Science General Education Courses: the Student's Perspective

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Development of Science General Education

- **A spectrum of general education courses have been developed under the School of Science over the past years**
  - 2006/07 Spring: 7 courses, about 800 students
  - 2007/08 Fall: 7 courses, about 1,000 students

- **More general education courses may be required for the 334 educational reform**

Objective of the Present Study

To collect students' opinions for the **improvement** and **overall planning** of general education courses under the School of Science.

Methodology

- Study period: **Spring Semester of 2006-2007**

- **Questionnaires**
  - **Pre-study** questionnaire (**beginning** of semester)
  - **Post-study** questionnaire (**end** of semester)

- **Three Science general education courses**
  - BISC 001 Appreciation of Biological Sciences
  - PHYS 002 Introduction to Astrophysics and Astronomy
  - GNED 011S Environmental Conservation and Public Health in HK

- **Students of Years 0, 1, 2, 3, 4**

Pre- and Post-Study Questionnaires

- **Pre-study Questionnaire**
  - To explore the **students' expectations** from Science general education

- **Post-study Questionnaire**
  - To investigate **if the Science general education courses have met the students' expectations**

Findings of Pre-study Questionnaire

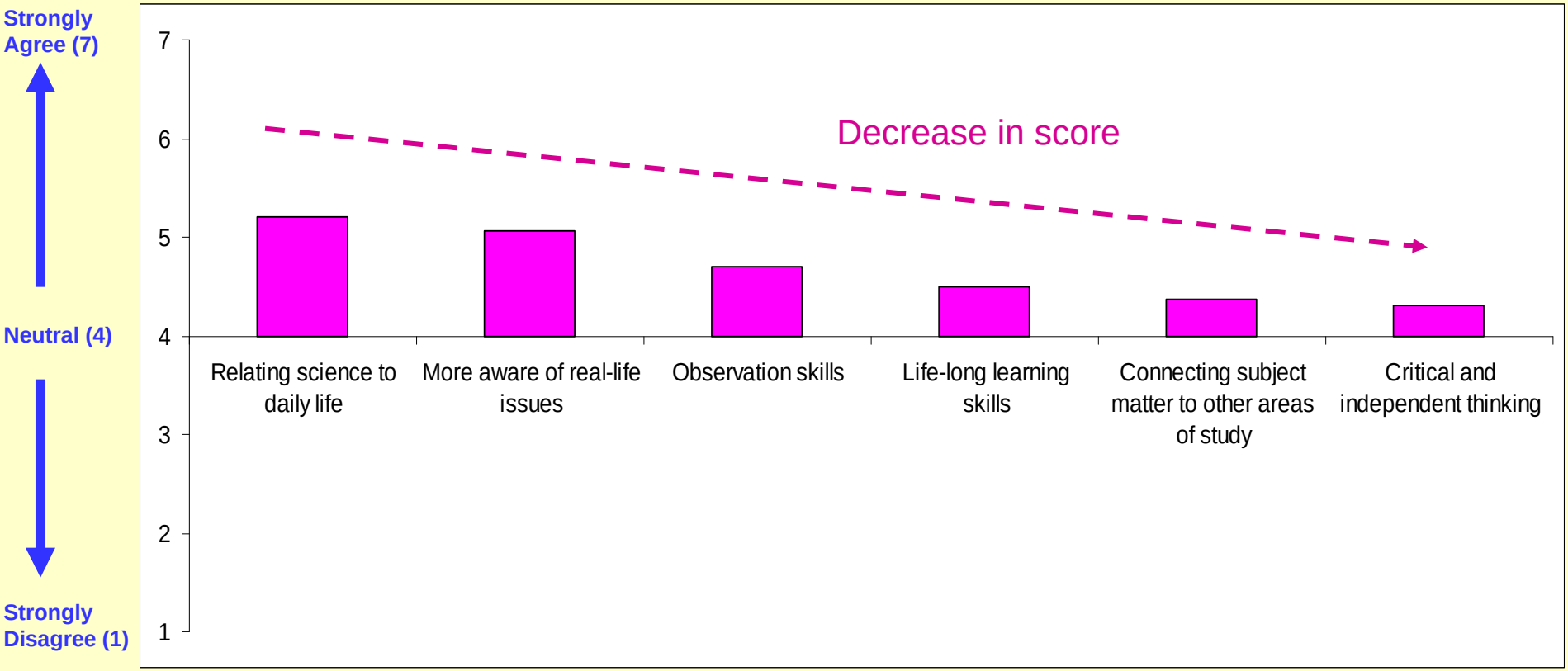
Pre-Study Questionnaire – Findings (1)

The **top three expectations** from Science general education (278 responses):

1. Relating science to daily life
2. Gaining knowledge on and becoming more aware of real-life issues
3. Achieving better observation skills

Increase in expectation

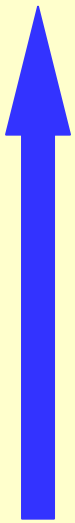
Pre-Study Questionnaire – Findings (1) (cont)



Pre-Study Questionnaire – Findings (2)

Students' preference among various interactive teaching methodologies:

1. Demonstrations
2. Field visits
3. Experiments
4. Discussions
5. Projects



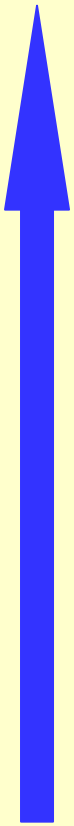
More preferable

Pre-Study Questionnaire – Findings (3)

Key criteria for students to select General Education courses:

- The course materials are interesting.
- The course has relatively light workload.
- Giving students good grades.
- The course is relevant to real-life situations.
- To acquire knowledge outside the scope of the major study.
- Anything to fulfill the requirement.
- To acquire knowledge relevant to the major study.

