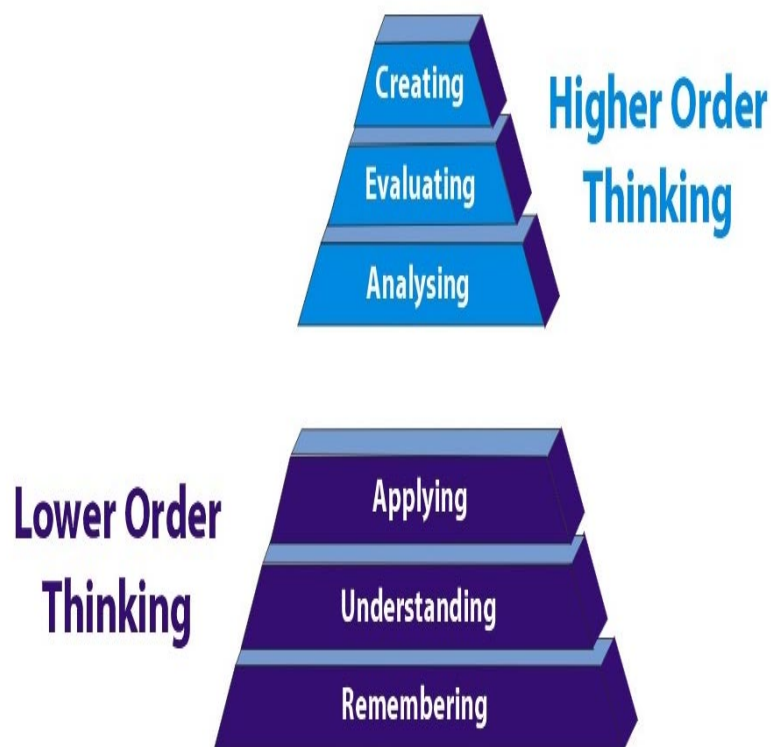
Like other taxonomies, Bloom's is hierarchical,
meaning that learning at the higher levels is
dependent on having attained prerequisite
knowledge and skills at lower levels.

You will see Bloom's Taxonomy often displayed as a
pyramid graphic to help demonstrate this hierarchy.

Reasons in favour of using Bloom's Taxonomy to improve thinking skills (1)
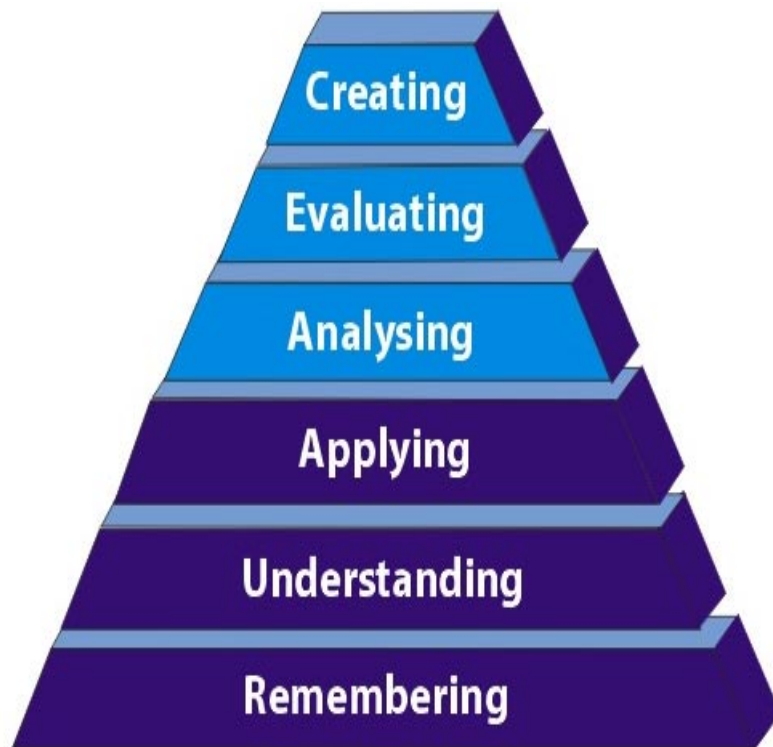
Bloom's Taxonomy has been a useful framework for educators and learners for close to 70 years - and with good reason.

It provides clear and relevant pathways for learners to move through the orders of thinking, from basic remembering to more complex skills such as evaluating and creating.

