Final Report on the Project:

"The Gender Gap in Science and Technology in Malta

—

evaluating the problem and tackling the issues"

compiled by

John Baptist Gauci M.Phil.

This project was funded by UNESCO
and co-ordinated by the
National Commission for the Promotion of Equality,
with the co-operation of
the Employment and Training Corporation
and the University of Malta.

Malta
May 2007

ISBN: 978-99909-89-19-9

Edited by:
Dr. Janet Mifsud; Ms Sina Bugeja; Ms Anna Borg; Prof. Irene Sciriha

Published by:
National Commission for the Promotion of Equality

Printed by:
Offset Press Ltd.

Table of Contents

Introduction – *Dr. Janet Mifsud* ..... *i*

Prologue ..... *iii*

Acknowledgements ..... *v*

List of Abbreviations ..... *vi*

List of Figures and Tables ..... *vii*

Aims of the Project 1

Part I: Statistical Analysis

1. Choice of subjects at secondary school level 4
2. SEC Level Examinations Statistics 10
3. MATSEC Intermediate Level Examinations Statistics 19
4. MATSEC Advanced Level Examinations Statistics 29
5. MCAST Statistics 38
6. University of Malta Statistics 44
7. Employment Statistics 53

Part II: Dissemination and Promotion of Science

1. Meetings with students and parents 87
2. Pilot Project: "Science Club for Girls" 91

Conclusions 94

Appendices

Appendix 1: Meetings with students and parents – Powerpoint slides 101

Appendix 2: "Science Clubs for Girls" – A guidebook 105

Introduction

Translating equal opportunities for all into a reality can be realised by enabling equal opportunities of access to all areas of knowledge and employment. This is particularly more so in the area of science and technology. The achievement of this goal requires discussion, promotion, data collection and the eventual adoption of relative scientific policies and specific actions that guarantee a representative proportion of both genders in all areas. Women scientists are indeed under-represented in the key positions of scientific research across Europe and Malta. This is a consequence of multiple factors, which must be addressed as unutilised or under-employed qualified women are a country's wasted investment. In Malta, although some gender data has been collected, serious discussion and research on issues related to women in science and technology have been neglected to date. This document is the result of nearly two years work and research on this reality.

The National Commission for the Promotion of Equality between Men and Women, in conjunction with Gender Issues Committee, University of Malta and the Gender Unit, Employment Training Corporation, initiated this research as a result of UNESCO funding. The work presented here assesses the gender gap in science and technology in Malta.

Thus, this research project includes:

Collation of data: Collation and establishment of a database on the fragmented studies already being carried out in Malta. This would aid to establish job status, job mobility, present employment or otherwise of these persons and demographic data related to family responsibility. It would assist in analysing the underlying factors behind the under-representation of women in science in Malta and thus elaborate policy responses in this field.

Media and Promotion Campaign: Awareness creating exercises through media, seminars and conferences among students, educators, parents and the general public were given in order to assist in overcoming gender stereotypes in science. There were also information sessions with multipliers, for example, science teachers and guidance counsellors, as well as information sessions with parents and secondary school students.

This dual pronged approach will thus hopefully assist in:

- Setting up of a database of women and science in Malta
- Attract more girls/women into Science and Technology.
- Identify factors that would facilitate the retention of women in the S & T field.
- Enable their progression in the area
- Attract back the women who have left the field

It is thus hoped that this research would thus fill in gaps in existing data in Malta on gender and science. It would also assist in creating a dynamic interface between scientists and policy-makers and promote awareness on the benefits of science among female students.

On behalf of the co-ordinating committee I would like to thank Mr John Baptist Gauci for the excellent work and dedication he has shown in compiling and undertaking this research. The work was certainly not easy and this extensive publication gives an indication of the time intensive work undertaken on this project.

We welcome all comments and we hope that this research will catalyse much needed further research in this area in the future.

Janet Mifsud
Commissioner NCPE

Prologue

This project was driven and inspired by the goal of translating equal opportunities for all into a reality in the area of science and technology in Malta, where the male dominance is still evident and palpable. Women scientists are indeed under-represented in the key positions of scientific research in Malta, and the lack of employed women in this area is a waste of the country's resources. A lot of work and research has been made and some initiatives have been taken since the launch of this project just over a year ago by making use of the UNESCO funds available. This is a full report of all the work done during the project titled "The Gender Gap in Science and Technology in Malta – evaluating the problem and tackling the issues".

Science is still viewed by many as a male area and some still feel that it is not an entirely appropriate field for women to enter. This is often the result of gender stereotyping which in turn will lead to occupational segregation. Overcoming gender stereotypes is never easy but it is vital that all individuals, irrespective of their sex, can choose freely the direction of their professional paths and working lives. It is also important for people to be able to develop fully their talents and capability regardless of their gender.

A major area that published data has indicated that hinders this gender balance is the lifestyle science very often demands, which in several cases, can get in conflict with the family main careprovider's, generally the woman's, desires and needs. It is often hard to bring together child rearing and the long hours of work a science career brings with it. In addition, the lack of women scientists is not providing an appropriate population of role models for young and not-so-young girls.

The traditional upbringing of both girls and boys in Malta is also creating barriers since both girls and boys are not being encouraged to develop certain skills which contradict the traditional gender stereotypes present in society. In general, girls are encouraged to play with dolls, learn to cook, and are rewarded for showing certain personality traits such as empathy, cooperation and kindness. On the other hand, most boys are encouraged to use tools, to build models with blocks, learn about cars, and are rewarded for displaying traits like aggressiveness and competition. Since science has historically developed as a masculine activity, the qualities that are rewarded professionally are the traditional male ones. Women who have no scientific hands-on experience as children may have a disadvantage in the lab, and instead of gaining confidence to pursue a career in science, they lose it. Thus, this negative

experience in the lab serves as a deterrent for girls who may have an interest in science and other related areas. Even at an older age, some women still find the experience in a lab a frightening one, and are afraid that they might press a wrong button and provoke chaos.

Acknowledgements

The work carried out during this project would not have been possible without the contribution of many people who, in some way or another, helped in the accomplishment of various tasks.

A special thanks goes to the committee members Dr. Janet Mifsud, Ms Sina Bugeja, Dr. Irene Sciriha and Ms Anna Borg, for their continuous assistance throughout the duration of the project.

Particular thanks go also to:

- The Assistant Director (Research and Planning) within the Department of Planning and Development in the Education Division, Mr Raymond Camilleri, and his staff for providing the statistics on the students in the secondary schools .
- The ex-Registrar of MCAST, Ms. Josephine Cilia, and her staff for providing the unpublished statistics on the number of applicants and graduates in their various institutes.
- The Office of the Registrar at the University of Malta for providing the unpublished statistics on the number of applicants and graduates in the various faculties and institutes.
- The Manager of Labour Market Information within the Employment and Training Corporation, Mr. Edwin Camilleri, and his staff for supplying the necessary employment statistics.
- The Headteachers of the participating schools who kindly accepting the request to take part in this project, in particular, Ms Maria Ciappara who collaborated in the pilot project "Science Club for Girls".
- Mr Horace Gauci, the teacher in charge of the science club, for his commitment and dedication in the pilot project "Science Club for Girls".
- Ms Nadine Axisa and Ms Marisa Cassar for the continuous support they gave throughout the dissemination and promotion campaign.
- Ms Rachel Azzopardi, Ms Claudine Cassar, Ms Stephanie Farrugia, Ms Fiona Fenech, Ms Lara Tabone and Ms Joanna Vella for assuming the roles of the female role models.
- Ms Bernardette Gatt and Mr Vincent Gatt for the digital conversion of the video clips.

Finally, I should like to thank my wife Claire for her constant and invaluable support.

List of Abbreviations

ETC	Employment and Training Corporation
EU	European Union
Eurostat	Statistical Office of the European Communities
I.T.	Information Technology
ISCO	International Standard Classification of Occupations
MATSEC	Matriculation and Secondary Education Certificate
MCAST	Malta College of Arts, Science and Technology
NCPE	National Commission for the Promotion of Equality
S & T	Science and Technology
SEC	Secondary Education Certificate
UNESCO	United Nations Educational, Scientific and Cultural Organisation

List of Figures and Tables

Part I: Statistical Analysis

1. Choice of subjects at secondary school level

Figure 1.1: Number of students starting studying Biology at Form 3 in Junior Lyceums 5
Figure 1.2: Number of students starting studying Biology at Form 4 and Form 3 in Area Secondary Schools 5
Figure 1.3: Number of students starting studying Chemistry at Form 3 in Junior Lyceums 6
Figure 1.4: Number of students starting studying Chemistry at Form 4 and Form 3 in Area Secondary Schools 6
Figure 1.5: Total number of students studying Biology in Junior Lyceums 7
Figure 1.6: Total number of students studying Biology in Area Secondary Schools 7
Figure 1.7: Total number of students studying Chemistry in Junior Lyceums 8
Figure 1.8: Total number of students studying Chemistry in Area Secondary Schools 8
Figure 1.9: Total number of students studying Biology in Junior Lyceums and Area Secondary Schools 9
Figure 1.10: Total number of students studying Chemistry in Junior Lyceums and Area Secondary Schools 9

2. SEC Level Examinations Statistics

Figure 2.1: Number of registrations submitted for all the subjects 10
Figure 2.2: Number of registrations submitted for science subjects 11
Table 2.1: Index of Actual Registrations in Science Subjects (May2001 = 100) 11
Table 2.2: Index of Registrations in all subjects (May2001 = 100) 12
Table 2.3: Index of Real Registrations in Science Subjects (May2001 = 100) 12
Figure 2.3: Index of Real Registrations in Science Subjects (May2001 = 100) 12
Figure 2.4: Number of registrations submitted for Biology 13
Figure 2.5: Number of registrations submitted for Mathematics 13
Figure 2.6: Number of registrations submitted for Computer Studies 13
Figure 2.7: Number of registrations submitted for Technical Design/Graphical Communications . 13
Figure 2.8: Number of registrations submitted for Chemistry 14
Figure 2.9: Number of registrations submitted for Physics 14
Figure 2.10: Total number of candidates obtaining a Pass Grade in a science subject 14
Figure 2.11: Percentage passes out of the total number of candidates in the science subjects 15
Figure 2.12: Passes in Chemistry 15
Figure 2.13: Passes in Mathematics 16
Figure 2.14: Passes in Physics 16
Figure 2.15: Passes in Computer Studies 17
Figure 2.16: Passes in Technical Design / Graphical Communications 17
Figure 2.17: Passes in Biology 17

3. MATSEC Intermediate Level Examinations Statistics

Figure 3.1: Number of registrations submitted for all the subjects 19
Figure 3.2: Number of registrations submitted for science subjects 20
Table 3.1: Index of Actual Registrations in Science Subjects (May2001 = 100) 20
Table 3.2: Index of Total Registrations (May2001 = 100) 20
Table 3.3: Index of Real Registrations in Science Subjects (May2001 = 100) 21
Figure 3.3: Index of Real Registrations in Science Subjects (May2001 = 100) 21
Figure 3.4: Number of registrations submitted for Environmental Science 22
Figure 3.5: Number of registrations submitted for Biology 22
Figure 3.6: Number of registrations submitted for Engineering/Graphical Communication 22
Figure 3.7: Number of registrations submitted for Computing 22
Figure 3.8: Number of registrations submitted for Physics 22
Figure 3.9: Number of registrations submitted for Pure Mathematics 22
Figure 3.10: Number of registrations submitted for Information Technology 22
Figure 3.11: Number of registrations submitted for Chemistry 22
Figure 3.12: Number of registrations submitted for Applied Mathematics 23
Figure 3.13: Total number of candidates obtaining a Pass Grade in a science subject 23
Figure 3.14: Percentage passes out of the total number of candidates in the science subjects 24
Figure 3.15: Passes in Pure Mathematics 24
Figure 3.16: Passes in Computing 25
Figure 3.17: Passes in Physics 25
Figure 3.18: Passes in Environmental Science 26
Figure 3.19: Passes in Information Technology 26
Figure 3.20: Passes in Chemistry 26
Figure 3.21: Passes in Biology 26
Figure 3.22: Passes in Engineering/Graphical Communication 27
Figure 3.23: Passes in Applied Mathematics 27

4. MATSEC Advanced Level Examinations Statistics

Figure 4.1: Number of registrations submitted for all the subjects 29
Figure 4.2: Number of registrations submitted for science subjects 30
Table 4.1: Index of Actual Registrations in Science Subjects (May2001 = 100) 30
Table 4.2: Index of Registrations in all subjects (May2001 = 100) 31
Table 4.3: Index of Real Registrations in Science Subjects (May2001 = 100) 31
Figure 4.3: Index of Real Registrations in Science Subjects (May2001 = 100) 31
Figure 4.4: Number of registrations submitted for Biology 32
Figure 4.5: Number of registrations submitted for Chemistry 32
Figure 4.6: Number of registrations submitted for Computing 32
Figure 4.7: Number of registrations submitted for Physics 33
Figure 4.8: Number of registrations submitted for Pure Mathematics 33
Figure 4.9: Number of registrations submitted for Information Technology 33
Figure 4.10: Total number of candidates obtaining a Pass Grade in a science subject 33
Figure 4.11: Percentage passes out of the total number of candidates in the science subjects 34
Figure 4.12: Passes in Chemistry 35
Figure 4.13: Passes in Biology 35

Figure 4.14: Passes in Information Technology 36
Figure 4.15: Passes in Physics 36
Figure 4.16: Passes in Pure Mathematics 36
Figure 4.17: Passes in Computing 37

5. MCAST Statistics

Figure 5.1: Total number of students attending MCAST between 2001 and 2005 38
Figure 5.2: Number of students in initial six institutes that formed MCAST 39
Figure 5.3: Actual number of students following a science related course at MCAST 40
Figure 5.4: Percentage number of students following a science related course out of the population of MCAST 41
Figure 5.5: Actual number of students following a science related course in initial six institutes 41
Figure 5.6: Percentage number of students following a science related course out of the population of the initial six institutes 42
Figure 5.7: Actual number of science graduates in MCAST 42
Figure 5.8: Percentage number of science graduates out of all the graduates 43

6. University of Malta Statistics

Figure 6.1: Total number of accepted applications between 1997-98 and 2004-05 45
Figure 6.2: Number of accepted applicants in science-related courses 45
Figure 6.3: Number of science applicants as a percentage of the total number of applicants 46
Figure 6.4: Applicants in the Board of Studies for IT 47
Figure 6.5: Applicants in the Faculty of Architecture and Civil Engineering 47
Figure 6.6: Applicants in the Faculty of Engineering 47
Figure 6.7: Applicants in the Faculty of Medicine and Surgery 47
Figure 6.8: Applicants in the Faculty of Science 47
Figure 6.9: Applicants in the Institute of Health Care 47
Figure 6.10: Distribution of the total science applicants between 1997-98 and 2004-05 according to course 48
Figure 6.11: Number of science applicants excluding applicants in Institute of Health Care 48
Figure 6.12: Science applicants as a percentage of total number of applicants excluding applicants in Institute of Health Care 49
Figure 6.13: Number of science graduates between 2001-02 and 2004-05 49
Figure 6.14: Number of Science graduates as a percentage of total number of graduates 50
Figure 6.15: Graduates from the Board of Studies for IT 50
Figure 6.16: Graduates from the Faculty of Architecture and Civil Engineering 50
Figure 6.17: Graduates from the Faculty of Engineering 51
Figure 6.18: Graduates from the Faculty of Medicine and Surgery 51
Figure 6.19: Graduates from the Faculty of Science 51
Figure 6.20: Graduates from the Institute of Health 51
Figure 6.21: Number of science graduates excluding graduates from the Institute of Health Care 51
Figure 6.22: Science graduates as a percentage of total number of graduates excluding graduates from the Institute of Health Care 52

7. Employment Statistics

Table 7.1: ISCO-88 Major, sub-major, minor and unit group titles considered as science-related 53
Table 7.2: Distribution of full-time employees in science-related employment 54
Figure 7.1: Total full-time employees in science-related employment 55
Table 7.3: Distribution of part-time employees in science-related employment 55
Figure 7.2: Total part-time employees in science-related employment 56
Figure 7.3: Overall total number of employees in science-related employment 56
Figure 7.4: Full-time employees in 'Physical, Mathematical and Engineering Science' 57
Table 7.4: Amount and Percentage annual increase of full-time employees in 'Physical, Mathematical and Engineering Science Professionals' 57
Table 7.5: Average annual number of full-time employees in 'Physical, Mathematical and Engineering Science Professionals' 58
Figure 7.5: Part-time employees in 'Physical, Mathematical and Engineering Science' 58
Table 7.6: Amount and Percentage annual increase of part-time employees in 'Physical, Mathematical and Engineering Science Professionals' 59
Table 7.7: Average annual number of part-time employees in 'Physical, Mathematical and Engineering Science Professionals' 59
Figure 7.6: Total number of employees in 'Physical, Mathematical and Engineering Science' 59
Figure 7.7: Full-time employees in 'Life Science and Health' 60
Figure 7.8: Part-time employees in 'Life Science and Health' 60
Table 7.8: Average annual number of full-time and part-time employees in 'Life Science and Health' 61
Figure 7.9: Full-time and Part-time employees in 'Nursing and Midwifery' 61
Figure 7.10: Full-time and Part-time employees in 'Life Science and Health Professionals' excluding 'Nursing and Midwifery' 61
Figure 7.11: Total employees in 'Life Science and Health' and in 'Life Science and Health excluding Nursing and Midwifery' 62
Table 7.9: Amount and Percentage annual increase of employees in 'Life Science and Health Professionals' between 2001 and 2005 63
Table 7.10: Amount and Percentage annual increase of employees in 'Nursing and Midwifery' between 2001 and 2005 63
Table 7.11: Amount and Percentage annual increase of employees in 'Life Science and Health Prof.' excluding 'Nursing and Midwifery' 63
Figure 7.12: Full-time employees in 'Physical & Engineering Science Associate Professionals' 64
Figure 7.13: Part-time employees in 'Physical & Engineering Science Associate Professionals' 64
Figure 7.14: Employees in 'Physical & Engineering Science Associate Professionals' 65
Table 7.12: Average annual number of full-time and part-time employees in 'Physical & Engineering Science Associate Professionals' 65
Table 7.13: Amount and Percentage annual increase of employees in 'Electronics and telecommunications engineering technicians' 66
Table 7.14: Amount and Percentage annual increase of employees in 'Mechanical engineering technicians' between 2001 and 2005 66
Table 7.15: Amount and Percentage annual increase of employees in 'Physical & Engineering Science Associate Professionals' excluding 'Electronics and telecommunications engineering technicians' and 'Mechanical engineering technicians' 67
Figure 7.15: Full-time and Part-time employees in 'Life Science and Health Associate Professionals' 67
Figure 7.16: Employees in 'Nursing and Midwifery Associate Professionals' 68

Figure 7.17: Full-time and Part-time employees in 'Life Science and Health Associate Professionals' excluding 'Nursing and Midwifery Associate Professionals' 68
Figure 7.18: Total employees in 'Life Science and Health Associate Professionals' 69
Figure 7.19: Total employees in 'Life Science and Health Associate Professionals' excluding 'Nursing and Midwifery Associate Professionals' 69
Table 7.16: Amount and Percentage annual increase of employees in 'Life Science and Health Associate Professionals' 70
Table 7.17: Amount and Percentage annual increase of employees in 'Nursing and Midwifery Associate Professionals' 70
Table 7.18: Amount and Percentage annual increase of employees in 'Life Science and Health Associate Professionals' excluding 'Nursing and Midwifery Associate Professionals' . 70
Figure 7.19: Full-time and Part-time employees in 'Craft and Related Trades Workers' 71
Figure 7.20: Employees in 'Craft and Related Trades Workers' 71
Table 7.19: Marital status of full-time employees in a science-related career for the years 2001 to 2005 72
Figure 7.21 Average number of full-time employees in a science-related career according to marital status 72
Table 7.20: Marital status of part-time employees in a science-related career for the years 2001 to 2005 73
Figure 7.22: Average number of part-time employees in a science-related career according to marital status 73
Figure 7.23: Full-time and part-time married employees in a science-related career between 2001 and 2005 74
Figure 7.24: Full-time and part-time single employees in a science-related career between 2001 and 2005 74
Figure 7.25: Married employees in a science-related career between 2001 and 2005 75
Figure 7.26: Single employees in a science-related career between 2001 and 2005 75
Figure 7.27: Average number of full-time employees in a science-related career according to age group 76
Table 7.21: Age group of full-time employees in a science-related career for the years 2001 to 2005 76
Figure 7.28: Average number of part-time employees in a science-related career according to age group 77
Table 7.22: Age group of part-time employees in a science-related career for the years 2001 to 2005 78
Figure 7.29: Number of employees in a science-related career in the '20 to 29 years' age group for 2001-2005 78
Figure 7.30: Number of employees in a science-related career in the '30 to 39 years' age group for 2001-2005 79
Figure 7.31: Number of employees in a science-related career in the '40 to 49 years' age group for 2001-2005 80
Figure 7.32: Number of employees in a science-related career in the '50 to 59 years' age group for 2001-2005 81
Figure 7.33: Median age of full-time and part-time employees in a science-related career for 2001-2005 82
Figure 7.34: Median age of employees in a science-related career for 2001-2005 82
Table 7.23: Average number of employees in a science-related career according to the duration in their current employment 83
Table 7.24: Average percentage number of employees in a science-related career according to the duration in their current employment 84

Figure 7.35: Mean duration time in current employment of full-time and part-time employees for 2001-2005 84
Figure 7.36: Mean duration time in current employment of employees in a science-related career for 2001-2005 85

Conclusions

Table C.1: Number of students studying Biology and Chemistry in Junior Lyceums and Area Secondary Schools 94
Table C.2: Science registrations at SEC Level 95
Table C.3: Science registrations at Intermediate Level 95
Table C.4: Science registrations at Advanced Level 96
Table C.5: Percentage passes out of the total number of candidates in the science subjects at all levels 97

Aims of the Project

The limited number of women in decision making positions is still a reality today in many societies, including the Maltese scenario. A lot has been said about the barriers present in the science and technology area which are hindering more women from entering this sphere, and we have, indeed over the last decade, progressed a great deal in this area. However, having advanced to some extent does not mean that this improvement is sufficient and that we can sit on our laurels. Although steps have been taken to increase the number of women and girls who opt to take up a career in the area of science, there is still much work that needs to be done. The project "The Gender Gap in Science and Technology in Malta – evaluating the problem and tackling the issues" was thought out and structured bearing these facts in mind.

The main objectives of this project can be summarised in the following two statements:

- to determine the rate of participation of women in science and technology in Malta; and
- to promote the choice of a science-related career with female students in secondary education in Malta.

These objectives were translated into practice through an investigation and a detailed analysis of sex-disaggregated statistics available from different sources, and through various initiatives that were undertaken to disseminate and promote the choice of science, even from an early stage in life.

Statistical Analysis

Any serious study needs to be based on sound and scientific research, upon which arguments can be built, valid conclusions reached and sensible and practical recommendations presented. A great deal of gender data has been collected in Malta on education and on the labour market over the last few years. However, this data was collected using different methodologies, is dispersed in the various literature and sources available and no effort has been made to gather it and give it a coherent meaning.

The first aim of this project was to collect and collate the statistical information available on the number of girls who chose science subjects at secondary school level as well as the number of females who work in a science-related career. The main results emerging from this research are presented in Part I

of this report. Analysis of data was made on the developments along the past few years in the following areas:

- the choice of science subjects at secondary school level;
- candidates sitting for the local SEC Level, MATRIC Intermediate Level and MATRIC Advanced Level examinations offered by the MATSEC Board within the University of Malta;
- science related applicants and graduates at MCAST;
- science related applicants and graduates at the University of Malta;
- employment of women in a science-related career.

Dissemination and Promotion of Science

Various initiatives marked our project, aimed at tackling the issues relating to women and science as presented to us by the current situation in our islands. Talks and discussion sessions were held with girls in secondary schools, to promote the choice of science subjects. A pilot project was launched, whereby female students aged between 11 and 15 had the opportunity to engage in scientific and technological activities and experiments. The presence of female role models in science-related studies and careers was also at the forefront of our promotional campaign. These initiatives are discussed in greater detail in Part II of this report.

The objectives behind these initiatives included, but were not limited to:

- stressing the importance of the contribution that females can give to the area of sciences;
- presenting the ever-increasing career opportunities in Malta in the area of science and technology;
- counteracting the negative perceptions some people (students and parents) have in relation to science.

PART I

STATISTICAL ANALYSIS

1. *Choice of subjects at secondary school level*

The students attending the secondary schools are given the opportunity to choose a number of subjects in which to further their studies. In the Junior Lyceums, this choice is made at Form 2 level. In the Area Secondary Schools the choice used to be made at Form 3 level until the academic year 2005-2006, when this choice was shifted to Form 2. This exercise gives the students a possibility to decide for themselves, with the help of their parents, teachers and guidance teachers, which subjects they would like to study. The options available are:

- Art
- Biology
- Business Studies
- Chemistry
- Computer Studies
- Design and Technology
- European Studies
- Geography
- Graphical Communications
- History
- Home Economics
- Physical Education
- Social Studies
- Textile Studies
- Languages: Arabic, French, German, Italian, Russian, Spanish

The subjects chosen for this part of the study are only the traditional science subjects – Biology and Chemistry. To avoid confusion, instead of analysing the number of students making the respective choice in a particular year, the number of students starting their studies in the chosen subjects during the following year was considered. Apart from this, the total number of students in all the forms studying Biology and Chemistry in the three academic years considered was also analysed.

Students starting their studies in Biology and Chemistry

The number of students in the Maltese state Junior Lyceums who chose to start studying Biology at Form 3 during the academic years 2004-05, 2005-06 and 2006-07 is given in the diagram below. The higher number of female students making this choice is evident for the three academic years considered, where these were always more than double the number of male students.

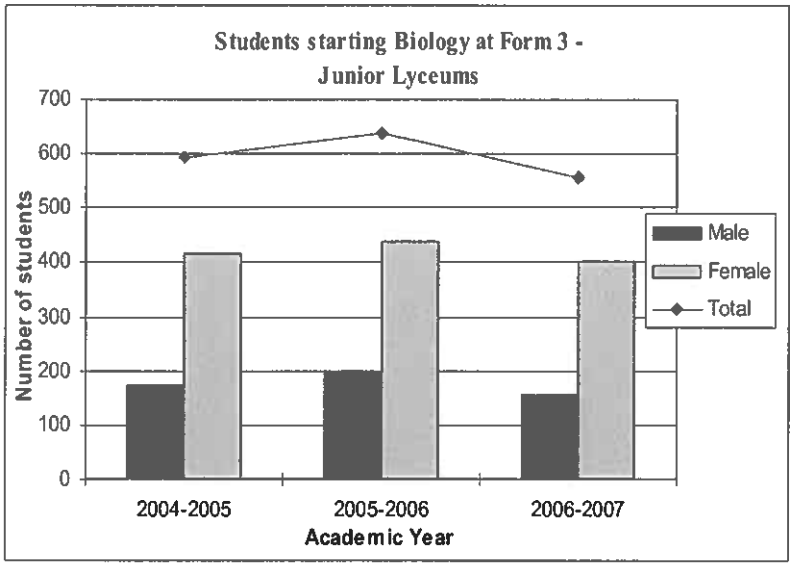


Figure 1.1: Number of students starting studying Biology at Form 3 in Junior Lyceums

In the case of Area Secondary Schools, the academic year 2006-2007 was the last one seeing students starting their studies in the chosen subjects in Form 4. In this same year, there was also the first group of students who started their studies in the chosen subjects in Form 3. The diagrams shown in Figure 1.2 below illustrate respectively these two situations. It is observed that in all the cases, the number of female students making this choice was considerably higher than the number of their male counterpart.

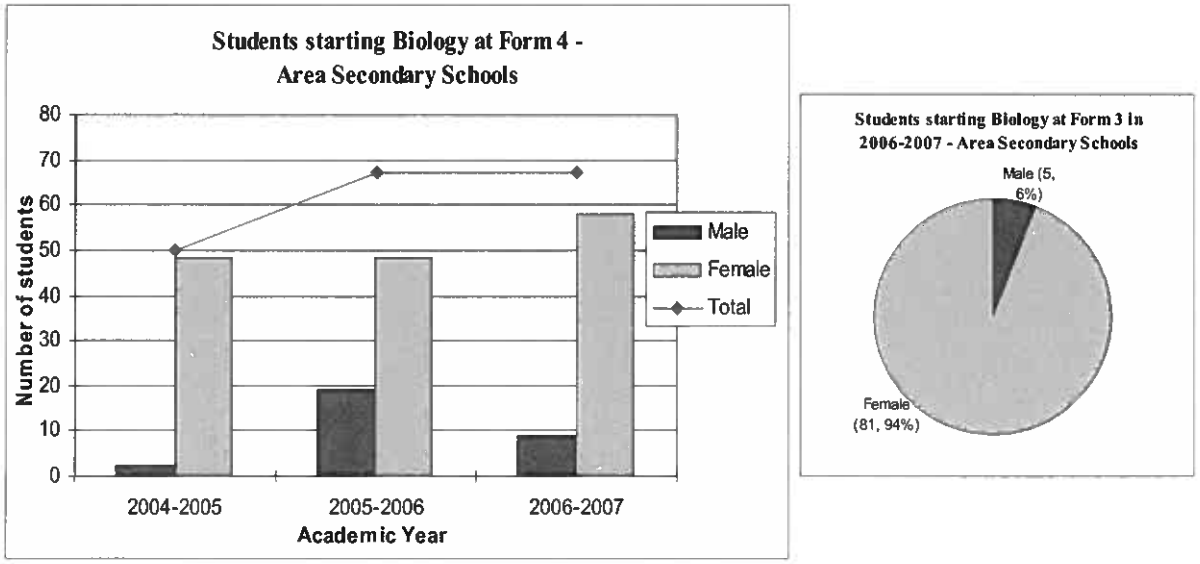


Figure 1.2: Number of students starting studying Biology at Form 4 and Form 3 in Area Secondary Schools

A similar situation to that described above is also present in the case of Chemistry with the students attending Junior Lyceums, although in this case, the difference is not as vast as in the case of Biology. In this case, it is also noted that the number of students (male and females) making this choice was in the decrease from one academic year to the next (refer to Figure 1.3 below).

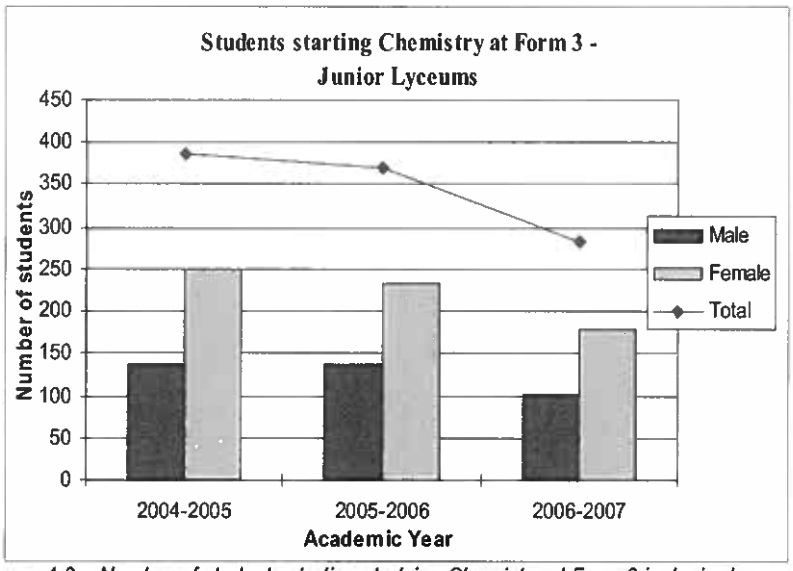


Figure 1.3: Number of students starting studying Chemistry at Form 3 in Junior Lyceums

The choice of Chemistry is, quite unsurprisingly, not at all popular with secondary school students as can be seen from Figure 1.4. However it is noted that the total number of students making the choice of this subject has been on the increase, although the significance of this remark is quite questionable due to the small numbers involved and the short period of time considered.