Increasingly important



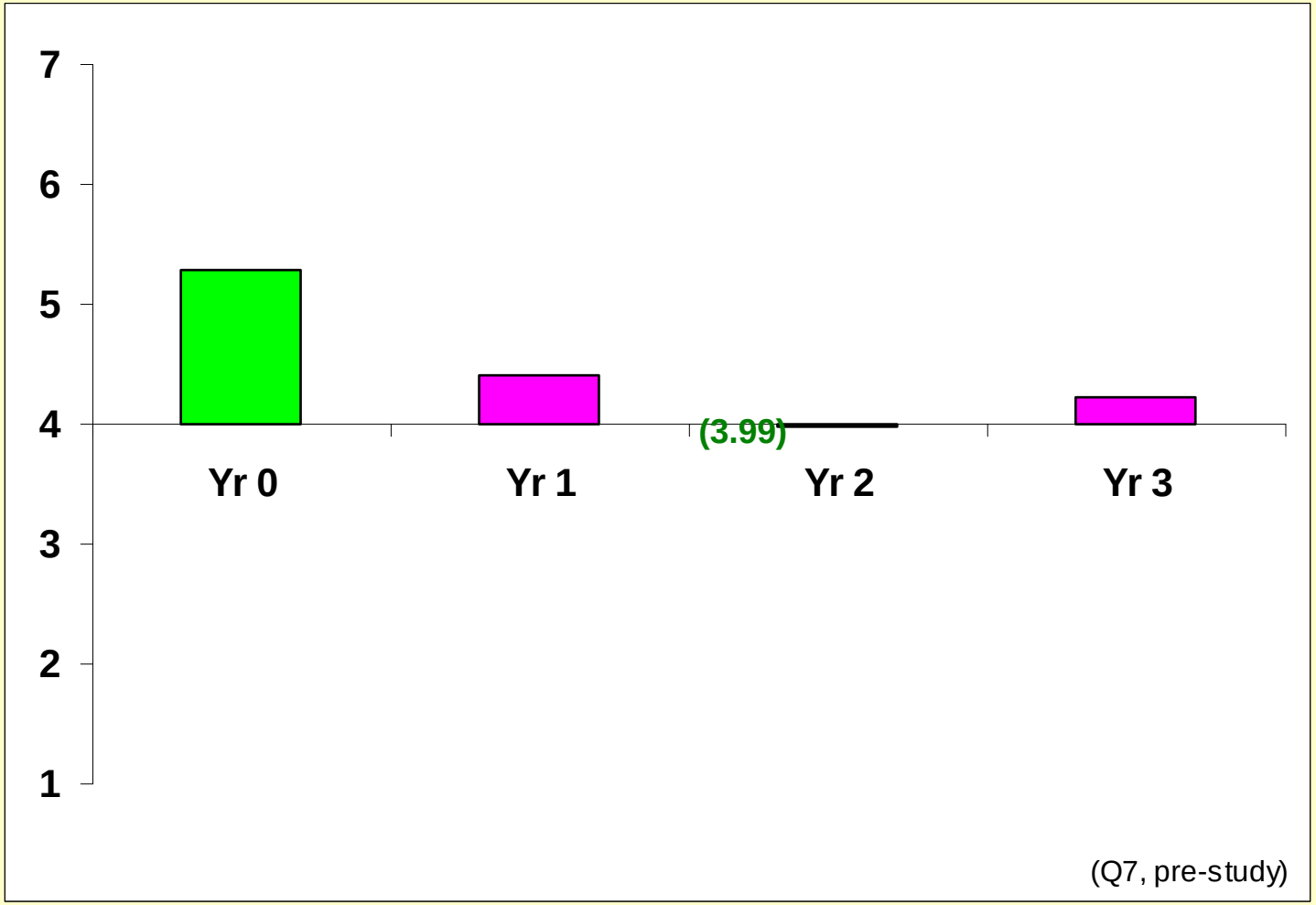
Pre-Study Questionnaire – Findings (4)

- **'Year 0' students had more enthusiasm, better learning attitudes, and higher expectations from Science general education.** They had the highest expectation in all the studied aspects:
  - Relating science to daily life
  - Becoming more aware of real-life issues
  - Enhancing critical and independent thinking
  - Making connection between its subject matter and other areas of study
  - Acquiring essential life-long learning skills
  - Developing better observation skills

- **On the other hand, 'Year 2' students appeared to have the lowest expectations from their study.**

Pre-Study Questionnaire – Findings (4) (cont)

Q7. The student will demonstrate ability in **critical and independent thinking**.



Pre-Study Questionnaire – Findings (5)

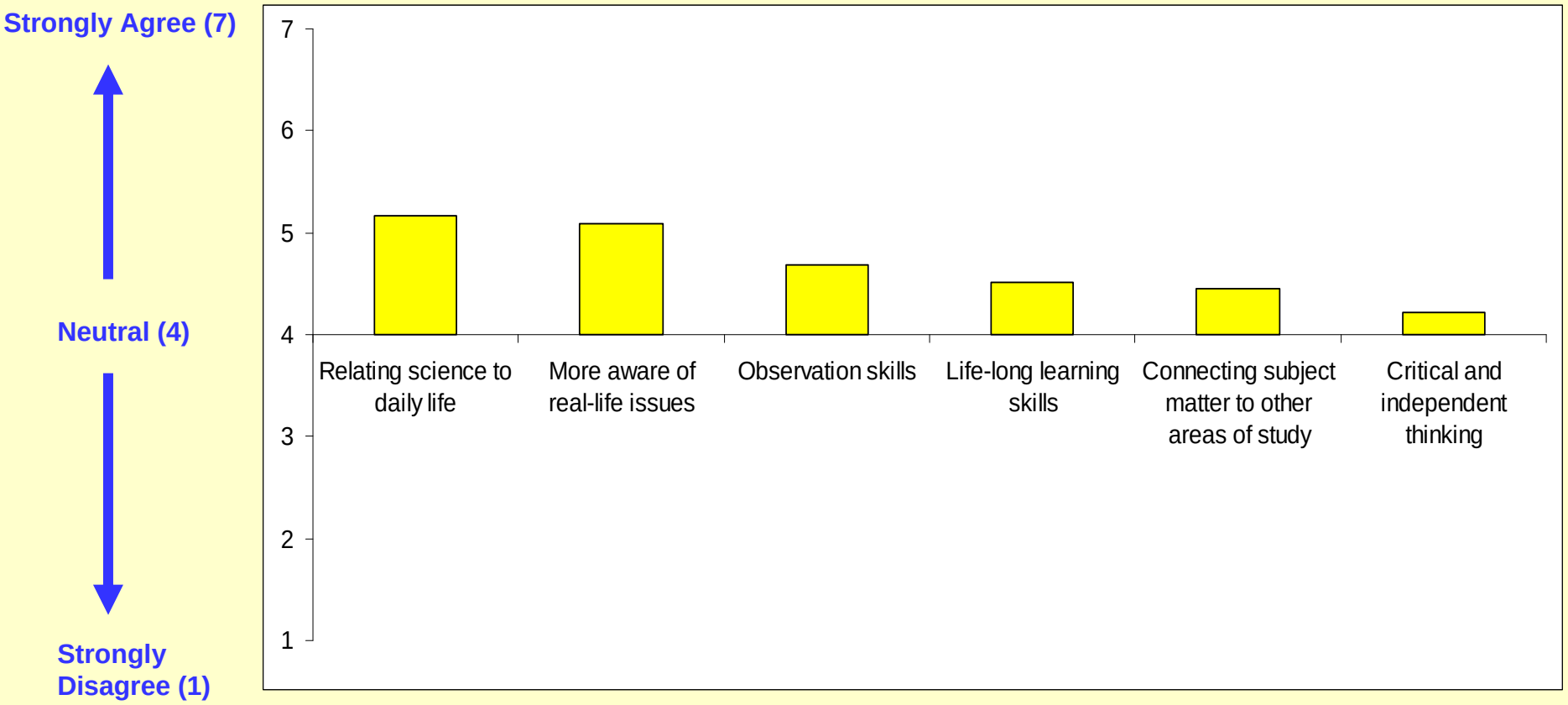
Some of the **students' suggested topics** for future general education:

- Food Science ⇢ **SSCI 003 Gastronomy (to be launched under *School of Science* in Spring 2007-2008)**
- Bioengineering
- Environmental Protection
- Weather and Climate
- Tourism
- Psychology
- Physical and Mental Health

