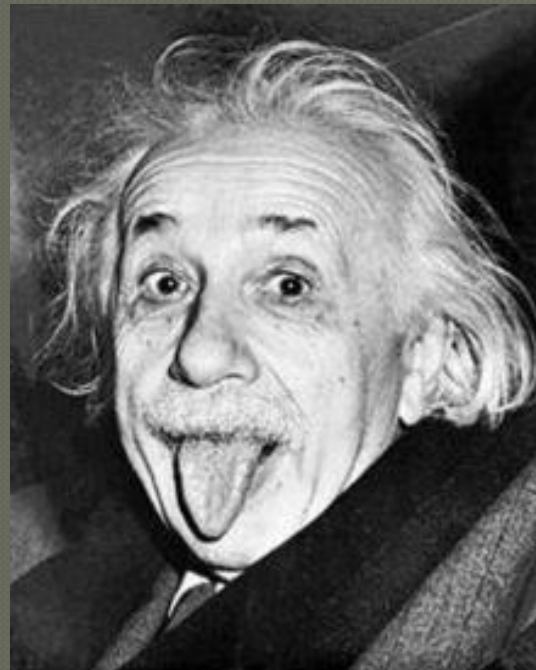
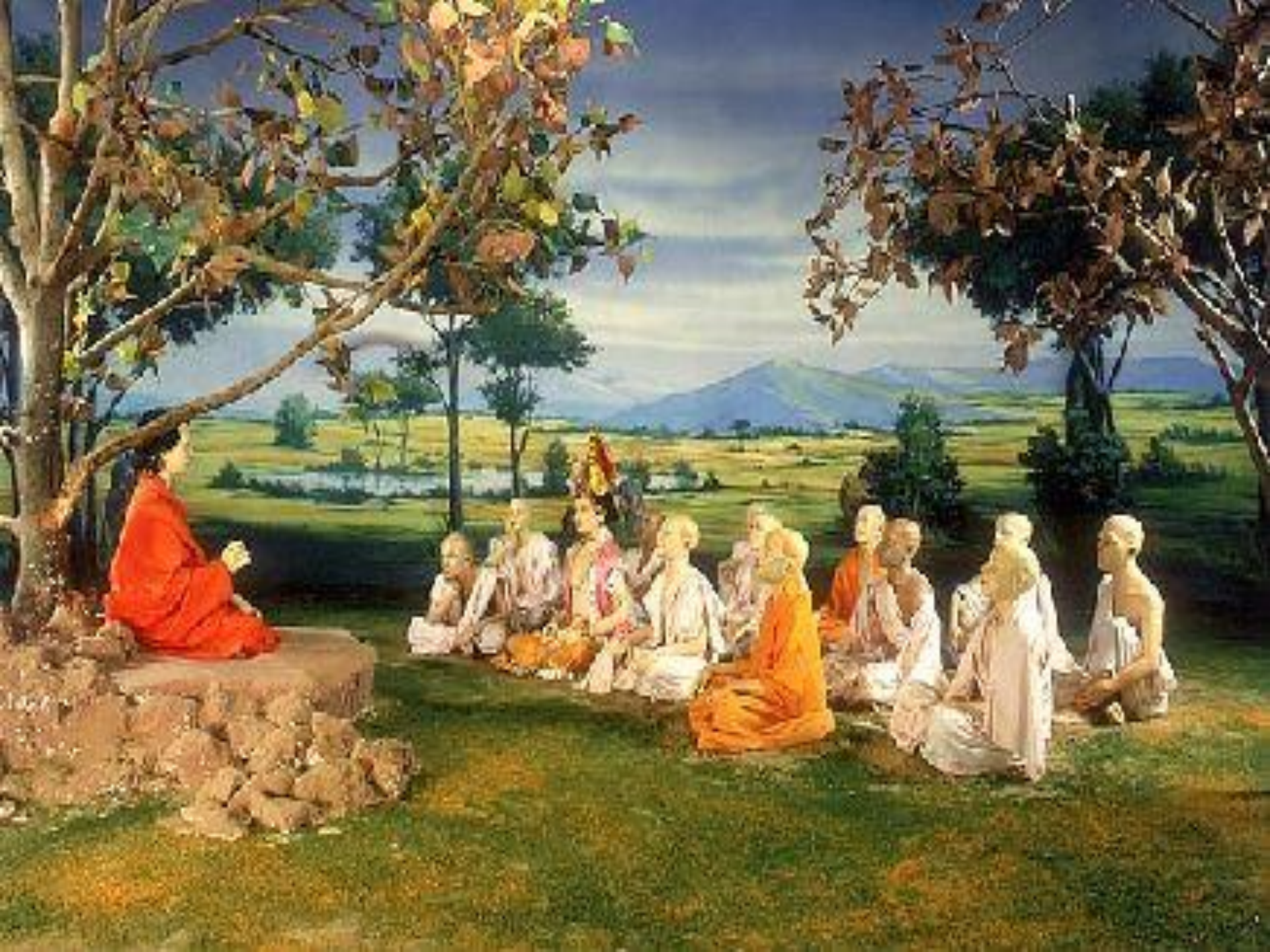


