

# Subject Choice and Performance in SEC Biology: Patterns in Gender and School Type

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# Presentation Layout

- ▶ Introduction
- ▶ Methodology
- ▶ Analysis of Results
- ▶ Concluding Remarks

# Introduction

- ▶ What is the aim of this study?
  - ▶ To investigate the factors that influence Form 2 students (age: 12/13) to choose to study Biology in secondary schools and Form 4 students (age: 14/15) to study Biology in post-secondary schools.
  - ▶ To investigate the factors that affect the performance in Integrated Science for Form 2 students and Biology for Form 4 students.
  - ▶ To find any trends and patterns between males and females and between the three school types in Malta – state, church and independent schools.

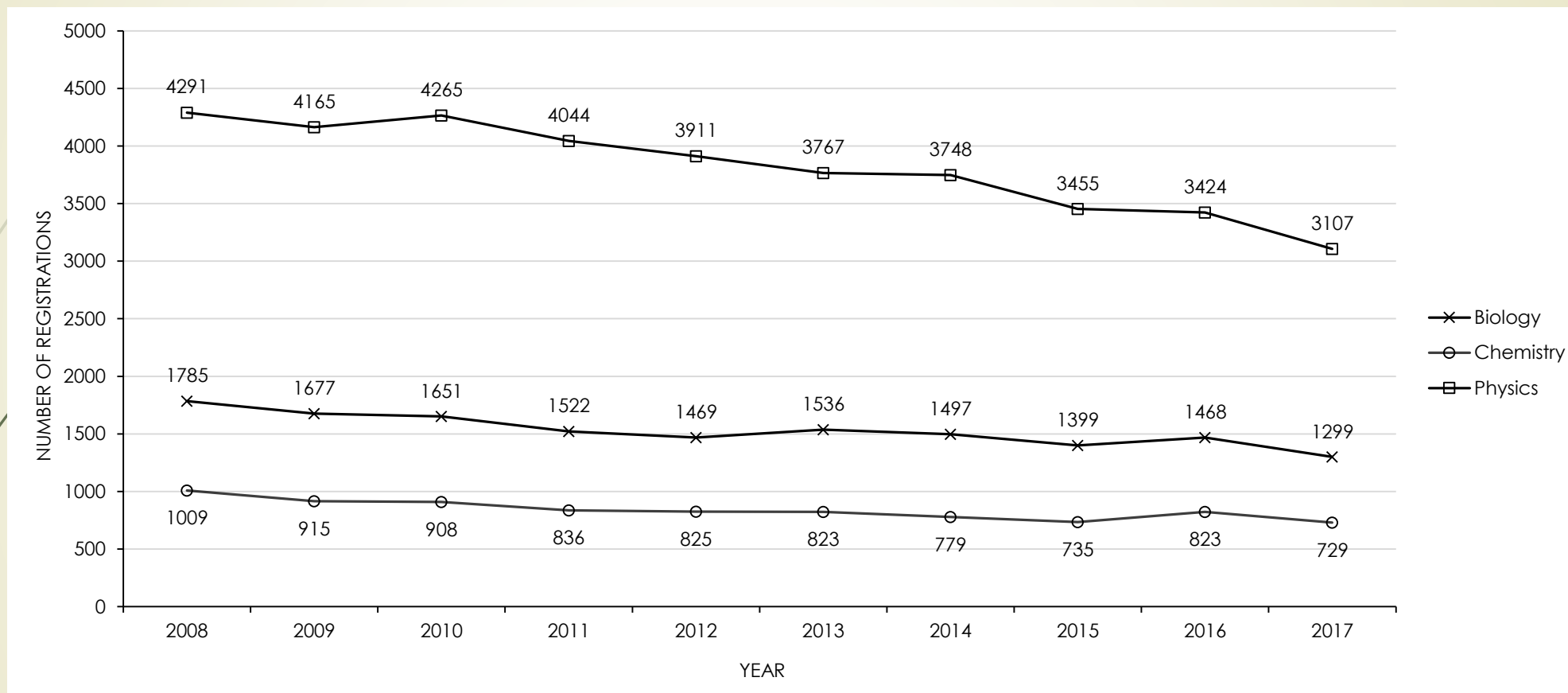
# The Maltese Educational System

- ▶ Obligatory schooling system in Malta:
  - ▶ Primary education: Year 1-6 Ages 5-11
  - ▶ Secondary education: Form 1-5 (Year 7-11) Ages 11-16
- ▶ In Form 2, students have to choose subjects that they will study from Form 3 to Form 5. Generally, students have to choose 2 subjects.
- ▶ At the end of Secondary education students can do their SEC examinations (O-levels). Their performance in these exams determine which schools they can go to for their post-secondary education.

