

Higher Order Thinking Skills (HOTS)

What is 'Higher Order Thinking Skills' (HOTS)?

- It combines the use of computers, drama, Socratic dialogue, and a detailed curriculum to stimulate thinking processes
- Computers are not used to present content, but rather to intrigue students and get them involved
- Drama, in the form of teacher play-acting—sometimes in costume—also stimulates students' interest and curiosity. Some days the teacher may present a lesson as a mysterious situation for which the students' help is needed.
- HOTS is a creative program designed to build the thinking skills of educationally disadvantaged students

What is 'Higher Order Thinking Skills' (HOTS)?

- However, HOTS is foremost a program built on Socratic dialogue, creative and logical conversation between teacher and students
- While most teachers ask simple questions of educationally disadvantaged students, and are content with one-word responses, HOTS teachers are trained to ask questions that require students to explain and elaborate their answers at length.

Thinking Skills ?

Thinking Skills can be broadly classified the into six areas:

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

The CBSE is using these components in the examinations.

It would be worth while to know more about the typical question frame work for all the six areas mentioned above.

Knowledge

This is about learning and recalling information from your text book and surroundings

- Define, Describe
- List down, Name
- When, Where
- Tabulate, Identify etc.

Comprehension

Comprehension: This is about drawing inferences from what you have read.

The question may ask you to grasp the meaning, infer the causes and make predictions.

- Typical question types are
- Explain / Discuss
- Compare / Contrast
- What will happen if
- Why does it happen so

Application

Application This is about using the information that you have acquired in new situations to solve problems.

- Typical question types are
- Numerical problems
- Apply / Illustrate
- Classify, etc.

Analysis

Analysis This section is about seeing patterns in what you study and recognizing the implications. The typical question types would be

- Arrange / Separate
- Classify / Compare
- Explain why

Synthesis

Synthesis This is your ability to draw conclusions from given facts and generalizations.

The question types are

- What if
- How will you design / plan
- What do you infer from

Evaluation

- **Evaluation** This is about assessing the merit of what you have learnt, knowing its uses, and limitations; giving out reasoned arguments, etc.
- The typical question types are
- Recommend / Judge
- What do you conclude
- Rank in the order of

Comments

- Comments »
 - Roshan Ghosh said,
 - Conceptwise it seems to be good
 - This will definitely bring out the difference between
 - a student who has
 - studied the subject with the view of actually “learning”
 - and a student who has “By-heart” it with the sole aim
 - of getting good marks.

Comments...

- At first, most students are resistant to expressing their ideas.
- The computer helps overcome this resistance by building a bridge between the familiar passive visual learning offered by TV
- and the active verbal learning expected in HOTS and the regular classroom.
- It provides an interactive means for students to test their ideas before verbalizing them.
- Over time, the teacher's expectations, combined with interesting program activities, result in a highly conversational environment in which students begin to discover that they are good at thinking and explaining ideas. With this confidence, they embrace intellectual challenges rather than run from them

How Principals can help

To successfully implement a HOTS program in grades, the principal's most important task is to:

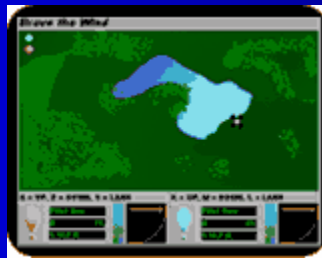
- select an outstanding teacher, one who is bright, open-minded, organized, and likes to engage students in Socratic discussions
- The principal can, for example, provide substitutes so that classroom teachers can observe HOTS instruction and see students who do poorly in their classrooms discussing, reflecting, and solving complex problems.
- The experience may encourage classroom teachers to think differently about the ability of such students, and to work more creatively with them.
- Careful student selection and scheduling is also critical to the success of the HOTS program, which provides guidelines for this purpose
- Not all Title I students or those with identified learning disabilities can benefit from a HOTS program; some will need other forms of help
- In addition, HOTS can be part of a schoolwide improvement plan to provide quality instruction for all students

Success of Hots

- The success of HOTS in producing learning gains with traditionally low achieving students demonstrates that these students have great intellectual potential;
 - that they want to be successful in school
 - and that the right educational approach in the hands of a good teacher
 - and with the support of a good principal, can unleash this ability

Examples

- In *Brave The Wind* students must learn to fly a hot air balloon using wind speed, direction and altitude. Develops *metacognition* skills



Examples


- *Hangman*, a modernization of the classic where students predict words based on clues. Develops *inference* skills.



Example

- In *Whale Spotters*, Students are taken on a whale watching voyage. Develops *synthesis* skills





This is the best program I have found. My principals tell me that this is the most successful program they have encountered. It impacts all academic areas, and improves behavior and attendance. Teachers love the program.

Dr. John Connelly
Assistant Superintendent
Ellenville, New York

Hots in CBSE

- For the first time, Central Board of Secondary Education (CBSE) students of Class 10 and 12 take their exams that includes Higher Order Thinking Skills (HOTS) that will put to test, their application skills. The question paper is designed in such a way that students should be able to answer all the questions within the stipulated time, besides revising them.
- This year too, they will be given an additional 15 minutes so that they get sufficient time to read the questions carefully.
- Internal evaluation in Maths, Social Science and Science subjects and oral testing in languages will be introduced for Class I to X.