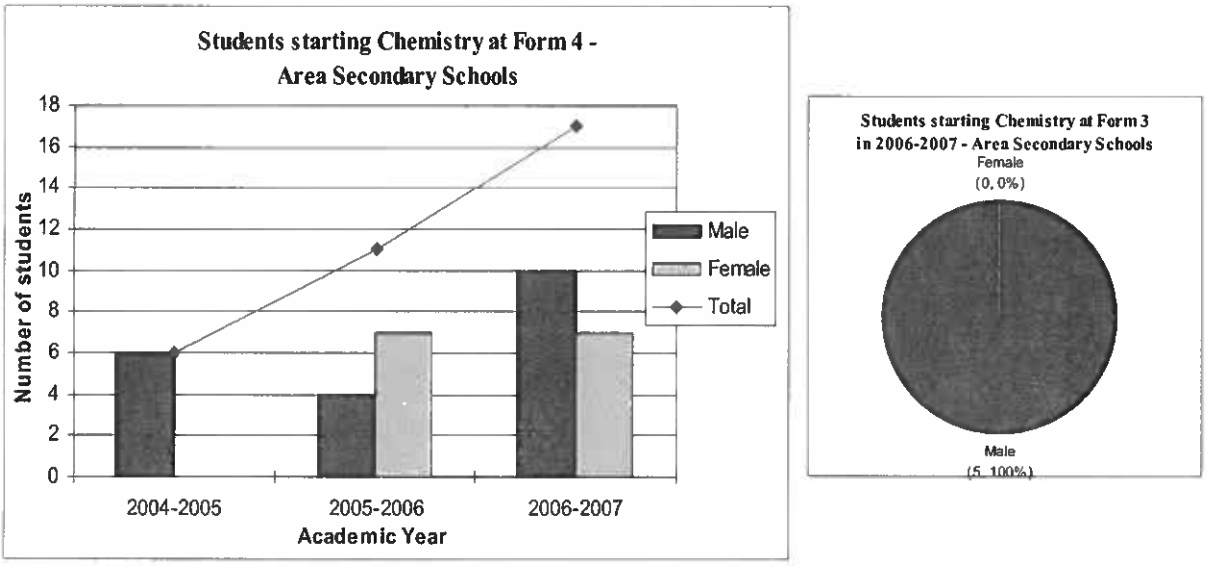


Figure 1.4: Number of students starting studying Chemistry at Form 4 and Form 3 in Area Secondary Schools

Total number of students studying Biology and Chemistry

The popularity of Biology with Junior Lyceum students has been on the rise throughout the three academic years taken into consideration. In fact, Figure 1.5 below shows that the total number of students in all the forms (both females and males) in Junior Lyceums who were studying this subject increased each year.

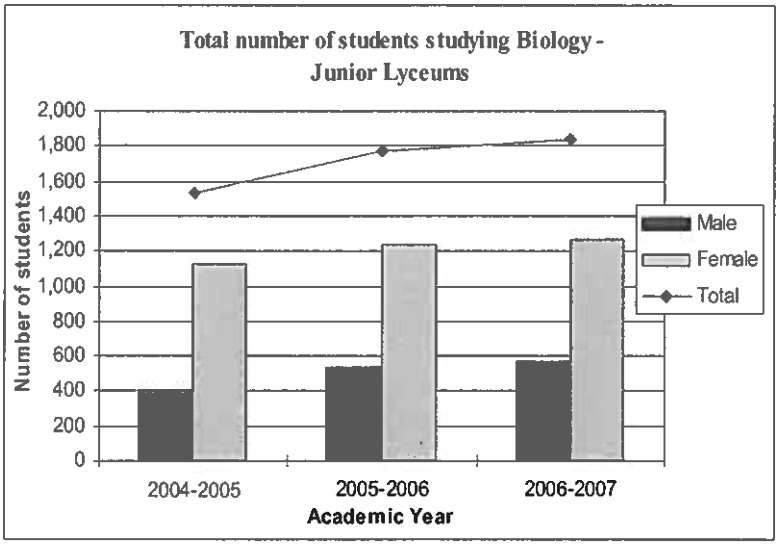


Figure 1.5: Total number of students studying Biology in Junior Lyceums

On the other hand, the situation in Area Secondary Schools was quite different. In fact, the total number of students studying biology in 2005-2006 decreased when compared with the previous year. When considering the sudden increase shown in Figure 1.6 for the academic year 2006-2007, one has to take into consideration the fact that the figures for this year include the Form 3 students who were not included in the previous years.

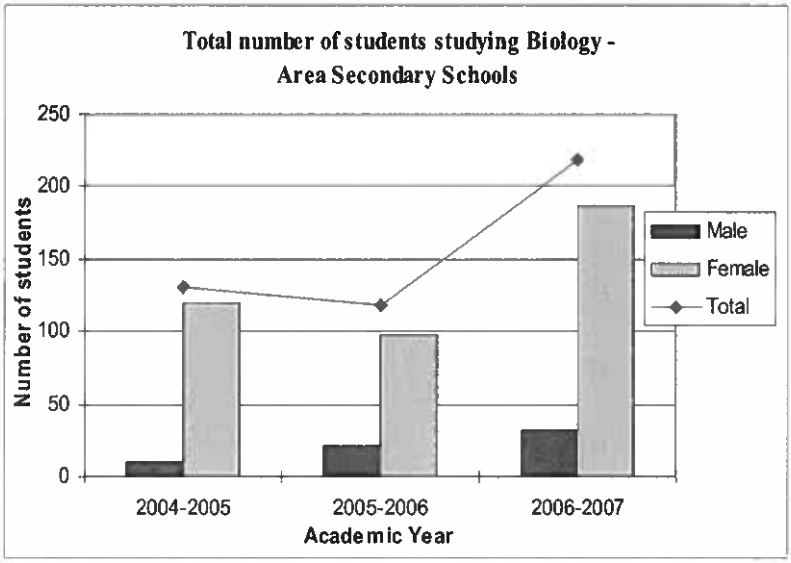


Figure 1.6: Total number of students studying Biology in Area Secondary Schools

The total number of students in all the forms studying chemistry in Junior Lyceums has been through a very slight increase throughout the three academic years considered, although the number of females remained almost constant. Figure 1.7 illustrates this situation.

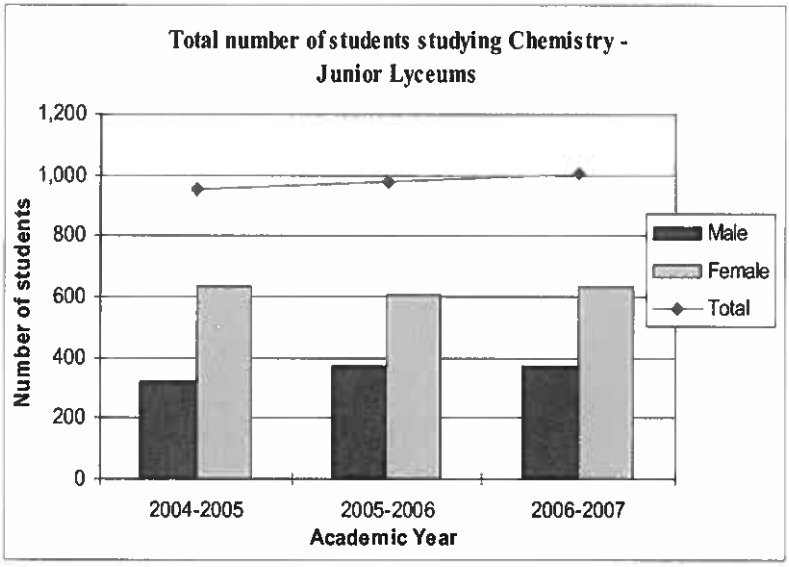


Figure 1.7: Total number of students studying Chemistry in Junior Lyceums

The number of students in the Area Secondary Schools opting for Chemistry has been through a constant increase. Again, one must treat these observations with caution due to the small number of students being considered in a short span of three academic years. However, this trend (illustrated also in Figure 1.8) seems to be a promising one.

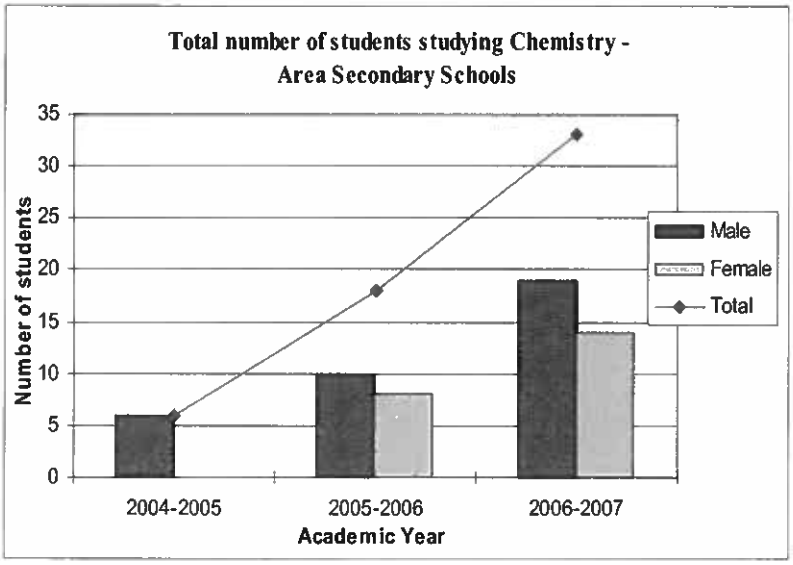


Figure 1.8: Total number of students studying Chemistry in Area Secondary Schools

The following two figures illustrate respectively the overall situation for Biology and Chemistry when combining the students in the Junior Lyceums and in the Area Secondary Schools. It is again noted that the popularity of Biology with females is greater than with males, and, also, the total number of students has been through an

increase in the three academic years considered. A similar remark can be made in the case of Chemistry, although, for the latter subject, the number of students studying this subject is considerably less.

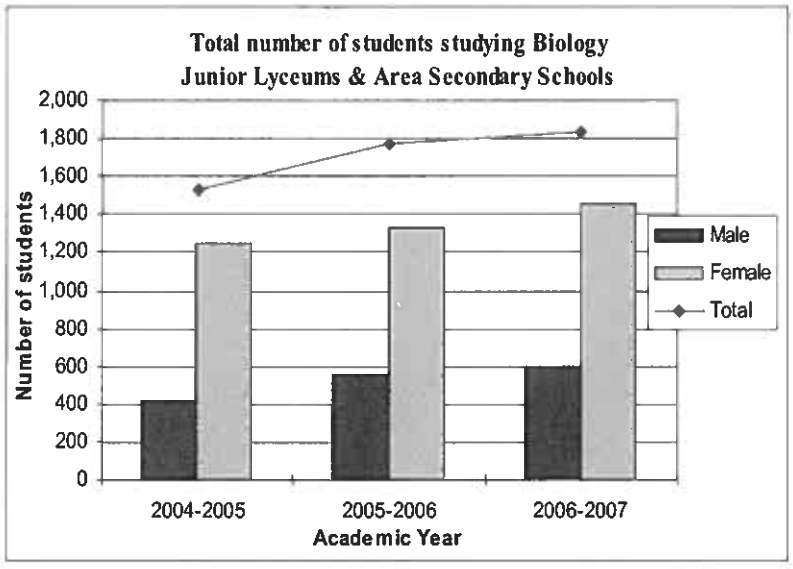


Figure 1.9: Total number of students studying Biology in Junior Lyceums and Area Secondary Schools

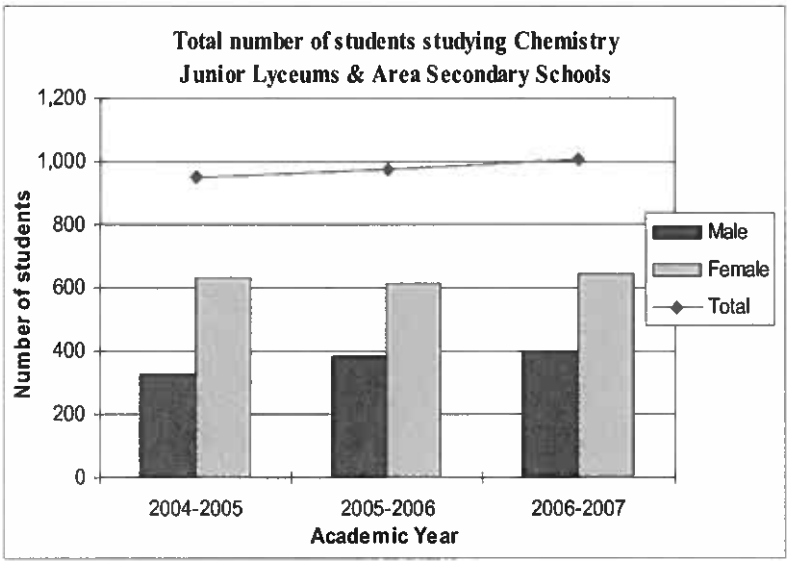


Figure 1.10: Total number of students studying Chemistry in Junior Lyceums and Area Secondary Schools

2. SEC Level Examinations Statistics

The MATSEC Board within the University of Malta offers around 30 subjects at Secondary Education Certificate (SEC) Level, covering a wide range of languages, humanities subjects and also scientific subjects. These examinations are held annually, in May and June with the possibility of a re-sit session for some subjects in September. In this part of the research, the total number of applications submitted by candidates to sit for the May examinations in different subjects, as well as the number of candidates passing from the respective examination, were analysed for the period 2001-2005. It is to be noted that for the purposes of the research the science related subjects were taken to be Biology, Chemistry, Computer Studies, Technical Design / Graphical Communications, Mathematics, Physics and Technology / Technical Design A

Applications submitted

The applications received by the MATSEC Board by candidates to sit for these examinations at SEC Level went through a constant increase between the years 2001 to 2005, resulting in a global increase of 9.8% in the same period. The percentage increase in the number of applications submitted by female candidates in 2005 when compared to 2001 was of 10.1%, while the increase in the applications submitted by male candidates over the same period was of 9.4%. As can be noted from Figure 2.1, the number of females applying to sit for these exams each year was greater than the number of males.

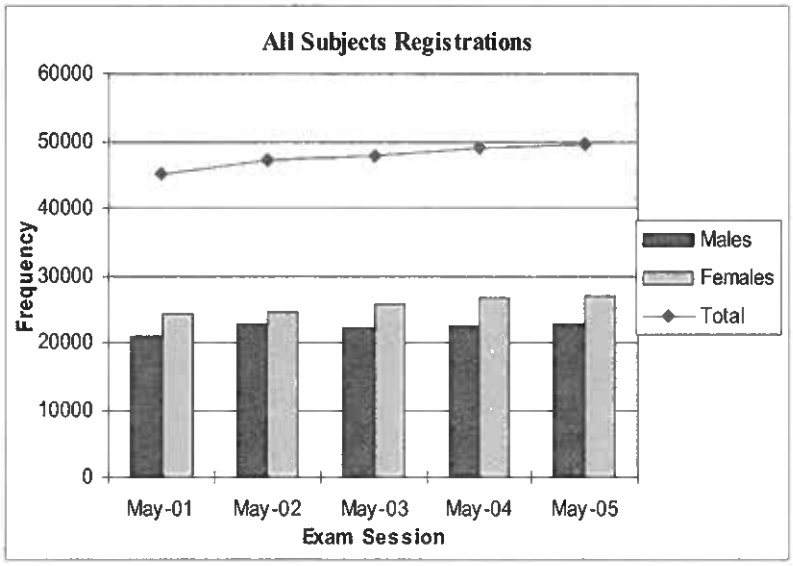


Figure 2.1: Number of registrations submitted for all the subjects

Figure 2.2 below illustrates the number of registrations received for seven science-related subjects, namely:

- Biology
- Chemistry
- Computer Studies
- Technical Design / Graphical Communications
- Mathematics
- Physics
- Technology / Technical Design A

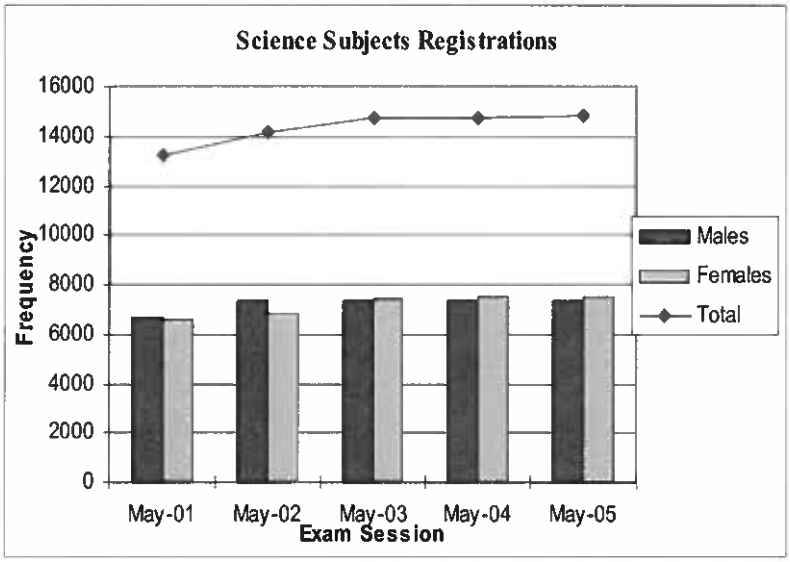


Figure 2.2: Number of registrations submitted for science subjects

It is to be noted that the number of males applying to sit for an examination in the science subjects in the May 2001 and May 2002 sessions was marginally greater than the applications from the female counterpart. However, from 2003 onwards, this situation was reversed, and the number of applications submitted by females surpassed the number of applications submitted by males. In fact, the yearly percentage increase in the ***actual*** number of females registering for science subjects between 2003 and 2005 when compared to May 2001 was greater than the corresponding yearly percentage increase in the registrations by males. This is shown in the table below (Table 2.1), where the actual registrations made each year for the above listed science subjects are compared with the registrations of May 2001.

Percentage Science Registrations	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	109.73	110.33	109.38	110.12
Females	100	103.75	112.50	113.46	113.84
Total	*100*	*106.76*	*111.41*	*111.41*	*111.96*

Table 2.1: Index of Actual Registrations in Science Subjects (May2001 = 100)

However, the number of registrations in all subjects received each year went through a great deal of variation (as shown in Table 2.2). It can be seen that, when compared to May 2001, the percentage number of female registrations in ALL subjects was also generally greater than the percentage number of male registrations. Thus, it would be more effective if we calculate the *real* percentage change in the number of science registrations by removing the effect of the change in the total number of registrations. This comparison is done in Table 2.3 and illustrated in Figure 2.3 through the calculation of an index of real registrations in the science subjects.

Percentage Total Registrations	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	109.30	105.74	107.04	109.41
Females	100	100.53	105.95	109.42	110.14
Total	*100*	*104.57*	*105.85*	*108.33*	*109.80*

Table 2.2: Index of Registrations in all subjects (May2001 = 100)

Index of real registrations in science subjects	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	100.39	104.34	102.18	100.64
Females	100	103.21	106.18	103.69	103.36
Total	*100*	*102.09*	*105.25*	*102.84*	*101.97*

Table 2.3: Index of Real Registrations in Science Subjects (May2001 = 100)

It is noted that through this calculation, the real registrations in science subjects by females resulted in being greater than the real registrations by male candidates in all the years, including 2002. In reality, May 2002 registered the greatest discrepancy in favour of females.

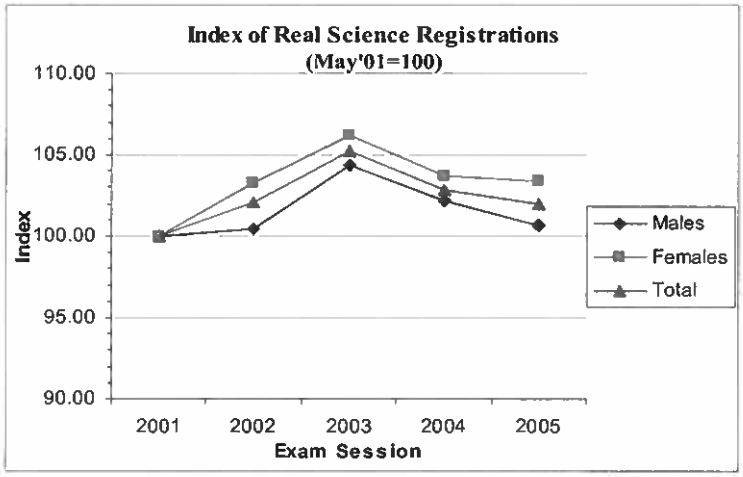


Figure 2.3: Index of Real Registrations in Science Subjects (May2001 = 100)

Before a closer look at the registrations received in the particular science subjects is taken, it should be pointed out that due to the small number of applications submitted for Technology/Technical Design A, only the other subjects were analysed.

It is noted that for all of the five years considered, Biology and Mathematics attracted more female applicants than male applicants (refer to Figure 2.4 and 2.5). However, as evident from Figure 2.6 and 2.7, Computer Studies and, more significantly, Technical Design / Graphical Communications were dominated by male candidates. The scenario for Chemistry (Figure 2.8) and Physics (Figure 2.9) was more balanced, and no particular sex seemed to dominate the number of registrations submitted for these two subjects.

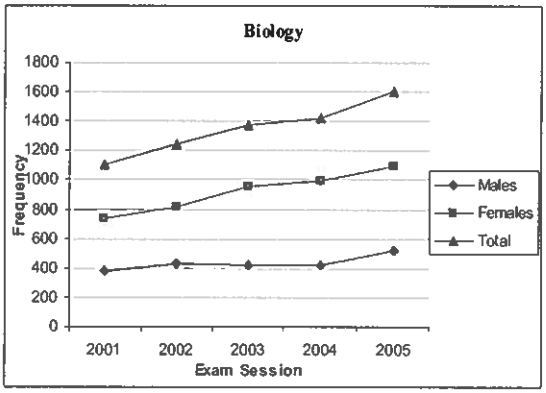


Figure 2.4: Number of registrations submitted for Biology

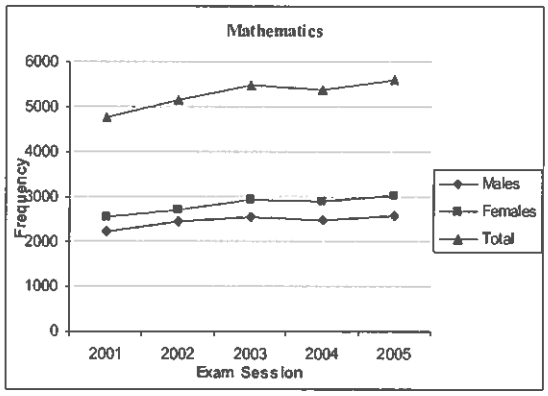


Figure 2.5: Number of registrations submitted for Mathematics

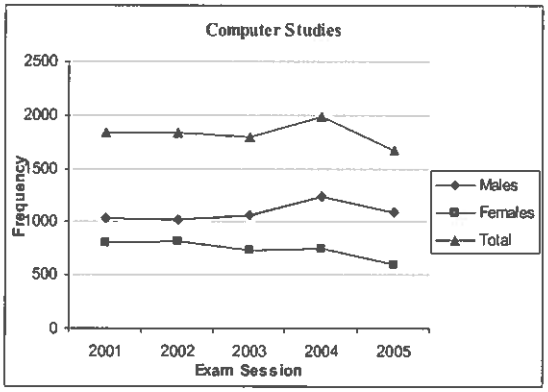


Figure 2.6: Number of registrations submitted for Computer Studies

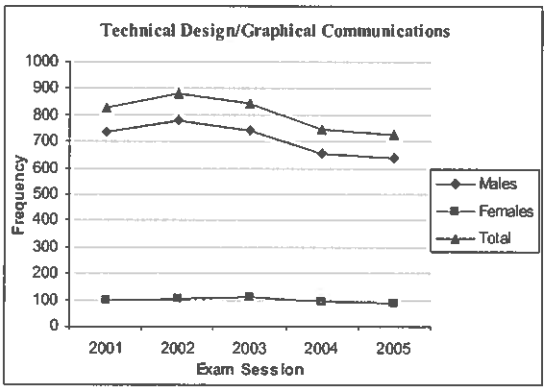


Figure 2.7: Number of registrations submitted for Technical Design/Graphical Communications

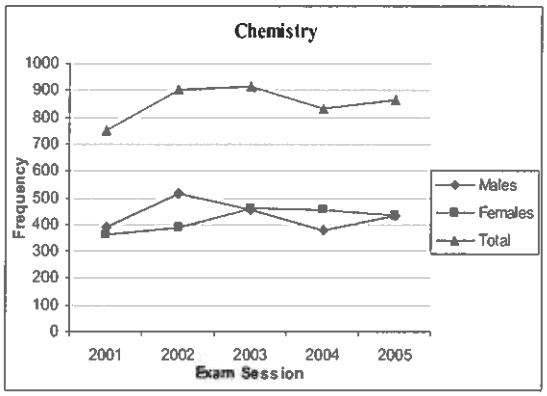


Figure 2.8: Number of registrations submitted for Chemistry

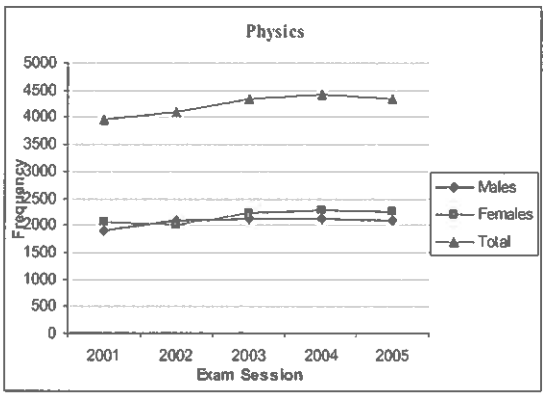


Figure 2.9: Number of registrations submitted for Physics

Results obtained

The results obtained in the science subjects' examinations were considered. A global overview of the total number of candidates obtaining a grade from 1 to 5 (hereafter referred to as a 'Pass Grade') in the science subjects is given in Figure 2.10.

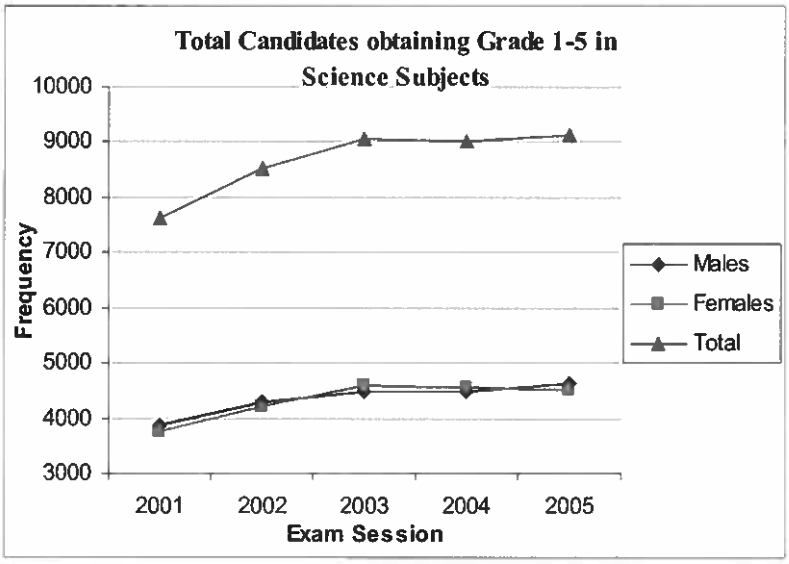


Figure 2.10: Total number of candidates obtaining a Pass Grade in a science subject

The diagram above highlights the close number of male students and of female students obtaining a pass grade each year. These went through a fast increase between 2001 and 2003, and then remained relatively stable.

The performance of females and males was further analysed by, first, calculating the percentage number of those passed over the number of registrations made, and, then, these percentage figures were compared and contrasted. This analysis for the total number of candidates obtaining a pass grade from

those who applied to sit for a science exam is done in Figure 2.11. It can be seen from this diagram how the percentage of male passes out of the male applications increased quite uniformly over the five years. On the other hand, the female performance went through a sudden change between 2000 and 2001, but then started decreasing from 2002 onwards. In fact, in the last two years, the percentage of males passing from those who applied was greater than the corresponding percentage for females.

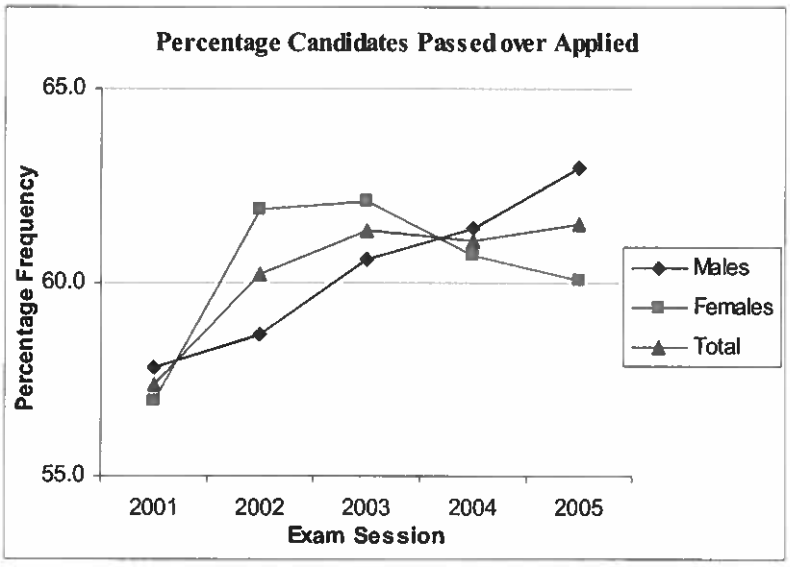
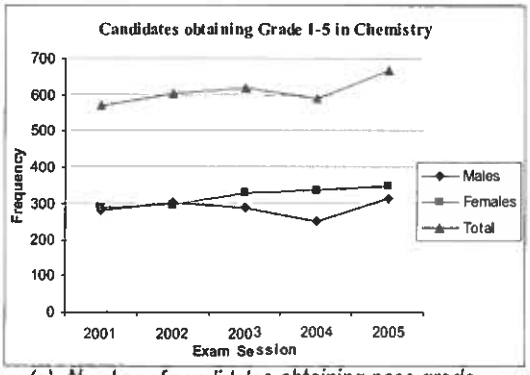


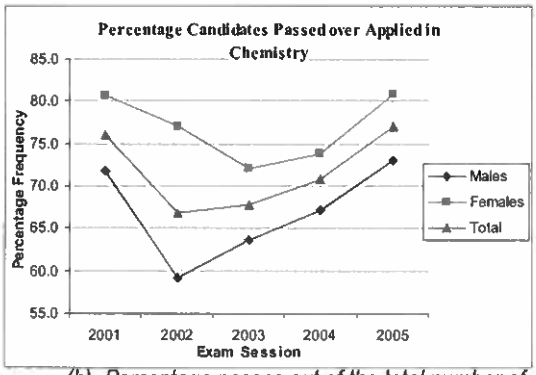
Figure 2.11: Percentage passes out of the total number of candidates in the science subjects

In the charts that follow, a similar analysis to that presented above is repeated for all the individual science subjects.

The only instance in which the situation remained unchanged when going through this analysis was in the case of Chemistry. In fact, Figure 2.12(a) shows that more females obtained a pass grade in all but one of the years considered. When the percentage of those passing out of those registering was calculated, this dominance by females was confirmed and strengthened, as can be seen from Figure 2.12(b).



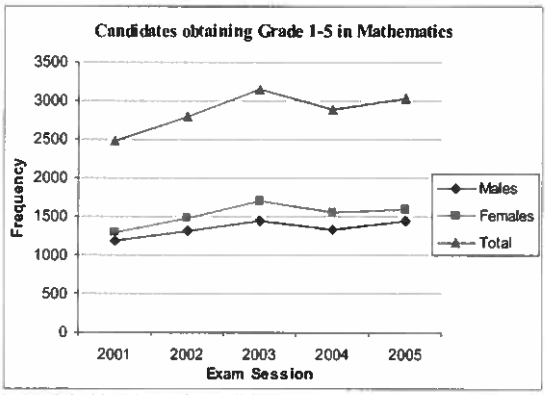
(a) Number of candidates obtaining pass grade



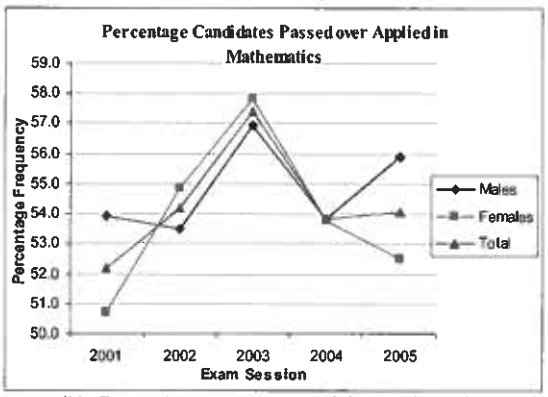
(b) Percentage passes out of the total number of candidates

Figure 2.12: Passes in Chemistry

Figures 2.13 and 2.14 present situations whereby the actual numbers suggest that more females are getting a pass grade than males, but when the percentages are worked out, this better performance by females is challenged in some of the instances. The subjects which gives rise to this situation are Mathematics and Physics, although in the latter case, the difference was initially less than the difference in the case of Mathematics.