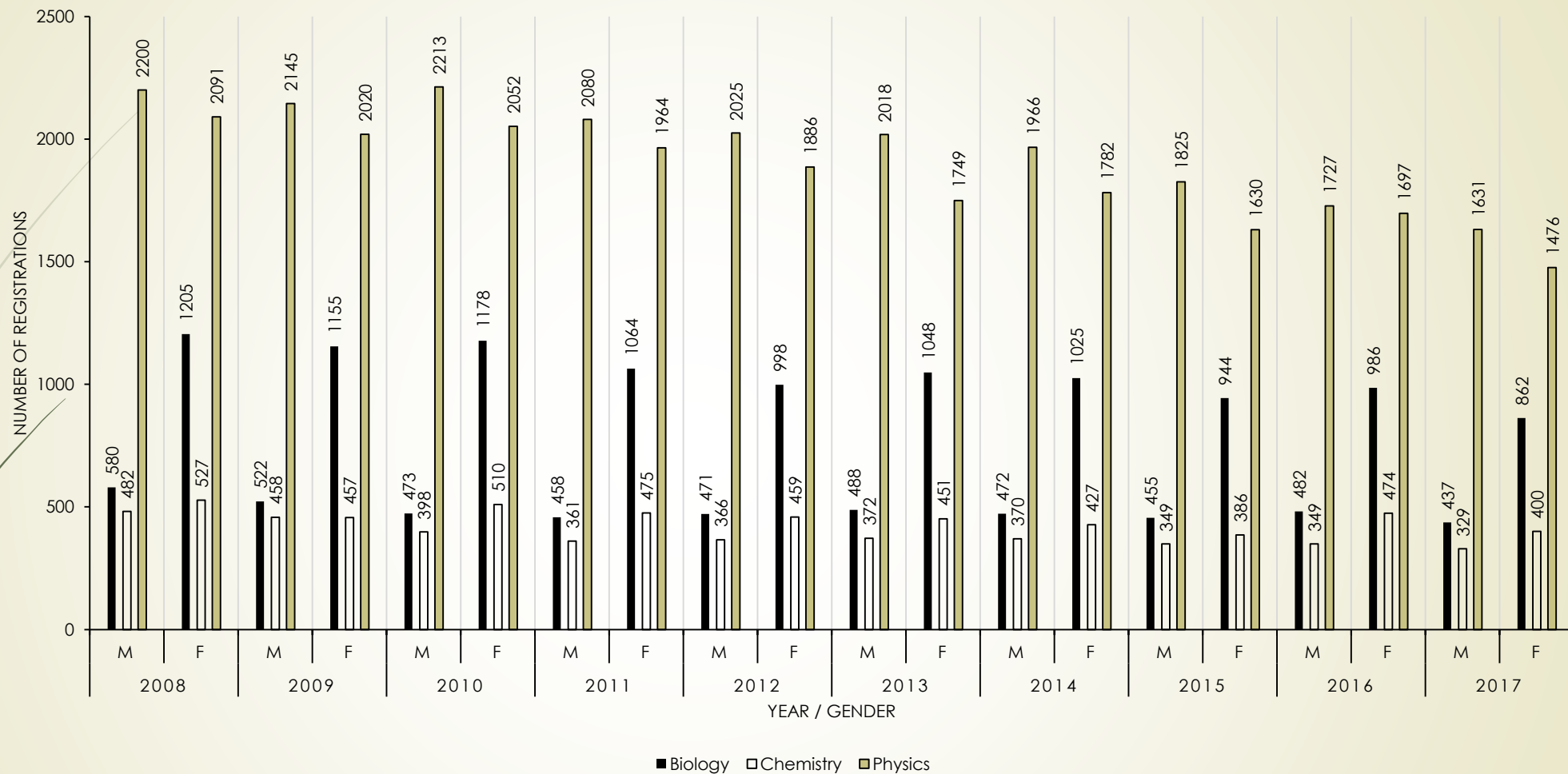
# List of Optional Subjects

- ▶ Accounting
- ▶ Art
- ▶ Biology
- ▶ Business Studies
- ▶ Chemistry
- ▶ Computing
- ▶ Design & Technology
- ▶ Economics
- ▶ Environmental Studies
- ▶ European Studies
- ▶ Geography
- ▶ History
- ▶ Home Economics
- ▶ Graphical Communication
- ▶ Physical Education
- ▶ Physics
- ▶ Social Studies
- ▶ Languages: Arabic, French, (Greek), German, Italian, (Latin), Russian, Spanish
- ▶ Vocational Education and Training (VET) subjects, such as Agribusiness, Engineering Technology, Hospitality and Information Technology.
- ▶ Some others . . .

# The Current Situation in Malta



Number of yearly SEC registrations for Biology, Chemistry and Physics, 2008 – 2017



Registrations for SEC Biology, Chemistry and Physics per gender per year, 2008 – 2017



# Subject Choice in Biology in Malta – Gender Differences

- ▶ Differences in gender in Physics and Chemistry are not pronounced.
- ▶ However, in Biology the number of females who register for SEC Biology are roughly double the number of males.
- ▶ There are no significant differences between the number of males and females that apply for Paper IIA and Paper IIB.
- ▶ A distinct difference is that there were 6 times as many females choosing Biology as their only compulsory science subject with respect to males.



# Performance in Biology in Malta – Gender Differences

- ▶ When it comes to performance scores there are only slight differences between males and females.
- ▶ The grading system for SEC exams in Malta is as follows:
  - ▶ Passing mark is awarded with a Grade 1 (best) to Grade 7 (lowest passing grade).
  - ▶ Failing mark is given a Grade U (unclassified).
- ▶ 16.5% of males and 13.9% of females obtained a grade 1 or 2 (excellent) in their 2017 SEC Biology exam.
- ▶ 46.4% of males and 48.5% of females obtained a grade of 3, 4 or 5 (average).
- ▶ 7.1% of males and 7.0% of females obtained a grade of 6 or 7 (poor).
- ▶ 26.8% of males and 28.4% of females failed their exam.

# Subject Choice and Performance in Biology in Malta – School Type Differences

- ▶ Biology is chosen far less often in state schools, than in church and independent schools.
- ▶ When compared to the number of students that registered for Mathematics and English Language (compulsory subjects) in the same year:
  - ▶ 48% of Church school students;
  - ▶ 55% of Independent school students;
  - ▶ 18% of State school students registered for SEC Biology.
- ▶ It is worth noting that independent schools have the largest percentage of top performers, and the smallest percentage of failing students.

# Methodology

- ▶ Questionnaires were used as research tools.
- ▶ Nearly all questionnaire items were closed questions.
- ▶ Eight experts – educational officers and teachers with specialisation in Biology – were asked to suggest reasons for choosing or not choosing Biology at Form 2 and at Sixth form.
- ▶ These ‘reasons’ were the basis to construct the student questionnaires.

# Questionnaire Distribution

- ▶ A total of 300 questionnaires were distributed in 6 schools:
  - ▶ 2 state schools;
  - ▶ 2 church schools;
  - ▶ 2 independent schools.

School Type	Form 2			Form 4		
	Males	Females	Total	Males	Females	Total
State	25	25	50	25	25	50
Church	25	25	50	25	25	50
Independent	25	25	50	25	25	50
<b>Total</b>			150			150

- ▶ In each school type, half the questionnaires were given to Form 2 students and the other half to Form 4 students.
- ▶ They were distributed evenly between male and female students.
- ▶ Out of 300 questionnaires, 228 were successfully collected.

# Reasons for Choosing Biology – The Experts

- ▶ The top reasons for choosing Biology at Form 2 included:
  1. a positive experience in Integrated Science, and enjoyed the subject;
  2. inspiration from parents and help from guidance teachers;
  3. need for future career options;
  4. a limited option of choices;
  5. a positive experience of friends who chose Biology;
  6. it is a rather easy subject.
- ▶ The top reasons for choosing Biology at Sixth Form were:
  1. did very well in exams and feel confident in the subject;
  2. career choice where Biology is required;
  3. inspired by family, friends or guidance teachers;
  4. need of a science subject, and considering it as a softer option;
  5. a positive experience at secondary level, and enjoyed it.



# Reasons for Not Choosing Biology – The Experts

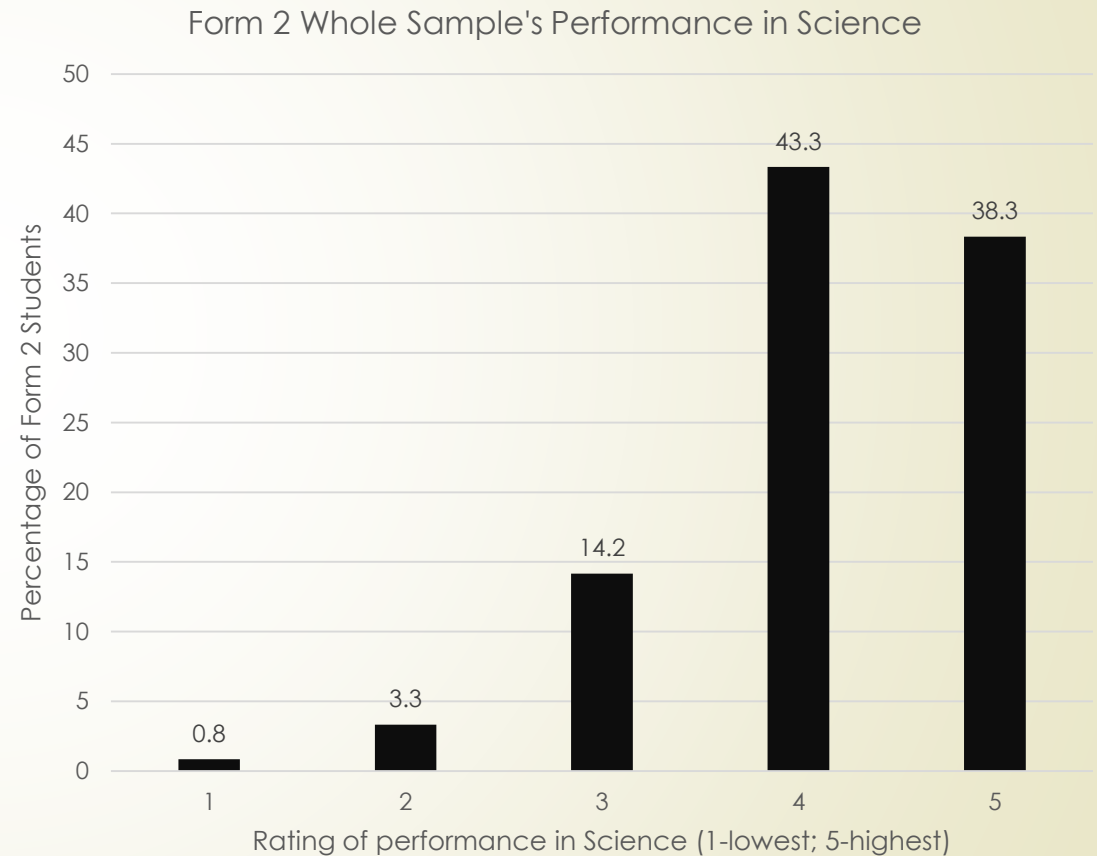
- ▶ The top reasons for not choosing Biology at Form 2 included:
  1. very vast subject requiring a lot of memorisation;
  2. not doing very well in Integrated Science;
  3. interested in a career path not requiring Biology;
  4. a negative experience of friends who chose Biology;
  5. do not enjoy topics about plants;
  6. afraid of blood and disgusted by dissections.
- ▶ The top reasons for not choosing Biology at Sixth Form were:
  1. not doing very well in annual exams and not feeling confident in the subject;
  2. considering Biology as a very vast subject, with too much to memorise;
  3. guided not to choose Biology by family, friends or guidance teachers;
  4. choosing a career where Biology is not required;
  5. preferring other subjects over Biology.