Reasons in favour of using Bloom's Taxonomy to improve thinking skills (2)
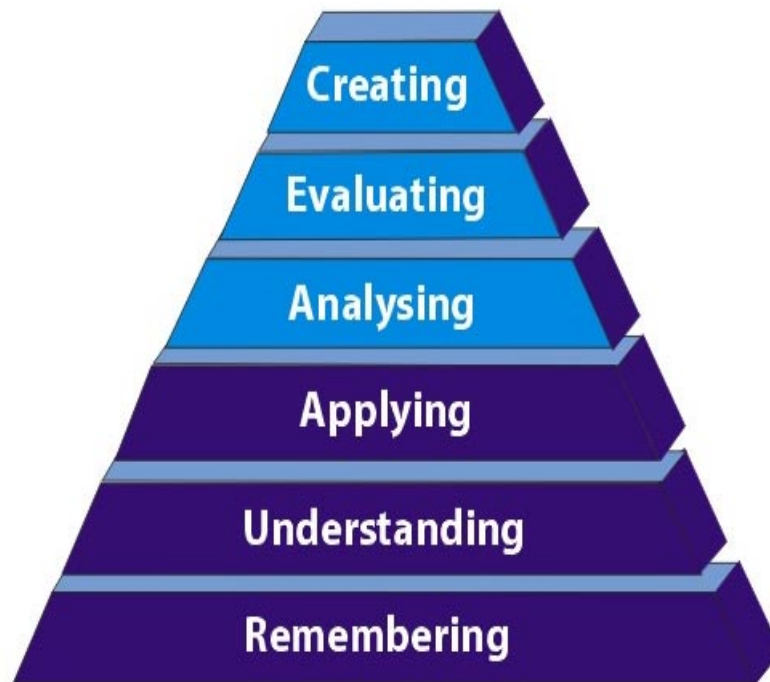

The fact that Bloom's Taxonomy can be applied to any cognitive content intended for learners to learn is what makes this framework so powerful.

For teachers, Bloom's Taxonomy is a practical tool to use, providing a framework in which to plan challenging lessons that help to ensure learners' progress is maximised – a fundamental tenet of successful teaching.

Among its many uses, Bloom's Taxonomy provides an excellent foundation for lessons, as it can be used as a framework in which to deliver appropriate activities, assessment, questioning, objectives and outcomes.

A critique of Bloom's Taxonomy
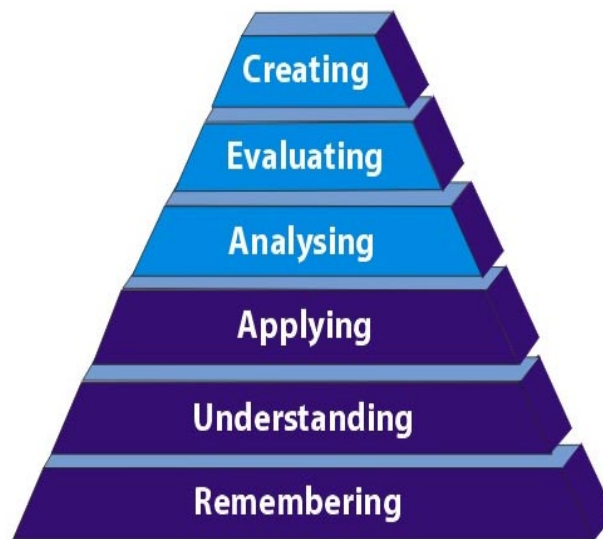
An article about Bloom's Taxonomy in *Education Week* argues:

Doug Lemov (an American educator and author) critiqued Bloom's Taxonomy with an argument that others have raised in the past. He said that learning is not a hierarchy or a linear process. This graphic gives the mistaken impression that these cognitive processes are discrete, that it's possible to perform one of these skills separately from others. It also gives the mistaken impression that some of these skills are more difficult and more important than others.

Lemov is concerned that the construction of the pyramid places knowledge/remembering at the bottom of the model. It is therefore seen as least important, as a "lower-level" process that should be avoided as much as possible to give students more "higher-level" skills.

Although one could alternately see the bottom of the pyramid (as Bloom intended) as its foundation – nothing above being possible without a strong base of knowledge – Lemov argues that this is not the way most teachers see it.

This is the general order that thinking and learning skills develop:			
First	Lower order thinking skills	**B L O O M**	↓
Next	Higher order thinking skills		↓
Then	Self-assessment		↓
After that	Metacognitive thinking skills		↓
Finally	Self-regulation: Metacognitive thinking skills + Non-Cognitive Skills (the attitudes and behaviours for learning - such as motivation, perseverance and self-belief)		↓

Bloom's Taxonomy is a useful framework for making thinking skills explicit and it also provides a solid foundation for enhancing thinking skills.