Findings of Post-study Questionnaire

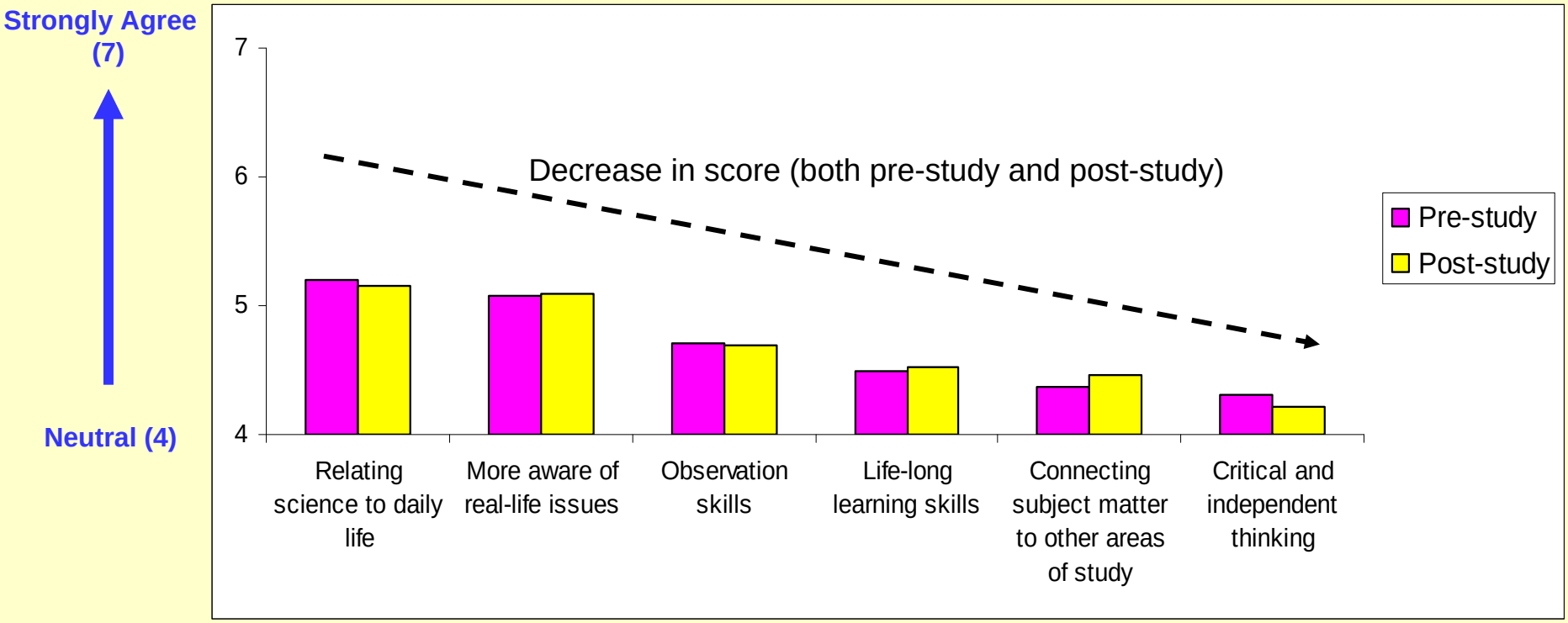
Post-Study Questionnaire – Findings (1)

In general, the students agreed that the Science general education courses under investigation have met their expectations (the same aspects studied in the pre-study questionnaire). (217 responses)



Post-Study Questionnaire – Findings (1) (cont)

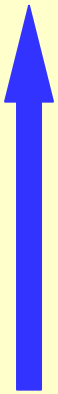
Students' expectations (pre-study) and their opinions on how well the courses have met their expectations (post-study) are in parallel:



Post-Study Questionnaire – Findings (2)

Effectiveness of interactive teaching methodologies:

1. Demonstrations
2. Field visits
3. Experiments
4. Discussions
5. Projects



Increasingly effective

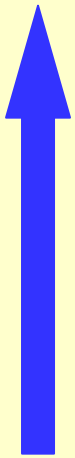
Other suggestions:

- More real-life situation in course materials
- Video watching is useful

Post-Study Questionnaire – Findings (2) (cont)

Students' preference (pre-study) and the ranking of effectiveness (post-study) of the following interactive teaching methodologies are the same:

1. Demonstrations
2. Field visits
3. Experiments
4. Discussions
5. Projects



More preferred/ Increasingly effective

Summary

a) In general, Science general education courses have met the students' expectations.

b) 'Year 0' students had the highest expectation from Science general education. On the other hand, 'Year 2' students appeared to have the lowest expectation.

c) Through Science general education, students expected that they could be most benefited by gaining ability to relate science to daily life, becoming more aware of real-life issues, and acquiring better observation skills.

d) Students' preference and the effectiveness of interactive teaching methodologies are in parallel (Demonstrations > Field Visits > Experiments > Discussions > Projects).

Future Work (1)

1) The pre-study and post-study findings are in parallel in many studied aspects. Does it indicate that our general education courses have been very successful in fulfilling the students' expectations? Or, does it imply that we have not been able to change the students' learning attitudes through our teaching?

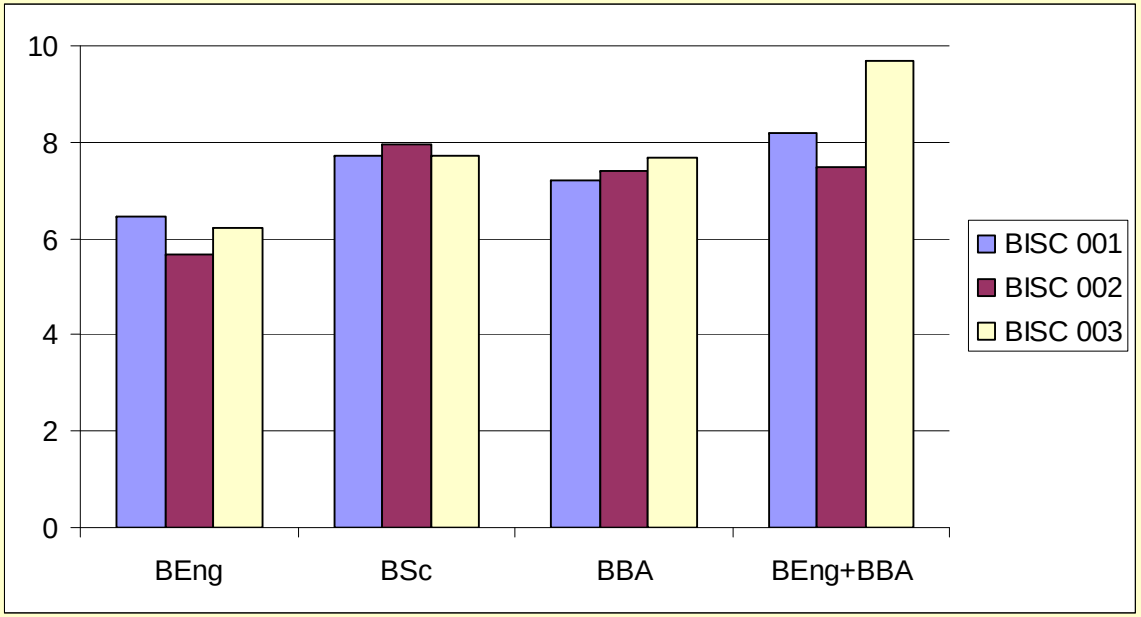
2) The study is largely probed from a student-oriented view. Does the students' expectation match the instructors' expectation?