# Analysis of Form 2 Age Group

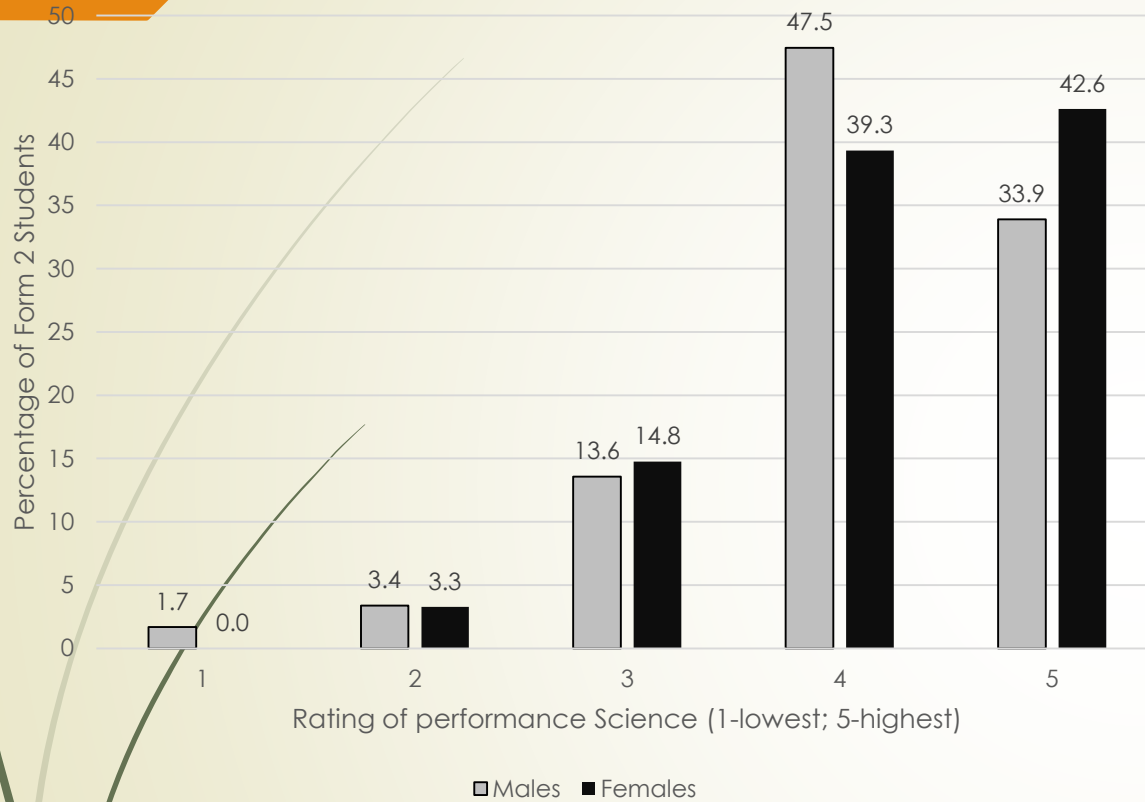


# Student Performance in Integrated Science

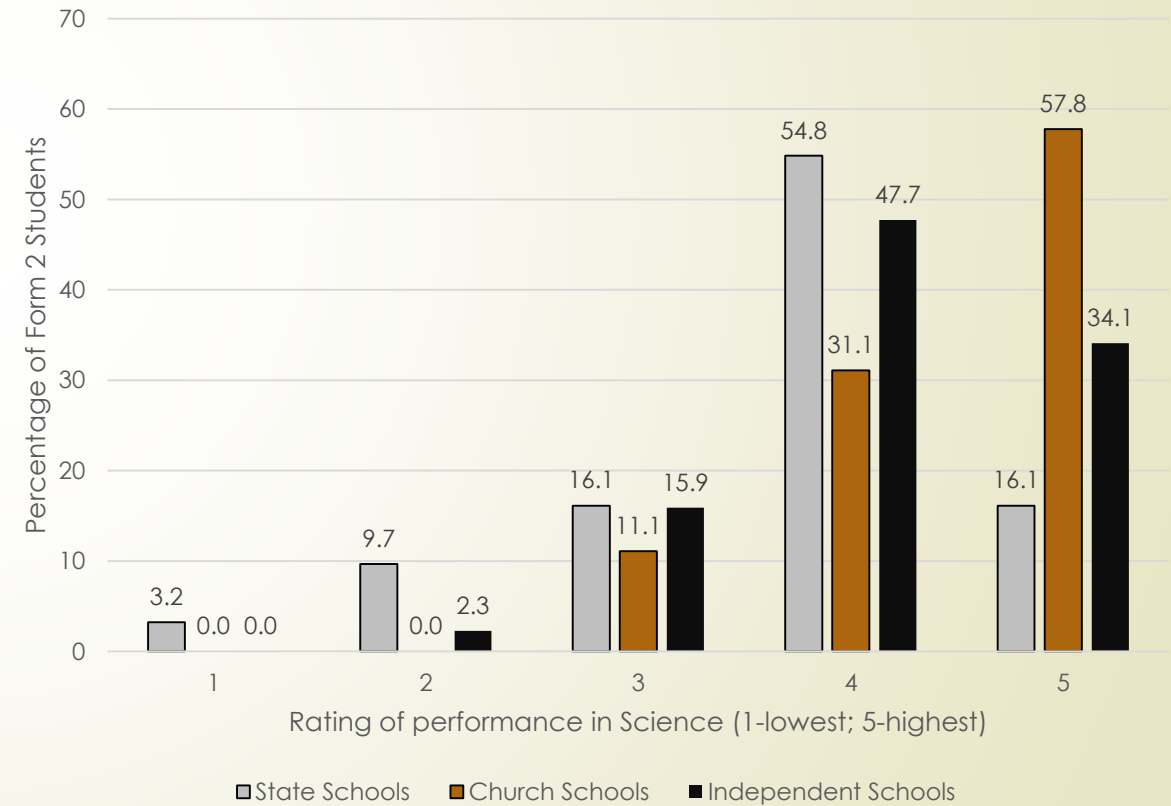
- ▶ Student self-rating of their own performance (1-lowest; 5-highest)
- ▶ An overall high performance rating.
- ▶ Females rated their performance higher than males.
- ▶ Church school students rated their performance the highest, and state school students rated theirs the lowest.