Overall, the research shows that despite its critics, learning outcomes are better using Bloom compared to not using Bloom.

Conclusion (1)

Other thinking skills have been identified as important since the creation of Bloom's Taxonomy in 1956

Three key thinking skills have been identified as being necessary for the 21st century

The three thinking skills identified as being necessary for the 21st century are:

- ☑ Critical Thinking
- ☑ Creative Thinking
- ☑ Problem Solving

Conclusion (2)

Since 1956 there has been three
key developments in thinking skills

1956	Benjamin Bloom created a taxonomy of 6 individual thinking skills:

Lower Order Thinking Skills	• Remembering
	• Understanding
	• Applying

Higher Order Thinking Skills	• Analysing
	• Evaluating
	• Creating

1971	Flavell developed the concept of metacognitive thinking skills (thinking about the way you are thinking)

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all the thinking skills above are skills that
usually involve a **single type** of thinking at a time

1980's onwards	more complex 21st century skills were identified - each skill needing at least 2 types of thinking

21st century thinking skills include:	• Critical Thinking
	• Creative Thinking
	• Problem Solving

Conclusion (3)

Level 1	• Remembering	Bloom's taxonomy created a model of 20th century thinking skills
Level 2	• Understanding	
Level 3	• Applying	
Level 4	• Analysing	each level needs only one type of thinking skill
Level 5	• Evaluating	
Level 6	• Creating	

21st century thinking skills are more complex thinking skills and each skill needs more than one type of thinking:

Problem Solving	Problem solving might need a range of skills including analytical skills, critical thinking skills, decision-making skills, evaluative skills, reflection, adaptability, flexibility, and innovative and creative thinking.
Creative Thinking	Creative thinking might need a range of skills including open-mindedness, problem-solving, lateral thinking, analysis, analytical skills and out-of-the-box thinking.
Critical Thinking	Critical thinking might need a range of skills including analysis, interpretation, reflection, evaluation, inference, explanation, problem solving, reasoning skills, decision-making and characteristics such as open-mindedness.

Conclusion (4)

Thinking has evolved from Bloom's
20th century model of thinking skills:

Level 1	● Remembering	each level has only one thinking skill
Level 2	● Understanding	
Level 3	● Applying	⬇
Level 4	● Analysing	⬇
Level 5	● Evaluating	⬇
Level 6	● Creating	

to a model that also includes
21st century thinking skills - such as:

Creative Thinking	Critical Thinking	Problem Solving

each 21st century thinking skill needs a
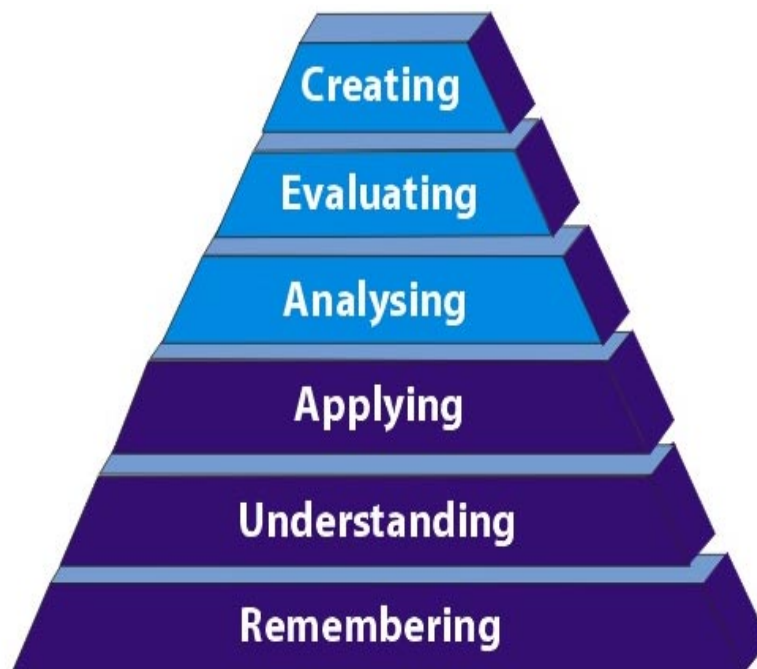combination of more than one thinking skill.