3) Is General Education an effective means to nurture students' critical and independent thinking skills?

Future Work (2)

4) ‘Year 2’ students seem to have the lowest motivation in their study of Science general education.

5) Preliminary observation from the course grades over the past 3 years indicates that the Engineering students appeared to perform poorer that other students in Science general education. On the other hand, the performance of the Business students seemed to be comparable to that of the Science students.



2004-05, 2005-06, 2006-07

BISC 001 (420 students)
BISC 002 (870)
BISC 003 (1,096)

General Education Courses under School of Science

- **2006-07 Spring (7 courses, about 800 students)**
  - BISC 001 Appreciation of Biological Sciences (117 students)
  - BISC 005 Biochemistry of Life (157)
  - CHEM 100 General Chemistry (46)
  - GNED 011S Environmental Conservation and Public Health in Hong Kong (186)
  - MATH 106 Multivariable Calculus and Basic Probability (112)
  - PHYS 002 Introduction to Astrophysics and Astronomy (159)
  - PHYS 007 Physical Phenomena in Everyday Life (32)

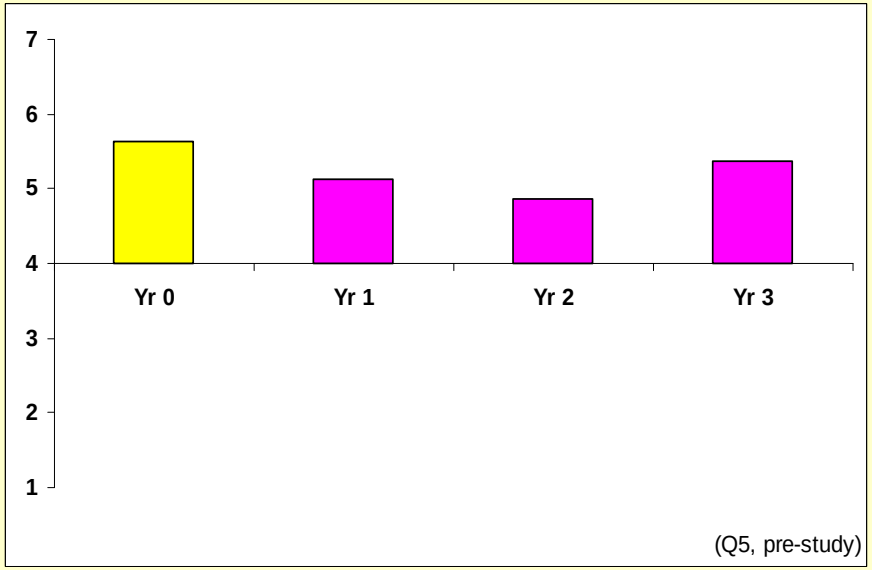
- **2007-08 Fall (7 courses, about 1,000 students)**
  - BISC 002 Biology of Human Health (259)
  - BISC 003 Environmental Science (408)
  - BISC 103 Nature of Biochemistry and Biotechnology (40)
  - CHEM 001 Introductory Chemistry (78)
  - MATH 106 Multivariable Calculus and Basic Probability (77)
  - PHYS 002 Introduction to Astrophysics and Astronomy (132)
  - PHYS 006 Energy and Related Environmental Issues (62)

Strongly Agree (7)

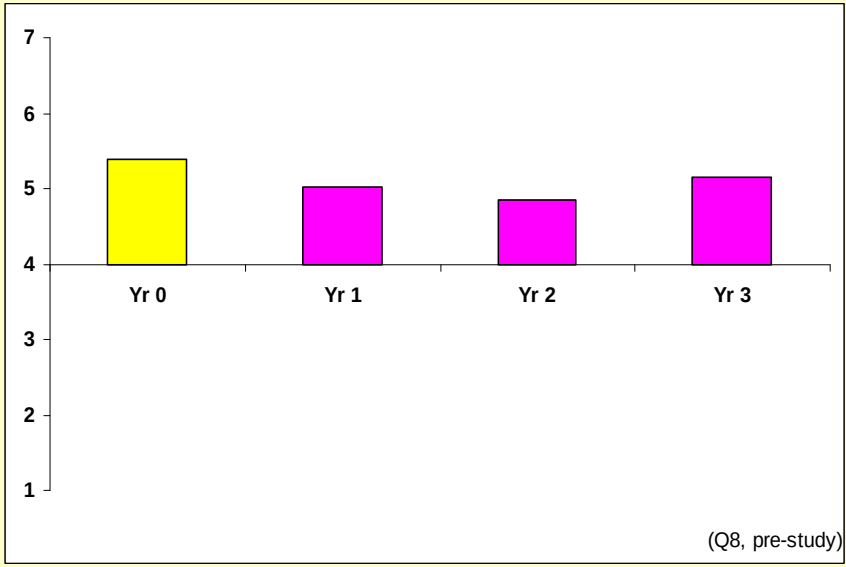
Neutral (4)

Strongly Disagree (1)

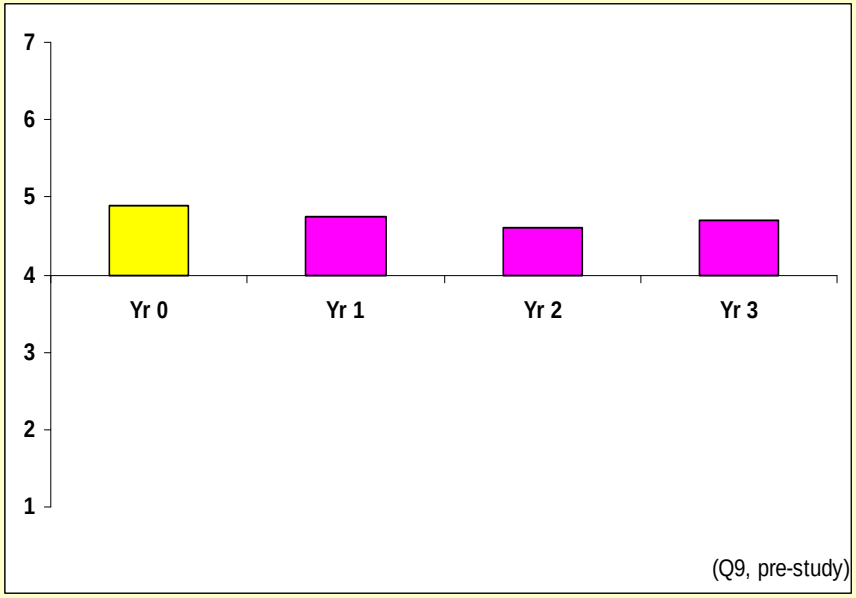
The student will appreciate and know more about the **relevance of science to daily life**.