SEER - The TLC Journal Club
Research Article Presentation on:
***“Can Undergraduate (Biology) Students
Learn to Ask Higher Level Questions”***

Pankaj Kumar Sharma
Dept. of Biological Sciences
BITS, Pilani, 31st Jan, 2019

-
- When Einstein was requested to provide his phone number.





- Role of questioning in teaching-learning of science

◎ “Answers are everywhere, and easily accessible.” – Tony Wagner, Harvard

◎ “You don’t learn unless you question.” –
Joi Ito, MIT

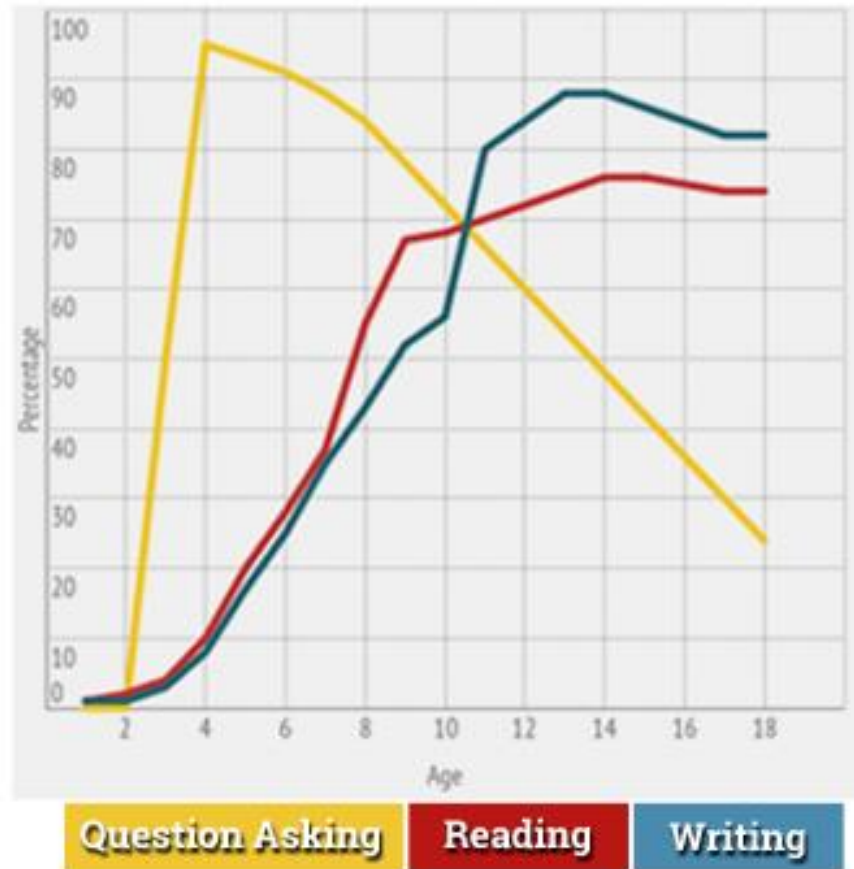
① Whose question is it?



Dan Rothstein and Luz Santana of the Right Question Institute say: “...*Even in the most progressive schools (educational institutes), questioning is still primarily the domain of the teacher.*”

- Source: ‘A More Beautiful Question’ – by Warren Berger

Why does kids' questioning drop off after age 3?



Can Undergraduate Biology Students Learn to Ask Higher Level Questions?

Gili Marbach-Ad and Phillip G. Sokolove

*Department of Biological Sciences, University of Maryland Baltimore County,
1000 Hilltop Circle, Baltimore, Maryland 21250*

-
- Good science begins with good questions.

- ① Course

- ① Class duration and frequency

- ① The study was conducted in two classes.

① Consent form and institute approval.