Percentage of Male vs Female Performance in Science of Form 2 Students



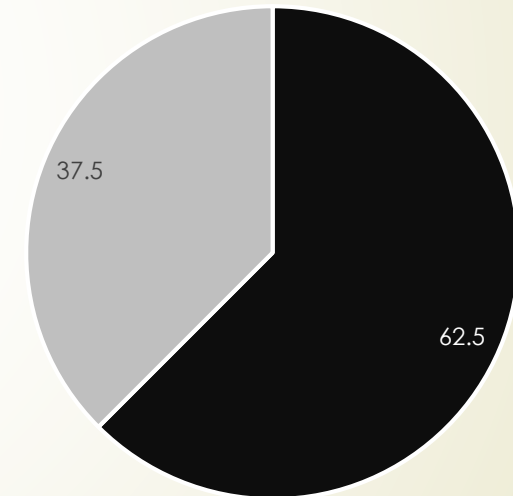
Percentage of State vs Church vs Independent School Performance in Science of Form 2 Students



# Students that Intend to Choose Biology at Form 3

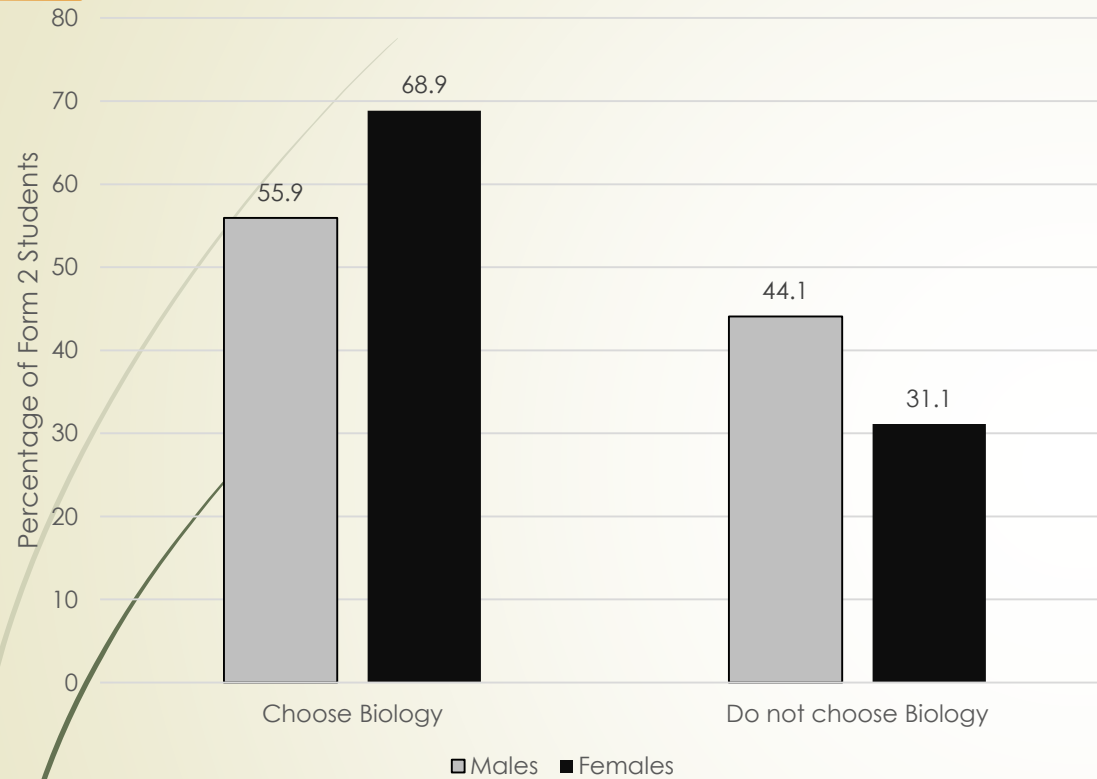
- ▶ Nearly two thirds intend to choose Biology at Form 3 – which is very high.
- ▶ Females were more likely to choose Biology.
- ▶ Church school students were most likely to choose Biology, and Independent school students were the least likely.