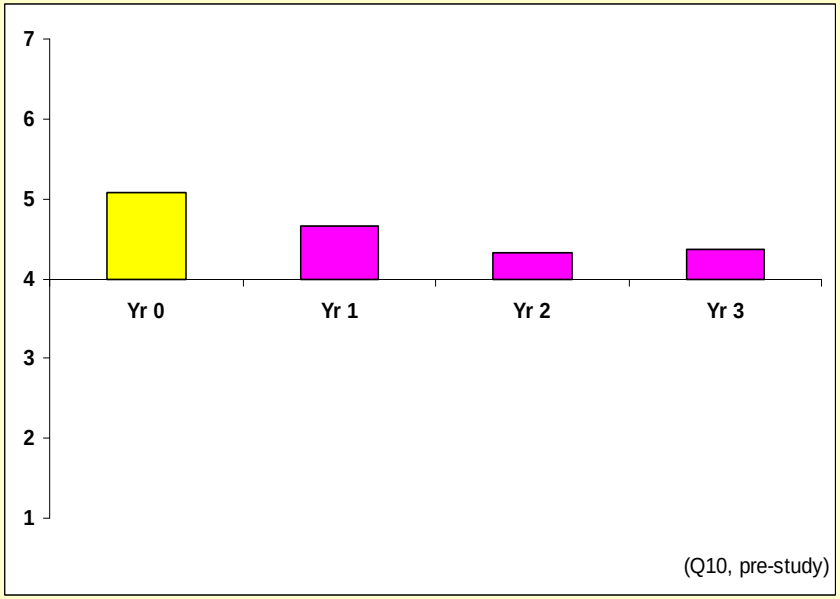
The student will gain more knowledge on and become more aware of **real-life issues**.



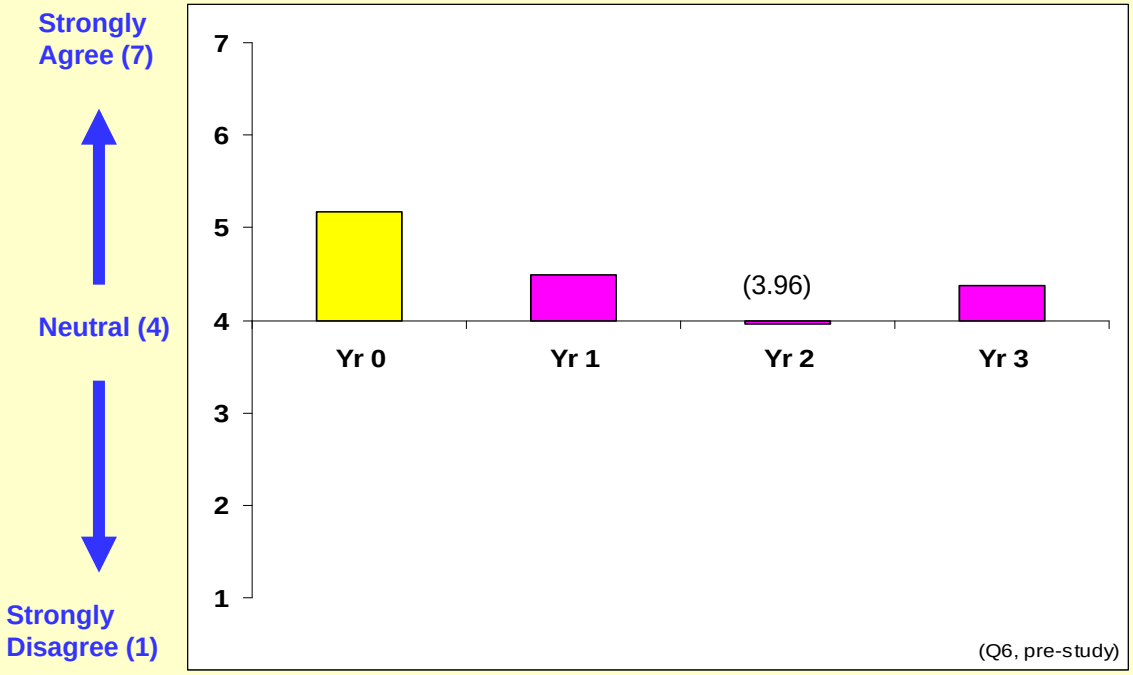
The student will demonstrate better **observation skills** in daily life.



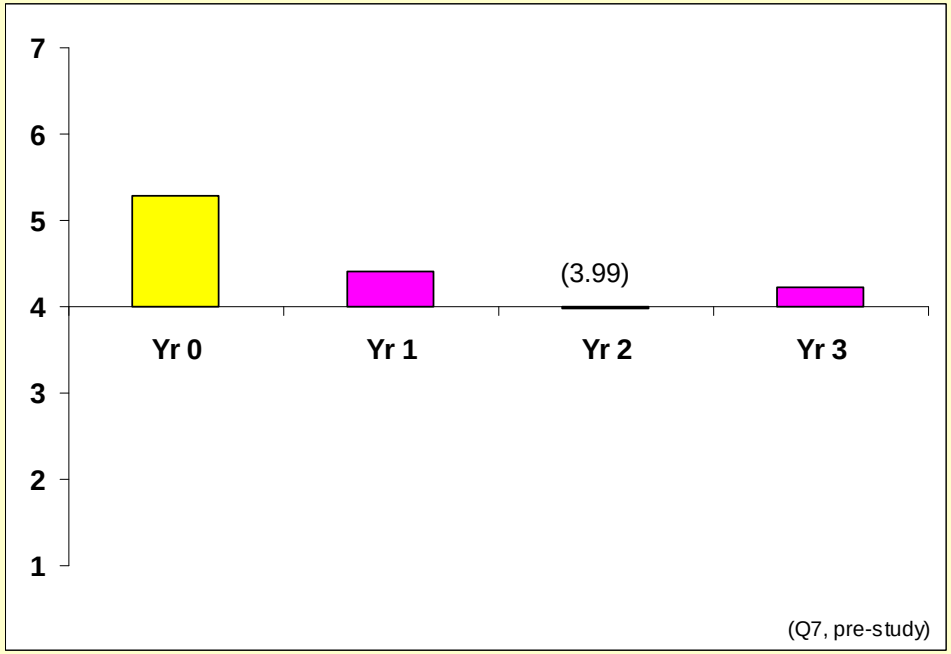
The student will develop skills that are essential for **life-long learning**.



The course can enable the student to **make connections between its subject matter and other areas of study**.



The student will demonstrate ability in **critical and independent thinking**.