Some approaches in the **active learning** class (vs traditional lecture class)

- ◉ Name badges
- ◉ Wireless microphones
- ◉ Group formation
- ◉ Encouragement by the teacher

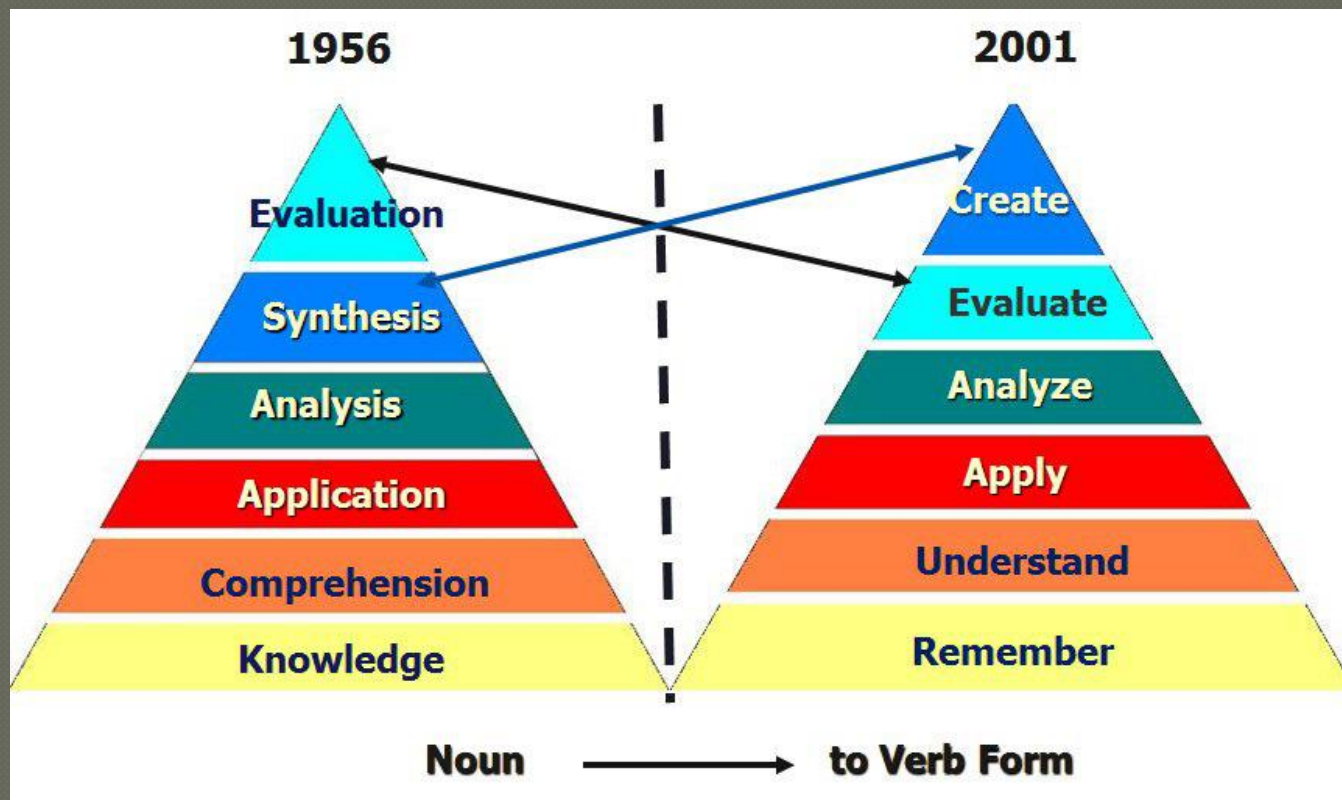
Take Home Assignments (HW)

- The flow – HW1 – HW3/HW5.
- To formulate one/two questions from an assigned textbook chapter and **submit** in a forthcoming class.
- Best question selection.
- Class Discussion



Categorizing Students' Questions

- Is Bloom's Taxonomy adequate for the purpose?



Taxonomy of Students' Questions

– also presented to students

Category	Question type
0	Not logical
1a	Simple definition
1b	More complex definition
2	Ethical, philosophical, socio-political
3	Evolutionary
4	Seeking more information
5	Extended thought
6	Research hypothesis



Table 2
Percentage of students' questions in each category in homework exercises in the active learning class

Category	HW1 <i>N</i> = 182	HW2 <i>N</i> = 188	HW3 <i>N</i> = 173
(0) Based on misunderstanding	15%	13%	8%
(1a) Simple definition question	12	11	5
(1b) Complex definition question	12	11	9
(2) "Motives" or "intentions"	1	3	2
(3) Evolutionary questions	10	10	2
(4) Seeking more information	20	32	30
(5) Thoughtful questions	23	13	30
(6) Research questions	7	7	14