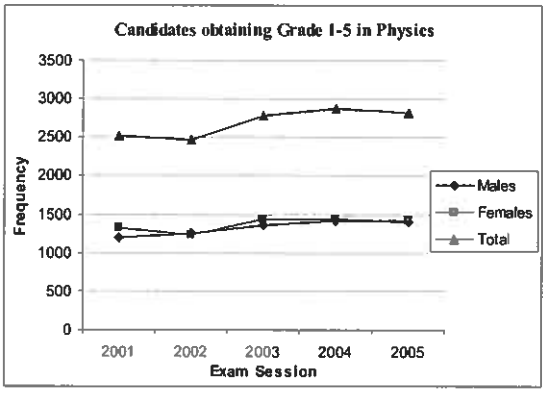


(a) Number of candidates obtaining pass grade

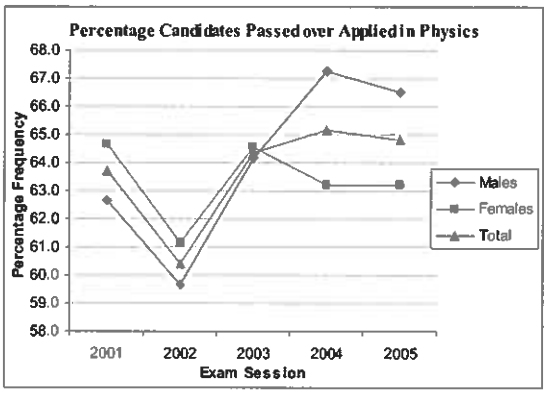


(b) Percentage passes out of the total number of candidates

Figure 2.13: Passes in Mathematics



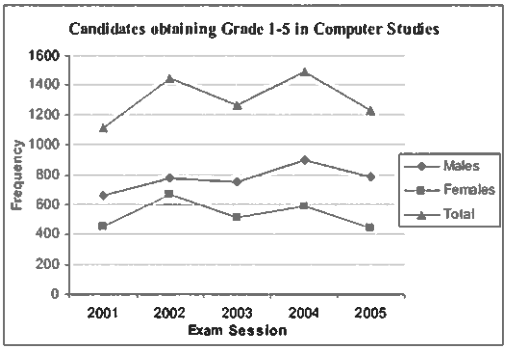
(a) Number of candidates obtaining pass grade



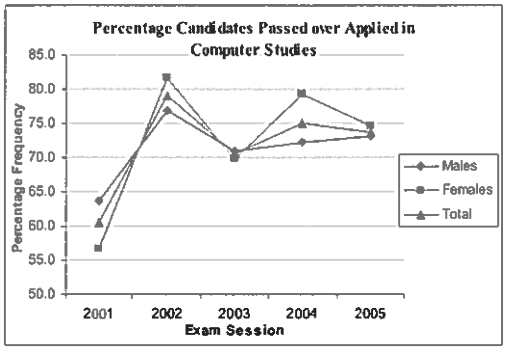
(b) Percentage passes out of the total number of candidates

Figure 2.14: Passes in Physics

In the Computer Studies and Technical Design / Graphical Communications examinations (shown in Figures 2.15 and 2.16, respectively), the situation is opposite to that illustrated above. The actual figures suggest that more males got a pass grade when compared to females. However, the calculation of the percentage of those getting a pass grade over those registering shows that females outperformed males. The situation in Technical Design / Graphical Communication is particularly more interesting, since, at first, the performance in this traditionally male subject shows a huge difference between the two sexes in favour of males, but the calculation of percentage shows that the females opting for this subject performed as good as, if not better, than males.

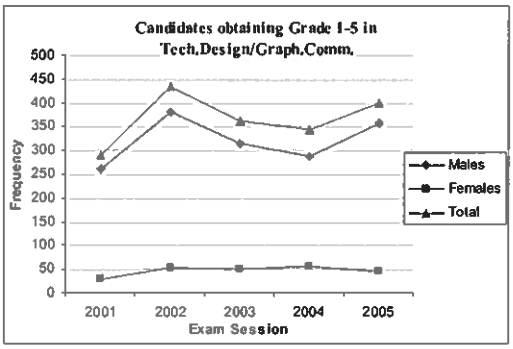


(a) Number of candidates obtaining pass grade

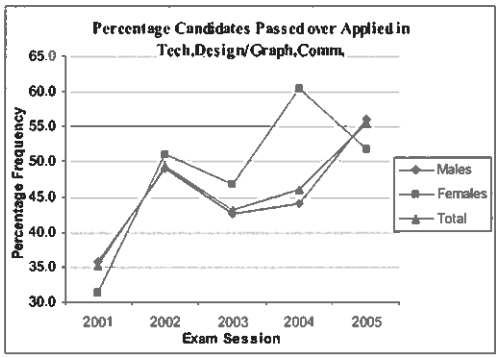


(b) Percentage passes out of the total number of candidates

Figure 2.15: Passes in Computer Studies



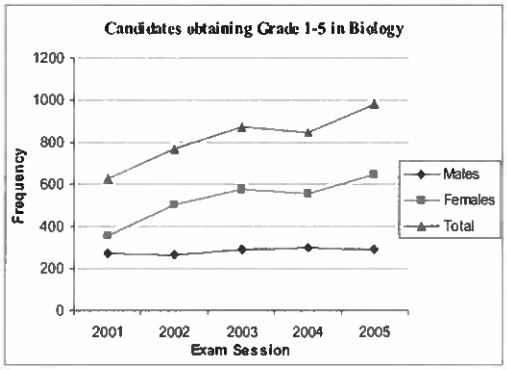
(a) Number of candidates obtaining pass grade



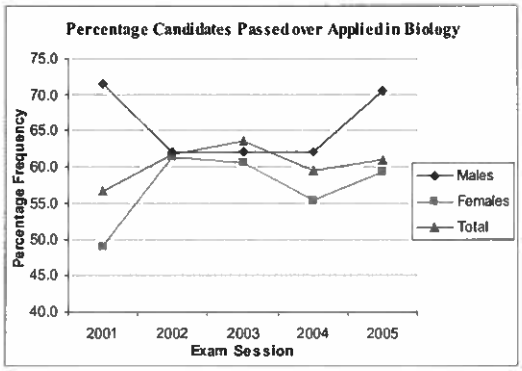
(b) Percentage passes out of the total number of candidates

Figure 2.16: Passes in Technical Design / Graphical Communications

Another interesting case is that for Biology, which, traditionally, is more associated with females. The actual figures suggest that more females obtained a pass grade when compared to their male counterparts (Figure 2.17(a)). However, as Figure 2.4 shows, there were also more females who applied to sit for this examination. When the percentage numbers of those who passed from those who applied was calculated, the situation turned in favour of the male candidates. As can be seen from Figure 2.17(b), the male performance was, in many cases, by far better than the performance by the female group.



(a) Number of candidates obtaining pass grade



(b) Percentage passes out of the total number of candidates

Figure 2.17: Passes in Biology

Chi-squared goodness of fit tests with 5% level of significance were conducted in order to determine if there was a significant difference between the sex of the candidates and the number of students obtaining a pass grade in the science subjects. It was discovered that, in fact, there were significant differences between sex and the number of passes in science subjects during the May 2002 and May 2005 sessions. In May 2002, the number of females passing their exam in a science subject was over-represented, while males obtaining a pass grade were under-represented. However, this situation was reversed in the May 2005 session, when, this time, the number of passes in science obtained by females was under-represented. This is also confirmed by the distance depicted in Figure 2.11 between the line diagram for females and that for males. No gender difference was perceived at the 5% level of significance between sex and number of passes in the other three exam sessions considered.

3. MATSEC Intermediate Level Examinations Statistics

The MATSEC Board within the University of Malta offers around 30 subjects at Intermediate Level, varying from humanities to scientific subjects. These examinations are held biannually; one of the sessions is in May/June, while the other is in September. The number of applications submitted by candidates to sit for the examinations in different subjects in the May/June session, together with the number of candidates passing from the respective examination, were analysed.

Applications submitted

The applications received by the MATSEC Board by candidates to sit for these examinations at an Intermediate Level were in constant increase between the years 2001 and 2005. The overall increase over these five years was of approximately 23.9%. Figure 3.1 below illustrates how the total number of applications submitted were distributed according to the sex of the candidates.

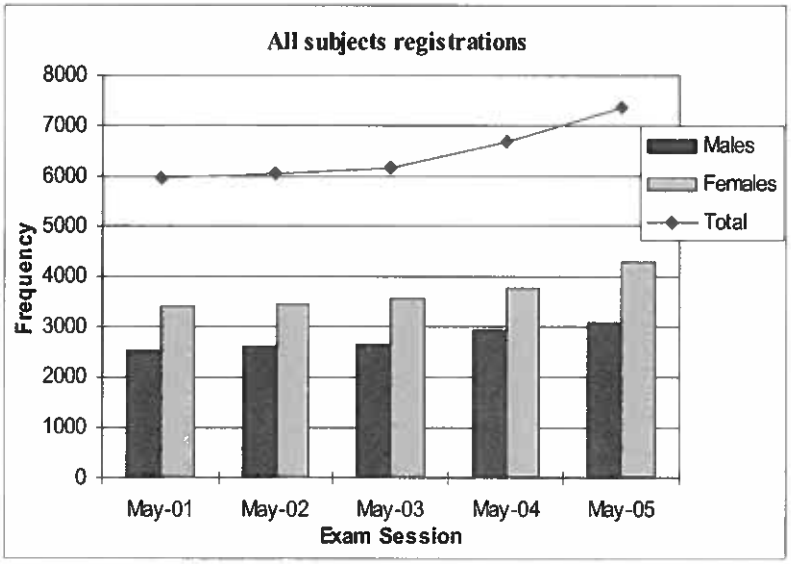


Figure 3.1: Number of registrations submitted for all the subjects

Figure 3.2 illustrates the number of registrations received for nine science-related subjects, namely:

- Applied Mathematics
- Biology
- Chemistry
- Computing
- Engineering/Graphical Drawing
- Environmental Science
- Information Technology
- Physics
- Pure Mathematics

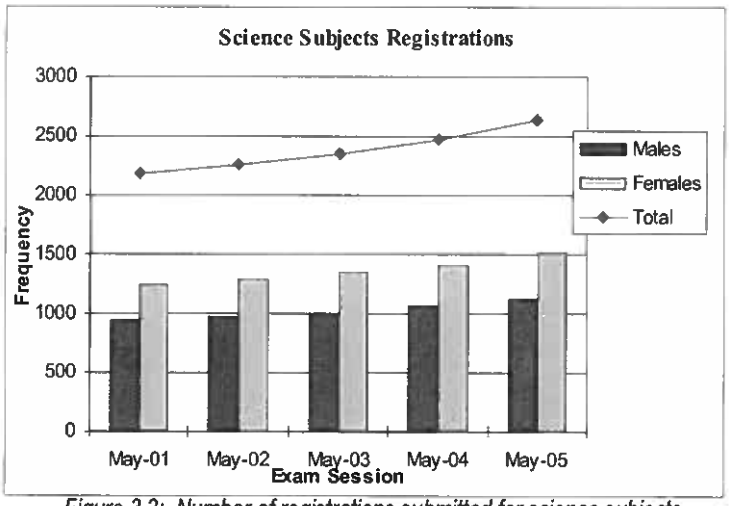


Figure 3.2: Number of registrations submitted for science subjects

Comparing the ***actual*** registrations made each year for the above listed science subjects with the registrations of May 2001, it is noted that the percentage change over this period in the registrations for these science subjects was as follows:

Percentage Science Registrations	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	103.08	106.05	112.53	119.11
Females	100	103.47	109.12	113.72	121.71
Total	*100*	*103.30*	*107.79*	*113.20*	*120.59*

Table 3.1: Index of Actual Registrations in Science Subjects (May2001 = 100)

As evident from the table above, the number of females registering for the science subjects has gone only through a marginally greater yearly increase when compared to the registrations by the number of males. Also, the overall increase in the number of registrations received from females was greater than in the number of registrations received from males (21.71% against 19.11%). However, the number of females registering to sit for all the subjects has also increased by a total of 25.29% over the five years, compared to the increase of 22.09% by males (shown in Table 3.2). Thus, it would be more effective to calculate the ***real*** percentage increase in the number of science registrations by removing the effect of the increase in the total number of registrations. This is done by calculating an index of ***real*** registrations in the science subjects, as shown in Table 3.3 and Figure 3.3.

Percentage Total Registrations	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	103.21	104.28	115.91	122.09
Females	100	100.88	103.69	110.36	125.29
Total	*100*	*101.87*	*103.94*	*112.72*	*123.93*

Table 3.2: Index of Total Registrations (May2001 = 100)

Index of real registrations in science subjects	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	99.88	101.70	97.08	97.56
Females	100	102.57	105.24	103.05	97.15
Total	*100*	*101.41*	*103.71*	*100.43*	*97.30*

Table 3.3: Index of Real Registrations in Science Subjects (May2001 = 100)

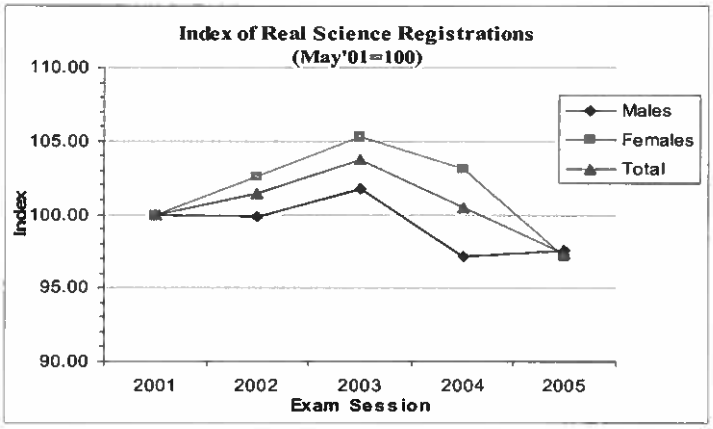


Figure 3.3: Index of Real Registrations in Science Subjects (May2001 = 100)

With the exception of May 2005, it is clear that even the real registrations in science subjects by females are far greater than the real registrations in science subjects by male candidates. The situation in May 2005 is, in fact, quite peculiar and singular. The real registrations for science subjects made by both sexes went below the 100% mark, meaning that the increase in the number of registrations for science subjects was not enough to counterbalance the increase in the total number of registrations. In other words, the registrations for science examinations between 2004 and 2005 increased at a slower rate when compared to the increase in the total registrations. Another point worth noting is that there was a substantial drop in the real number of registrations for science subjects made by females, which, for the first time in five years, was less than the real registrations made by the male complement.

Taking a closer look at the registrations received in the particular science subjects (Figures 3.4 to 3.10), it is noticeable that some of the subjects such as 'Environmental Science' and 'Biology' are considerably dominated by female candidates. On the other hand, other subjects, including 'Engineering/ Graphical Communication' and 'Computing' are still attracting more male registrations than female registrations. The registrations for the other subjects are shared out fairly equally between male and females, even more so when it is borne in mind that the number of females registering for science subjects is higher than that for male.

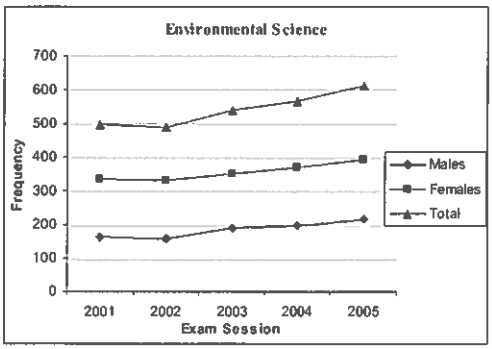


Figure 3.4: Number of registrations submitted for Environmental Science

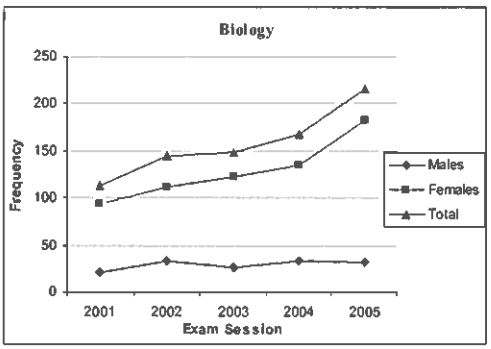


Figure 3.5: Number of registrations submitted for Biology

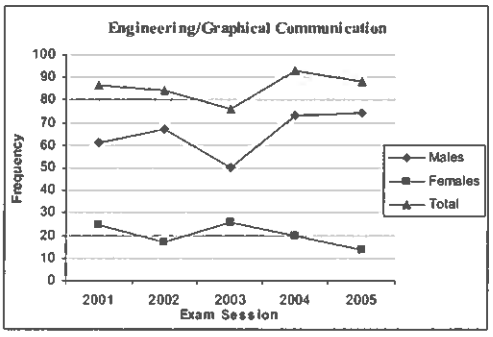


Figure 3.6: Number of registrations submitted for Engineering/Graphical Communication

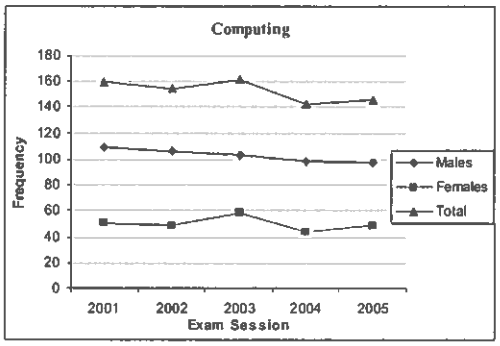


Figure 3.7: Number of registrations submitted for Computing

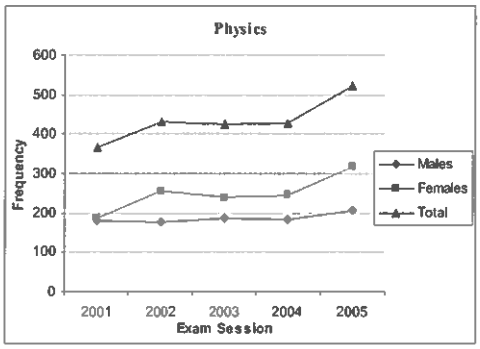


Figure 3.8: Number of registrations submitted for Physics

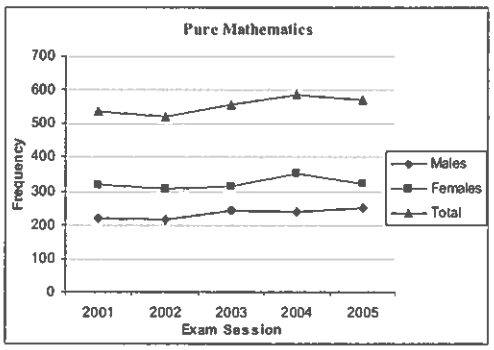


Figure 3.9: Number of registrations submitted for Pure Mathematics

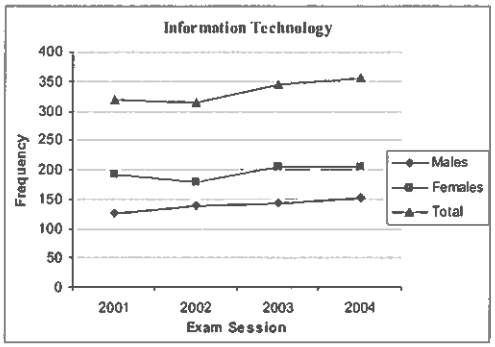


Figure 3.10: Number of registrations submitted for Information Technology

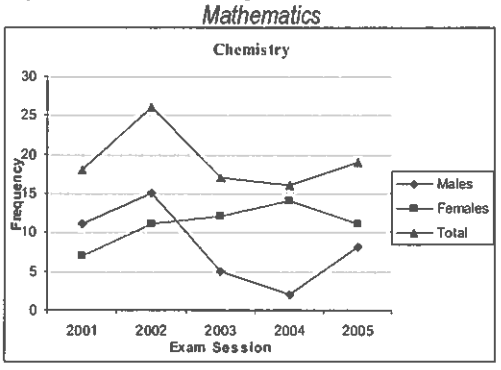


Figure 3.11: Number of registrations submitted for Chemistry

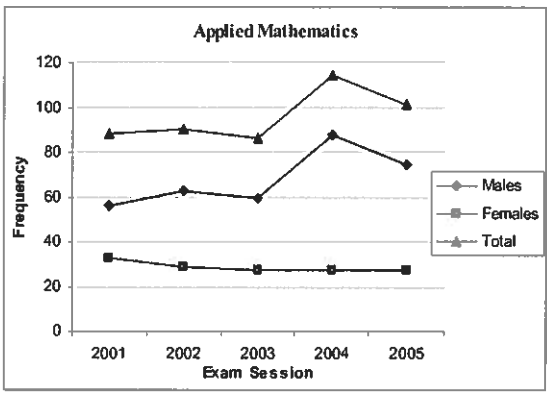


Figure 3.12: Number of registrations submitted for Applied Mathematics

Results obtained

The situation with regards to the results obtained in Intermediate level examinations, with particular reference to the science subjects' examinations, was also examined. A global overview to the total number of candidates obtaining a grade from A to E (hereafter referred to as a 'Pass Grade') in the science subjects is given in Figure 1.13.

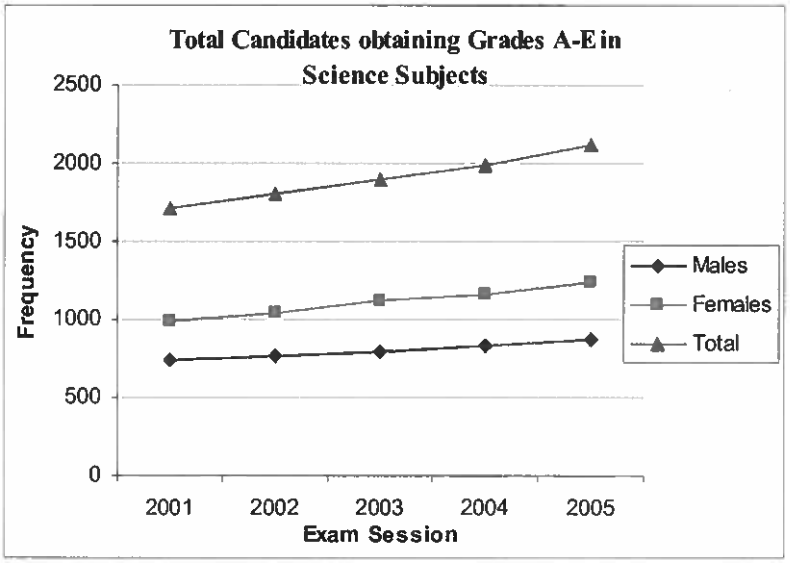


Figure 3.13: Total number of candidates obtaining a Pass Grade in a science subject

It is noted that the number of candidates obtaining a pass grade kept on increasing year by year. Another remark is that the number of female candidates obtaining a pass grade was greater than the number of male candidates.

However, this last observation is, in fact, quite obvious since the number of registrations for science subjects received from female candidates is higher than that received by the male candidates. For this

reason, it is understandable that a better way how to analyse the performance of females and males is by first calculating the percentage number of those passed over the number of registrations, and then compare and contrast these percentage figures. This kind of analysis for the total number of candidates obtaining a pass grade in sciences is done in Figure 3.14. A greater difference between females and males is observed, where, in the last couple of years, this disparity went over the 4% mark. This indicates that females are overall performing better in science subjects when compared to males.

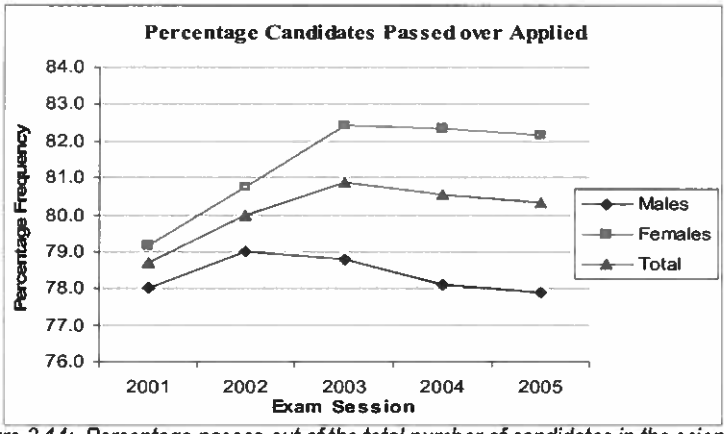
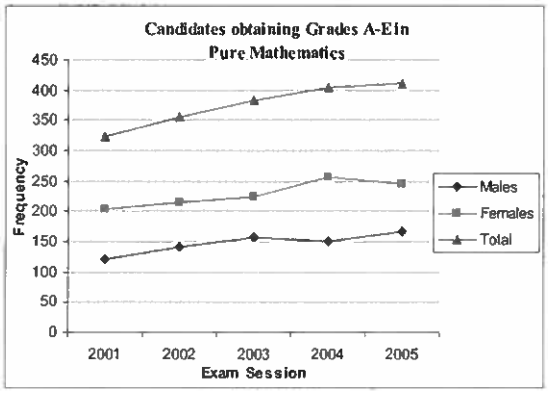


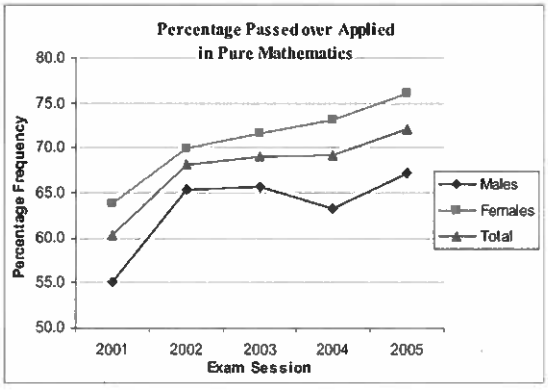
Figure 3.14: Percentage passes out of the total number of candidates in the science subjects

In the charts that follow, a similar analysis to that presented above is repeated for all the individual science subjects.

Pure Mathematics and Computing are the only two cases in which the situation remains unchanged when going through this analysis. As suggested by the actual figures presented in Figure 3.15(a), Figure 3.15(b) confirms that females are doing better than males. In fact, the percentage of the females passing over those registering has increased quite uniformly over the past five years, in contrast with the performance of their male counterpart.



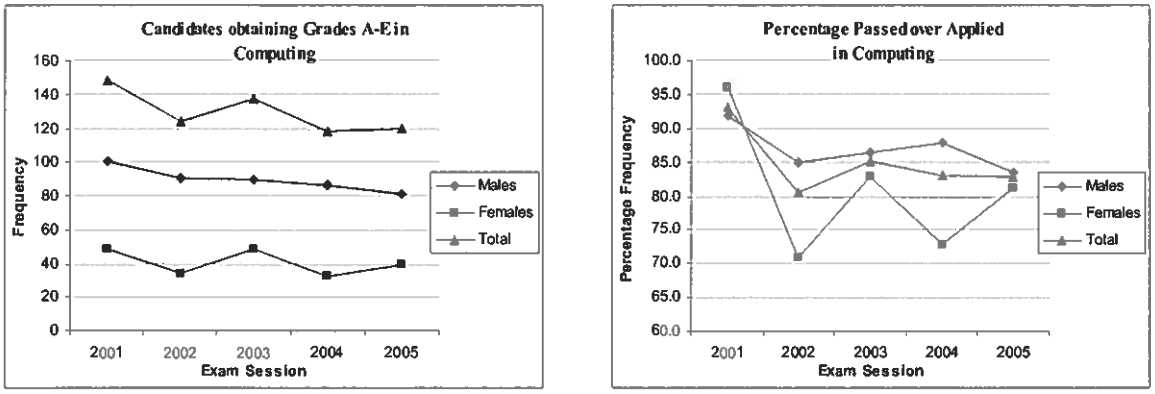
(a) Number of candidates obtaining pass grade



(b) Percentage passes out of the total number of candidates

Figure 3.15: Passes in Pure Mathematics

The opposite situation is shown in Figure 3.16, whereby the percentage of those passing over those applying confirms that males outdo females in Computing. However, the difference in favour of males is not that outstanding as it may initially seem. As a case in point, in May 2005, the difference between males and females was of only approximately 2%.

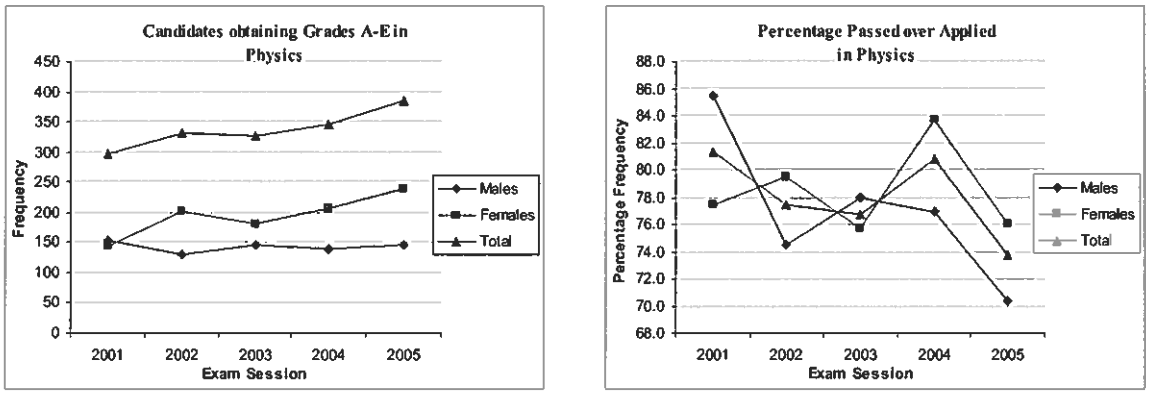


(a) Number of candidates obtaining pass grade

(b) Percentage passes out of the total number of candidates

Figure 3.16: Passes in Computing

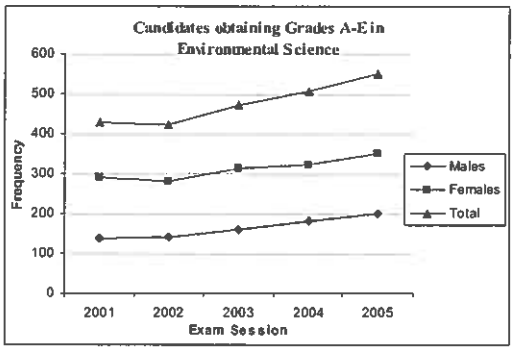
The situation present in the following five subjects (namely Physics, Environmental Science, Information Technology, Chemistry and Biology) is very unstable. Although the actual numbers suggest that more females than males are getting a pass grade, the following charts (Figures 3.17 to 3.21) show that there were sessions when the percentage of those passing over those applying was in favour of males. The reasons justifying such situations are certainly complex and various, and, possibly, unrelated between each other. Not enough information is available in order to put forward any possible causes and explanations for this phenomenon which will not go beyond pure and simple speculations.