The three 21st century skills
are covered in separate lessons.
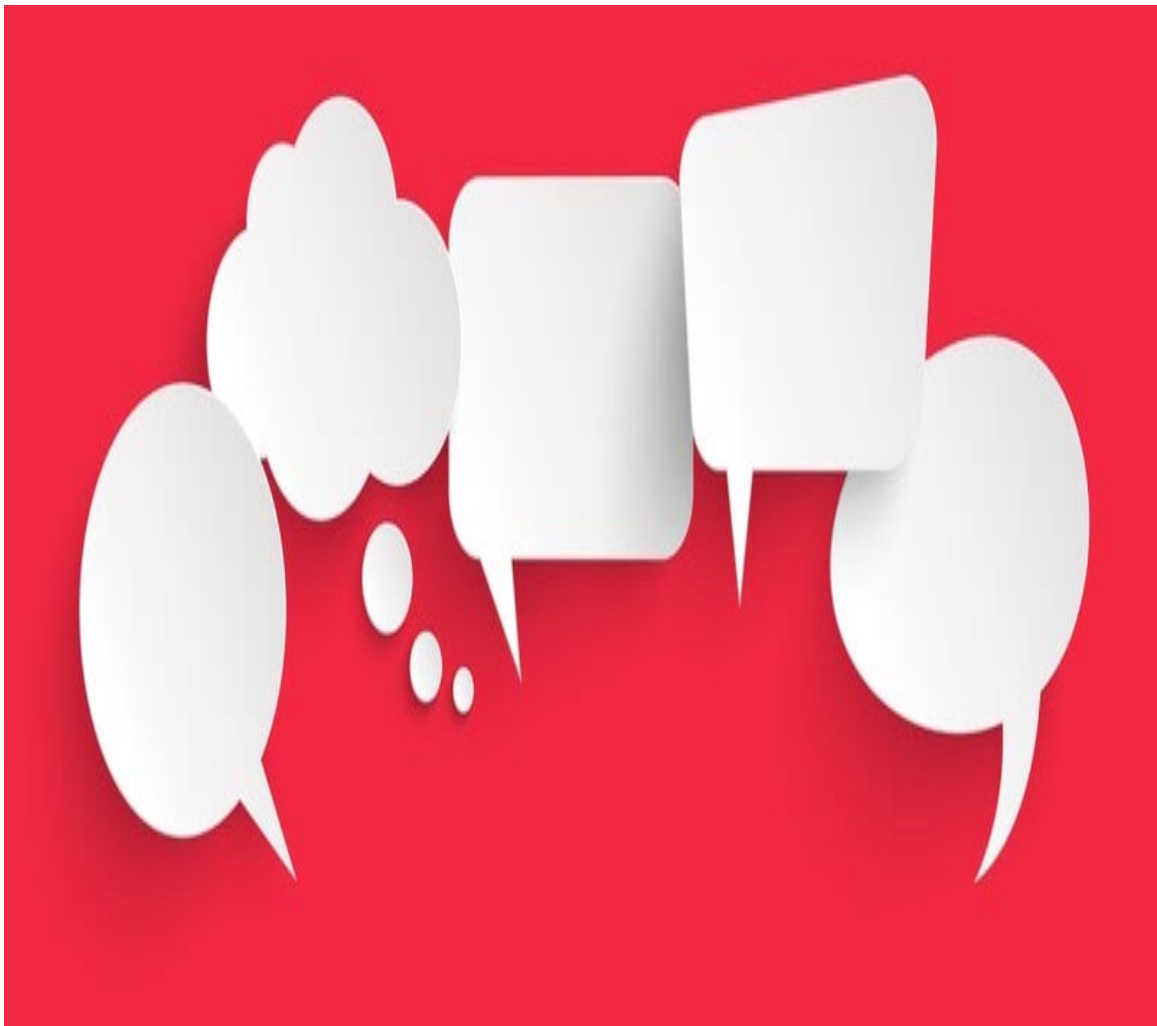
Conclusion (5)