Students' questions in the active learning class

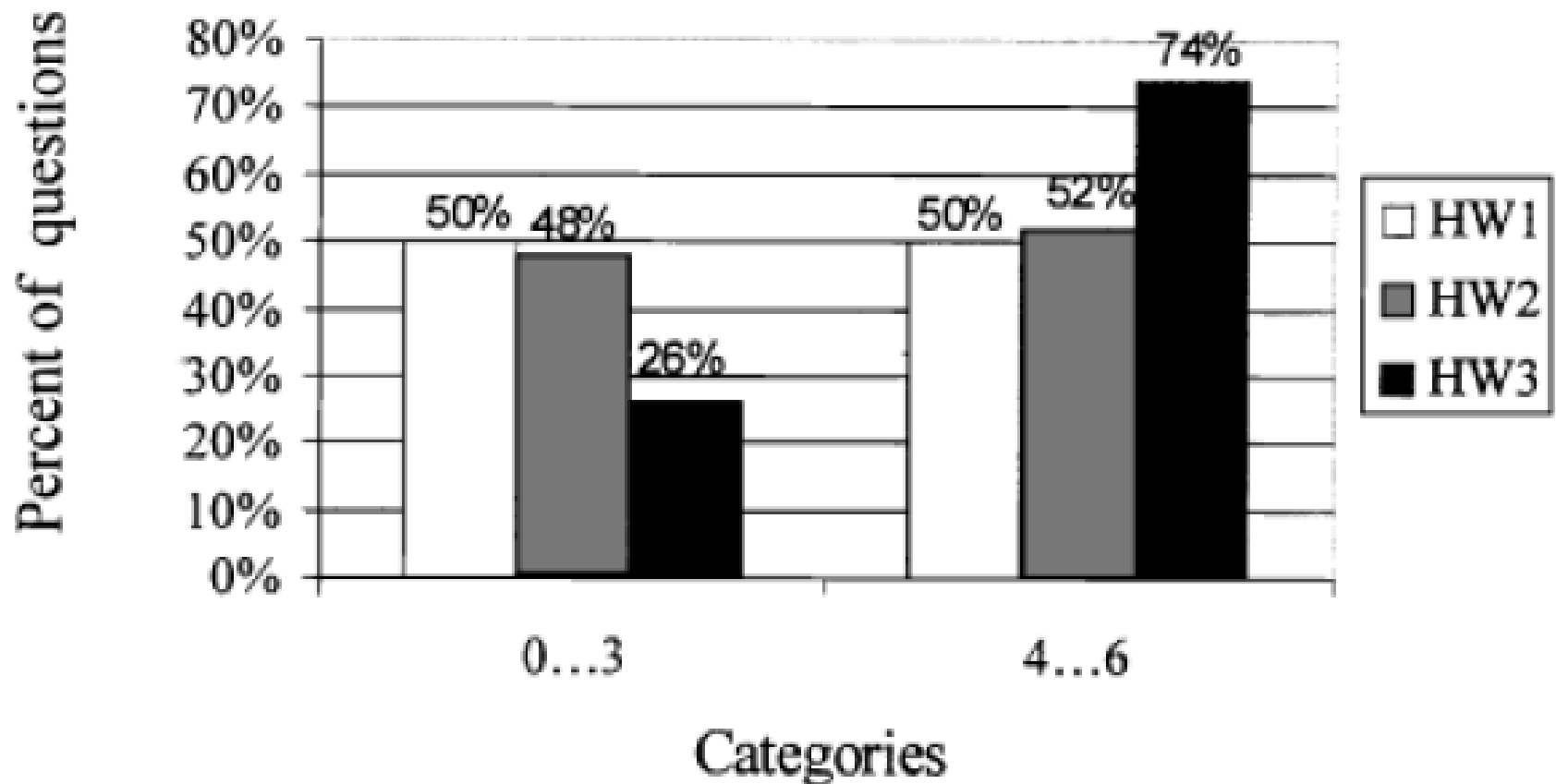
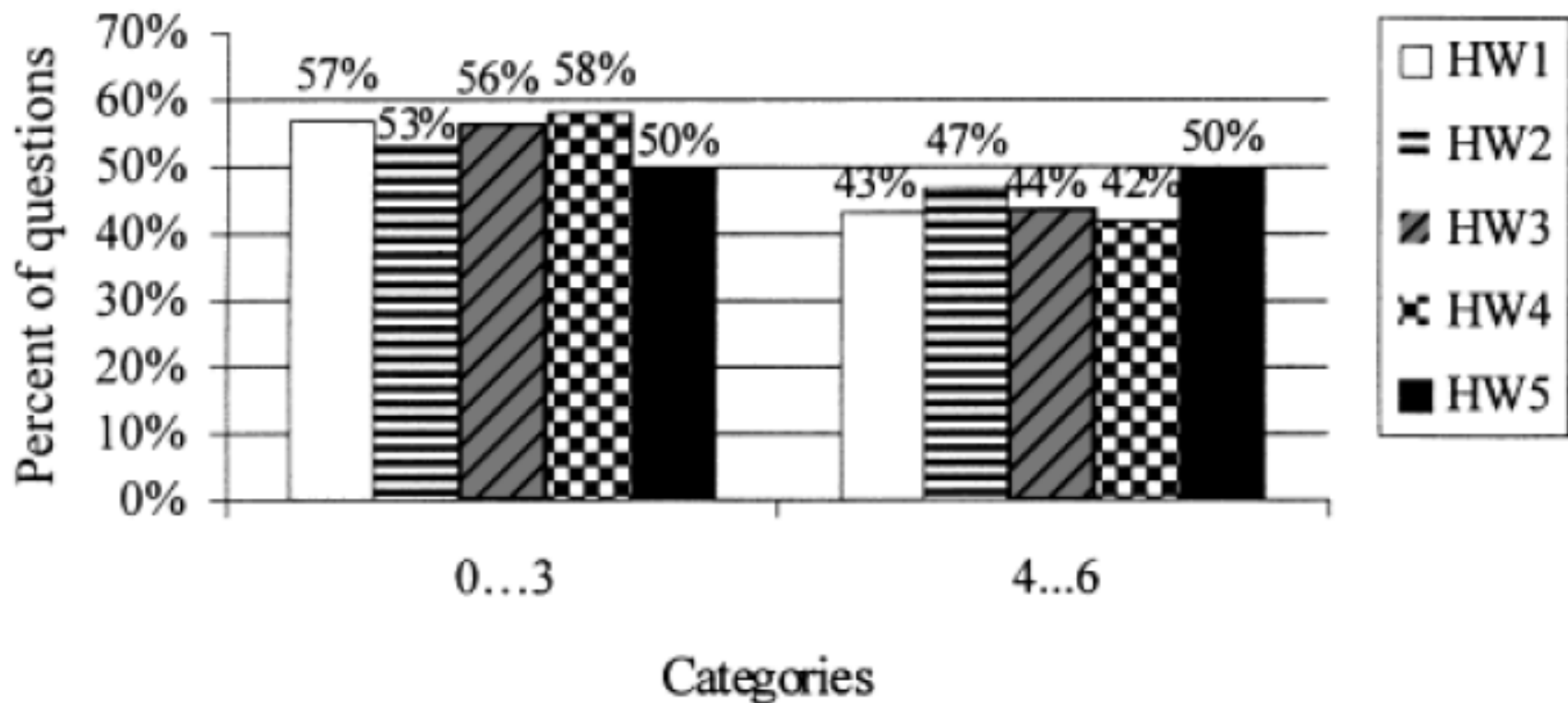