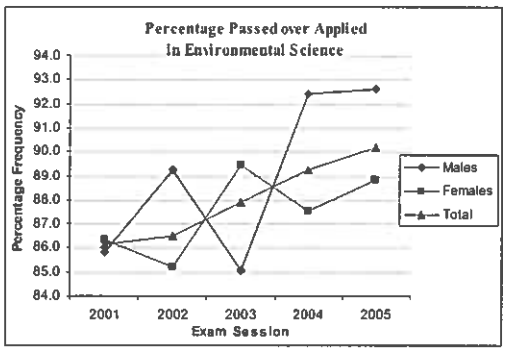
(a) Number of candidates obtaining pass grade

(b) Percentage passes out of the total number of candidates

Figure 3.17: Passes in Physics

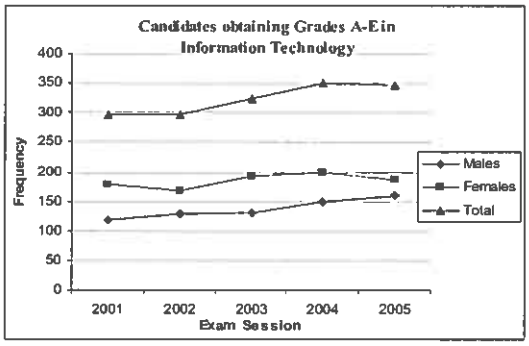


(a) Number of candidates obtaining pass grade

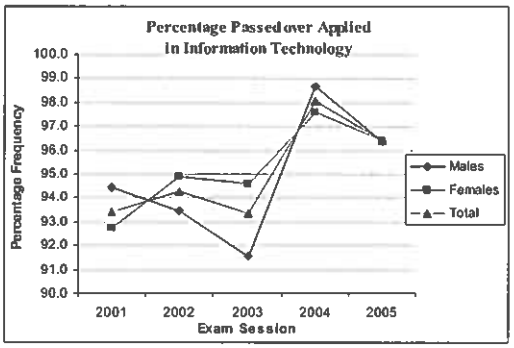


(b) Percentage passes out of the total number of candidates

Figure 3.18: Passes in Environmental Science

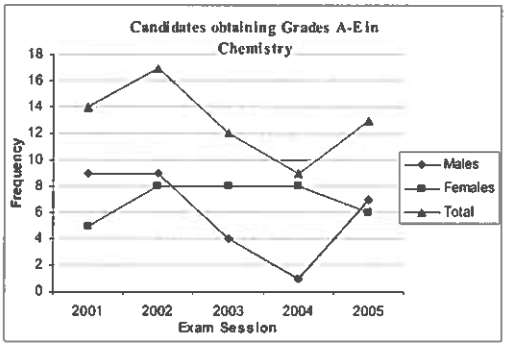


(a) Number of candidates obtaining pass grade

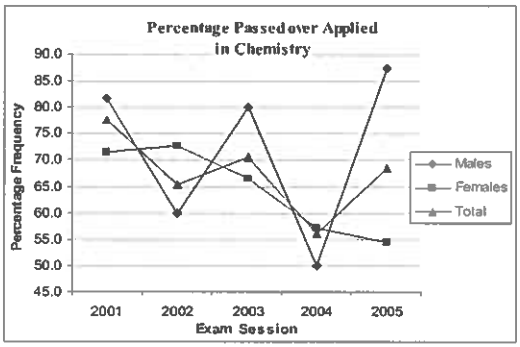


(b) Percentage passes out of the total number of candidates

Figure 3.19: Passes in Information Technology

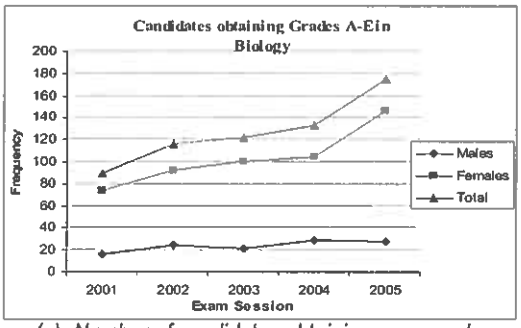


(a) Number of candidates obtaining pass grade

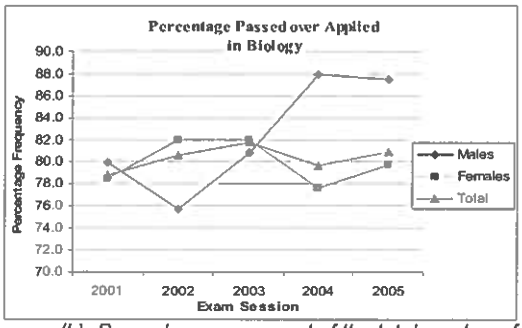


(b) Percentage passes out of the total number of candidates

Figure 3.20: Passes in Chemistry



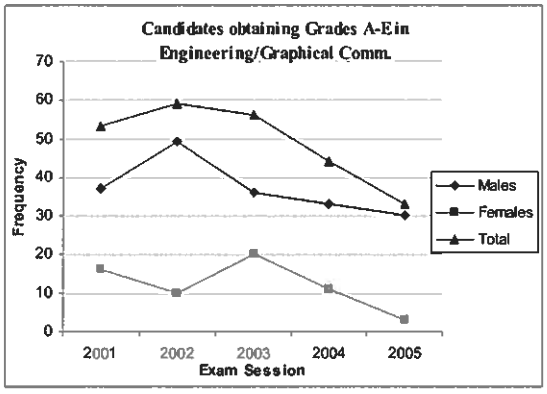
(a) Number of candidates obtaining pass grade



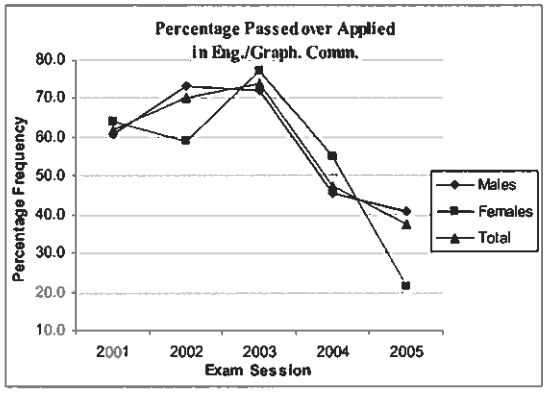
(b) Percentage passes out of the total number of candidates

Figure 3.21: Passes in Biology

In the Engineering/Graphical Communication examination (illustrated in Figure 3.22), the situation is opposite to that described above. The actual figures suggest that more males are getting a pass grade when compared to females. However, the calculation of the percentage of those getting a pass grade over those registering shows that in three sessions out of five (namely May 2001, May 2003 and May 2004), females outperformed males.



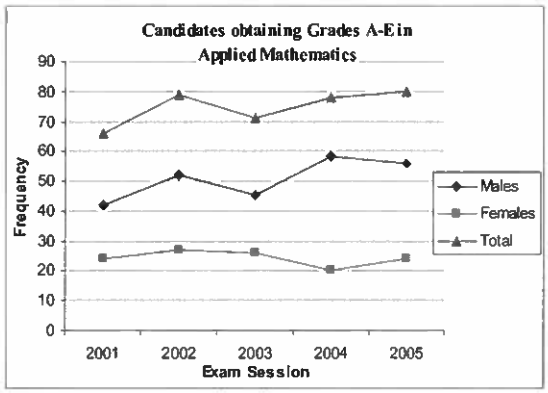
(a) Number of candidates obtaining pass grade



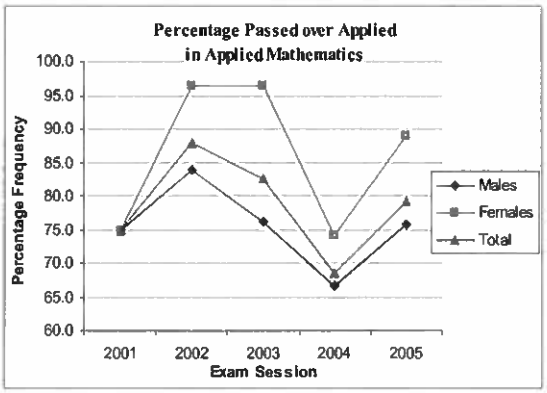
(b) Percentage passes out of the total number of candidates

Figure 3.22: Passes in Engineering/Graphical Communication

An interesting case is presented by Applied Mathematics, shown in Figure 3.23. While the actual number of males candidates obtaining a pass grade is almost in all cases double that of female candidates, when the percentage of those passing over those applying was compared, the situation was inverted. In reality, female candidates are doing better than their male complement. One possible reason for this is that the female students who choose to study this subject, which is traditionally more considered as being a male subject, are more determined to prove to themselves and to their fellow colleagues that they can perform well.



(a) Number of candidates obtaining pass grade



(b) Percentage passes out of the total number of candidates

Figure 3.23: Passes in Applied Mathematics

Chi-squared goodness of fit tests with 5% level of significance were conducted in order to determine if there was a significant difference between the sex of the candidates and the total number of students over the five sessions obtaining a pass grade in each individual science subjects. Only three instances were found where the difference is significant, namely in Applied Mathematics, Computing and Pure Mathematics. This means that in all the other subjects there was no significant difference at 5% level of significance between the sex and the number of passes achieved by the candidates. The significant difference in Computing was minimal, and it was in favour of males. However, the significant difference in the other two subjects was in favour of females.

Another chi-squared goodness of fit test with 5% level of significance was conducted on the sex of candidates and the number of them passing each session's examinations in the science subjects as a whole. Through this analysis it can be concluded that, although in the sessions of May 2001 and 2002 there was no significant difference, the May 2003, 2004 and 2005 sessions registered a significant difference in favour of females. This is also confirmed by the substantial difference shown in the two line diagrams for males and females in Figure 3.14.

4. MATSEC Advanced Level Examinations Statistics

The MATSEC Board within the University of Malta offers around 30 subjects at Advanced Level, varying from humanities to scientific subjects. The candidates can apply to sit for these exams either as part of their Matriculation Certificate or else on a single-subject basis. These examinations are held biannually, one of the sessions is in May/June, while the other is in September. The total number of applications submitted by candidates to sit for the May/June examinations in different subjects, as well as the number of candidates passing from the respective examination were analysed.

Applications submitted

The applications received by the MATSEC Board by candidates to sit for these examinations at an Advanced Level were quite constant between 2001 and 2004, but the session of May 2005 experienced a sharp increase as is evident from Figure 4.1. In fact, there was an increase of over 30% in the registrations in 2005 over the number of registrations in 2004. The number of females applying to sit for these exams each year was greater than the number of males, with the greatest increase taking place between 2004 and 2005.

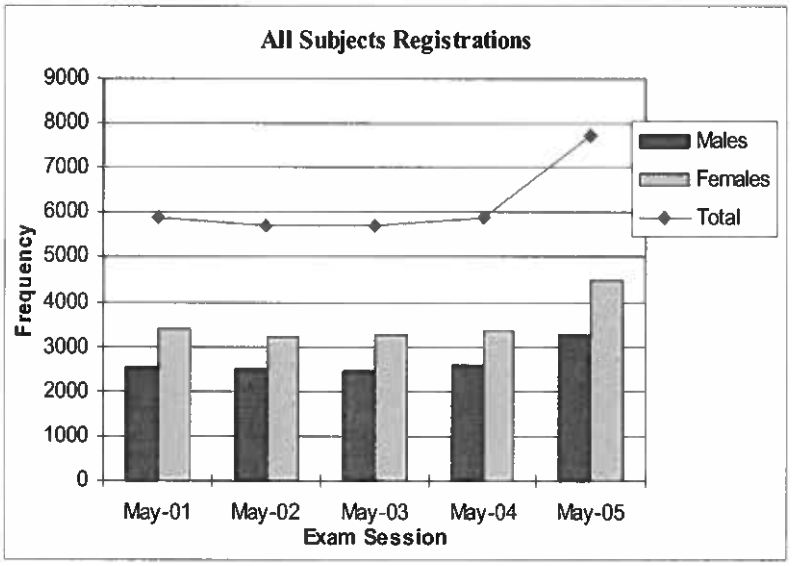


Figure 4.1: Number of registrations submitted for all the subjects

Figure 4.2 below illustrates the number of registrations received for nine science-related subjects, namely:

- Applied Mathematics
- Biology
- Chemistry
- Computing
- Engineering Drawing
- Graphical Communications
- Information Technology
- Physics
- Pure Mathematics

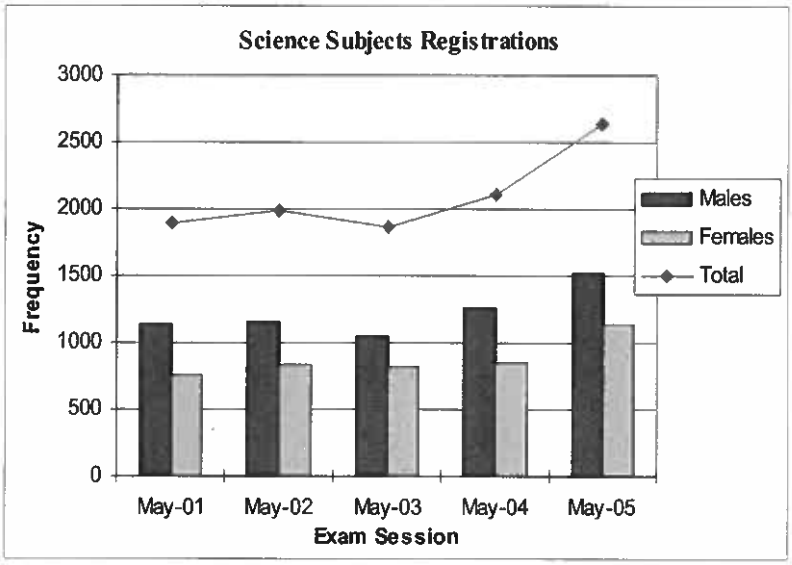


Figure 4.2: Number of registrations submitted for science subjects

Here it is noted that the number of males applying to sit for an examination in the science subjects was greater than the applications from the female counterpart. However, when the ***actual*** registrations made each year for the above listed science subjects are compared with the registrations of May 2001, the percentage change over this period in the registrations for these science subjects was as follows:

Percentage Science Registrations	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	102.30	92.57	111.76	133.33
Females	100	109.38	107.79	112.15	149.93
Total	*100*	*105.14*	*98.68*	*111.92*	*139.99*

Table 4.1: Index of Actual Registrations in Science Subjects (May2001 = 100)

Clearly, the increase in the number of females registering for the science subjects each year when compared to May 2001 was greater than the corresponding increase in the registrations by males. This indicates that, although females are still the minority in applying for science subjects, the rate of increase in their number of applications is greater than that of males.

However, the number of registrations in all subjects received each year went through a lot of variation (as shown in Table 4.2). Thus, it would be more effective if we calculate the ***real*** percentage change in the number of science registrations by removing the effect of the change in the total number of registrations. This is done by calculating an index of real registrations in the science subjects, as shown in Table 4.3 and illustrated in Figure 4.3.

Percentage Total Registrations	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	98.46	96.16	101.15	128.89
Females	100	94.93	96.50	98.93	132.35
Total	*100*	*96.44*	*96.36*	*99.88*	*130.87*

Table 4.2: Index of Registrations in all subjects (May2001 = 100)

Index of real registrations in science subjects	*Examination Session*				
	May 2001	May 2002	May 2003	May 2004	May 2005
Males	100	103.90	96.27	110.49	103.45
Females	100	115.22	111.70	113.36	113.28
Total	*100*	*109.02*	*102.41*	*112.05*	*106.97*

Table 4.3: Index of Real Registrations in Science Subjects (May2001 = 100)

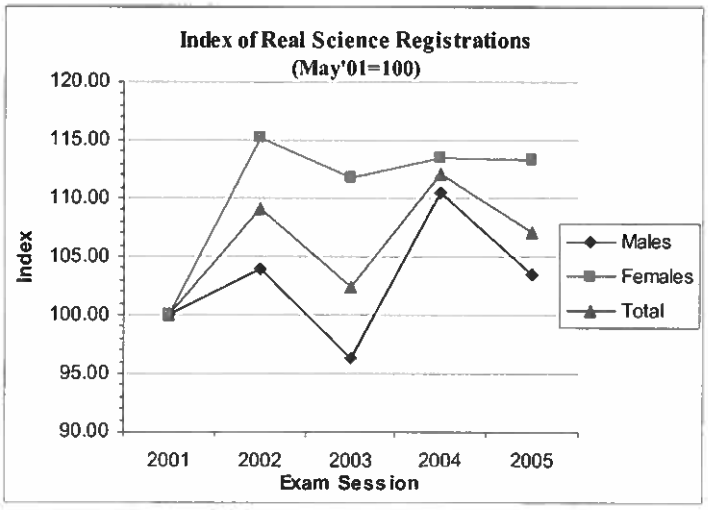


Figure 4.3: Index of Real Registrations in Science Subjects (May2001 = 100)

It is evident that even the real registrations in science subjects by females were in all the five years greater than the real registrations in science subjects by male candidates. In almost all the cases with the exception of May 2004, the discrepancy was extremely marked. This indicates that the real number of registrations for science subjects made by female are not only increasing, but they are doing so in an amazingly fast manner to outdo the increase in the registrations by females in the other subjects. This increase is also greater than the increase in the real registrations in science subjects made by males.

Before a closer look at the registrations received in the particular science subjects is taken, it is pointed out that due to the small number of applicants for each of Applied Mathematics, Engineering Drawing and Graphical Communications, only the remaining subjects were analysed. It is noticeable that some of the subjects such as Biology, Chemistry and Computing are considerably dominated by female candidates (refer to Figures 4.4, 4.5 and 4.6, respectively). On the other hand, the other three subjects, namely Physics, Pure Mathematics and Information Technology (illustrated in Figures 4.7, 4.8 and 4.9, respectively), are still attracting more male registrations than female registrations.

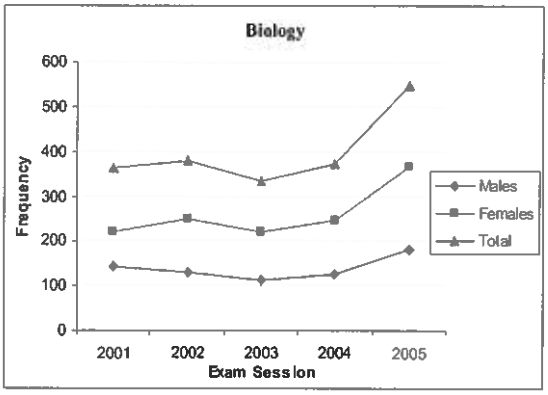


Figure 4.4: Number of registrations submitted for Biology

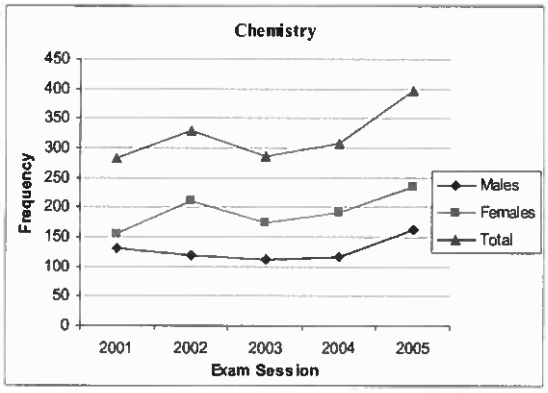


Figure 4.5: Number of registrations submitted for Chemistry

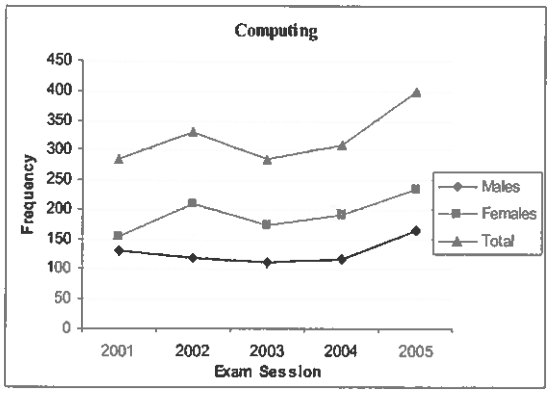


Figure 4.6: Number of registrations submitted for Computing

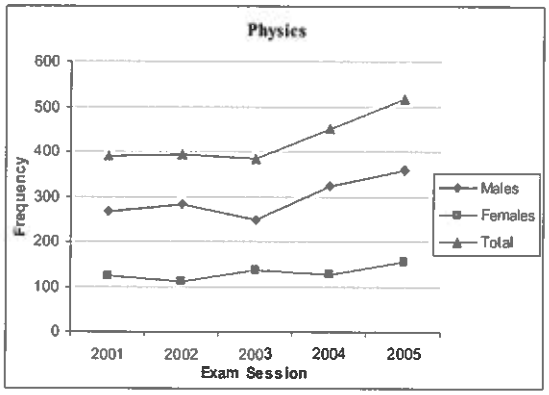


Figure 4.7: Number of registrations submitted for Physics

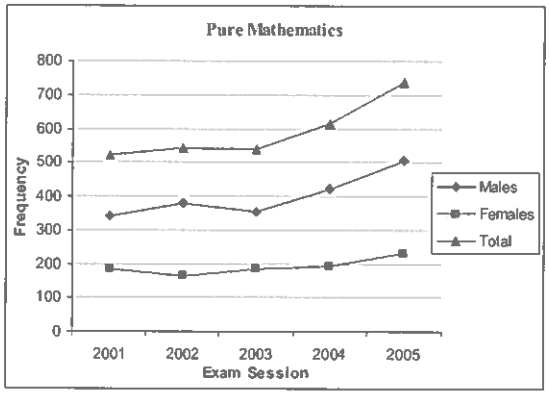


Figure 4.8: Number of registrations submitted for Pure Mathematics

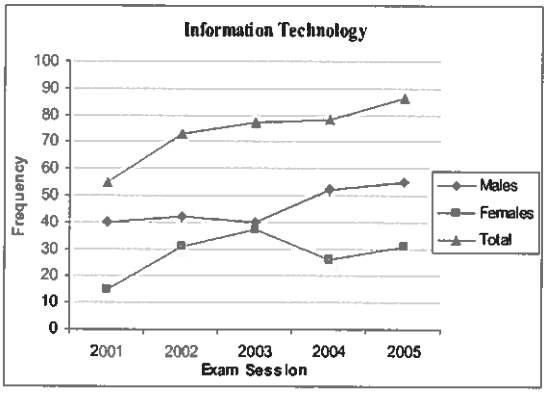


Figure 4.9: Number of registrations submitted for Information Technology

Results obtained

The results obtained in these examinations were considered, with particular reference to the science subjects' examinations. A global overview to the total number of candidates obtaining a grade from A to E (hereafter referred to as a 'Pass Grade') in the science subjects is given in Figure 4.10.

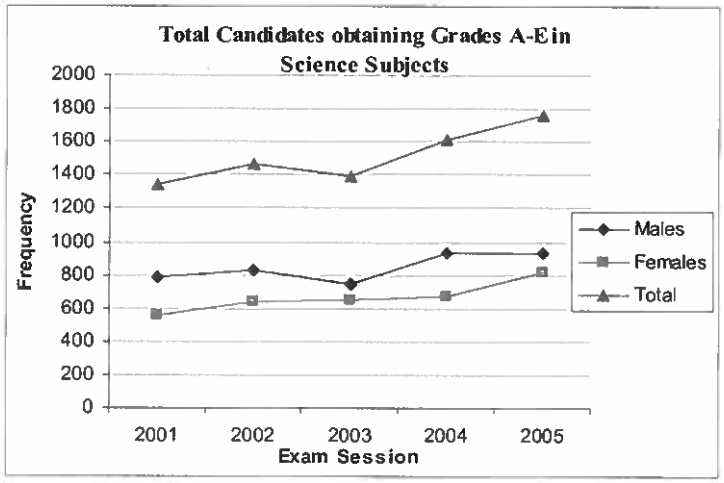


Figure 4.10: Total number of candidates obtaining a Pass Grade in a science subject

It is noticed that the number of female students obtaining a pass grade kept on increasing year by year, contrary to what happened in the case of the male candidates. In fact, the session of May 2003 halted this increase in the number of males achieving a pass grade, although, still in all cases, the number of male candidates obtaining a pass grade was greater than the number of female candidates.

This latter remark comes as no surprise since the registrations for science subjects made by males is greater than that made by females. For this reason, the performance of females and males was analysed by, first, calculating the percentage number of those passed over the number of registrations made, and, then, these percentage figures were compared and contrasted. This analysis for the total number of candidates obtaining a pass grade in sciences is done in Figure 4.11, where a complete transformation of the situation illustrated in Figure 4.10 is observed. Now it is noticed that, actually, a greater percentage of females are passing over those applying for these subjects when compared to males, indicating that females are, overall, performing better in science subjects when compared to males.

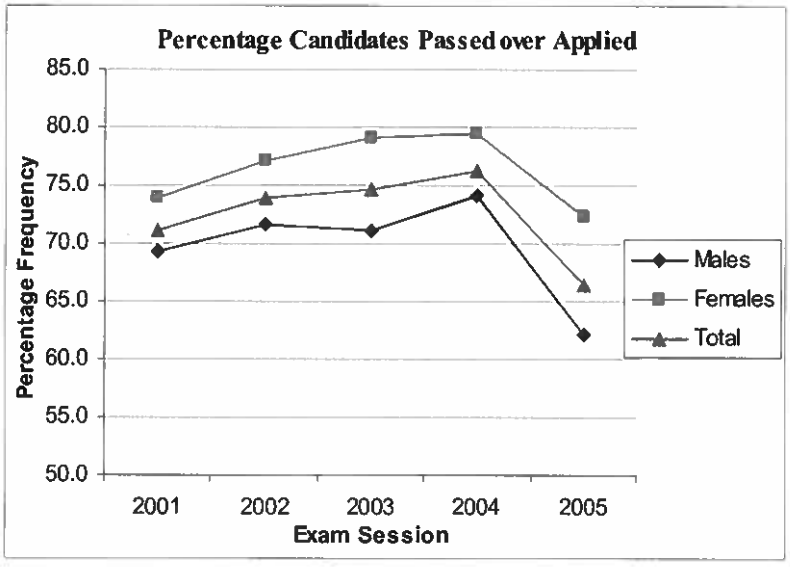
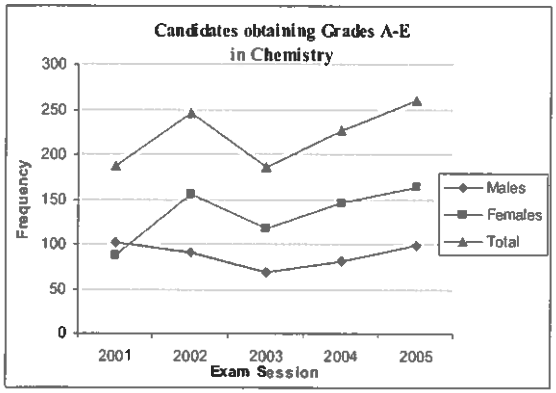


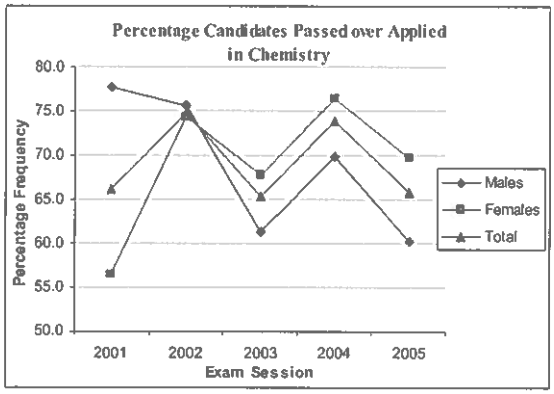
Figure 4.11: Percentage passes out of the total number of candidates in the science subjects

In the charts that follow, a similar analysis to that presented above is repeated for all the individual science subjects.

Chemistry is the only subject for which the situation remains unchanged when going through this analysis, for the exception of the year 2002. The actual figures presented in Figure 4.12(a) suggest that females did better than male as from 2003 onwards, and this is confirmed by Figure 4.12(b).



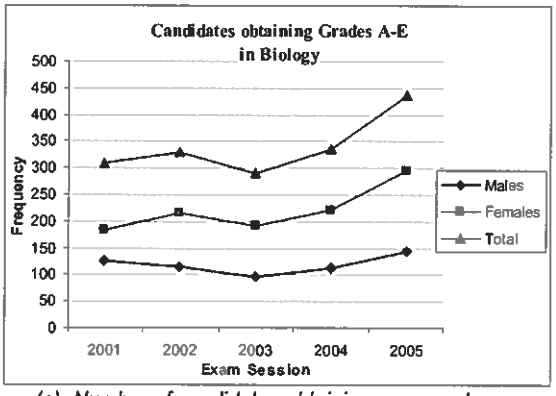
(a) Number of candidates obtaining pass grade



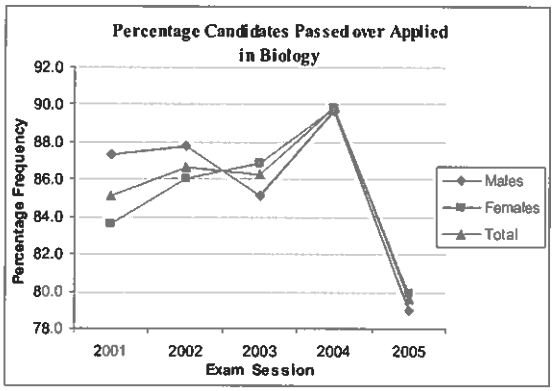
(b) Percentage passes out of the total number of candidates

Figure 4.12: Passes in Chemistry

Figure 4.13 presents the situation in Biology, whereby the actual numbers suggest that more females are getting a pass grade than males, but when the percentages are worked out, this dominance by females is not always present.



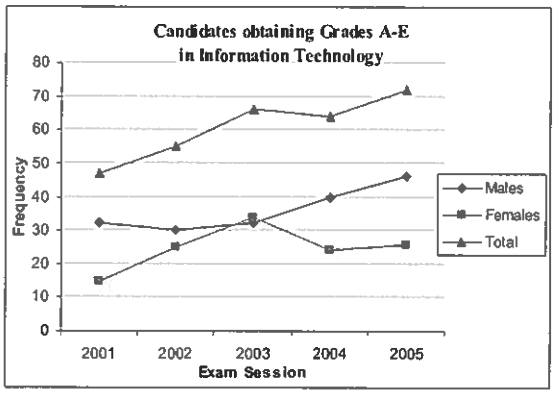
(a) Number of candidates obtaining pass grade



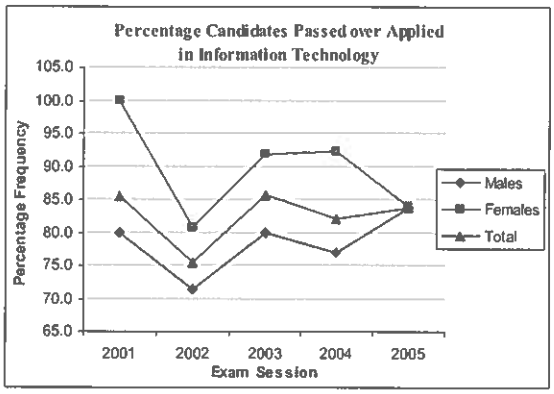
(b) Percentage passes out of the total number of candidates

Figure 4.13: Passes in Biology

In Information Technology, Physics and Pure Mathematics examinations (shown in Figures 4.14, 4.15 and 4.16, respectively), the situation is opposite to that illustrated above. The actual figures suggest that more males are getting a pass grade when compared to females. However, the calculation of the percentage of those getting a pass grade over those registering shows that females outperformed males.