Bloom's 1956 model was
a *noun-based* model that listed the
names of the skills needed at each level:
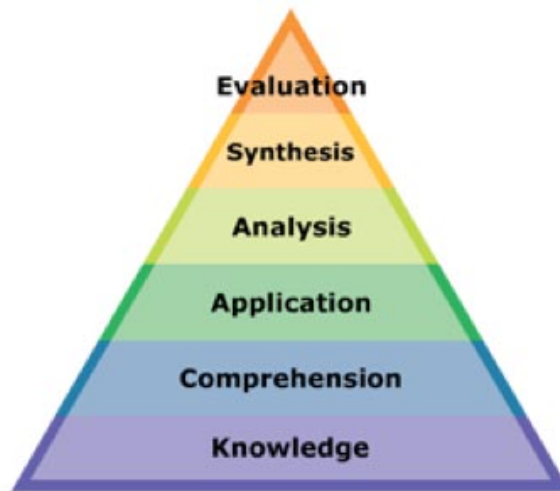
Anderson and Krathwohl's 2001 model
was a *verb-based* model that listed
the **actions** needed at each level:

The following pages have
research-based quotes
on Bloom's Taxonomy.

This research could be used for
teacher CPD on the drawbacks and
the benefits of using this taxonomy.

Critiques of Bloom's Taxonomy (1)

Bloom's Taxonomy "gives the mistaken impression that some of these skills are more difficult and more important than others"

"Learning is not a hierarchy or a linear process"

The problem is that both (the 1956 and the 2001) versions of the taxonomy present a false vision of learning.

Learning is not a hierarchy or a linear process.

This model of the taxonomy give the mistaken impression that these cognitive processes are discrete, that it's possible to perform one of these skills separately from others.

It also gives the mistaken impression that some of these skills are more difficult and more important than others.

Critiques of Bloom's Taxonomy (2)

Bloom's Taxonomy is teacher-centred and is not learner-centred.

"The taxonomy does not consider the learner"

The taxonomy does not consider the learner and the differences that each learner brings to the table. Motivation, their intellectual values, their past experiences with the content, their differences in cognitive processing: none of these are considered.

The approach is based on the belief that all learners are at the same place in their learning, which is inherently false. In short, Bloom's Taxonomy focuses on abstract cognitive domains and not on the individual learner. Bloom's Taxonomy is teacher-centred and not learner-centred.

Research that supports using Bloom's Taxonomy (1)

Bloom's Taxonomy built on earlier research by Piaget and Vygotsky

"Thinking skills are developed by cognitive challenge"

Bloom's Taxonomy of thinking skills (what he called 'the cognitive goals of education') has been widely used by teachers in planning their teaching. Bloom identified a number of basic or 'lower order' cognitive skills – remembering, understanding and applying and a number of 'higher order' skills – analysing, evaluating and creating.

Bloom's Taxonomy built on earlier research by Piaget and Vygotsky that suggested that thinking skills are developed by cognitive challenge.

Bloom's Taxonomy encourages pupils to think more deeply and more widely and in more systematic and sustained ways.

Research that supports using Bloom's Taxonomy (2)

Bloom's Taxonomy works

Using Bloom's Taxonomy improves learning outcomes

In this study, the authors conducted a meta-analysis of previous research on the impact of Bloom's Taxonomy on student learning and found that the use of Bloom's Taxonomy in the classroom was associated with increased student achievement, as compared to control groups who did not receive instruction using the taxonomy.

The study concluded that teaching Bloom's Taxonomy of thinking skills can have a positive impact on students' abilities to analyze, synthesize, evaluate, and apply information, as well as improve their overall learning outcomes.

The Impact of Bloom's Taxonomy on Student Learning: A Meta-Analysis" by R. J. Marzano and J. S. Pickering 2007

Research that supports using Bloom's Taxonomy (3)

Bloom's Taxonomy provides a usable structure for teachers

The greatest strength of the taxonomy

Anderson (2000) argues that nearly all complex learning activities require the use of several different cognitive skills. Like any theoretical model, Bloom's Taxonomy has its strengths and weaknesses. Its greatest strength is that it has taken the very important topic of thinking and placed a structure around it that is usable by practitioners.

Those teachers who keep a list of question prompts relating to the various levels of Bloom's Taxonomy undoubtedly do a better job of encouraging higher-order thinking in their learners than those who have no such tool.

Research that supports using Bloom's Taxonomy (4)

Using Bloom promotes critical thinking

"Higher order questions put advanced cognitive demands on pupils"

Higher order questions are those that the pupils cannot answer just by simple recollection or by reading the information "verbatim" from the text. Higher order questions put advanced cognitive demands on pupils. They encourage pupils to think beyond literal questions.

Higher order questions promote critical thinking skills because these types of questions expect pupils to analyze, synthesize, and evaluate information instead of simply recalling facts.

Adapted from: Higher Order Questions - Oct 2014
dataworks-ed.com