Hots in CBSE

- “We need industry support not only for framing curriculum but also for the transition of curriculum. This is going to be a paradigm shift for Class 11 and 12.
- One of the reasons for the change is the 11th Plan, which is about universalisation of secondary education,” Mr Ganguly said.
- On new subjects for Class 12, he said it will be more skill-based. One of them has already been implemented — creative writing and translation.
- “Some of the programmes we are planning to introduce are films and media, heritage crafts and others,” he said.
- The chairman said the board is thinking of introducing nanotechnology at school-level. “We are thinking whether to introduce in science or as a separate subject,” he added.

- “The new examination pattern with focus on judging the high order thinking skills (HOTS) of students might be the reason behind a dip in the number of students (scoring)cent per cent,” CBSE chairman Ashok Ganguly said.

Only 753 score 'perfect 100' in CBSE class 12 this year

- New Delhi, May 23 (IANS) The number of students securing a 'perfect score' - or 100 out of 100 marks in subjects - has come down by over 50 percent in this year's Central Board Of Secondary Education (CBSE) class 12 exams, and the board says the reason is 'HOTS'. High order thinking skills — or HOTS — was the new basis of the question papers in the class 12 examination question papers of the board this year. HOTS is an analytical problem solving process, geared to assess the students' absorption of knowledge and its application.
- Only 753 class 12 students have scored 100 marks in any subjects as compared to 1,506 last year, the education board said, after declaring the results here Friday. A total of 549,344 students appeared in the examination.

How can technology develop higher order thinking and problem solving?

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- Technology can enable the development of higher order thinking skills when students are taught to apply the process of problem solving and are then allowed opportunities to apply technology in development of solutions.

RESEARCH EVIDENCE

- Computers, combined with drama and Socratic dialogue, build thinking skills. The Higher Order Thinking Skills (HOTS) pull-out program, developed in the early 1980s to build the thinking skills of students through exposure to a combination of computers, drama, and Socratic dialogue, enabled disadvantaged fourth through seventh graders to achieve:

How can technology develop higher order thinking and problem solving?

- twice the national average gains on reading and math test scores,
- suggesting a transfer of the students' cognitive development to learning specific content, and
- increased performance on measures of reading comprehension, metacognition, writing, components of IQ, transfer to novel tasks, and grade point average
- Higher-order thinking skills improve with home and school access to computers. Students who were supplied home computers and modem access to the school were compared with students who didn't have this equipment. The students with home computers and modem access to school realized:
 - *an increase in all writing skills,*
 - *better understanding and broader view of math,*
 - *greater problem-solving and critical thinking skills,*
 - *ability to teach others,*
 - *greater self-confidence and self-esteem, and*
 - *more confidence with computer skills.*

How can technology develop higher order thinking and problem solving?

- Software tools that promote student collaboration also promote "higher level" science discussions. Fourth and fifth grade students were divided into teams of four or five for a 10-week project designing a lesson for teaching third graders about the brain. Science discussions that led fourth and fifth grade students to reformulate the academic content at higher levels also enabled them to:

- focus on the design of software screens,
- choose their research question within the confines of the science subject,
- choose the software screens to design, and
- choose the methods for conducting their research for teaching third graders about the brain.

How can technology develop higher order thinking and problem solving?

- Students who were experienced with collaborative software design tools provided better learning opportunities for their peers who were newcomers to the software. "Their extensive questioning functioned as a way for their teams to bootstrap up to the next level of engagement." The combination of whole-classroom science activities with more individualized research questions allowed both for content coverage as well as for activities that were intellectually and socially meaningful to individuals
- On-line use can increase thinking skills.
- online use can increase thinking skills.
- 'bringing together' different points of view
- effective presentation, accuracy of information, presentation of full picture, completeness of the assignment

How can technology develop higher order thinking and problem solving?

- when students used the Internet to research topics, share information and complete a final project within the context of a semi-structured lesson they became independent, critical thinkers

A RAND project based on a review of the effectiveness literature and focus groups with practitioners in educational technology reported that through the use of technology, students gain a greater sense of responsibility for their work. They produce higher-quality assignments that reflect the increased depth and breadth of their knowledge and talent. ([Glennan & Melmed, 1996](#)).

Powerful technologies are now available to significantly augment the skills that are necessary to convert data into information and transform information into knowledge. In an historical review of computers in education, research shows that educational technology, when properly applied, can provide an effective means for learning. ([Molnar, 1997](#)).

How can technology develop higher order thinking and problem solving?

- Interactive video programs have been demonstrated to increase problem-solving skills. Students across nine states who used Jasper video software as a centerpiece for mathematics instruction for 3 to 4 weeks were compared with students who did not. The comparative research demonstrated that the students in classrooms that used the Jasper video programs were better at complex problem solving ([Cognition and Technology Group, 1992](#)).

Eighth grade students whose teachers effectively used technology for 'simulations and applications' to enhance higher-order thinking skills performed better on the National Assessment of Education Progress test than did students whose teachers did not use the technology. Students whose teachers used the technology primarily for 'drill and practice' (generally associated with lower order thinking skills) performed worse on the NAEP ([Wenglinsky, 1998](#)).