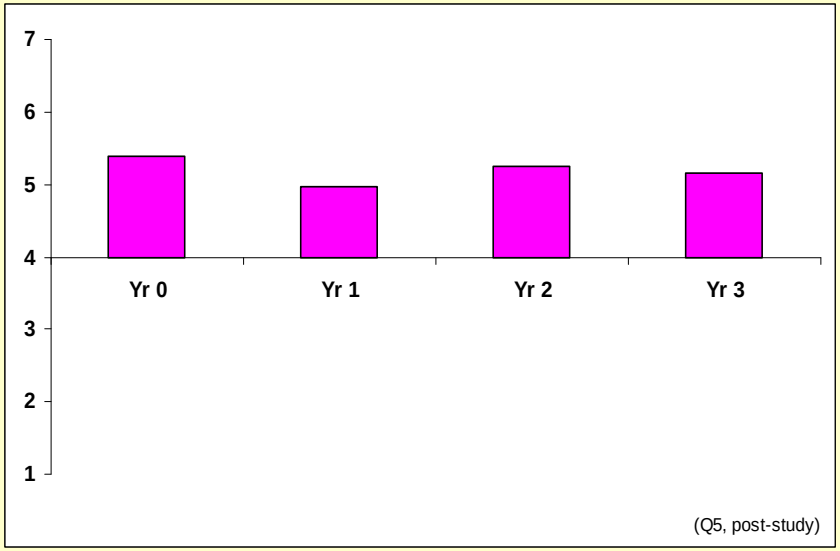


Strongly Agree (7)

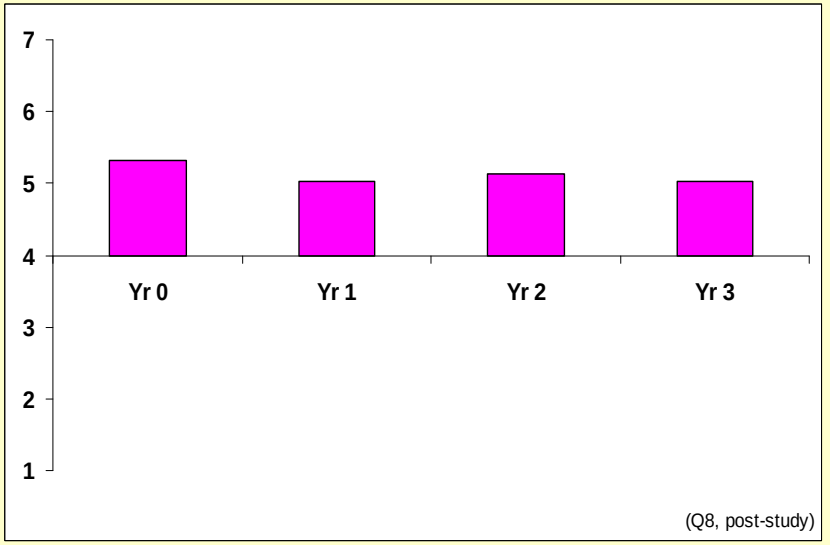
Neutral (4)

Strongly Disagree (1)

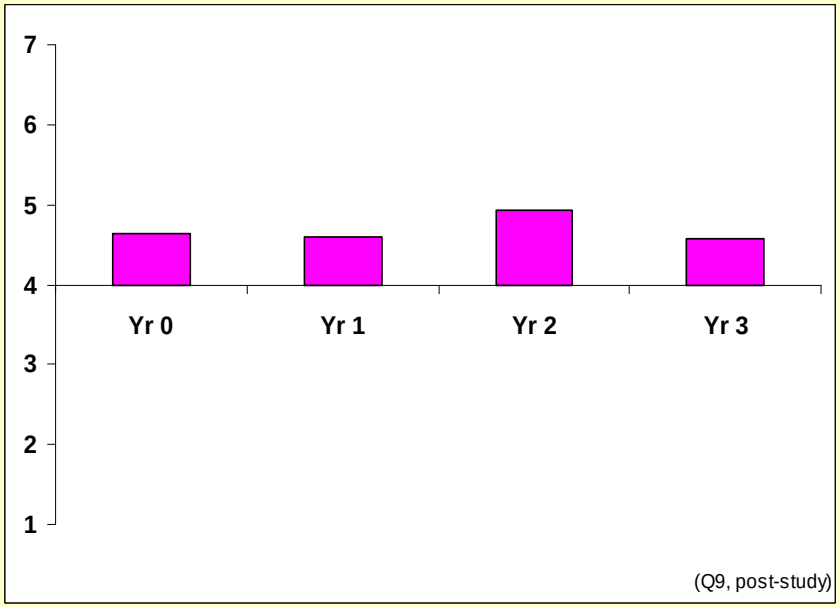
The student has learnt to appreciate and know more about the **relevance of science to daily life**.



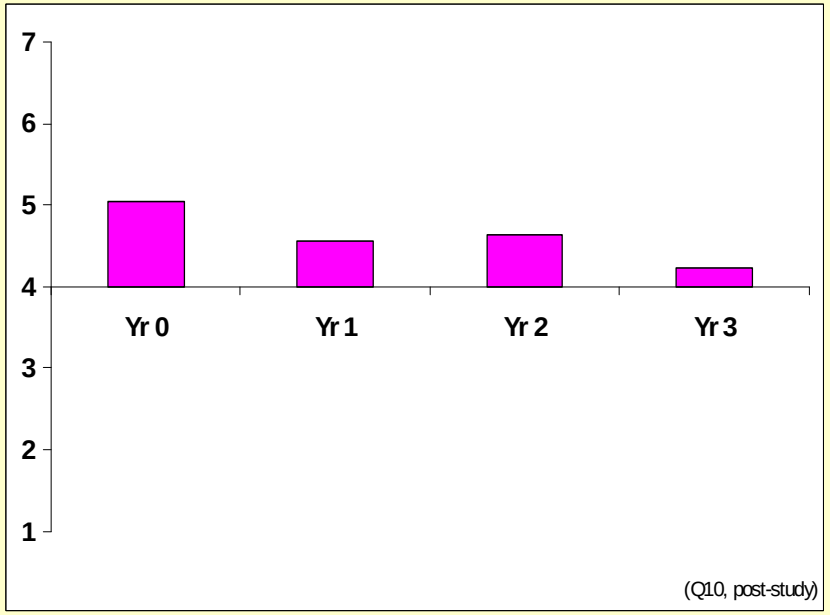
The student has gained more knowledge on and become more aware of **real-life issues**.



The student has demonstrated better **observation skills** in daily life.



The student has developed skills that are essential for **life-long learning**.