Percentage of Form 2 Students interested in choosing Biology in Form 3

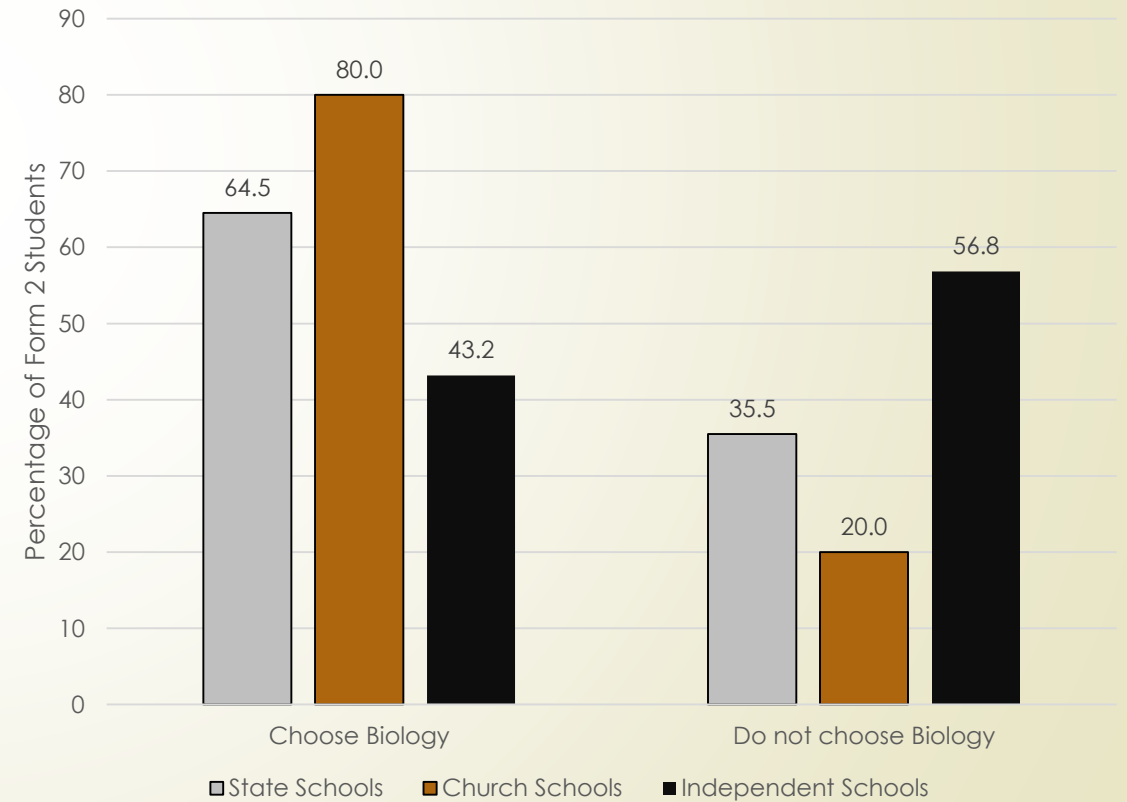


■ Choose Biology    ■ Do not choose Biology

## Percentage of Form 2 Students that will Choose Biology in Form 3 in relation to Gender

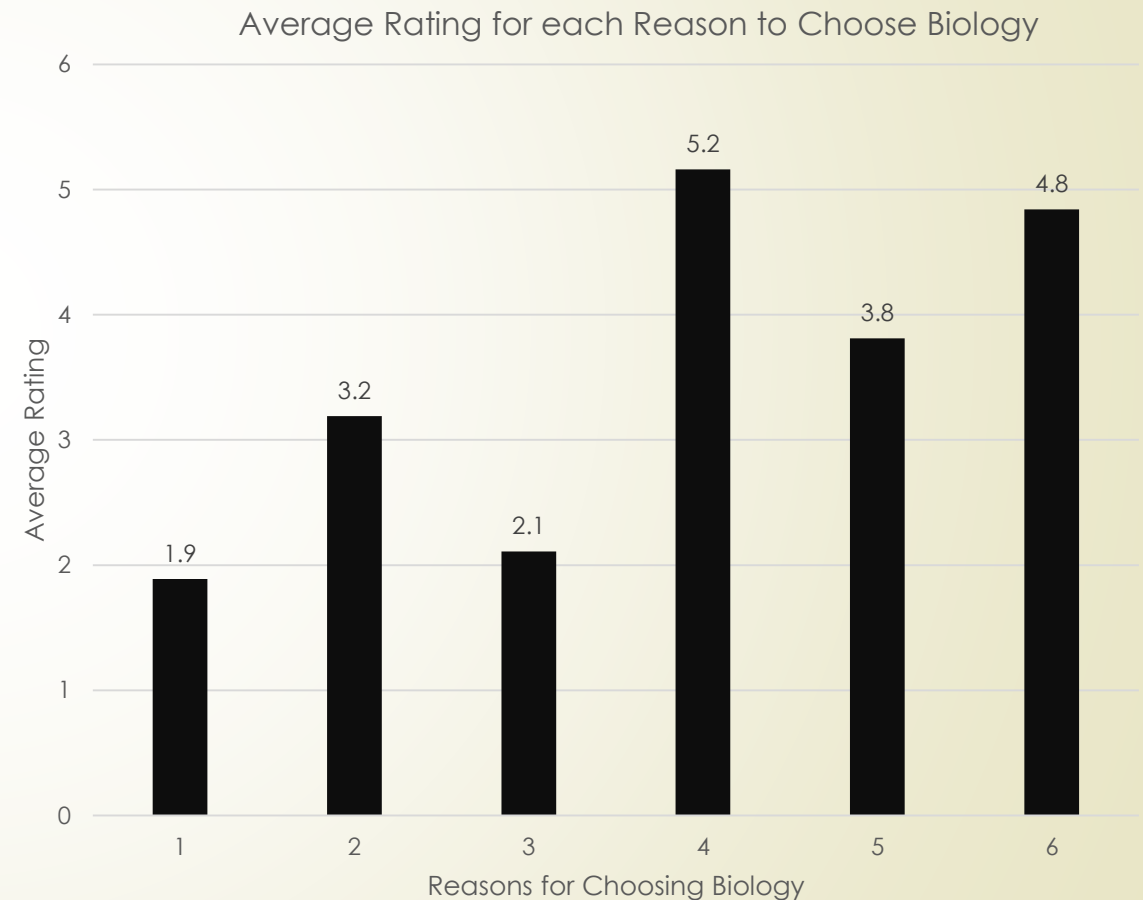


## Percentage of Students who will Choose Biology in Form 3 in relation to School Type



# Reasons for Intending to Choose Biology

- ▶ The reasons given by experts were rated 1-6 by students, with 1 being the most relevant to them.
- 1. a positive experience in Integrated Science, and enjoyed the subject;
- 2. inspiration from parents and help from guidance teachers;
- 3. need for future career options;
- 4. a limited option of choices;
- 5. a positive experience of friends who chose Biology;
- 6. it is a rather easy subject.
- ▶ These reasons were given similar importance by both genders and all three school types.



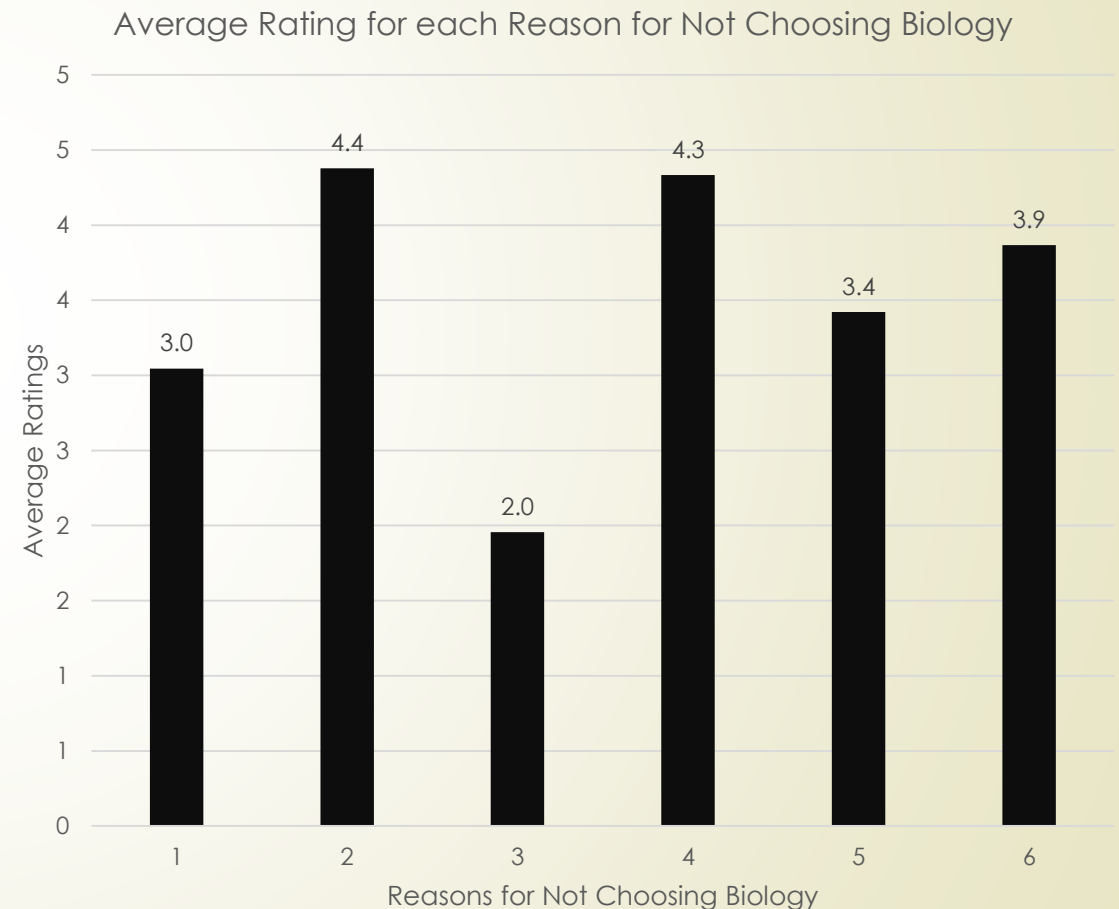
# Reasons for Intending Not to Choose Biology

► The reasons given by experts were rated 1-6 by students, with 1 being the most relevant to them.

1. very vast subject requiring a lot of memorisation;
2. not doing very well in Integrated Science;
3. interested in a career path not requiring Biology;
4. a negative experience of friends who chose Biology;
5. do not enjoy topics about plants;
6. afraid of blood and disgusted by dissections.

► Again, both genders and all three school types had similar results.

► Exception – state school students give higher importance to Reason 2.