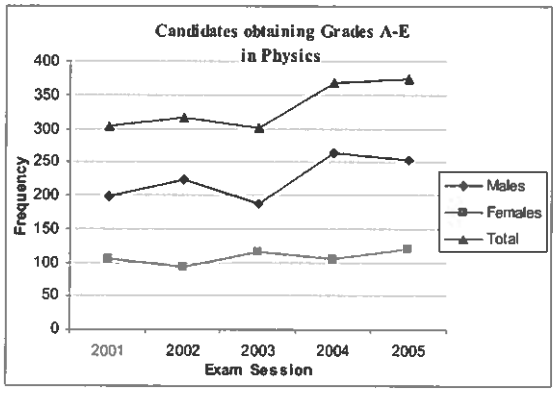


(a) Number of candidates obtaining pass grade

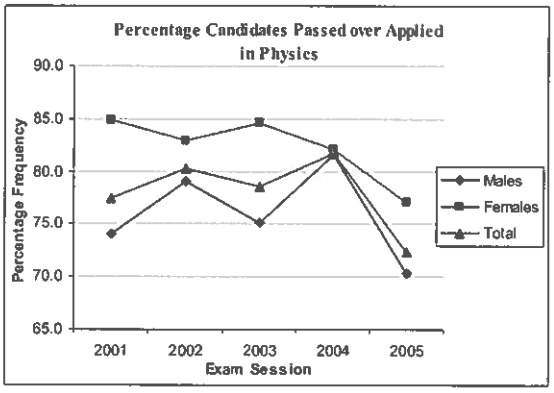


(b) Percentage passes out of the total number of candidates

Figure 4.14: Passes in Information Technology

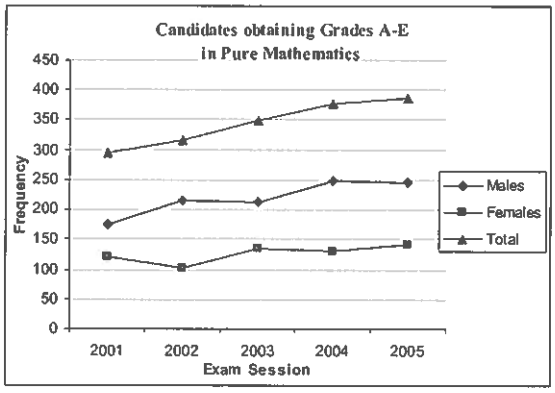


(a) Number of candidates obtaining pass grade

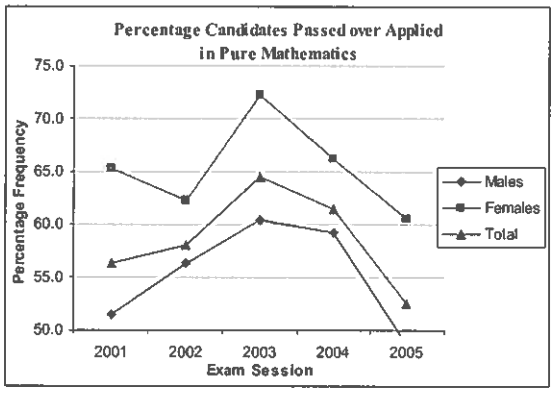


(b) Percentage passes out of the total number of candidates

Figure 4.15: Passes in Physics



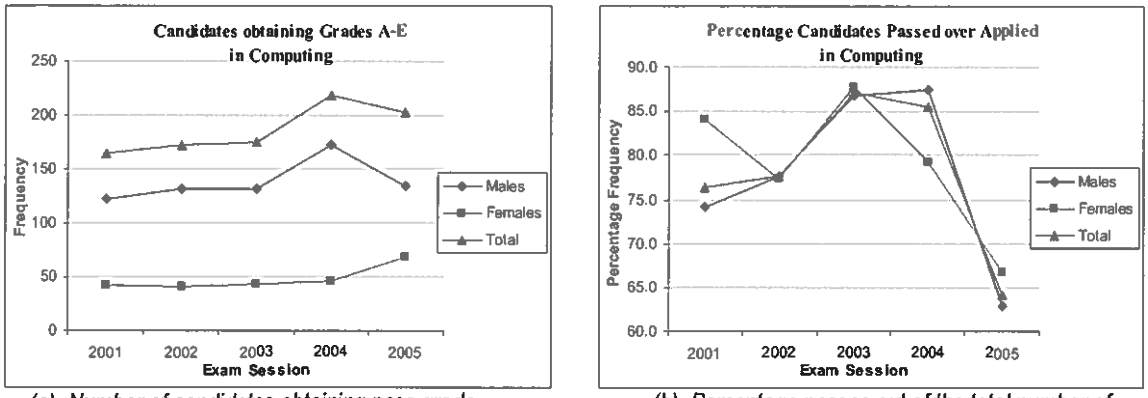
(a) Number of candidates obtaining pass grade



(b) Percentage passes out of the total number of candidates

Figure 4.16: Passes in Pure Mathematics

In the last case, that is, Computing (refer to Figure 4.17), although initially it seems that males are doing better than females, a look at the percentages reveals that there is no pattern underneath the situation in this final case. The reasons behind such a situation might be numerous and various.



(a) Number of candidates obtaining pass grade

(b) Percentage passes out of the total number of candidates

Figure 4.17: Passes in Computing

Chi-squared goodness of fit tests with 5% level of significance were conducted to determine if there was a significant difference between the sex of the candidates and the total number of students over the five sessions obtaining a pass grade in each individual science subjects. Only three instances were observed where the difference is significant, namely in Information Technology, Physics and Pure Mathematics. This means that in all the other subjects there was no significant difference at 5% level of significance between the sex and the number of passes achieved by the candidates. The significant difference in the mentioned three subjects was always in favour of females, meaning that females are doing better than expected when compared to males.

Chi-squared goodness of fit tests with 5% level of significance were also conducted on the sex of candidates and the number of them passing each session's examinations in the science subjects group. Through this analysis we can conclude that, in all the five sessions considered, there is enough evidence with 5% level of significance that females outperformed their male complement. This is also confirmed by the substantial difference shown in the two line diagrams for males and females in Figure 4.11.

5. MCAST Statistics

Since its inception in 2001, MCAST has attracted many students to follow courses offered in one of its institutes. Originally, the number of institutes forming part of MCAST was six, namely the Institute of Art and Design, the Institute of Business and Commerce, the Institute of Building and Construction Engineering, the Institute of Information Communication and Technology, the Institute of Electrical and Electronics Engineering and the Maritime Institute. Currently, with the addition of the Institute for Community Services, the Institute for Mechanical Engineering, and the Institute of Agribusiness, the number of institutes has increased to nine. Apart from these institutes in Malta, in 2003 MCAST has opened a Gozo Centre as well.

Students attending MCAST

The number of students frequenting the college has risen from just over 1500 in 2001 to almost 3800 over a period of five years, as shown in Figure 5.1. The increase in the number of institutes has surely contributed to this drastic increase in students attending the courses offered at MCAST.

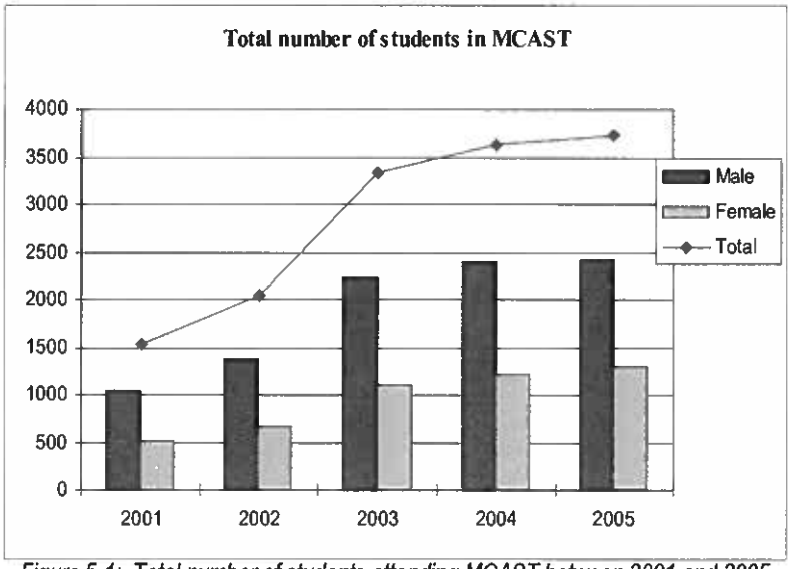


Figure 5.1: Total number of students attending MCAST between 2001 and 2005

Another reason behind this rise in the number of students is the yearly introduction of new courses in almost each institute. In fact, taking into consideration only the number of students attending the original six institutes which formed MCAST in 2001, it can still be noted that the number of students increased by about 1100 over the same five year period (Figure 5.2).

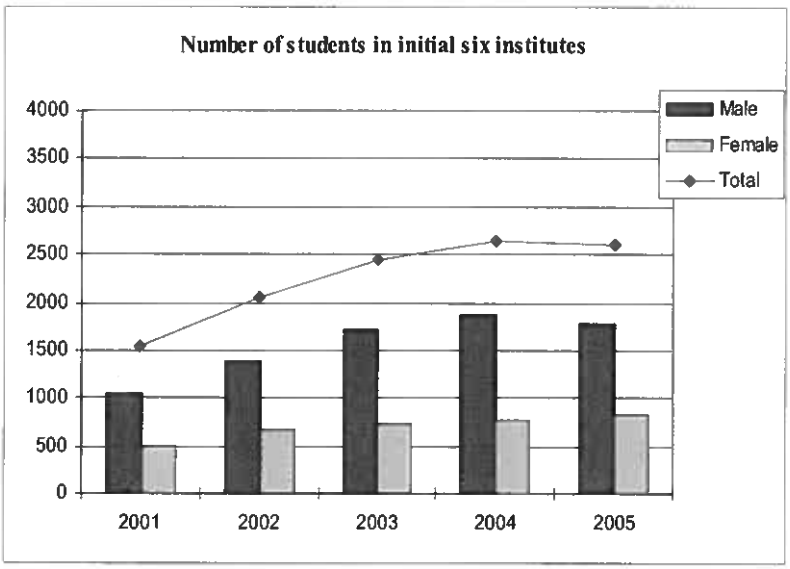


Figure 5.2: Number of students in initial six institutes that formed MCAST

A number of these institutes offer different courses leading to qualifications in science-related vocations, including:

- Institute of Art and Design:
  - Higher National Diploma/Certificate in Art & Design
  - Higher National Diploma/Certificate in 3D Design/Graphic Design
  - Technician Certificate in Industrial Design
  - Diploma in Art & Design

- Institute of Business and Commerce:
  - National Diploma in Applied Science

- Institute of Building and Construction Engineering
  - Certificate/Advanced Diploma in Heating, Ventilation and Air Conditioning
  - Technician Certificate Course in Draughtsmanship (Civil, Electrical, Mechanical)

- Institute of Information Communication and Technology:
  - Foundation/First/National/Higher National Diploma in Computing
  - First/National Diploma for I.T. Practitioners
  - Applied Information Technology

- Institute of Electrical and Electronics Engineering:
  - Certificate in Electrical Installation/Fitters
  - Foundation/First/National Diploma/Certificate in Electrical/Electronics Engineering
  - Certificate/Diploma in Industrial Electronics
  - Certificate/Diploma in Computer Engineering
  - Diploma in Computer Engineering
  - National/Higher National Diploma/Certificate in Telecommunications
  - Certificate/Diploma in Computer Hardware

- Institute of Mechanical Engineering:
  - Technician Certificate in Motor Vehicle Engineering
  - Foundation/First/Advanced/National Diploma/Certificate in Mechanical Engineering
  - Technician Diploma/Advanced Diploma in Motor Vehicle Engineering
  - Certificate in Panel Beating
  - National Diploma in Aerospace Engineering
  - Applied Mechanical and Electrical Engineering
  - Computer Aided Engineering
  - Motor Vehicle Engineering 1
  - Automobile/Mechanical Fitters
  - Mechanical Technician Course
  - Advanced Mechanical / Electrical Engineering

The number of students following these courses has also increased between the years 2001 and 2005, with the greatest increase exhibited in 2003 when the last three institutes joined MCAST. A breakdown of the annual number of students following a science-related course at MCAST according to sex is presented in Figure 5.3. It is evident from the figure that the number of male students outdoes the number of female counterparts.

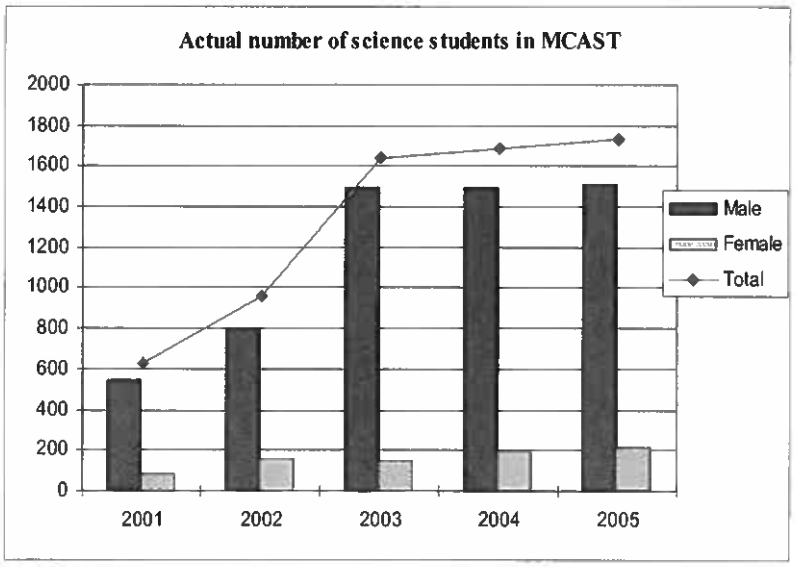


Figure 5.3: Actual number of students following a science related course at MCAST

As mentioned before, the overall number of students attending MCAST increased by over 140%. Thus, it would be more useful to compare and contrast the percentage number of students who followed a science-related course out of the whole population of MCAST (Figure 5.4). In doing this, it is noted that, although the actual total number of students following science-related courses increased, there was a decrease in percentage terms from 2003 to 2004, while there was virtually no change from 2004 to 2005. A more salient point evident from this analysis is that over the last three years, the percentage

amount of female students following a science-related course increased at a faster rate than the percentage number of male students.

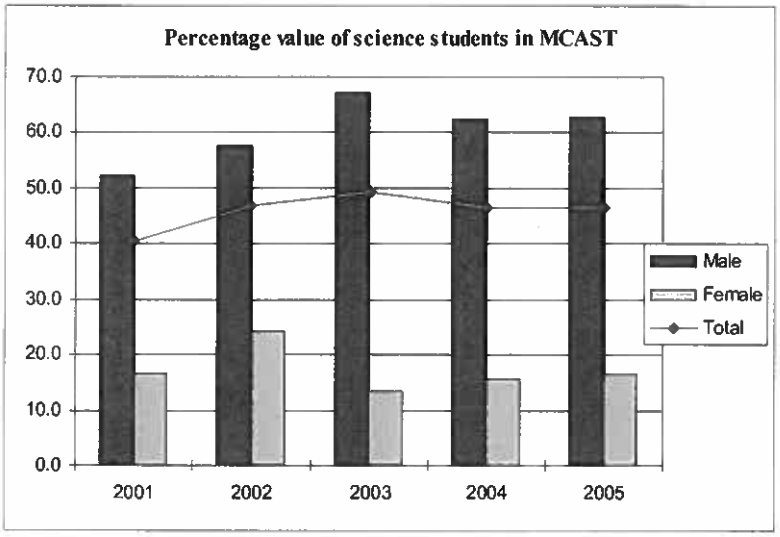


Figure 5.4: Percentage number of students following a science related course out of the population of MCAST

The introduction of the new institutes in 2003 may have caused the great difference observed above. Thus, the changes in the actual number of students in the initial six institutes following a science-related course was also independently investigated (refer to Figure 5.5). In fact, the increase from 2002 to 2003 was not as impressive as previously noted. Also, it is noted that the number of students following a science-related course in these initial six institutes decreased from 2004 to 2005.

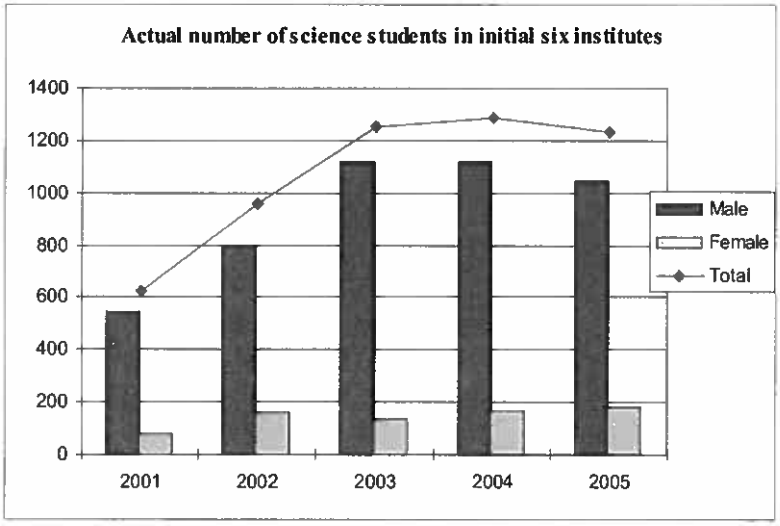


Figure 5.5: Actual number of students following a science related course in initial six institutes

Figure 5.6 shows that even the percentage values demonstrate a decrease from 2003 to 2005, both for the total number of students and for the number of male students following a science related course in the initial six institutes decreased. On the other hand, the percentage amount of females taking science is higher than that mentioned before.

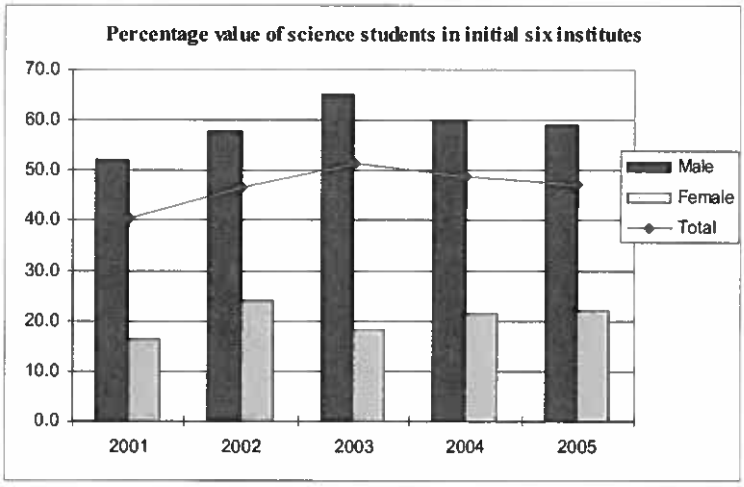


Figure 5.6: Percentage number of students following a science related course out of the population of the initial six institutes

A chi-squared test for significance concludes that there is substantial evidence (even at 1% level of significance) indicating a relationship between the sex of applicants and the choice of a science-related course over the five years taken into consideration. It can be deduced that male students were more likely to choose to follow a science-related course than female students.

Graduates from MCAST

Apart from the number of applicants, the number of graduates at MCAST during the four years from 2002 to 2005 was also examined. As Figure 5.7 illustrates, the total number of science graduates increased from just under 200 to over 700; the great majority of whom are male graduates. Also, the rate at which the number of male graduates increased is much faster than the rate of increase of the female graduates.

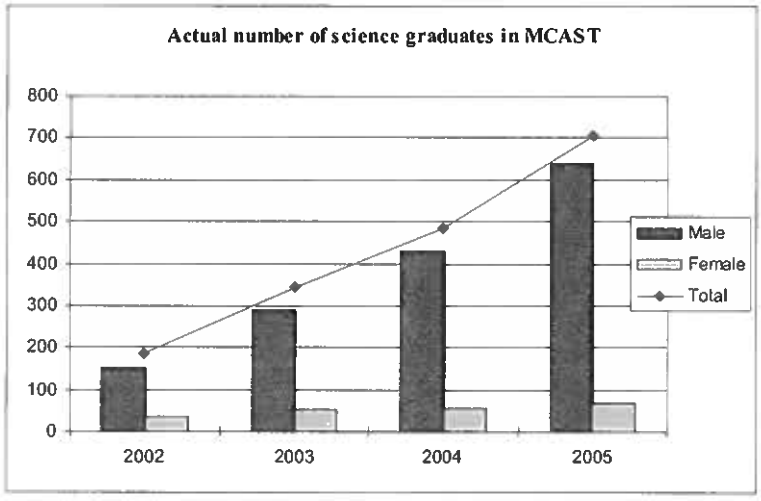


Figure 5.7: Actual number of science graduates in MCAST

When the percentage values of science graduates out of the total number of graduates were taken into consideration (refer to Figure 5.8), it was noted that the percentage number of science graduates oscillated around the 50% mark, dropping to a minimum of about 40% in 2004. Again, the discrepancy between the male and female graduates in science is extremely evident and marked.

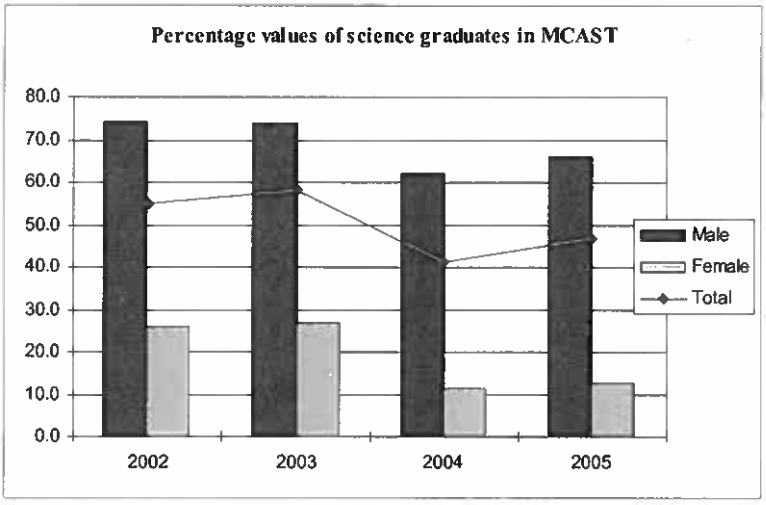


Figure 5.8: Percentage number of science graduates out of all the graduates

Another chi-squared test for significance concludes that, over the four years considered, there was substantial evidence (even at 1% level of significance) indicating a relationship between the sex of graduates and the number of students graduating from a science-related course. It can be said that male graduates are more likely than their female counterparts to graduate from a science-related course.

6. *University of Malta Statistics*

The University of Malta is the only institution on the Maltese Islands providing education at a tertiary level. Apart from seven centres and about thirteen interdisciplinary institutes, it comprises ten faculties, namely the:

- Faculty of Architecture and Civil Engineering;
- Faculty of Arts;
- Faculty of Dental Surgery;
- Faculty of Economics, Management and Accountancy;
- Faculty of Education;
- Faculty of Engineering;
- Faculty of Laws;
- Faculty of Medicine and Surgery;
- Faculty of Science; and
- Faculty of Theology.

The University student population has been on the increase for many years, and currently reaches over 9800 students. This study concentrated on the number of new applicants accepted each year and on the number of graduates from all the faculties, centres and institutes forming part of the University of Malta. Special attention was given to and more detailed analysis was made on those faculties, centres and institutes which prepare students to enter into a science-related career. These are listed below, together with the name of some of the main courses they run:

- Faculty of Architecture and Civil Engineering:
  - B.E&A (Hons)
  - B.Planning (Hons)
  - Dip. Planning
- Faculty of Dental Surgery:
  - B. Dental Surgery
- Faculty of Engineering:
  - B.Eng. (Hons)
  - M.Sc. Eng.
- Faculty of Medicine and Surgery:
  - B.Pharm. (Hons.)
  - Doctor of Medicine and Surgery
  - M.Phil. (Med.&Surg.)
  - M.Sc. (Med.&Surg.)
- Faculty of Science:
  - B.Sc. (Hons)
  - M.Phil. (Science)
  - M.Sc.
- Institute of Health Care:
  - B.Sc. (Hons.)
  - Dip. Health Science
  - Dip. Medical Lab Technician
  - Dip. Nursing/Psychiatric Nursing
  - Dip. Radiography
  - M.Sc. (Health)
  - PQ Dip. Nutrition/Health Services Management
- Board of Studies for I.T. (an inter-faculty initiative between the Faculties of Engineering and Science):
  - B.Sc. IT (Hons)
  - Dip. IT
- European Centre of Gerontology:
  - M. Gerontology & Geriatrics
  - P. Dip. Gerontology & Geriatrics

New applicants

Statistics were collected on the number of accepted new applicants for the years between 1997-98 and 2004-05. As shown in Figure 6.1, the number of accepted new applicants in all Faculties was rather unstable, but, apart from 2001-2002, it varied between 2,500 and 3,000 students. Another point worth mentioning is that the number of female applicants was always higher than the number of male applicants.

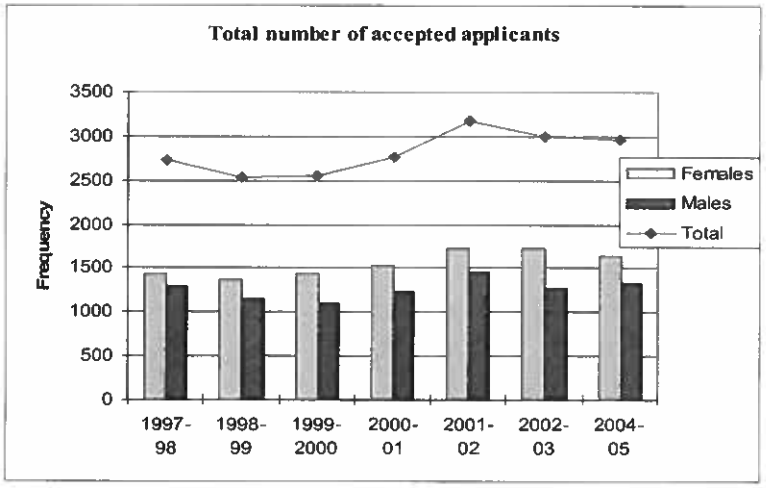


Figure 6.1: Total number of accepted applications between 1997-98 and 2004-05

Some of these students were enrolled in one of the science-related courses mentioned above. Figure 6.2 illustrates the number of accepted new applicants following a science-related course. Excluding again the year 2001-2002, the number of applicants in a science-related course ranged between 600 and 700 yearly. However, in contrast to the situation mentioned previously, the number of female students was never higher than the number of male students in these science-related courses.

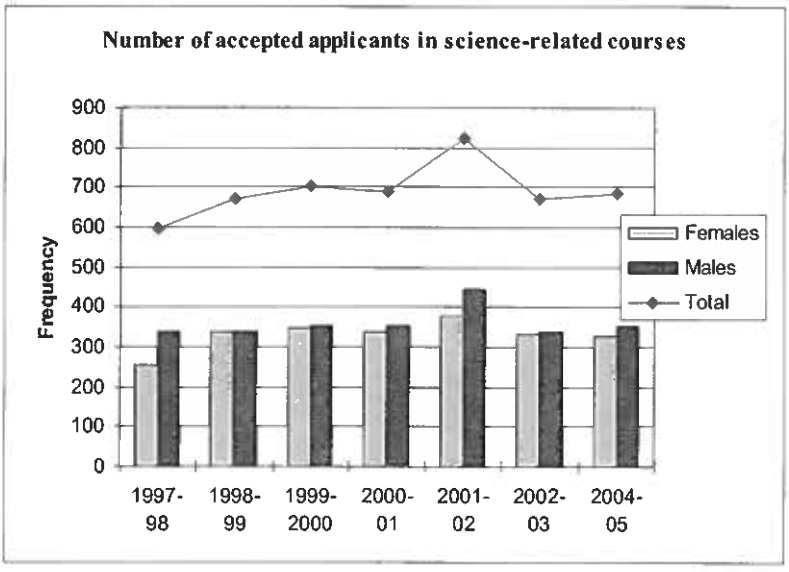


Figure 6.2: Number of accepted applicants in science-related courses

When calculating the percentage number of students choosing science out of the total number of applicants, a more biased situation in favour of males is observed (as shown in Figure 6.3). In fact, over the mentioned seven years, the percentage number of males choosing sciences out of the total number of applicants was at least 5% more than the percentage number of females choosing sciences out of the total number of applicants. Therefore, the female cohort was greatly underrepresented in the science areas during the mentioned time-period. This is also confirmed by means of a chi-squared test for significance. It could be concluded that there is substantial evidence (even at 1% level of significance) indicating a relationship between the sex of applicants and the choice of a science-related course over the seven years taken into consideration, whereby it can be deduced that male students were more likely than female students to choose to follow a science-related course.

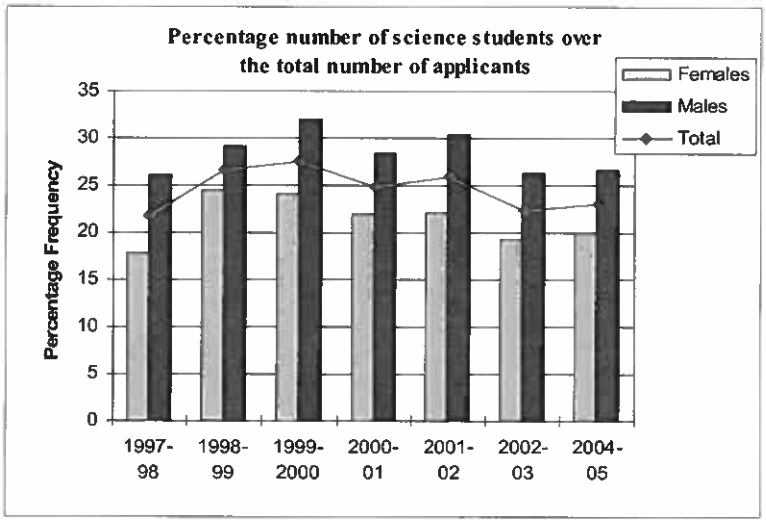


Figure 6.3: Number of science applicants as a percentage of the total number of applicants

The situation in each of the six of the faculties, institutes or centres related to science was also analysed in more details. The Faculty of Dental Surgery and the European Centre of Gerontology were not taken into consideration in this analysis because they each recruited less than 15 students each year (there is a numerus clausus in these institutions).

The male dominance is evident in the Board of Studies for I.T., in the Faculty of Architecture and Civil Engineering and in the Faculty of Engineering, as illustrated in Figures 6.4 to 6.6 below. The applicants for the Faculty of Medicine and Surgery and for the Faculty of Science were quite fairly distributed between females and males (refer to Figures 6.7 and 6.8, respectively). On the other hand, Figure 6.9 shows that the courses at the Institute of Health Care are largely chosen by females.

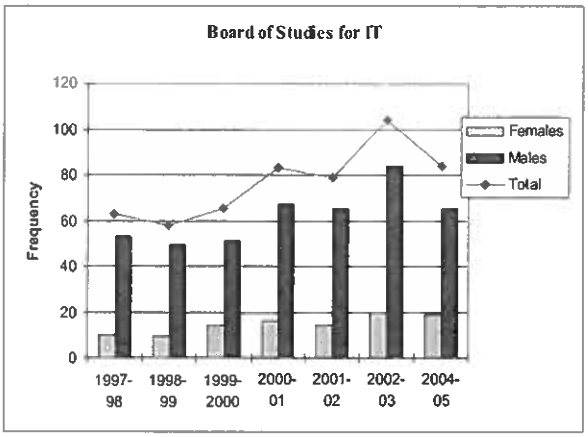


Figure 6.4: Applicants in the Board of Studies for I.T.