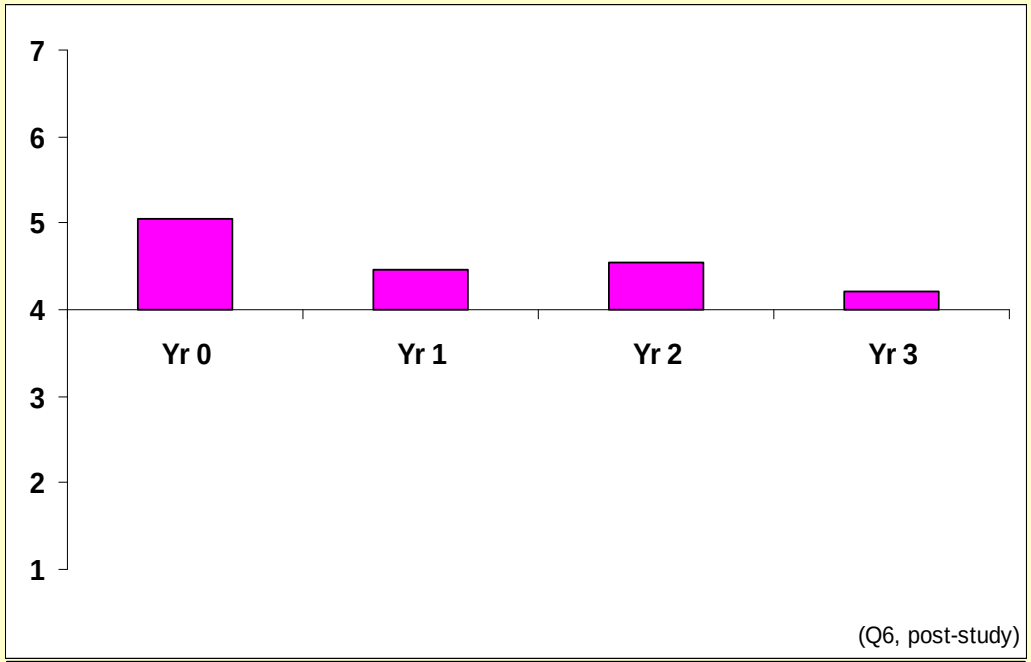


The course has enabled the student to **make connections between its subject matter and other areas of study**.

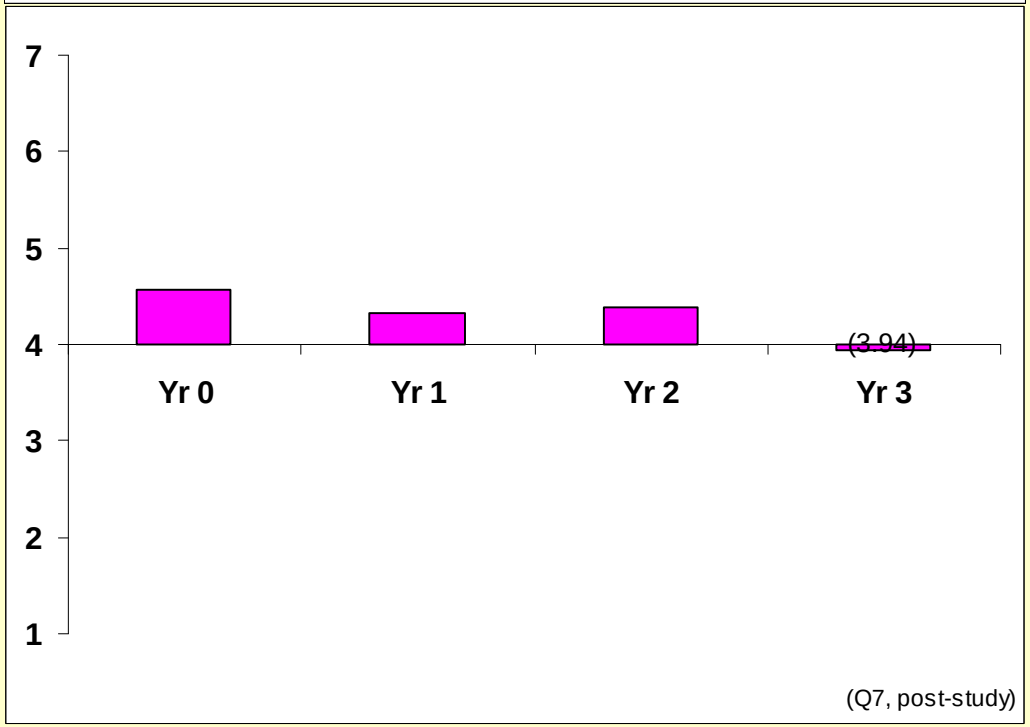
Strongly Agree (7)

Neutral (4)

Strongly Disagree (1)

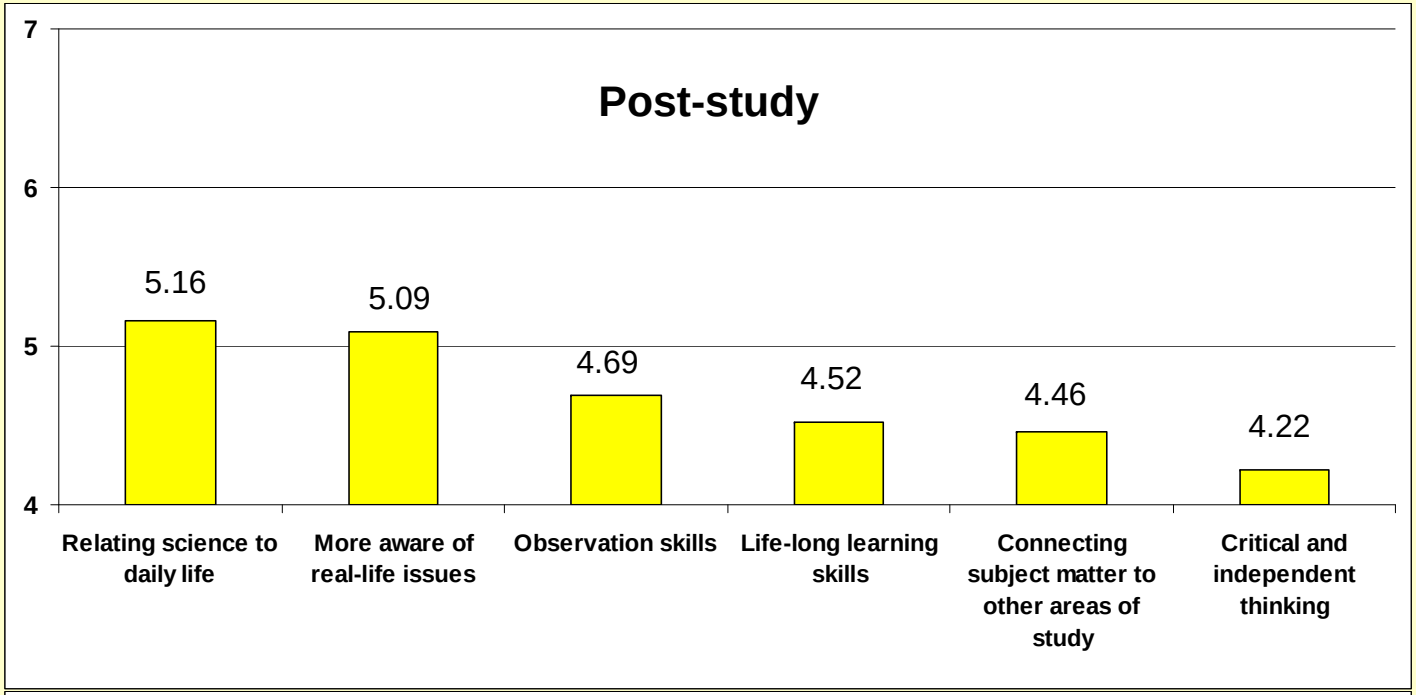


The student has strengthened their skills in **critical and independent thinking**.