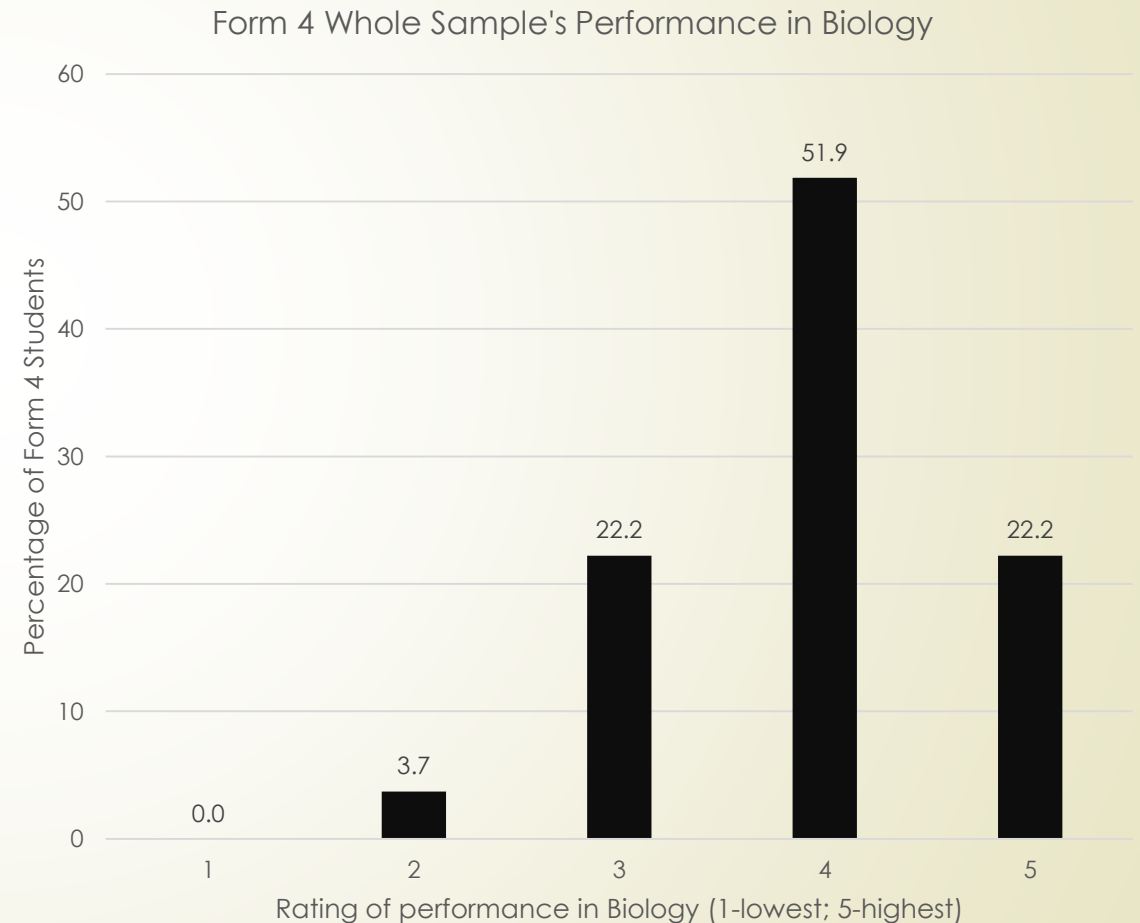


# Analysis of Form 4 Age Group

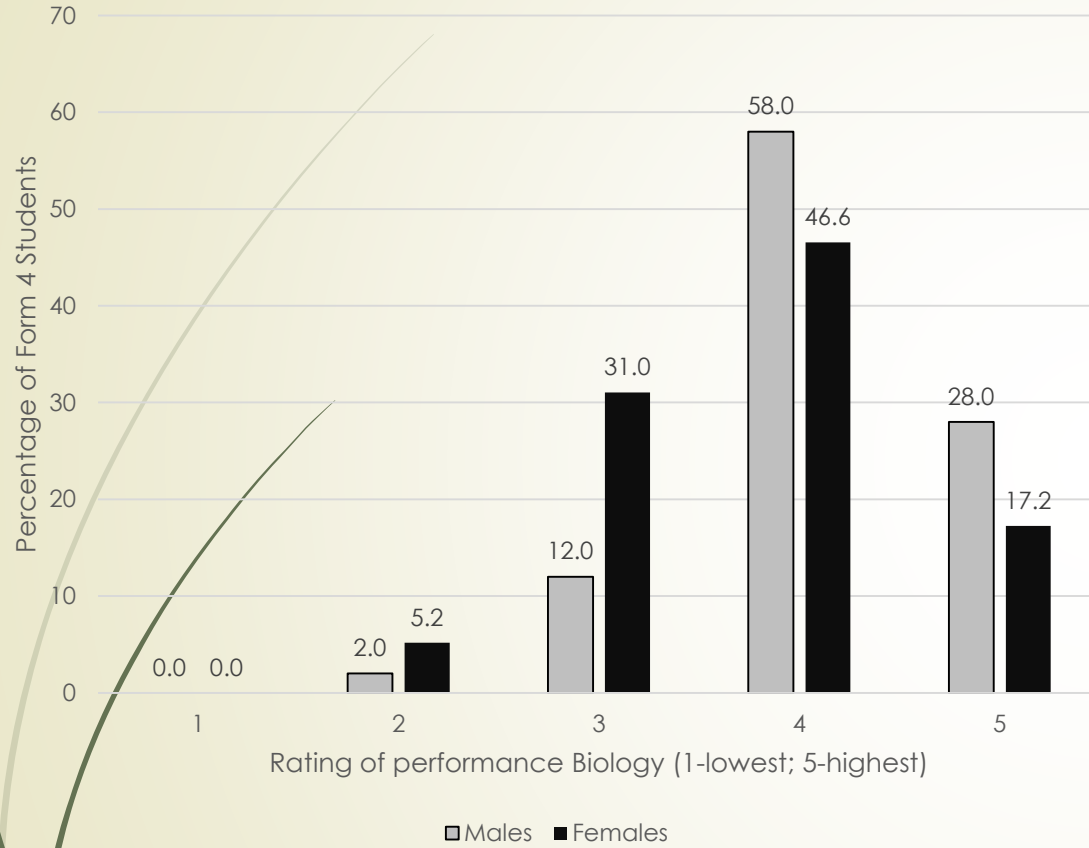


# Student Performance in Biology

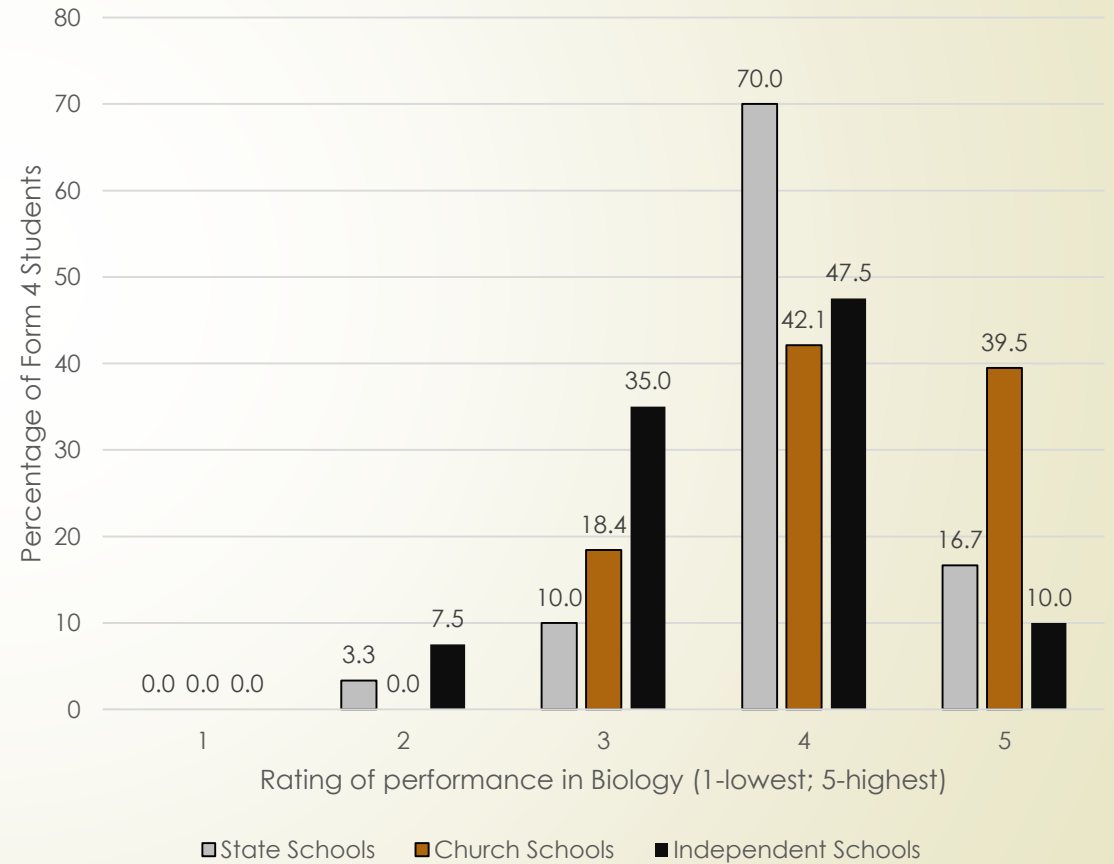
- ▶ Student self-rating of their own performance.
- ▶ Overall lower performance than the Form 2 group.
- ▶ Males rated their performance higher than females.
- ▶ Church school students rated their performance the highest, and independent school students rated theirs the lowest.