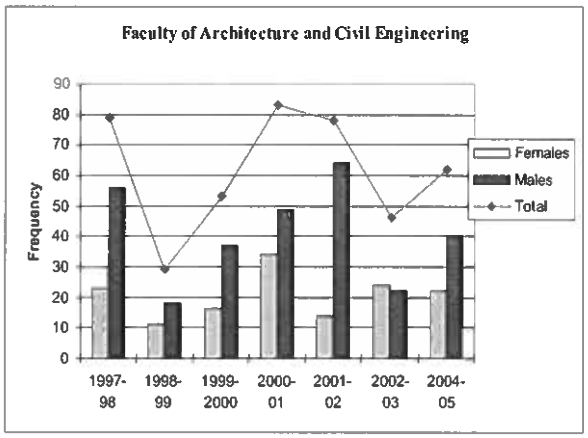


Figure 6.5: Applicants in the Faculty of Architecture and Civil Engineering

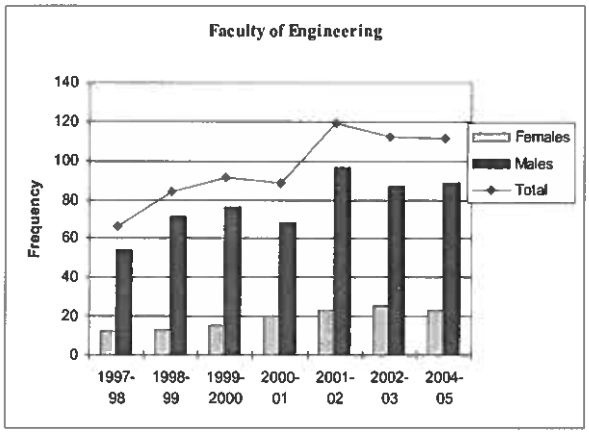


Figure 6.6: Applicants in the Faculty of Engineering

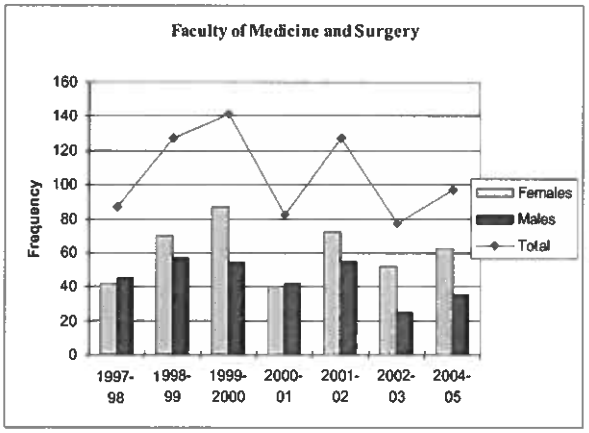


Figure 6.7: Applicants in the Faculty of Medicine and Surgery

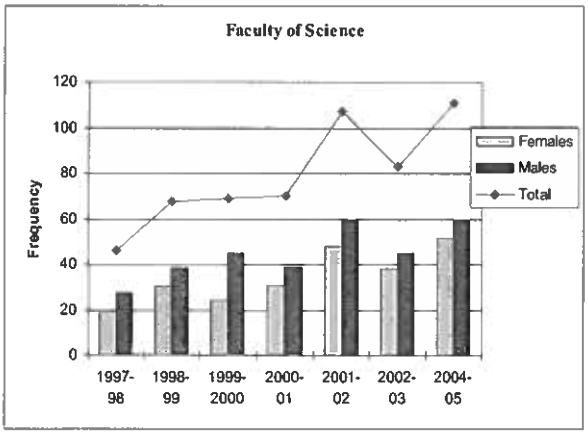


Figure 6.8: Applicants in the Faculty of Science

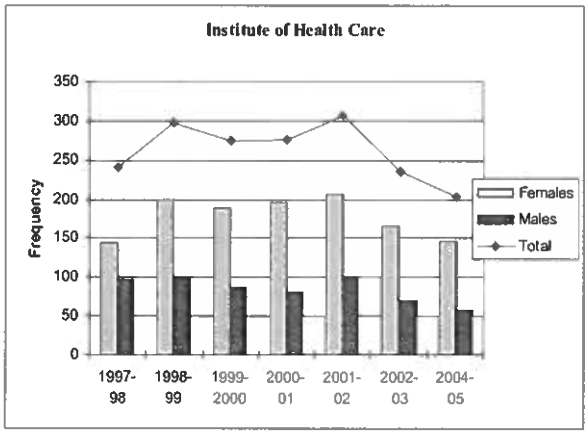


Figure 6.9: Applicants in the Institute of Health Care

It can be noted that the applicants in the Institute of Health Care are large in numbers when compared to the number of applicants in the other areas of science. As a matter of fact, they almost equate to half the total number of science applicants for each year. In Figure 6.10 below, the distribution of the

applicants over the seven years under consideration is shown. The total number of applicants in each faculty/centre/institute over the seven years was considered, and then it was calculated as a percentage of the grand total of students in the sciences. The diagram confirms the high proportion of the applicants in the Institute of Health Care.

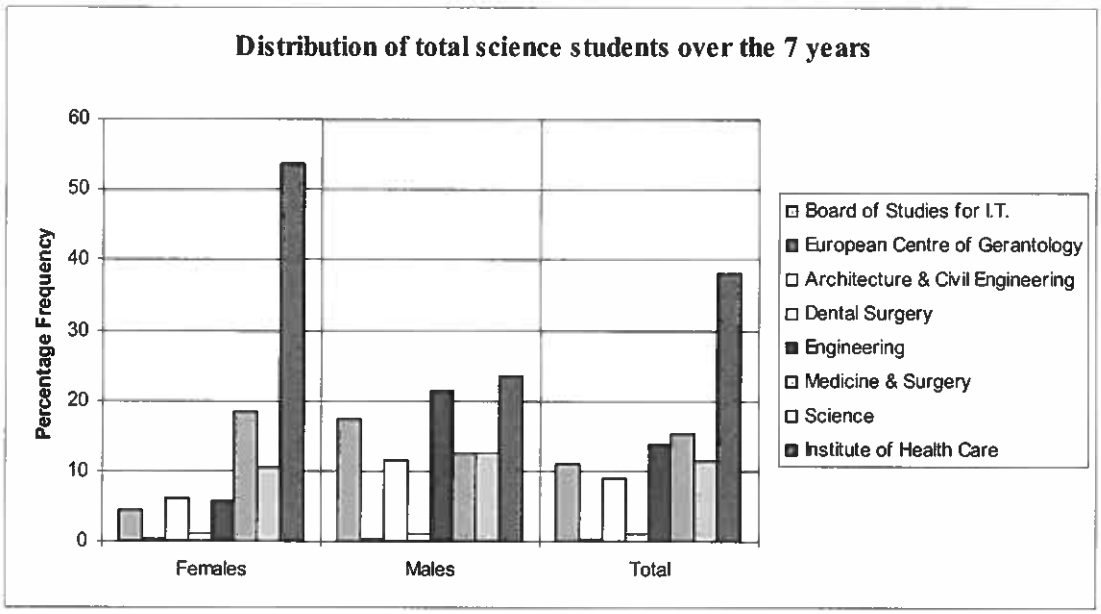


Figure 6.10: Distribution of the total science applicants between 1997-98 and 2004-05 according to course

Thus, the number of applicants in the Institute of Health Care has a large effect on the data and tends to hide certain characteristics. For this reason, the resulting situation if these applicants were removed was also examined. As was to be expected from this mathematical model, this yielded an even worse scenario with regards to the participation of females in the science-related areas. This can be seen in Figure 6.11 below, where the gap between the male and female counterparts increased substantially.

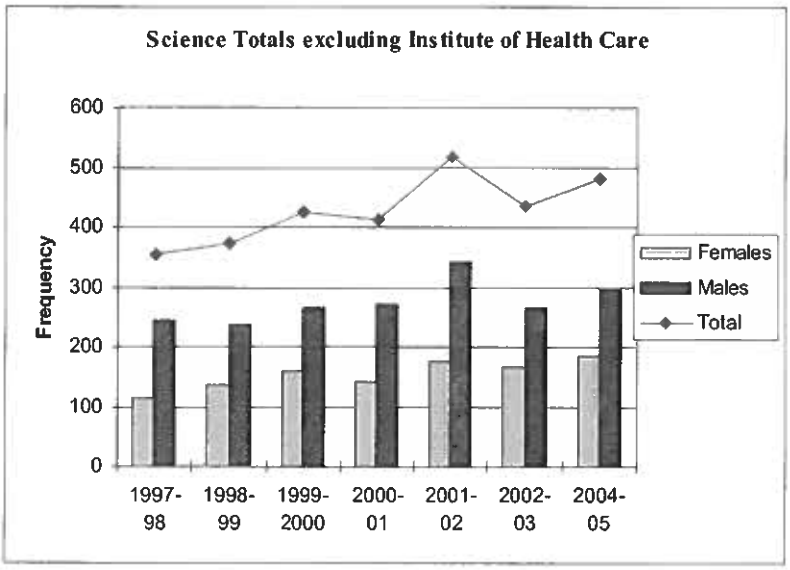


Figure 6.11: Number of science applicants excluding applicants in Institute of Health Care

Figure 6.12 shows the number of science applicants excluding applicants in the Institute of Care, when expressed as a percentage of the total number of applicants. Apart from the dominance of males, a comparison with Figure 6.3 above shows a considerable increase in the gap between males and females.

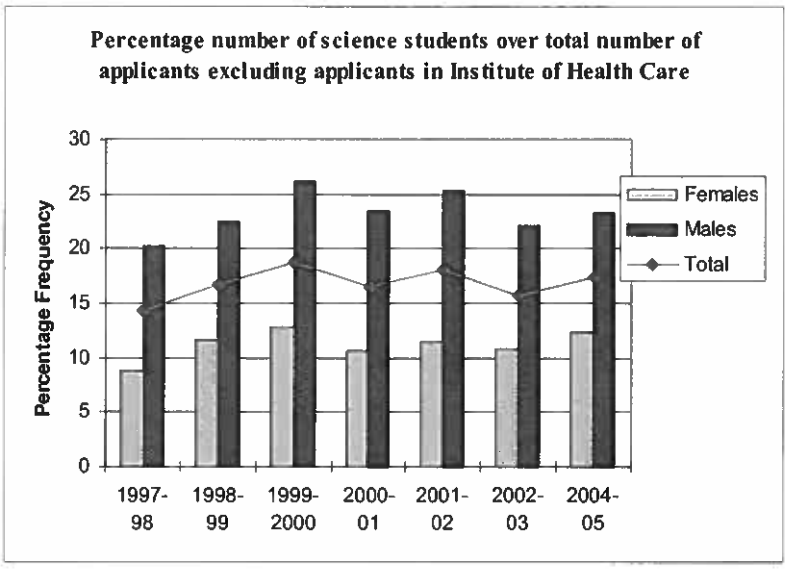


Figure 6.12: Science applicants as a percentage of total number of applicants excluding applicants in Institute of Health Care

Graduates from the University of Malta

Apart from the number of accepted new applicants, the number of graduates during the four years from 2001-02 to 2004-2005 were also collected and examined. As Figure 6.13 illustrates, the numbers of female and male graduates are almost equal to each other.

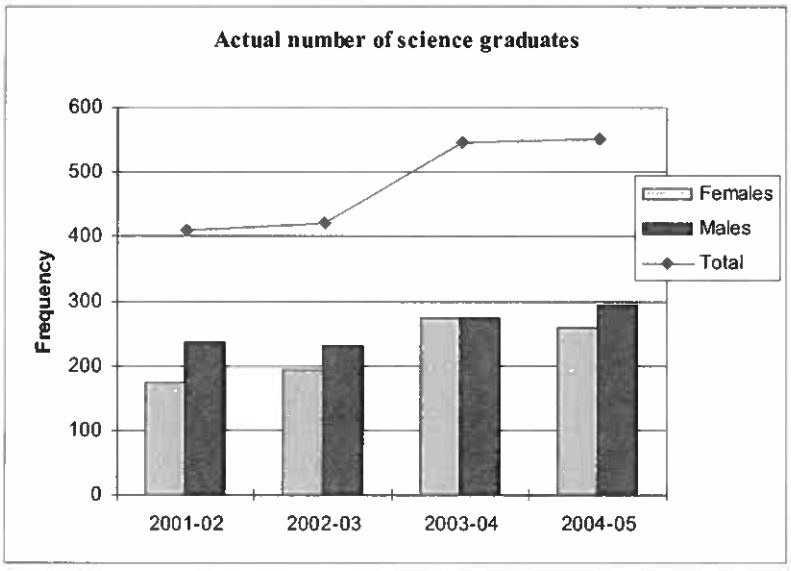


Figure 6.13: Number of science graduates between 2001-02 and 2004-05

However, considering the total number of graduates from University and computing the percentage number of the science graduates over the total number of graduates, it is again noted that the female graduates in science are still not adequately represented. This is shown in Figure 6.14, where now the gap between males and females has increased when compared to Figure 6.13.

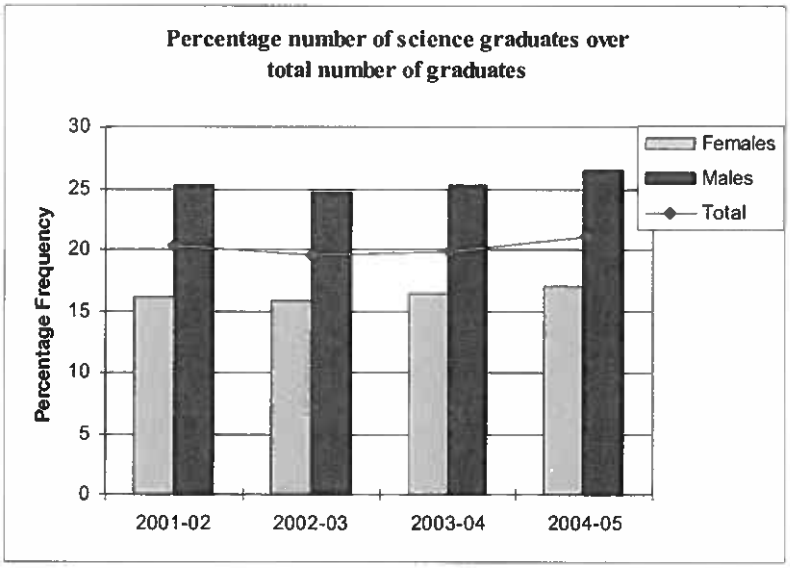


Figure 6.14: Number of Science graduates as a percentage of total number of graduates

An investigation of the number of graduates from each of the six main faculties, centres or institutes, considered as being related to science, generates a very similar situation to that of the number of applicants. The graduates from the Board of Studies for I.T., the Faculty of Architecture and Civil Engineering, the Faculty of Engineering and the Faculty of Science, are still mainly males. As before, the numbers of male and female graduates from the Faculty of Medicine and Surgery are almost equal. However, the graduates from the Institute of Health Care are still predominantly females. Figures 6.15 to 6.20 illustrate this situation.

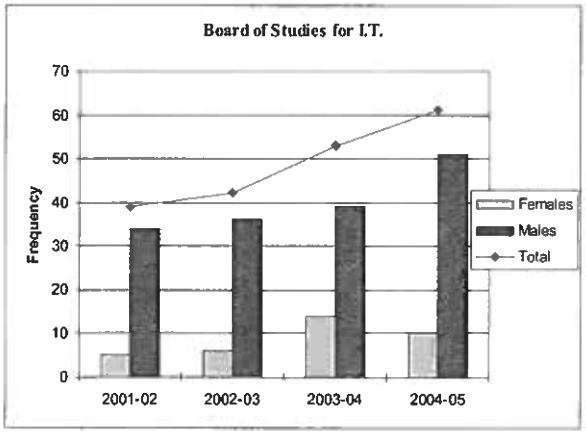


Figure 6.15: Graduates from the Board of Studies for IT

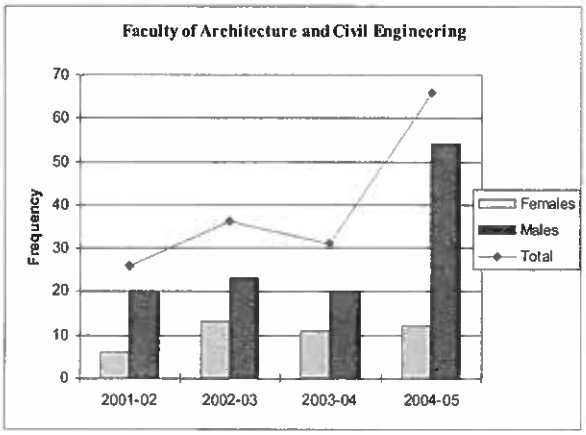


Figure 6.16: Graduates from the Faculty of Architecture and Civil Engineering

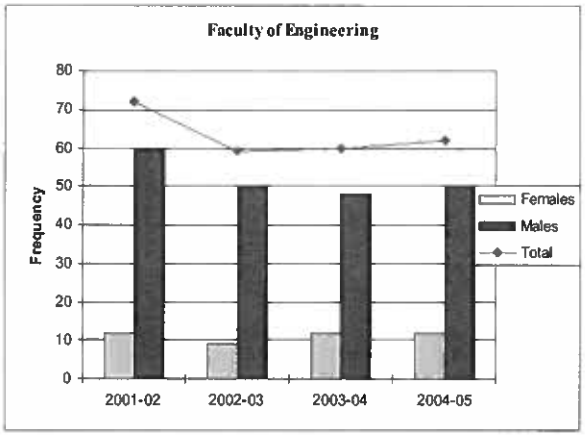


Figure 6.17: Graduates from the Faculty of Engineering

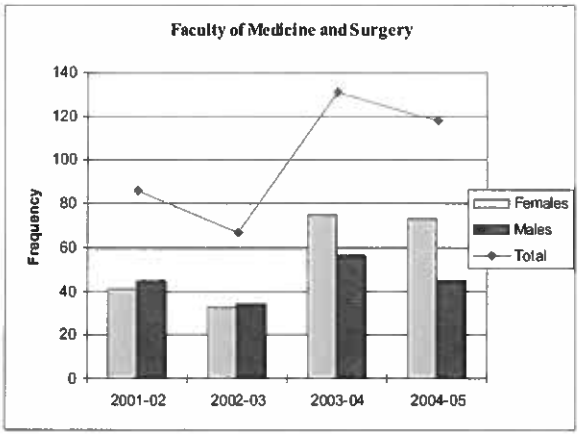


Figure 6.18: Graduates from the Faculty of Medicine and Surgery

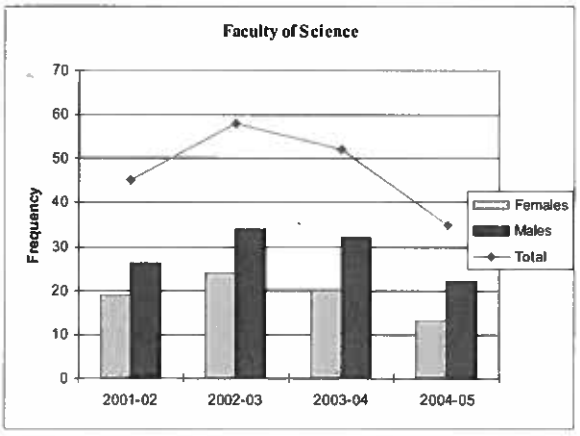


Figure 6.19: Graduates from the Faculty of Science

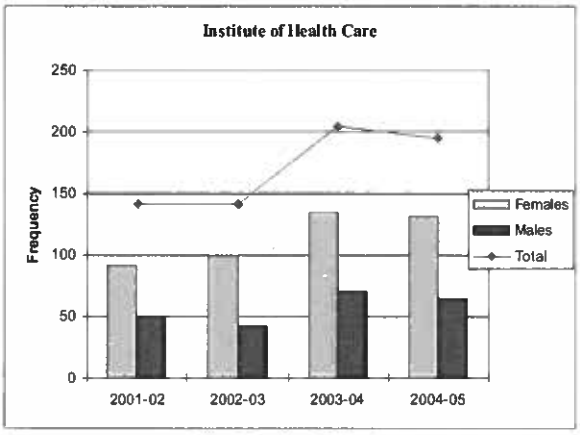


Figure 6.20: Graduates from the Institute of Health Care

The Institute of Health Care is still the greatest contributor to the number of graduates in the science field. By removing these graduates, a situation is created (illustrated in Figure 6.21) whereby the difference between male and female graduates in sciences is even greater than that illustrated in Figure 6.13 above.

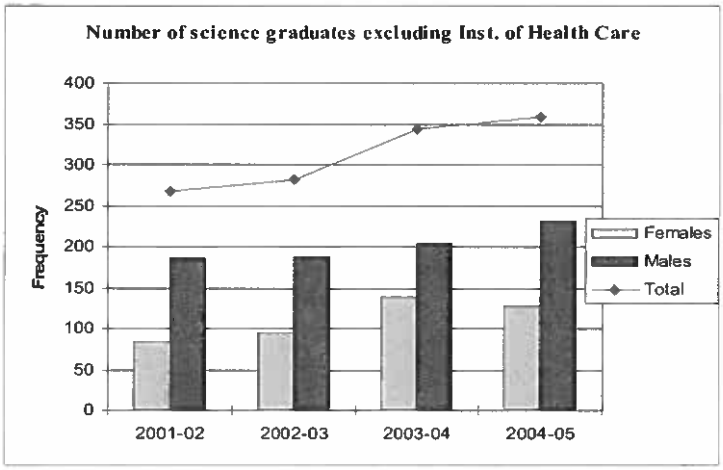


Figure 6.21: Number of science graduates excluding graduates from the Institute of Health Care

The gap between males and females widens when the number of science graduates excluding the graduates from the Institute of Health Care is computed as a percentage of the total number of graduates. This is evident by a comparison between Figure 6.14 shown above and Figure 6.22 illustrated below.

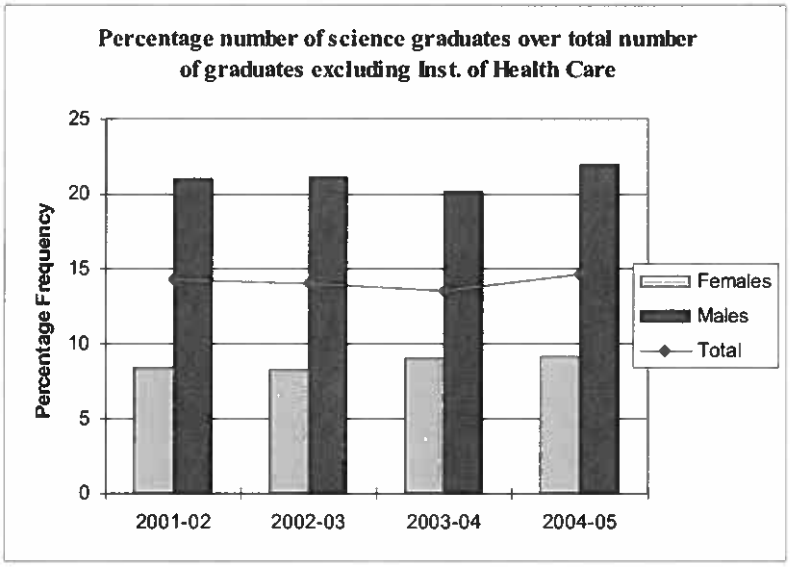


Figure 6.22: Science graduates as a percentage of total number of graduates excluding graduates from the Institute of Health Care

Another chi-squared test for significance concludes that, there is substantial evidence (even at 1% level of significance) indicating that over the four years considered there was a relationship between the sex of graduates and the number of graduates graduating from a science-related field. It can be said that male graduates are more likely than their female counterparts to graduate from a science-related field.

7. Employment Statistics

The Employment and Training Corporation (ETC) in Malta is principally responsible for providing a public employment service. It is also empowered by law to maintain a database of all persons in employment. The following statistics are based on data provided by the ETC on the national labour market for the years 2001 to 2005 with December as the reference period, and are correct as at October 2006. The occupations are classified according to the ISCO-88 (2006) Classification (International Standard Classification of Occupations).

This study is focussed on the science- and technology-related occupations. The main fields of science and technology were classified using the Frascati Classification as adopted by UNESCO and Eurostat (the EU Statistical Agency), and these are:

Natural Sciences
- Mathematics and computer sciences
- Physical sciences
- Chemical Sciences
- Earth and related environmental sciences
- Biological sciences

Agricultural sciences
- Agriculture, forestry, fisheries and allied sciences
- Veterinary medicine

Engineering and technology
- Civil engineering
- Electrical engineering
- Electronics
- Other engineering sciences

Medical sciences
- Basic medicine
- Clinical medicine
- Health sciences

For this reason, the ISCO group titles that were considered as forming part of the group of occupations related to science and technology are shown in Table 7.1. This table shows the minor {3-digit} group titles or unit {4-digit} group titles that were chosen from the respective major group titles. When only the minor group titles are given, it is implied that all the unit group titles in that category were considered.

Major Group 1: Legislators, Senior Officials and Managers		
12	*Corporate Managers*	
	1221	Managers in production and operations department managers in Forestry and Fishing
	1236	Managers in computing services
13	*General Managers*	
	1311	Managers in Agriculture, Hunting, Forestry and Fishing

Major Group 2: Professionals	
21	*Physical, Mathematical and Engineering Science Professionals*
	211 Physicists, Chemists and related professionals
	212 Mathematicians, Statisticians and related professionals
	213 Computing Professionals
	214 Architects, Engineers and related professionals
22	*Life Science and Health Professionals*
	221 Life Science Professionals
	222 Health Professionals (except nursing)
	223 Nursing and Midwifery professionals
Major Group 3: Technicians and Associate Professionals	
31	*Physical and Engineering Science Associate Professionals*
	311 Physical and Engineering Science Technicians
	312 Computer Associate Professionals
	314 Ship and Aircraft Controllers and Technicians
32	*Life Science and Health Associate Professionals*
	321 Life Science Technicians and related associate professionals
	322 Modern Health Associate Professionals (except Nursing)
	323 Nursing and Midwifery Associate Professionals
Major Group 7: Crafts and Related Trades Workers	
71	*Extraction and Building Trades Workers*
	7137 Building and related electricians
72	*Metal, Machinery and related Trades Workers*
	723 Machinery Mechanics and Fitters
	724 Electrical and Electronic Equipment Mechanics and Fitters

Table 7.1: ISCO-88 Major, sub-major, minor and unit group titles considered as science-related

Number of employees

From the statistics available, the number of employees employed in the above listed occupations was analysed according to whether they are in full-time or part-time employment. Table 7.2 and Figure 7.1 below show the distribution of the full-time employees. Along the five years taken in consideration, the number of full-time employees in a science-related career was in a constant increase. However, the huge gap between the number of male and female full-time employees is extremely evident from the illustration, where the number of male full-timers is almost three times as much as the number of female full-timers. In spite of this, the rate of increase of female full-time employees between 2001 and 2005 was of 10.4%, contrasting with the 4.5% increase in the number of male full-time employees.

Occupation Code		1221	1236	1311	21	22	31	32	7	Total
Dec 01	Male	9	31	8	1849	1930	4056	978	2689	**11550**
	Female	0	3	1	205	1325	289	1321	12	**3156**
	Total	*9*	*34*	*9*	*2054*	*3255*	*4345*	*2299*	*2701*	***14706***
Dec 02	Male	8	27	5	1923	1895	4225	1017	2587	**11687**
	Female	0	3	1	205	1327	290	1389	11	**3226**
	Total	*8*	*30*	*6*	*2128*	*3222*	*4515*	*2406*	*2598*	***14913***

Dec 03	Male	8	22	3	1984	1886	4307	1034	2549	**11793**
	Female	0	3	1	219	1346	301	1470	10	**3350**
	Total	*8*	*25*	*4*	*2203*	*3232*	*4608*	*2504*	*2559*	***15143***
Dec 04	Male	7	20	3	2037	1892	4312	1052	2526	**11849**
	Female	0	2	1	246	1346	307	1484	9	**3395**
	Total	*7*	*22*	*4*	*2283*	*3238*	*4619*	*2536*	*2535*	***15244***
Dec 05	Male	6	19	3	2128	1845	4399	1057	2612	**12069**
	Female	0	1	0	272	1341	317	1544	9	**3484**
	Total	*6*	*20*	*3*	*2400*	*3186*	*4716*	*2601*	*2621*	***15553***

Table 7.2: Distribution of full-time employees in science-related employment

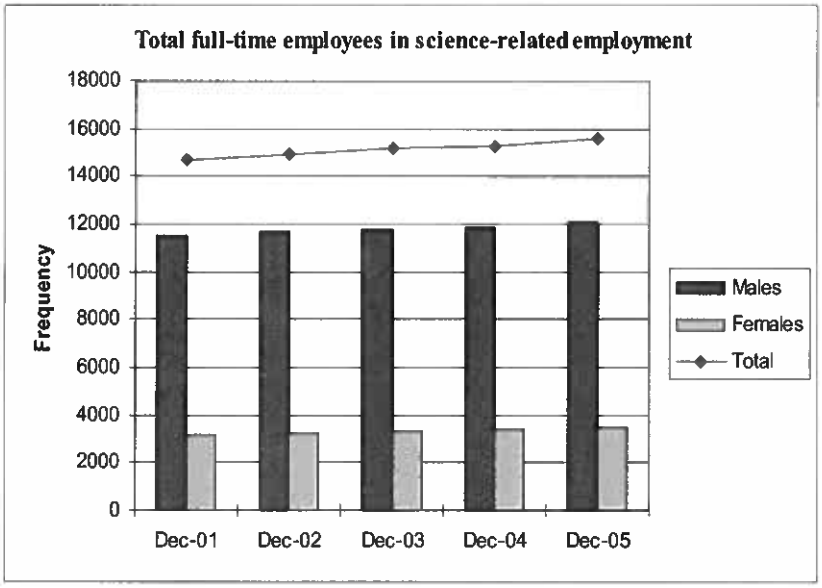


Figure 7.1: Total full-time employees in science-related employment

The situation with part-time employment was also analysed. Although the situation is not as dramatic as in the case of full-time employment, it still shows a greater number of males employed on a part-time basis when compared to females. Apart from this, although both the number of males and the number of females increased along the five years taken into consideration, it is noticed that the number of male employees increased at a faster rate. In fact, between 2001 and 2005, the number of male part-time employees increased by 37.2% when compared to the increase of 30.4% in part-time female employees. Table 7.3 and Figure 7.1 illustrate the situation for part-time employment.

Occupation Code		1236	21	22	31	32	7	Total
Dec 01	Male	1	191	425	292	235	321	**1465**
	Female	0	46	323	21	588	2	**980**
	Total	*1*	*237*	*748*	*313*	*823*	*323*	***2445***
Dec 02	Male	1	195	436	333	276	321	**1562**
	Female	0	55	330	27	604	3	**1019**
	Total	*1*	*250*	*766*	*360*	*880*	*324*	***2581***

Dec 03	Male	1	210	416	357	292	337	**1613**
	Female	0	55	335	26	666	3	**1085**
	Total	*1*	*265*	*751*	*383*	*958*	*340*	***2698***
Dec 04	Male	1	258	425	402	352	374	**1812**
	Female	0	65	340	31	738	3	**1177**
	Total	*1*	*323*	*765*	*433*	*1090*	*377*	***2989***
Dec 05	Male	1	281	441	502	381	404	**2010**
	Female	0	77	359	42	796	4	**1278**
	Total	*1*	*358*	*800*	*544*	*1177*	*408*	***3288***

Table 7.3: Distribution of part-time employees in science-related employment

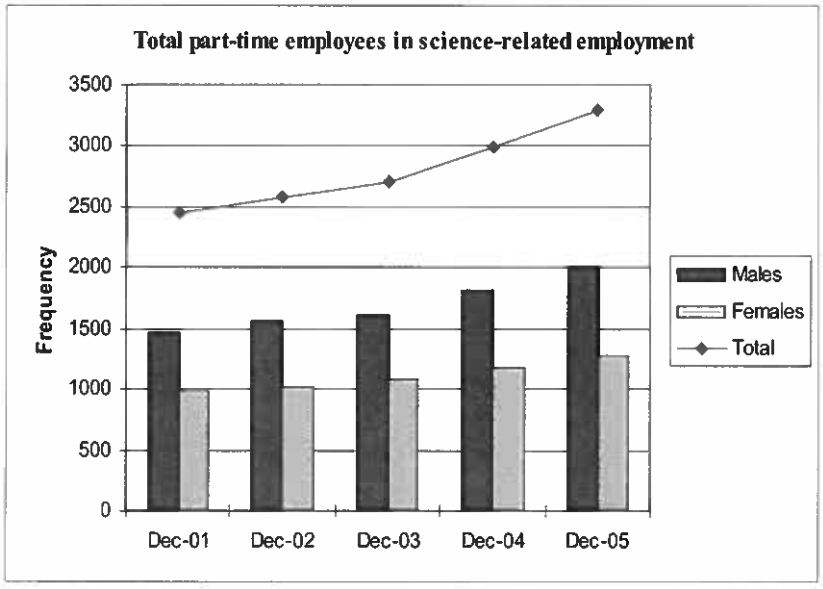


Figure 7.2: Total part-time employees in science-related employment

Figure 7.3 below illustrates the overall total number of employees employed in a science-related employment. The overall increase in the number of employees between 2001 and 2005 was higher for females than for males, with a percentage growth of 15.1% against 8.2% for the two categories, respectively.

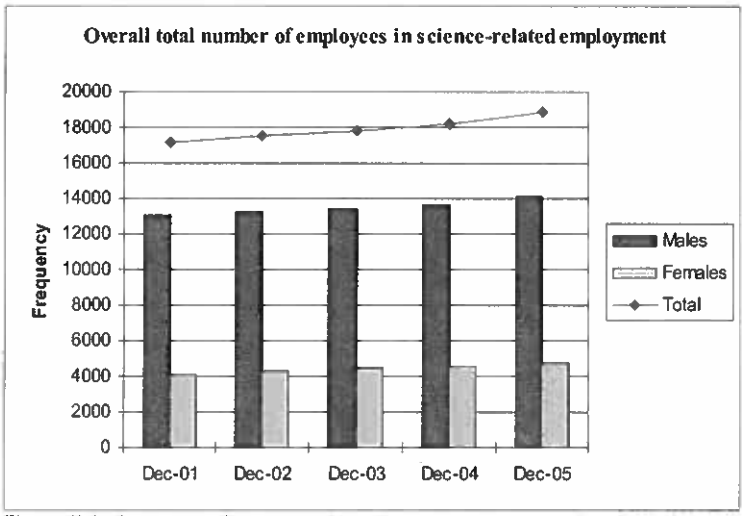


Figure 7.3: Overall total number of employees in science-related employment

A further analysis on the number of employees in the above listed categories was made, as explained and illustrated below.