Table 4
Percentage of students' questions in homework exercises in the traditional class

Category	HW1 N= 120	HW2 N= 101	HW3 N= 117	HW4 N= 108	HW5 N= 123
(0) Based on misunderstanding	22%	27%	23%	25%	27%
(1a) Simple definition	15	9	21	17	8
(1b) Complex definition	5	14	3	4	9
(2) Motives or intentions	1	1	0	1	3
(3) Evolutionary questions	14	2	9	11	3
(4) Seeking more information	30	32	35	33	33
(5) Thoughtful questions	10	13	9	7	9
(6) Research questions	3	2	0	2	8

Students' questions in the traditional class



Conclusions

- There was a significant improvement in students' questions toward the end of the semester in the active learning class following a specific intervention.

-
- Challenges in active learning method.

-
- **Acknowledgements** and a brief Epilogue...

-
- Activity given to students of Biochemistry class, September 2016.

Design questions on the given statement:

“The three-dimensional structure is determined for a pure protein.”



Some Questions that Students wrote

- A. Who made this statement?
- B. Which protein are we talking about?
- C. How was the protein purified?
- D. What do we exactly mean by protein purification?
- E. Can the structure of an impure protein be determined?
- F. Which forces maintain the 3D structure of proteins?
- G. Is the protein in its active or inactive state?

Thank you!

The question 'Who am I?' is not really meant to get an answer, the question 'Who am I?' is meant to dissolve the questioner.

Ramana Maharshi

quotefancy