Percentage of Male vs Female Performance in Biology of Form 4 Students



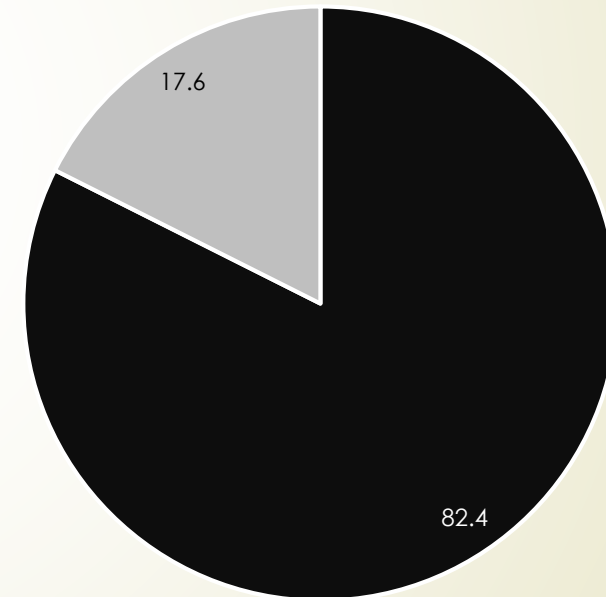
Percentage of State vs Church vs Independent School Performance in Biology of Form 4 Students



# Students that Intend to Choose Biology at Sixth Form

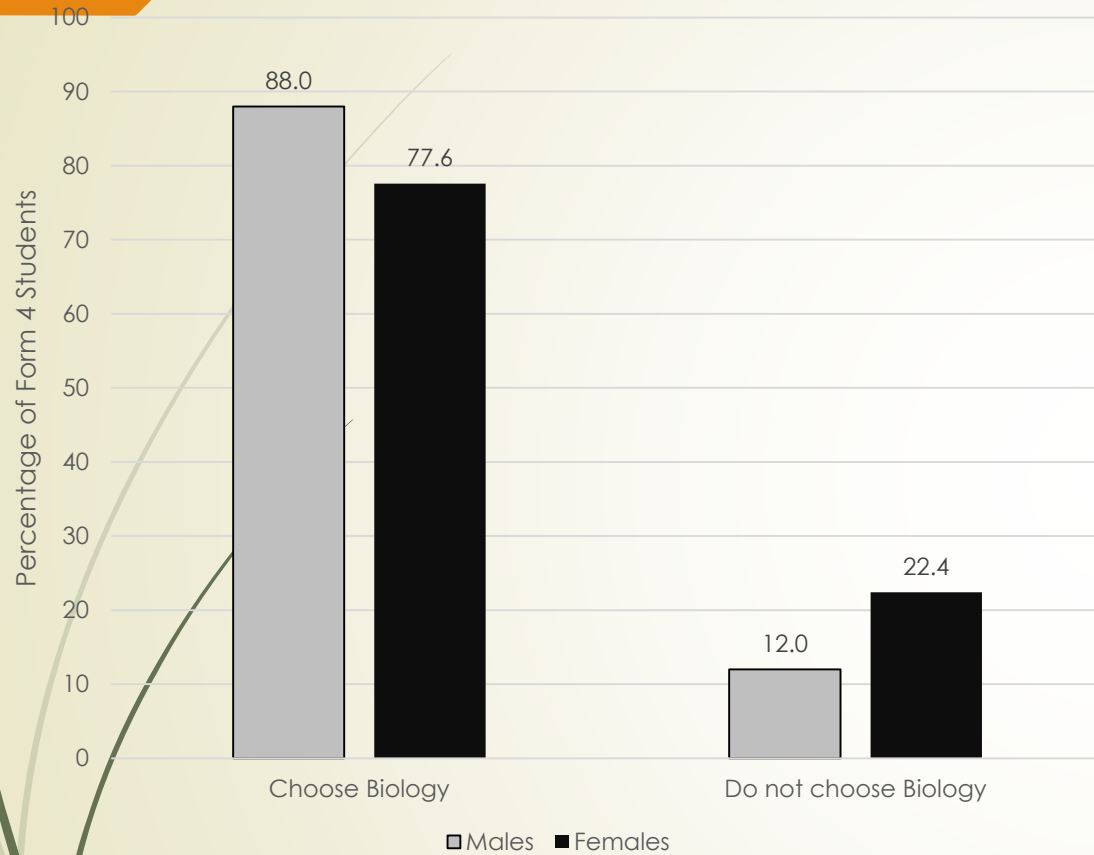
- ▶ Most of the students intend to choose Biology at Sixth Form.
- ▶ Males were more likely to choose Biology.
- ▶ Church school students were most likely to choose Biology, and Independent school students were the least likely.