The number of full-time male 'Physical, Mathematical and Engineering Science Professionals' (sub-major subgroup {21}) during the five years taken in consideration was by far greater than their female counterpart, which is evident from Figure 7.4. However, a closer look to the figures of full-time employees (shown in Table 7.4) reveals that the annual rate of increase in the number of female full-timers had a greater momentum in the last three years when compared to the annual rate of increase in the number of male part-timers.

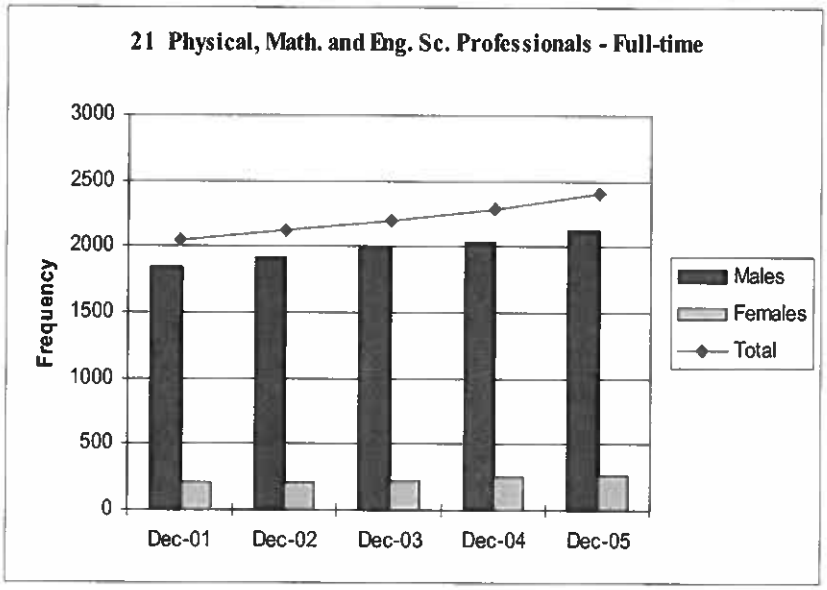


Figure 7.4: Full-time employees in 'Physical, Mathematical and Engineering Science'

Full-time	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	1849	-	205	-	2054	-
2002	1923	*4.0*	205	*0*	2128	*3.6*
2003	1984	*3.2*	219	*6.8*	2203	*3.5*
2004	2037	*2.7*	246	*12.3*	2283	*3.6*
2005	2128	*4.5*	272	*10.6*	2400	*5.1*
Average	1984.2	*3.6*	229.4	*7.4*	2213.6	*4.0*

Table 7.4: Amount and Percentage annual increase of full-time employees in 'Physical, Math. and Eng. Science Prof.' between 2001 and 2005

On average, each year between 2001 and 2005 there were, 1984.2 male professionals compared to the 229.4 female professionals. This difference is mainly due to an imbalance in the number of 'Computing Professionals {213}' and the number of 'Architects, Engineers and related professionals {214}'. As

shown in Table 7.5, the average annual number of male employees during these five years in these two categories was of 484.4 and 1434.6, respectively, when compared to the 61 and 129.8 female employees in the respective two categories.

Minor Group Title	Male	Female	*Total*
211	56.8	28.2	*85*
212	8.4	10.4	*18.8*
213	484.4	61	*545.4*
214	1434.6	129.8	*1564.4*
Total	**1984.2**	**229.4**	***2213.6***

Table 7.5: Average annual number of full-time employees in 'Physical, Math. and Eng. Sc. Prof.'

A similar situation to that described above was present in the number of part-time professionals employed in 'Physical, Mathematical and Engineering Science', although the gap between females and males is less marked. Figure 7.5 illustrates this situation, where the sudden increase in the number of male part-timers in 2004 was the main reason behind the increase in the total number of part-timers in this year. An analysis of the figures for part-time employees and the respective annual increases for each sex is made in Table 7.6. It is noticed that the average annual rate of increase of male part-timers between 2001 and 2005 was less than that of the female part-timers.

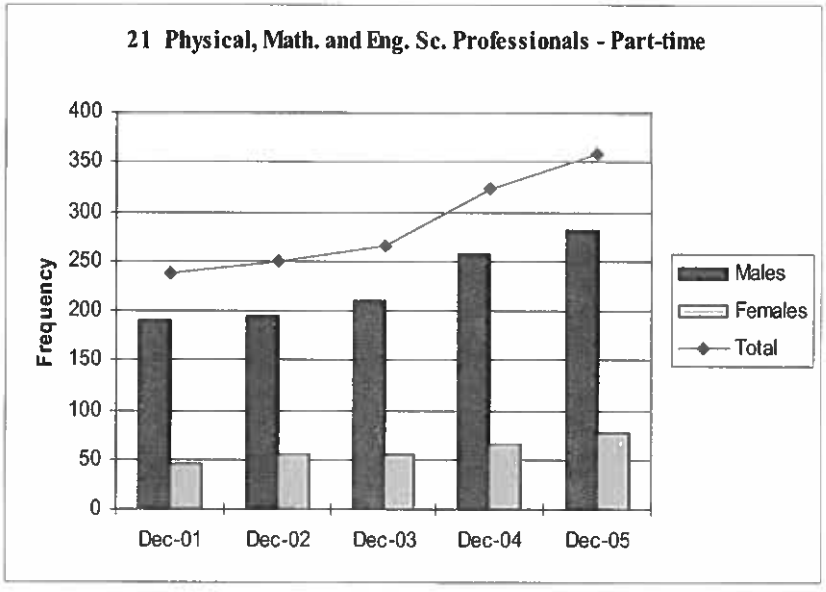


Figure 7.5: Part-time employees in 'Physical, Mathematical and Engineering Science'

Part-time	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	191	-	46	-	237	-
2002	195	*2.1*	55	*19.6*	250	*5.5*
2003	210	*7.7*	55	*0*	265	*6.0*
2004	258	*22.9*	65	*18.2*	323	*21.9*
2005	281	*8.9*	77	*18.5*	358	*10.8*
Average	227	*10.4*	59.6	*14.1*	286.6	*11.1*

Table 7.6: Amount and Percentage annual increase of part-time employees in 'Physical, Math. and Eng. Science Prof.' between 2001 and 2005

The average annual number of part-time male professionals during these five-years was of 227, in comparison with the 59.6 part-time female professionals. A difference from the situation with full-time employment is that the average of the number of female 'Physicists, Chemists and related professionals' in part-time employment was greater than the number of males (22 against 18.2 in part-time employment compared to 28.2 against 56.8 in full-time employment).

Minor Group Title	Male	Female	*Total*
211	18.2	22	*40.2*
212	0.8	0.4	*1.2*
213	64	18	*82*
214	144	19.2	*163.2*
Total	**227**	**59.6**	***286.6***

Table 7.7: Average annual number of part-time employees in 'Physical, Math. and Eng. Sc. Prof.'

The overall setting in the 'Physical, Mathematical and Engineering Science Professionals' group along the five years considered is illustrated in Figure 7.6.

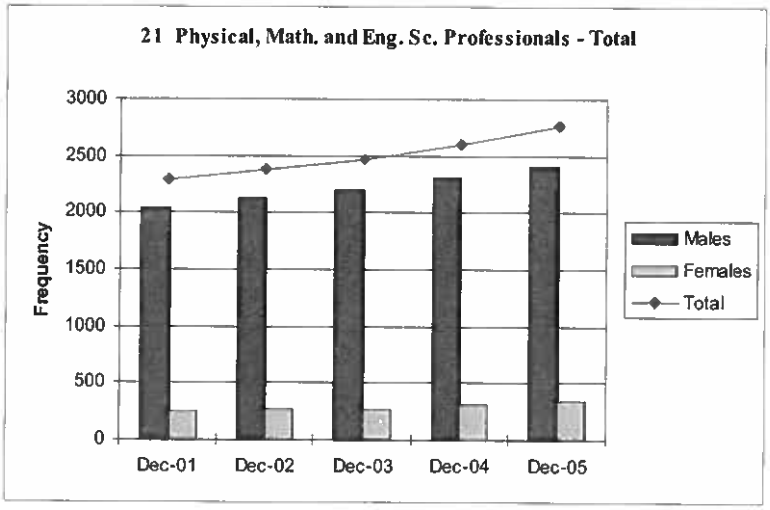


Figure 7.6: Total number of employees in 'Physical, Mathematical and Engineering Science'

Figure 7.7 illustrates the number of full-time professionals employed in 'Life Science and Health'. Here it is noted that the number of males was on a constant decrease, while the number of females increased between 2001 and 2005.

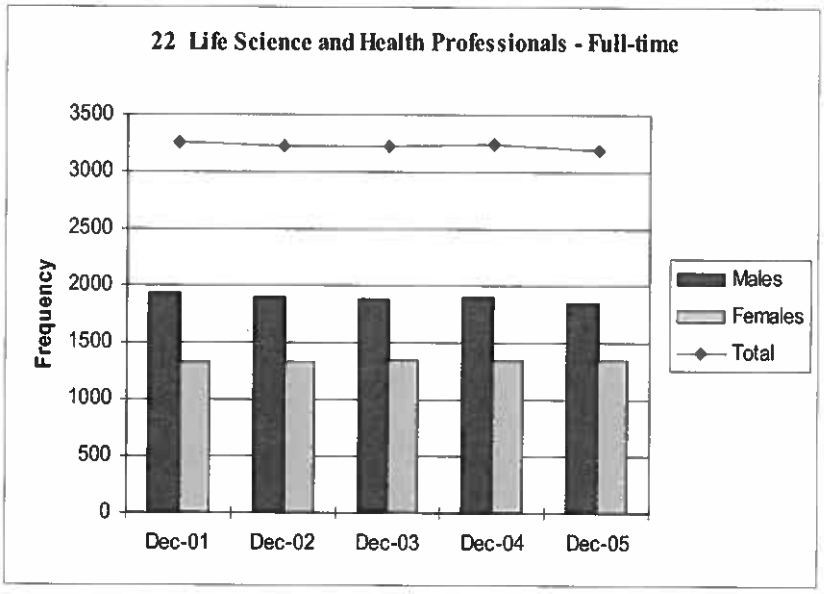


Figure 7.7: Full-time employees in 'Life Science and Health'

Even the number of part-time female professionals in this group went through a constant increase during the five years considered. On the other hand, the number of male part-timers was relatively unsteady. Figure 7.8 depicts this situation.

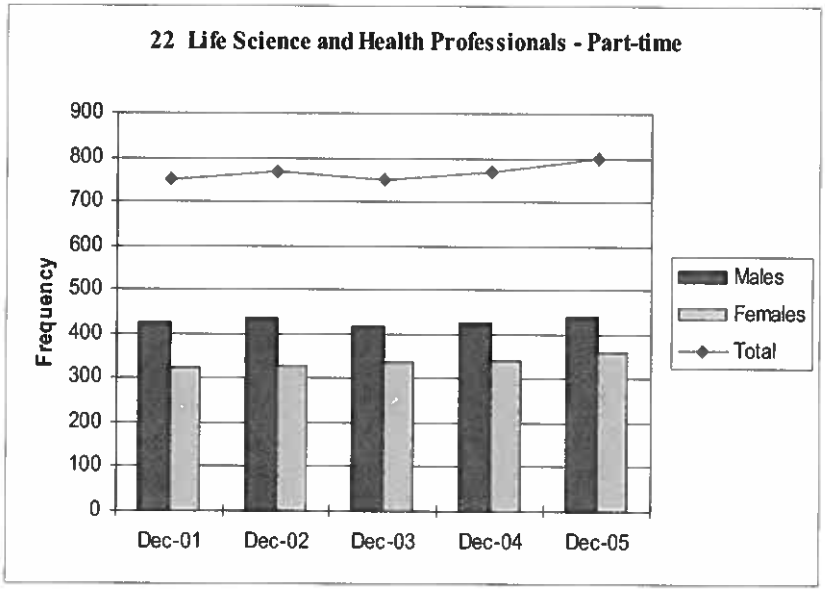


Figure 7.8: Part-time employees in 'Life Science and Health'

A look into the average annual number of employees in each minor group reveals certain interesting traits (refer to Table 7.8). For instance, the average number of male 'Health Professionals excluding Nursing {222}' is almost double the number of female professionals in this category, both for full-time employment (1208.8 male employees against 623.6 female employees) and for part-time employment (420.4 male employees against 247.4 female employees). On the other hand, the number of female 'Nurses and Midwifes {223}' is greater than the number of their male counterparts, with an enormous difference noticeable for part-timers (illustrated in Figure 7.9).

Minor Group Title	Full-Time			Part-Time		
	Male	Female	*Total*	Male	Female	*Total*
221	14	14.4	*28.4*	5.6	1.8	*7.4*
222	1208.8	623.6	*1832.4*	420.4	247.4	*667.8*
223	666.8	699	*1365.8*	2.6	88.2	*90.8*
Total	**1889.6**	**1337**	***3226.6***	**428.6**	**337.4**	***766***

Table 7.8: Average annual number of full-time and part-time employees in 'Life Science and Health'

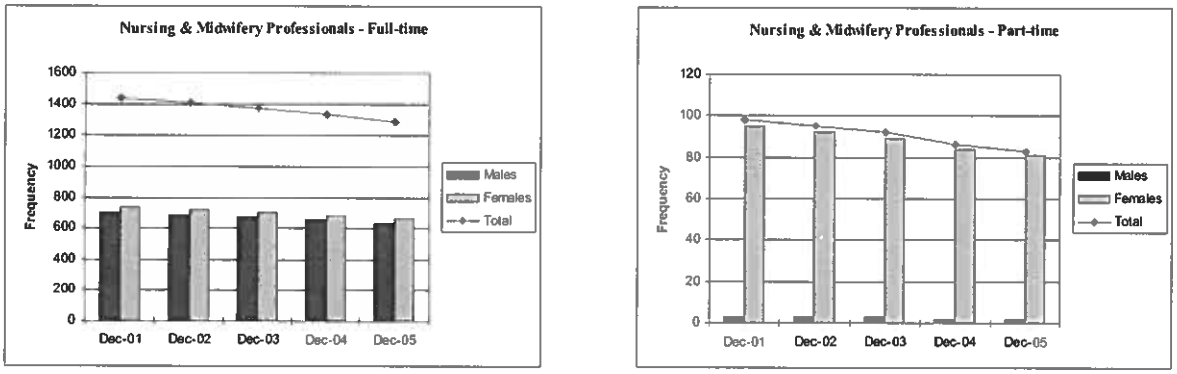


Figure 7.9: Full-time and Part-time employees in 'Nursing and Midwifery'

If the employees in this minor subgroup, which is traditionally associated with females, are removed, the resulting situation is illustrated below (Figure 7.10). It is noticed that the gap between male and females broadens substantially, especially in the case of part-time employees (compared with Figures 7.7 and 7.8 illustrated above).

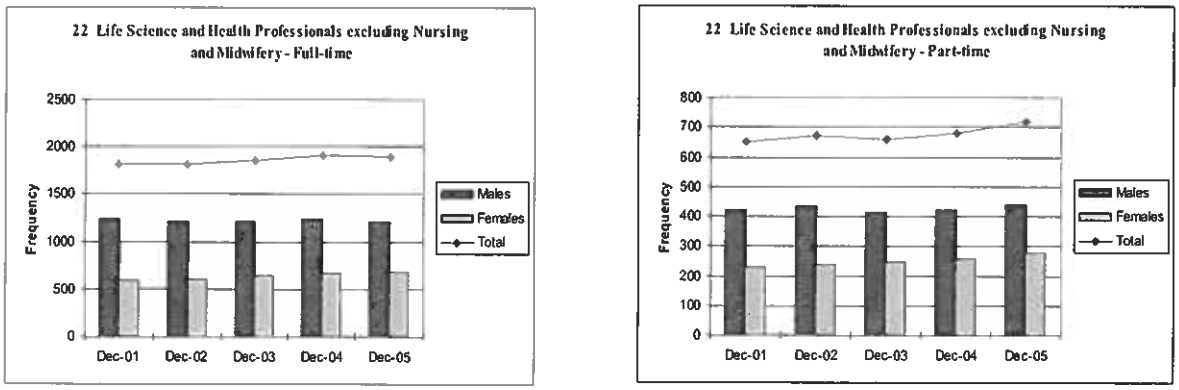


Figure 7.10: Full-time and Part-time employees in 'Life Science and Health Professionals' excluding 'Nursing and Midwifery'

The two graphs in Figure 7.11 compare the total number of employees in the 'Life Science and Health Professionals' category if 'Nursing and Midwifery' is first included (Figure 7.11(a)) and then removed (Figure 7.11(b)).

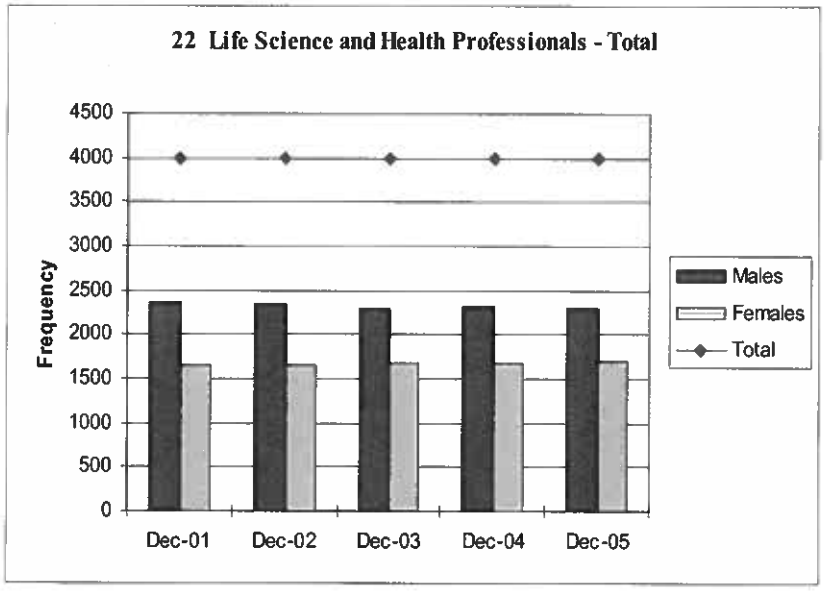


Figure 7.11(a): Total employees in 'Life Science and Health'

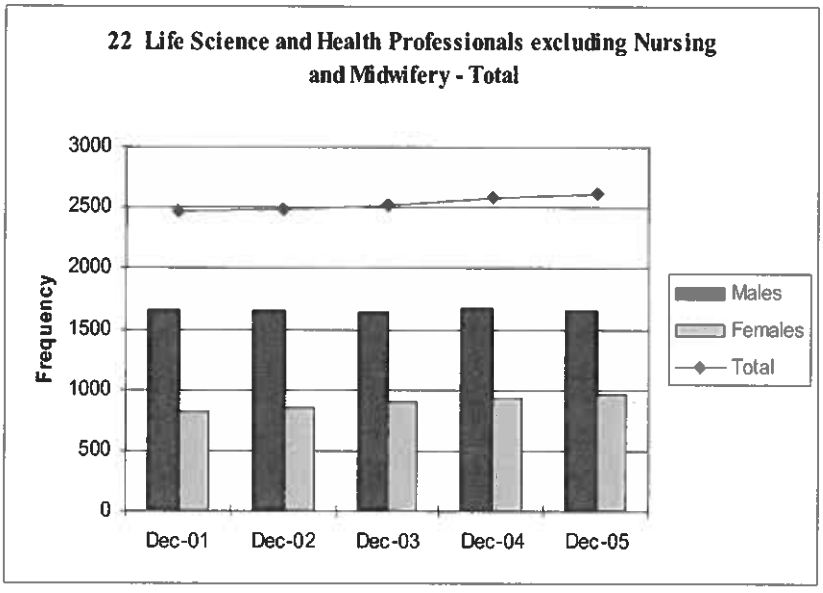


Figure 7.11(b): Total employees in 'Life Science and Health' excluding 'Nursing and Midwifery'

A more thorough analysis of the actual amounts of male and female employees in the category 'Life Science and Health Professionals' is given in Tables 7.9-7.11. The annual percentage increases were examined and the following observations can be made:

- There was an average annual decrease of 0.7% in the number of male employed in this category, compared to the average annual increase of 0.8% in the number of female employees.
- The number of employees in 'Nursing and Midwifery' saw an average annual decrease of 2.7%, which was shared out fairly equally between males and females.
- If the employees in 'Nursing and Midwifery' are removed, the average annual increase in female life science and health professionals was of 4.1%, in contrast with the virtually inexistent average annual change in the number of the male counterpart.

Thus, it can be concluded that, not only the number of female employees in this category is increasing at a faster rate than the number of male employees, but, if the sub-group traditionally associated with the female sex is removed, this rate of increase is even higher.

Total	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	2355	-	1648	-	4003	-
2002	2331	*-1.0*	1657	*0.5*	3988	*-0.4*
2003	2302	*-1.2*	1681	*1.4*	3983	*-0.1*
2004	2317	*0.7*	1686	*0.3*	4003	*0.5*
2005	2286	*-1.3*	1700	*0.8*	3986	*-0.4*
Average	2318.2	*-0.7*	1674.4	*0.8*	3992.6	*-0.1*

Table 7.9: Amount and Percentage annual increase of employees in 'Life Science and Health Prof.' between 2001 and 2005

Total	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	702	-	830	-	1532	-
2002	685	*-2.4*	812	*-2.2*	1497	*-2.3*
2003	673	*-1.8*	790	*-2.7*	1463	*-2.3*
2004	654	*-2.8*	763	*-3.4*	2427	*-3.1*
2005	633	*-3.2*	741	*-2.9*	1374	*-3.0*
Average	669.4	*-2.6*	787.2	*-2.8*	1658.6	*-2.7*

Table 7.10: Amount and Percentage annual increase of employees in 'Nursing and Midwifery' between 2001 and 2005

Total	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	1653	-	818	-	2471	-
2002	1646	*-0.4*	845	*3.3*	2491	*0.8*

2003	1629	*-1.0*	891	*5.4*	2520	*1.2*
2004	1663	*2.1*	923	*3.6*	2586	*2.6*
2005	1653	*-0.6*	959	*3.9*	2612	*1.0*
Average	1648.8	*0.01*	887.2	*4.1*	2536	*1.4*

Table 7.11: Amount and Percentage annual increase of employees in 'Life Science and Health Prof.' excluding 'Nursing and Midwifery' between 2001 and 2005

Figure 7.12 illustrates the number of full-time employees in the category 'Physical and Engineering Science Associate Professionals {31}'. The massive gap between males and females is immediately evident.

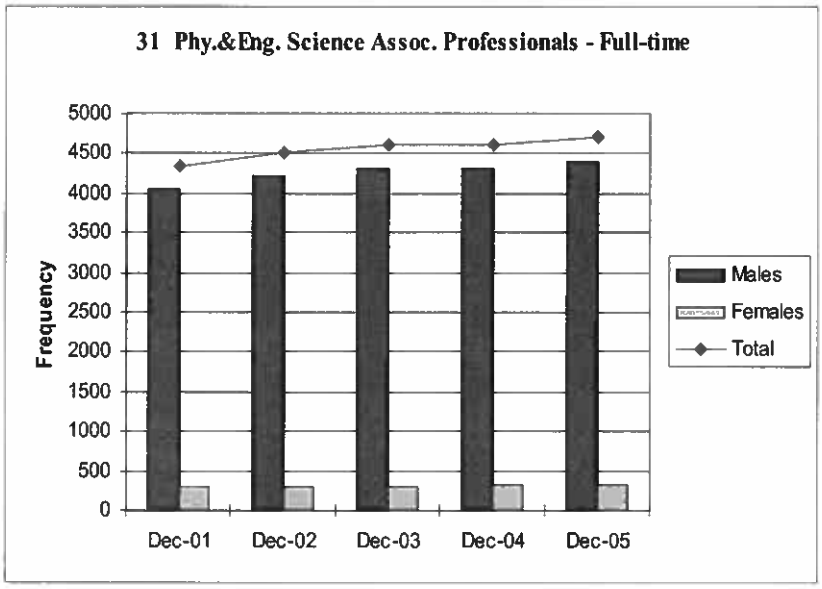


Figure 7.12: Full-time employees in 'Phy. & Eng. Science Assoc. Prof'

When the number of part-time employees in the same category is analysed, a similar gap to that mentioned above is found (refer to Figure 7.13). It can also be noted that the number of male employees went through a sudden increase between 2004 and 2005.

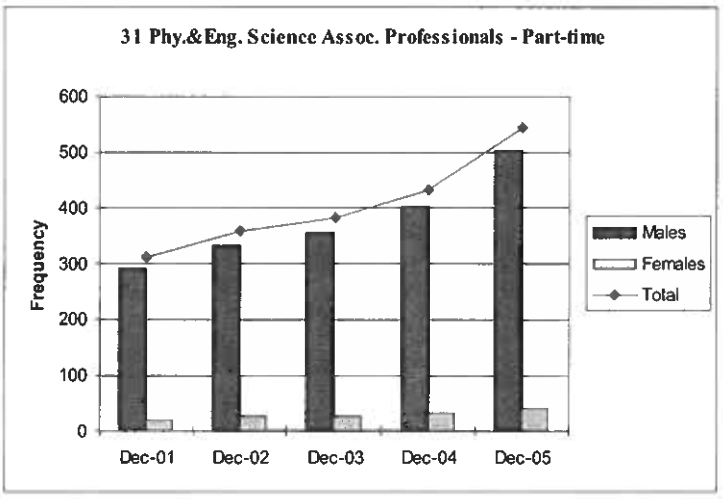


Figure 7.13: Part-time employees in 'Phy. & Eng. Science Assoc. Prof.'

The resulting situation for the total number of employees in this category is illustrated in Figure 7.14 below. Again, the minimal contribution of the female sex in this category is overt.

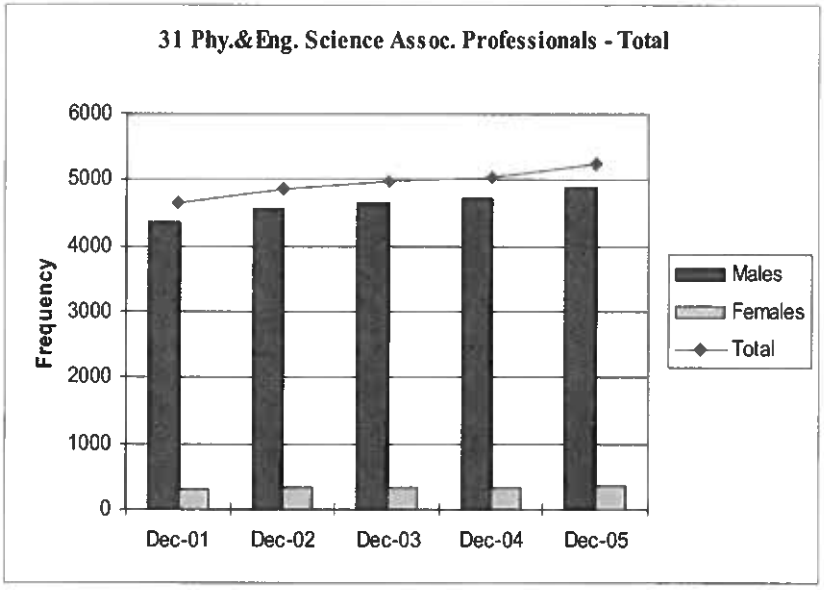


Figure 7.14: Employees in 'Phy. & Eng. Science Assoc. Prof.'

Table 7.12 scrutinizes the average annual number of employees in each minor group for the five years taken into consideration. Actually, since the minor group 'Physical and Engineering Science Technicians {311}' contained a large number of employees, it was decided to further break down this group into its unit titles, grouping the units {3116}, {3117} and {3119} together due their small size.

Unit/Minor Group Title	Full-Time			Part-Time		
	Male	Female	*Total*	Male	Female	*Total*
3111	88.4	42.2	*130.6*	2	4	*6*
3112	221.2	40.6	*261.8*	0	2.2	*2.2*
3113	770	15	*785*	125.8	6.2	*132*
3114	1283.4	46.6	*1330*	68.4	1.4	*69.8*
3115	1116.4	40.6	*1157*	89.8	2	*91.8*
3118	238.8	22.6	*261.4*	36.6	3.8	*40.4*
3116/7/9	31	1.8	*32.8*	1	0	*1*
312	253.2	66.8	*320*	47.6	9.8	*57.4*
314	257.4	24.6	*282*	6	0	*6*
Total	**4259.8**	**300.8**	***4560.6***	**377.2**	**29.4**	***406.6***

Table 7.12: Average annual number of full-time and part-time employees in 'Phy. & Eng. Science Assoc. Prof.'

Although there are more males in almost each section, the difference in 'Electronics and telecommunications engineering technicians {3114}' and 'Mechanical engineering technicians {3115}' is more rampant, confirming the traditional association of these two careers with the male sex. For this reason, a more detailed analysis into each of these two categories was made.

It is noted through Table 7.13 that there was an average annual decrease in the percentage numbers of both male and female employees in the 'Electronics and telecommunications engineering technicians' category. Moreover, although there is already a smaller number of female employees (48 females against 1351.8 males), the average percentage annual decrease for females is greater than for males.

Total {3114}	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	1403	-	50	-	1453	-
2002	1351	*-3.7*	48	*-4*	1399	*-3.7*
2003	1321	*-2.2*	48	*0*	1369	*-2.1*
2004	1331	*0.8*	48	*0*	1379	*0.7*
2005	1353	*1.7*	46	*-4.2*	1399	*1.5*
Average	1351.8	*-0.9*	48	*-2.0*	1399.8	*-0.9*

Table 7.13: Amount and Percentage annual increase of employees in 'Electronics and telecommunications engineering technicians' between 2001 and 2005

A similar analysis was made for the 'Mechanical engineering technicians' category, and an analogous conclusion can be reached. In fact, the number of female employees decreased at a greater average annual rate than the number of male employees, although, again, the number of females was already much smaller than the number of males.

Total {3115}	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	1265	-	46	-	1311	-
2002	1256	*-0.7*	44	*-4.3*	1300	*-0.8*
2003	1204	*-4.1*	42	*-4.5*	1246	*-4.2*
2004	1170	*-2.8*	44	*4.8*	1214	*-2.6*
2005	1136	*-2.9*	37	*-15.9*	1173	*-3.4*
Average	1206.2	*-2.6*	42.6	*-5.0*	1248.8	*-2.7*

Table 7.14: Amount and Percentage annual increase of employees in 'Mechanical engineering technicians' between 2001 and 2005

Table 7.15 shows that the average percentage annual increase in the number of males in 'Physical and Engineering Science Associated Professionals' excluding the last two categories mentioned above was still higher that the average percentage annual increase for females. However, it seems that in the last two years the female employees started to recover and were increasing at a faster rate since the percentage annual increase in female employees is greater than their male counterparts.

Total {31 excl. 3114/5}	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	1680	-	214	-	1894	-
2002	1951	*16.1*	225	*5.1*	2176	*14.9*
2003	2139	*9.6*	237	*5.3*	2376	*9.2*
2004	2213	*3.5*	246	*3.8*	2459	*3.5*
2005	2412	*9.0*	276	*12.2*	2688	*9.3*
Average	2079	*9.6*	239.6	*6.6*	2318.6	*9.2*

Table 7.15: Amount and Percentage annual increase of employees in 'Phy. & Eng. Science Assoc. Prof.' excluding 'Elec. and tele. eng. tech.' and 'Mech. eng. tech.'

Another minor subgroup title that was examined was 'Life Science and Health Associate Professionals {32}'. This is the only group were the female number of employees exceeds the male number, both in full-time and in part-time employment. This can be seen in the following figure.