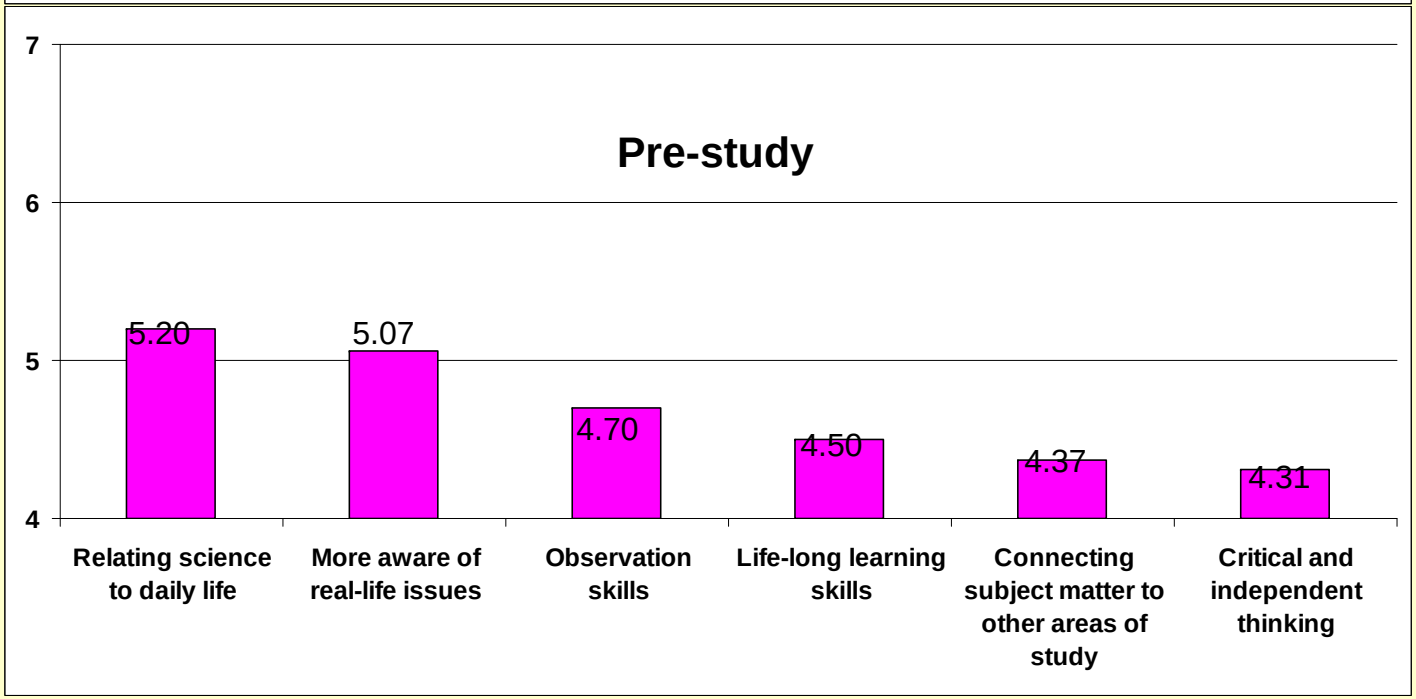
Strongly Agree (7)

Neutral (4)



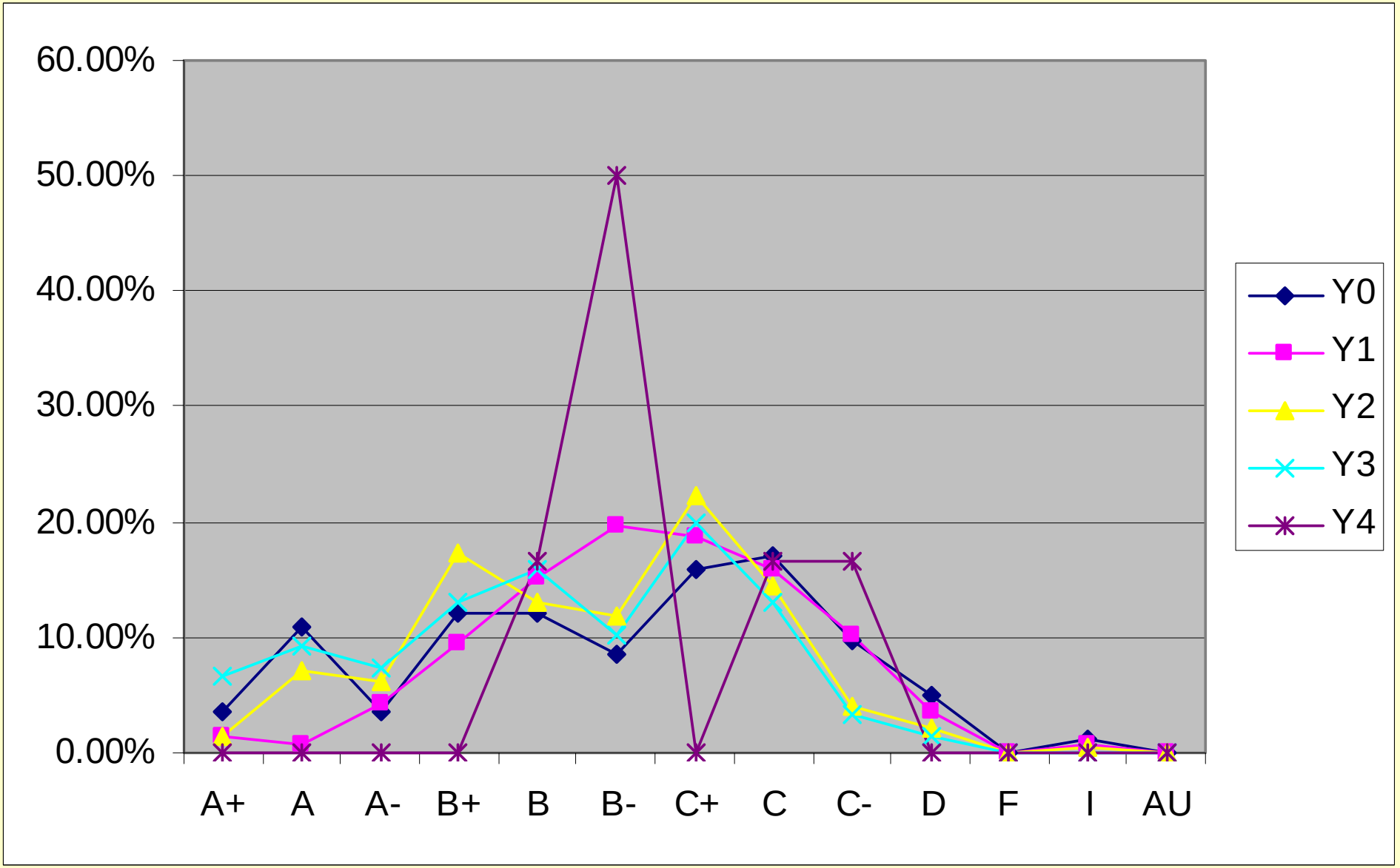
Strongly Agree (7)

Neutral (4)



Grade Distribution of BISC 001 (by Year of Study)

(2004-05, 2005-06, 2006-07; 420 students)



Grade Distribution of BISC 001 (by School)

(2004-05, 2005-06, 2006-07; 420 students)