Percentage of Form 4 Student interested in Choosing Biology at Sixth Form

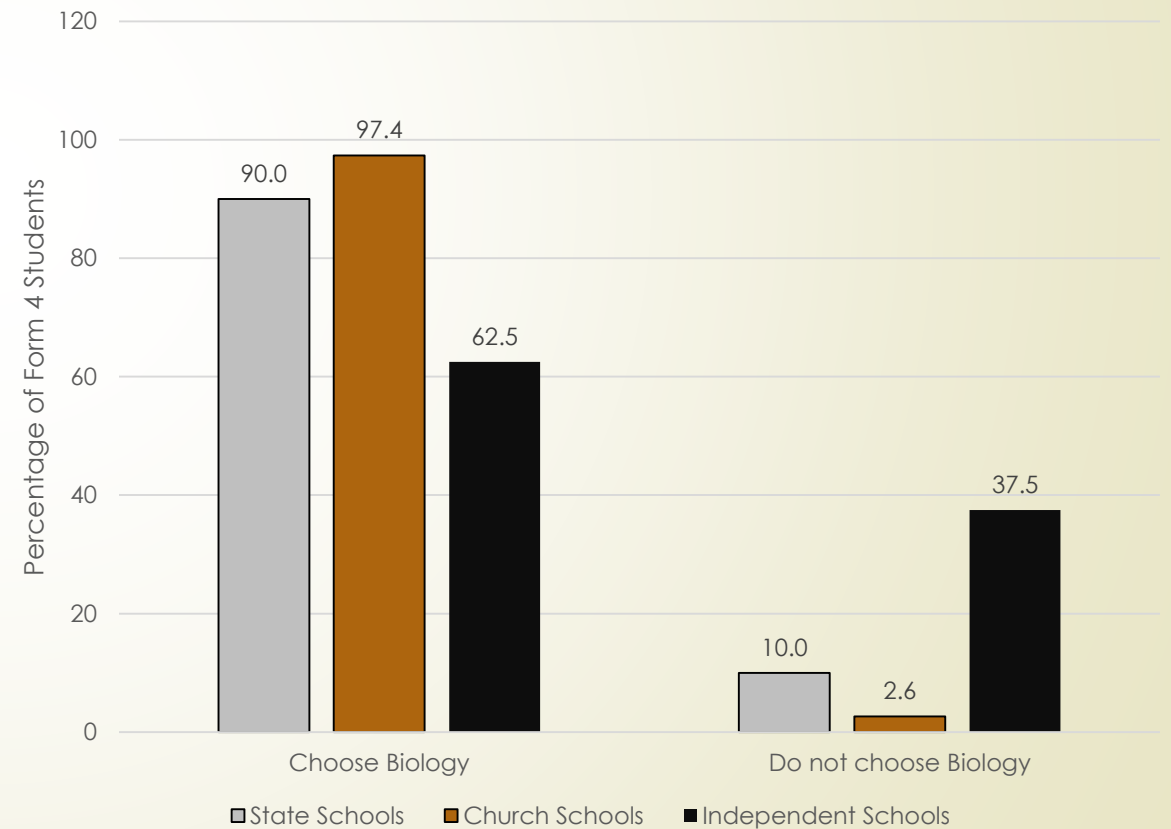


■ Choose Biology   ■ Do not choose Biology

## Percentage of Form 4 Students interested in Choosing Biology at Sixth Form in relation to Gender

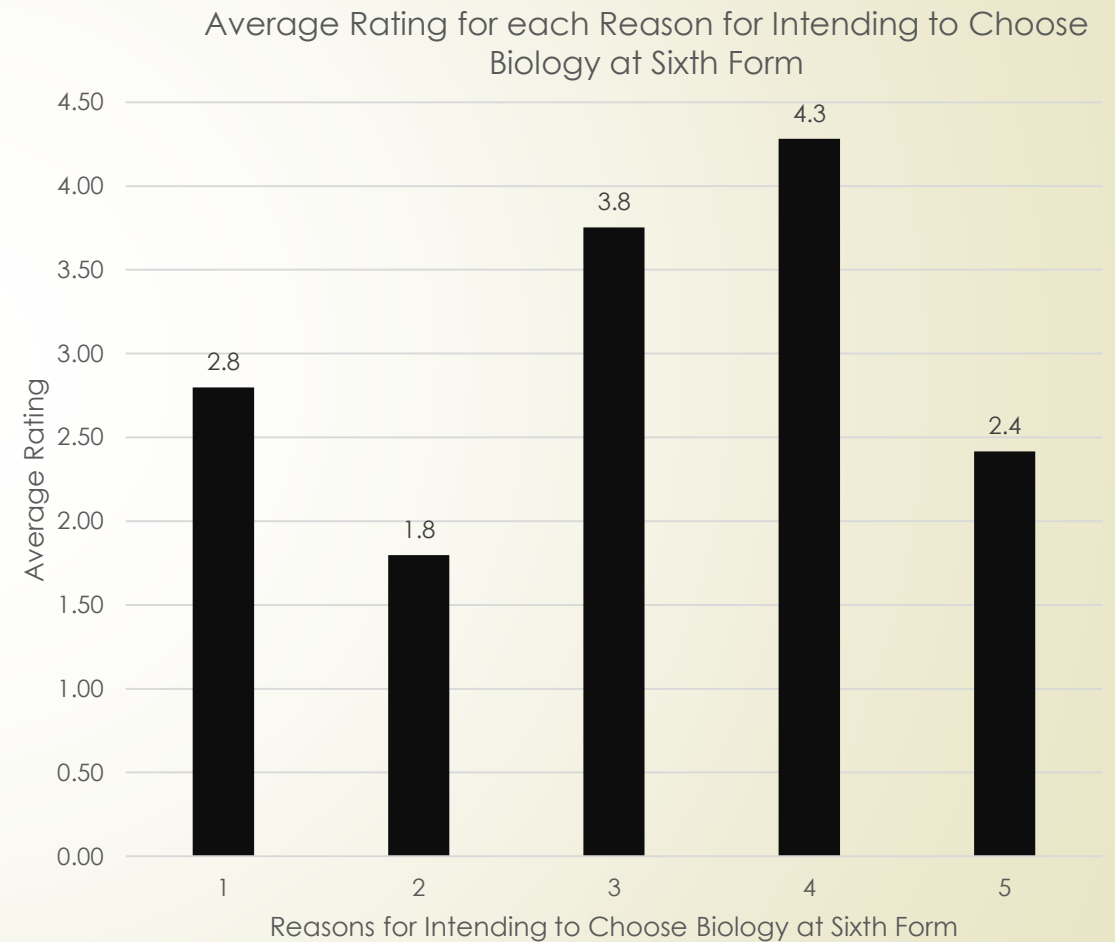


## Percentage of Form 4 Students interested in Choosing Biology at Sixth Form in relation to School Type



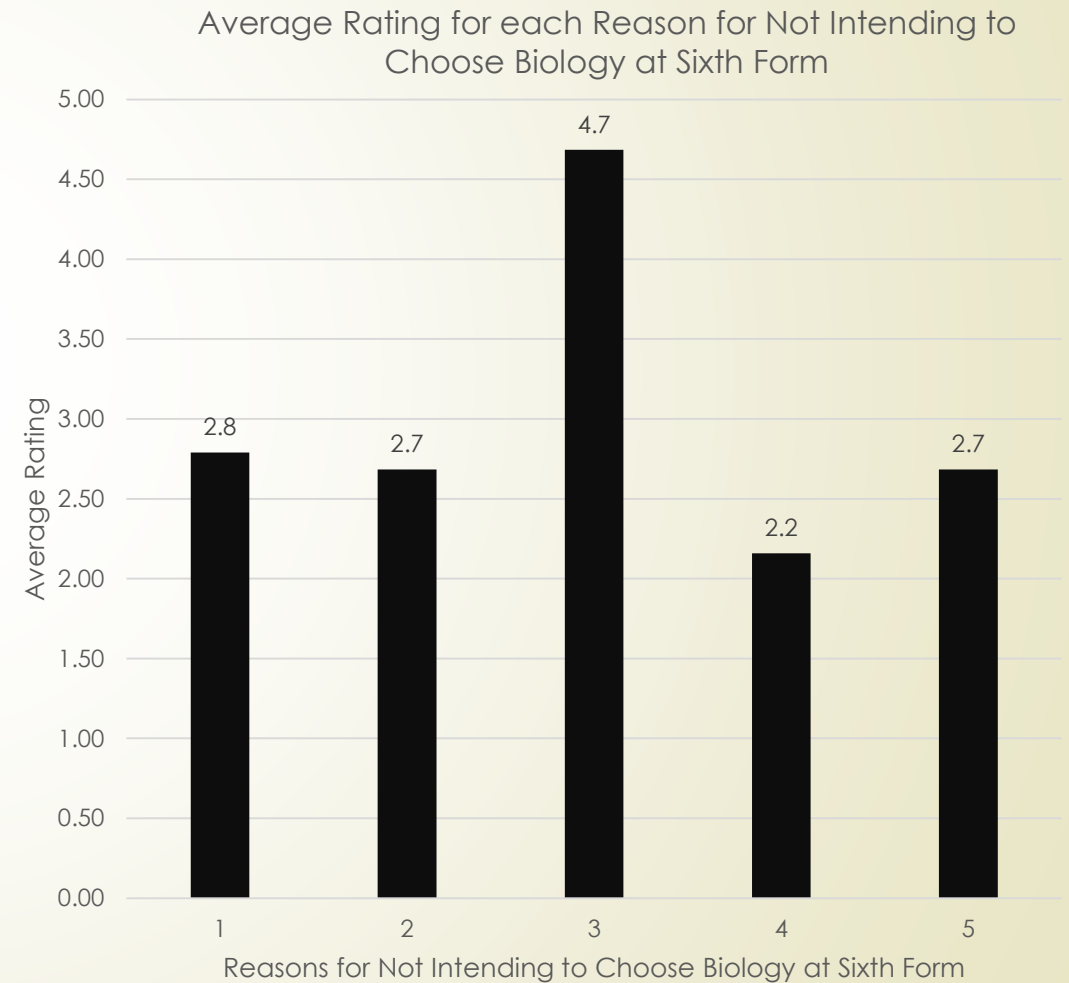
# Reasons for Intending to Choose Biology

- ▶ The reasons given by experts were rated 1 - 5 by students, with 1 being the most relevant to them.
  1. did very well in exams and feel confident in the subject;
  2. career choice where Biology is required;
  3. inspired by family, friends or guidance teachers;
  4. need of a science subject, and considering it as a softer option;
  5. a positive experience at secondary level, and enjoyed it.
- ▶ These reasons were given the same importance by both genders and all three school types.



# Reasons for Intending Not to Choose Biology

- ▶ The reasons given by experts were rated 1 - 5 by students, with 1 being the most relevant to them.
  1. not doing very well in annual exams and not feeling confident in the subject;
  2. considering Biology as a very vast subject, with too much to memorise;
  3. guided not to choose Biology by family, friends or guidance teachers;
  4. choosing a career where Biology is not required;
  5. preferring other subjects over Biology.
- ▶ Again, both genders and all three school types had similar results.
- ▶ Exception – females give higher importance to Reason 2.





# Concluding Remarks

- From this research study it is evident that there are a few pressing issues when it comes to Malta's educational system.
- In general, males feel far less confident than females in Integrated Science at Form 2 and are less willing to choose Biology.
- Females, choose Biology more than males, although they have reported lower performance in the subject at Form 4.
  
- When considering school types, it is evident that church school students are doing the best when it comes to Science and Biology.
- Independent school students seem to focus less on Biology in comparison to other subjects, as not as many students are willing to choose it.
- Finally, state schools are the most problematic as many students wish to choose Biology, although they have reported low levels of enjoyment and performance in the subject.



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