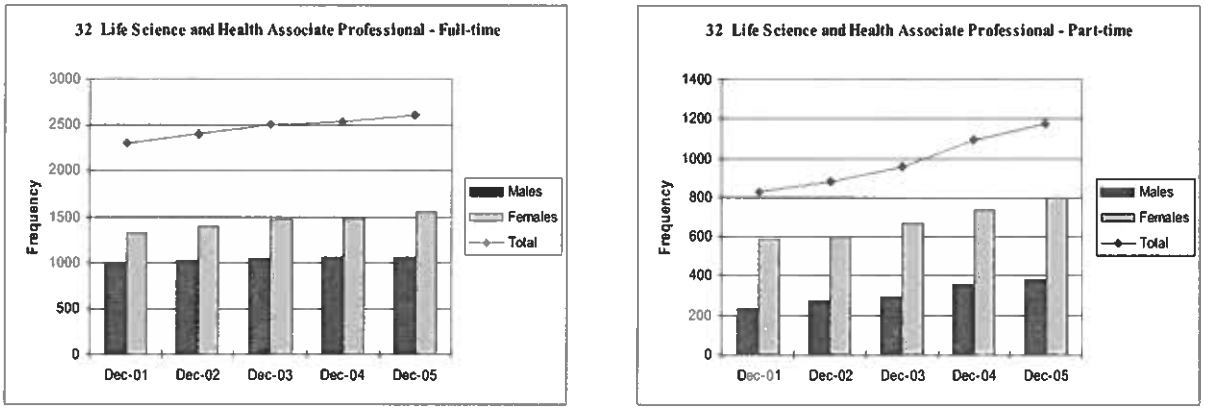


Figure 7.15: Full-time and Part-time employees in 'Life Science and Health Associate Professionals'

However, it was noted that a large portion of the employees in this category are classified under 'Nursing and Midwifery Associate Professionals'. In fact, with an annual average of 645 male and 1129.4 female full-timers together with 190.4 male and 543 female part-timers, nurses and midwifes formed the greatest majority of the employees in this category. Figure 7.16 illustrates this situation.

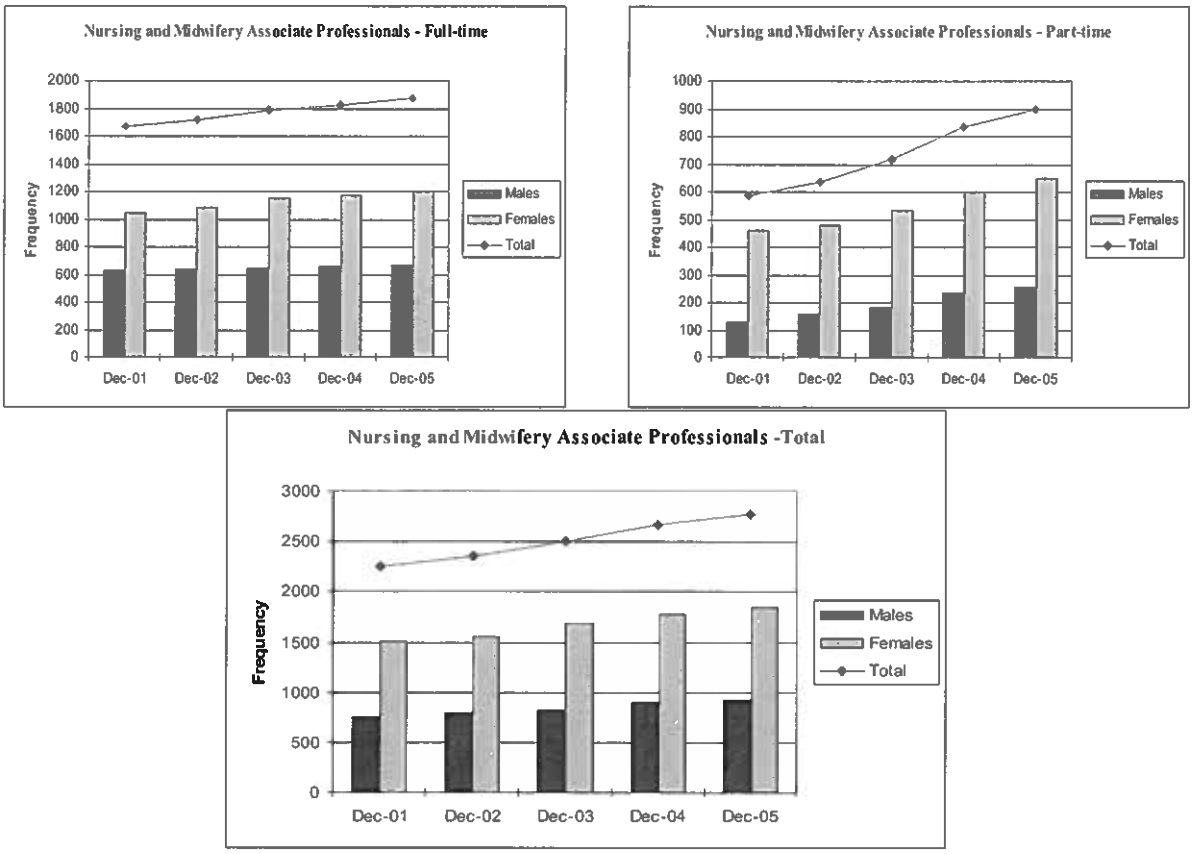


Figure 7.16: Employees in 'Nursing and Midwifery Associate Professionals'

The influence of these huge numbers over the total amount of employees in 'Life Science and Health Associate Professionals' is, obviously, critical and bears a lot of weight. Thus, a better picture of the remaining number of employees would be given by removing the employees in 'Nursing and Midwifery Associate Professionals' from this category. This is illustrated in Figure 7.17, where it is noted that, now, the number of male full-timers exceeds the number of female full-timers. Also, although the female part-timers are still in majority, the gap between the two sexes has narrowed considerably.

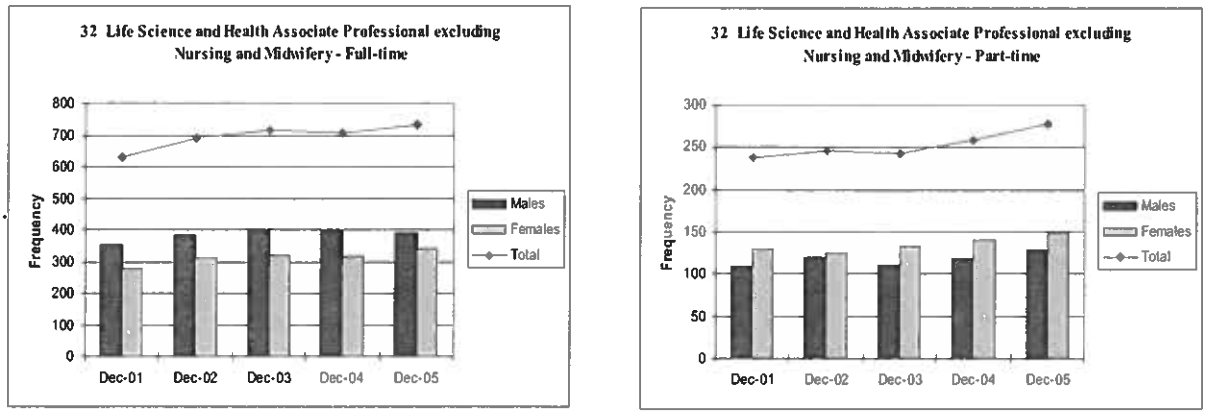


Figure 7.17: Full-time and Part-time employees in 'Life Science and Health Associate Professionals' excluding 'Nursing and Midwifery Associate Professionals'

Thus, a look at the total number of employees in this category exposes even more the great influence that 'Nursing and Midwifery Associate Professionals' had on this category. In Figure 7.18, the number of employees in the whole category is shown, and it can be seen that females are in the absolute greater majority. However, Figure 7.19 shows the amount of employees when nurses and midwifes are excluded. This time, the number of male employees surpasses the number of female employees in all the five years taken into consideration.

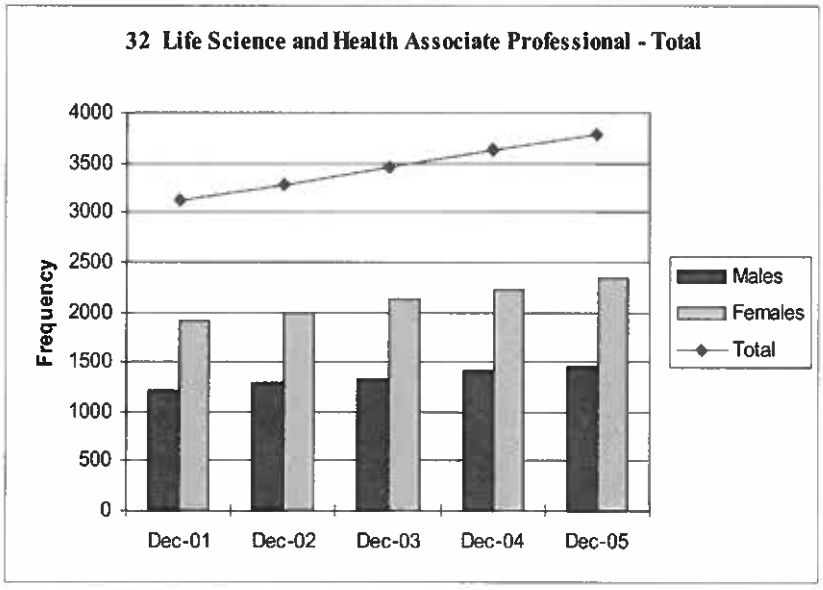


Figure 7.18: Total employees in 'Life Science and Health Associate Professionals'

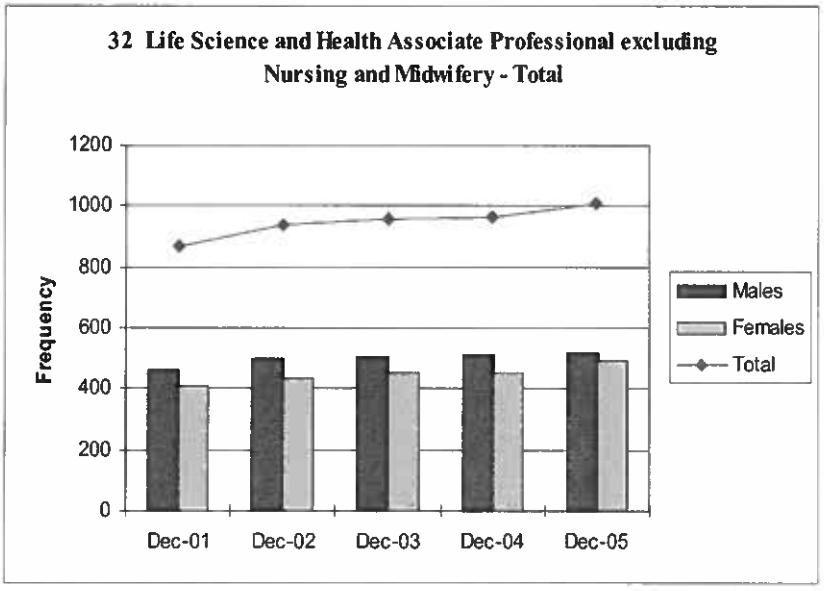


Figure 7.19: Total employees in 'Life Science and Health Associate Professionals' excluding 'Nursing and Midwifery Associate Professionals'

The amounts of and the percentage annual increases in the number of employees (full-time and part-time) for 'Life Science and Health Assoc. Prof.', for 'Nursing and Midwifery Assoc. Prof.' alone and for the difference between the two, are shown in Tables 7.16, 7.17 and 7.18, respectively. It is remarked that, although, as also discussed above, the number of male employees in this category becomes greater than the number of female employees when the number of nurses and midwifes is removed from the total (shown in Figure 7.18 above and Table 7.18 below), the average percentage annual increase for females is still greater than that for males. In fact, in all the three tables that follow, the average annual rate of increase for females is more than that for males.

Total {32}	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	1213	-	1909	-	3122	-
2002	1293	*6.6*	1993	*4.4*	3286	*5.3*
2003	1326	*2.6*	2136	*7.2*	3462	*5.4*
2004	1404	*5.9*	2222	*4.0*	3626	*4.7*
2005	1438	*2.4*	2340	*5.3*	3778	*4.2*
Average	1334.8	*4.4*	2120	*5.2*	3454.8	*4.9*

Table 7.16: Amount and Percentage annual increase of employees in 'Life Science and Health Assoc. Prof.'

Total {323}	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	753	-	1501	-	2254	-
2002	792	*5.2*	1558	*3.8*	2350	*4.3*
2003	822	*3.8*	1683	*8.0*	2505	*6.6*
2004	892	*8.5*	1769	*5.1*	2661	*6.2*
2005	918	*2.9*	1851	*4.6*	2769	*4.1*
Average	835.4	*5.1*	1672.4	*5.4*	2507.8	*5.3*

Table 7.17: Amount and Percentage annual increase of employees in 'Nursing and Midwifery Assoc. Prof.'

Total {32 excl. 323}	Male		Female		Total	
	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*	Amount	*Percentage annual increase*
2001	460	-	408	-	868	-
2002	501	*8.9*	435	*6.6*	936	*7.8*
2003	504	*0.6*	453	*4.1*	957	*2.2*
2004	512	*1.6*	453	*0*	965	*0.8*
2005	520	*1.6*	489	*7.9*	1009	*4.6*
Average	499.4	*3.2*	447.6	*4.7*	947	*3.9*

Table 7.18: Amount and Percentage annual increase of employees in 'Life Science and Health Assoc. Prof.' excluding 'Nursing and Midwifery Assoc. Prof.'

The last group of employees in a science-related profession that was considered is that forming part of the major group 'Craft and Related Trades Workers {7}' as shown in Table 7.1. The female participation in this group is practically inexistent, as can be seen from the following graphical representations.

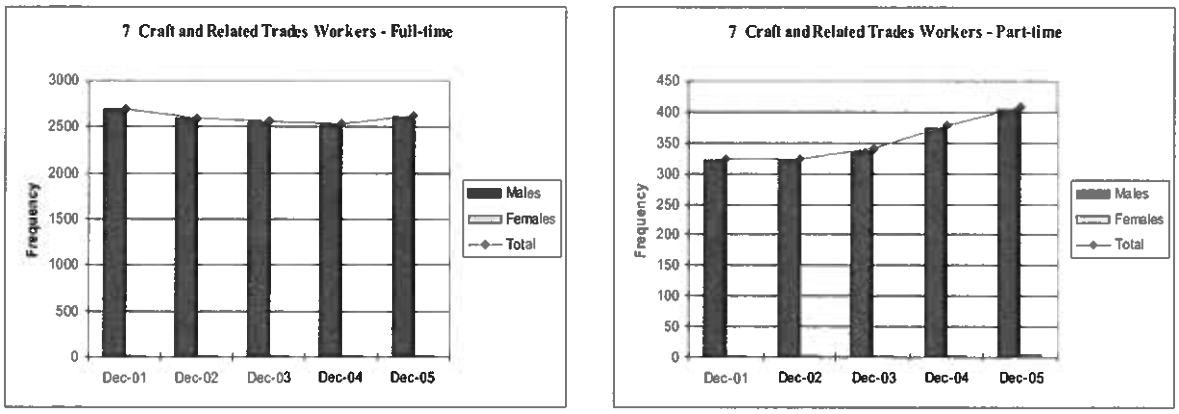


Figure 7.19: Full-time and Part-time employees in 'Craft and Related Trades Workers'

Although the overall number of full-time male employees decreased over the five years taken into consideration, this was compensated by an increase in the number of part-timers. Figure 7.20 in fact shows that the total number male employees remained practically constant. The average number of male employees along these five years amounted to 2944 employees, in contrast with a global average of 13.2 female employees.

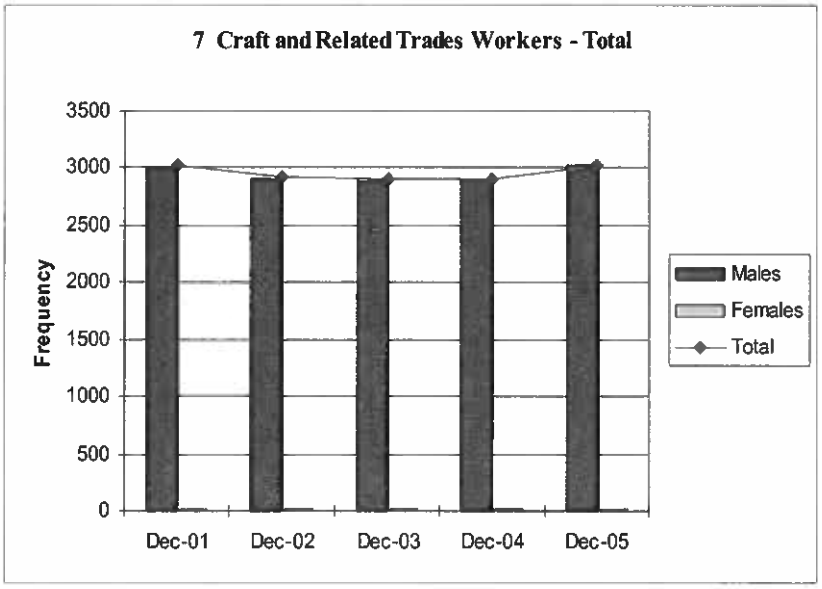


Figure 7.20: Employees in 'Craft and Related Trades Workers'

Marital status of employees

Further analysis was made on the marital status of the employees in a science-related profession. Tables 7.19 and 7.20 respectively show the distribution of full-time and part-time employees according to sex and

marital status for the years 2001 to 2005, together with the average amount of employees in each category over the five years. These average amounts are illustrated in Figure 7.21 and Figure 7.22. As can be noted and as could reasonably be expected, the majority of the employees are either married or single. Thus, the annual figures for the married and single full-time and part-time employees carry the greatest interest, and further graphical representations (Figure 7.23 to Figure 7.27) illustrate the movement in the annual numbers of employees for each of these two marital status.

Full-time		2001	2002	2003	2004	2005	**Average**
Divorced / Annulled	Male	16	15	15	14	15	**15**
	Female	4	3	5	3	3	**3.6**
	Total	*20*	*18*	*20*	*17*	*18*	***18.6***
Married	Male	6508	6350	6160	5982	5883	**6176.6**
	Female	1680	1647	1656	1600	1577	**1632**
	Total	*8188*	*7997*	*7816*	*7582*	*7460*	***7808.6***
Separated	Male	110	100	98	101	98	**101.4**
	Female	41	38	37	38	39	**38.6**
	Total	*151*	*138*	*135*	*139*	*137*	***140***
Single	Male	4901	5210	5509	5742	6068	**5486**
	Female	1422	1528	1641	1744	1857	**1638.4**
	Total	*6323*	*6738*	*7150*	*7486*	*7925*	***7124.4***
Widow/er	Male	15	12	11	10	5	**10.6**
	Female	9	10	11	10	8	**9.6**
	Total	*24*	*22*	*22*	*20*	*13*	***20.2***
Total	Male	11550	11687	11793	11849	12069	**11789.6**
	Female	3156	3226	3350	3395	3484	**3322.2**
	Total	*14706*	*14913*	*15143*	*15244*	*15553*	***15111.8***

Table 7.19: Marital status of full-time employees in a science-related career for the years 2001 to 2005

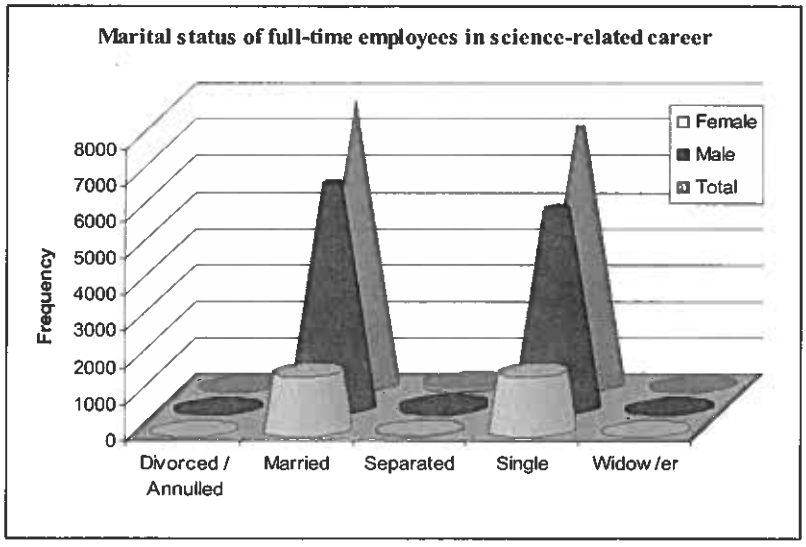


Figure 7.21: Average number of full-time employees in a science-related career according to marital status

As can be deduced from the above table and figure, the great majority of both the married and the single full-time employees are male. However, there are more female single employees than married female employees, while the situation is reversed in the case of male employees.

Part-time		2001	2002	2003	2004	2005	Average
Divorced / Annulled	Male	2	0	0	0	1	**0.6**
	Female	1	1	1	1	2	**1.2**
	Total	*3*	*1*	*1*	*1*	*3*	***1.8***
Married	Male	984	1025	1048	1126	1206	**1077.8**
	Female	717	716	726	755	784	**739.6**
	Total	*1701*	*1741*	*1774*	*1881*	*1990*	***1817.4***
Separated	Male	20	25	28	27	32	**26.4**
	Female	21	19	23	23	26	**22.4**
	Total	*41*	*44*	*51*	*50*	*58*	***48.8***
Single	Male	454	506	532	654	766	**582.4**
	Female	238	280	332	394	461	**341**
	Total	*692*	*786*	*864*	*1048*	*1227*	***923.4***
Widow/er	Male	5	6	5	5	5	**5.2**
	Female	3	3	3	4	5	**3.6**
	Total	*8*	*9*	*8*	*9*	*10*	***8.8***
Total	Male	1465	1562	1613	1812	2010	**1692.4**
	Female	980	1019	1085	1177	1278	**1107.8**
	Total	*2445*	*2581*	*2698*	*2989*	*3288*	***2800.2***

Table 7.20: Marital status of part-time employees in a science-related career for the years 2001 to 2005

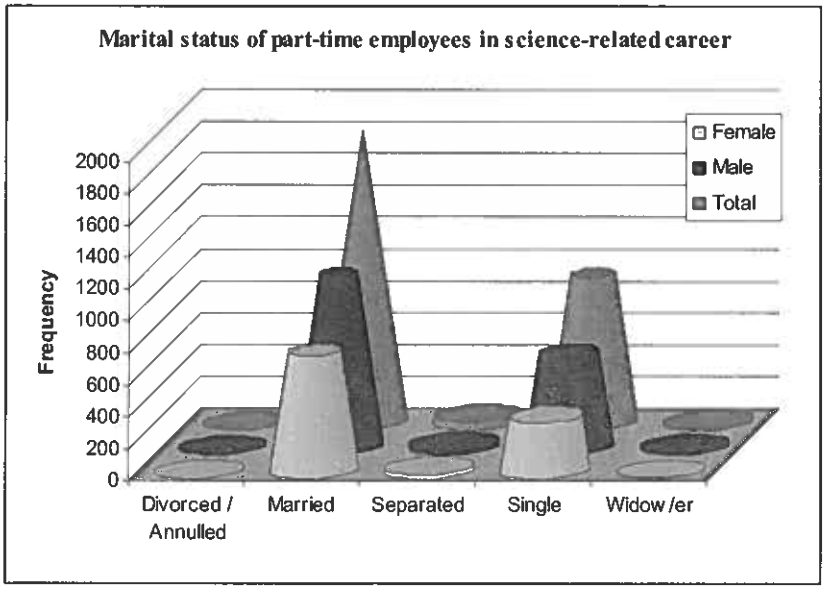


Figure 7.22: Average number of part-time employees in a science-related career according to marital status

In the case of part-time employees, the gap between single males and single females and between married males and married females, although still existent, is by far less than the gap present in full-time

employment. Also, contrasting the situation in full-time employment, the majority of female part-timers are married. As for the male, the majority of them are, again, married.

The number of full-time married employees in a science-related career was on a steady decrease between 2001 and 2005. Mainly this was a result of the decrease in the number of male full-time married employees, since the number of female married full-timers remained almost constant. A completely different picture is portrayed in the case of part-time married employees. The last few years saw a fast increase in the total number of married part-timers, and this was a result of a fast increase both for males and females. Figure 7.23 illustrates this situation.

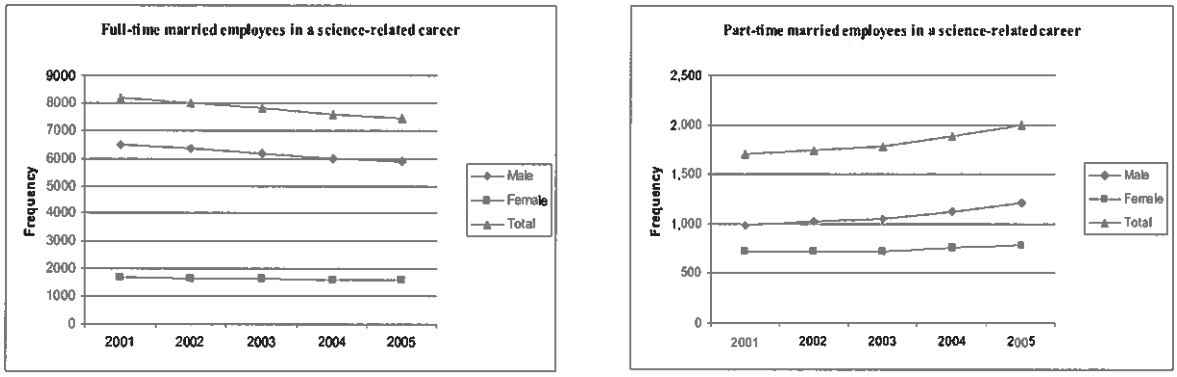


Figure 7.23: Full-time and part-time married employees in a science-related career between 2001 and 2005

In contrast with full-time married employees, the number of full-time single employees increased quite drastically between 2001 and 2005. This was a result of the substantial increases for both male and female single full-timers. In the case of part-time single employees, the increase was even greater and more marked. In fact, the total number of part-time employees almost doubled over the five years considered. Again, this was a consequence of increases in both sexes. The difference between the situations for males and females was that, while female part-time single employees increased at a steady rate over the five years, the increase in the amount of male single part-timers became more intense in the last three years. This is evident even from the graphs in Figure 7.24.

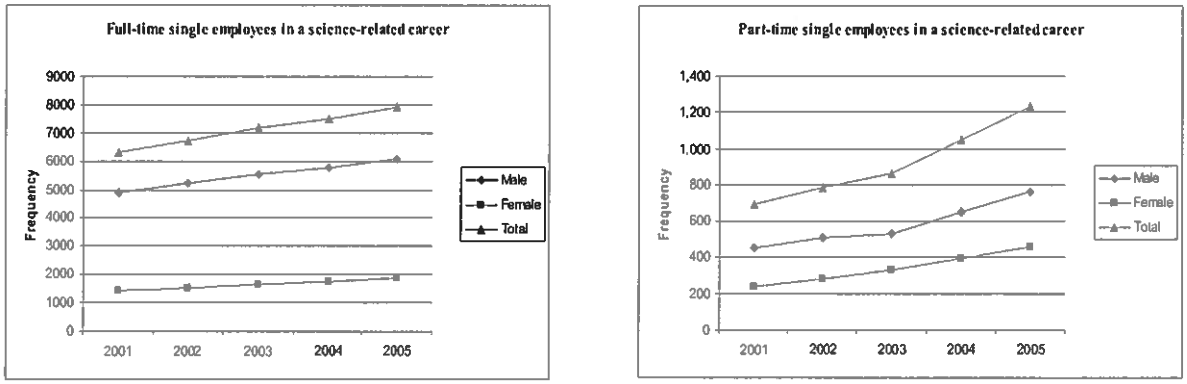


Figure 7.24: Full-time and part-time single employees in a science-related career between 2001 and 2005

The situation for the total number (full-time and part-time) of employees was examined to determine the overall effect of the changes mentioned above (refer to Figures 7.25 and 7.26). In fact, it can be noted that there was a marginal decrease in the number of married employees, while the increase in the number of single employees was more substantial. Also, the rate at which these changes happened was quite constant over the five years taken into consideration.

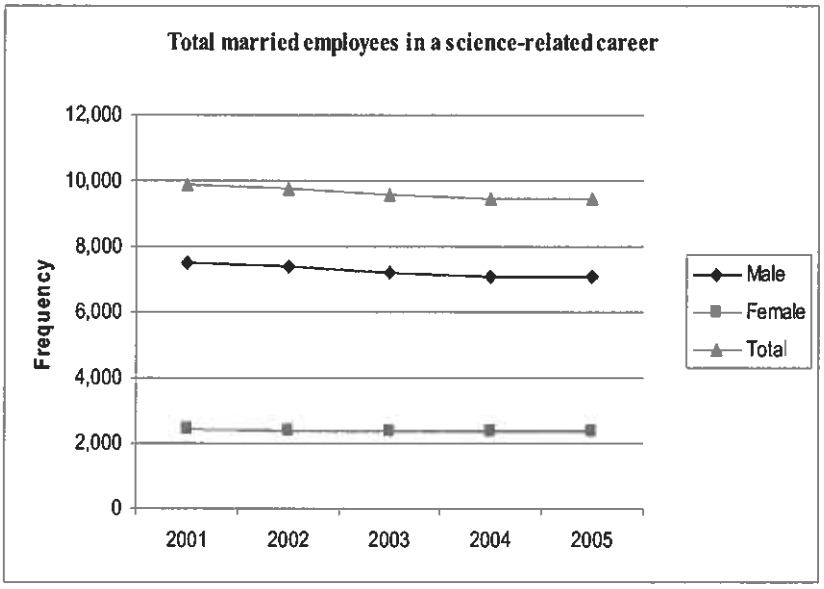


Figure 7.25: Married employees in a science-related career between 2001 and 2005

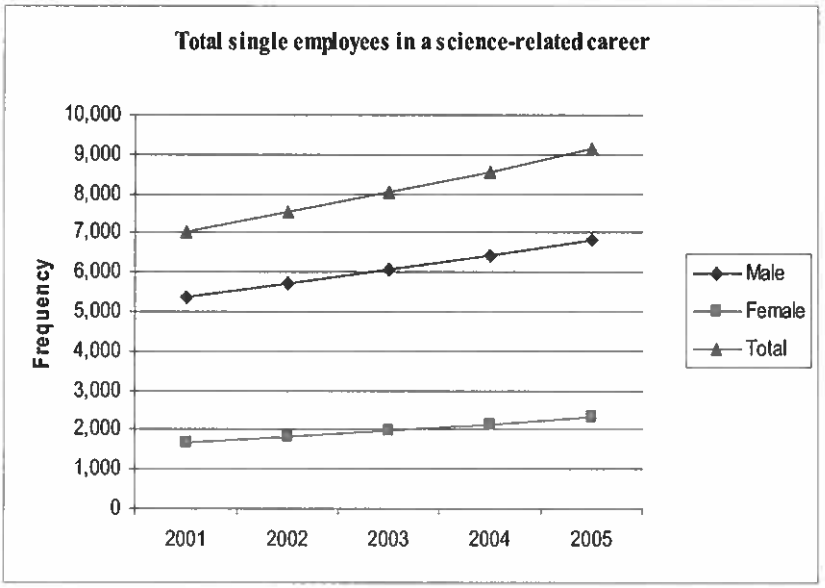


Figure 7.26: Single employees in a science-related career between 2001 and 2005

All the above mentioned analysis led to an indication of a significant gender difference in full-time and in part-time employment. For this reason, significant tests with 5% level of significance were conducted for each year to check whether this hypothesis was justified or otherwise. The results of these tests confirmed that there is significant evidence of a gender difference in the case of full-time employment in

all the five years considered. In fact, female married full-timers were consistently under-represented, while female single full-timers were over-represented. However, in the case of part-time employment, the only registered significant evidence of a gender difference was in 2001, where female single employees were over-represented.

Age group of employees

Another variable that was taken into consideration was the age of the employees in a science-related career. For graphical purposes, the available data was grouped into six age-groups, as shown in the Tables 7.21 and 7.22 below.

Figure 7.27 and Table 7.21 show the age-groups of the full-time employees. As can be noted by taking the average over the five years being considered, the majority of the full-timers in science-related careers have between 30 and 39 years, followed closely by those in the '20 to 29 years' age-group. For each age-group, the male full-timers are always in the majority. The most common age-group for the male full-timers is between 30 and 39 years. On the other hand, the majority of the female full-time employees in a science-related career have between 20 and 29 years.

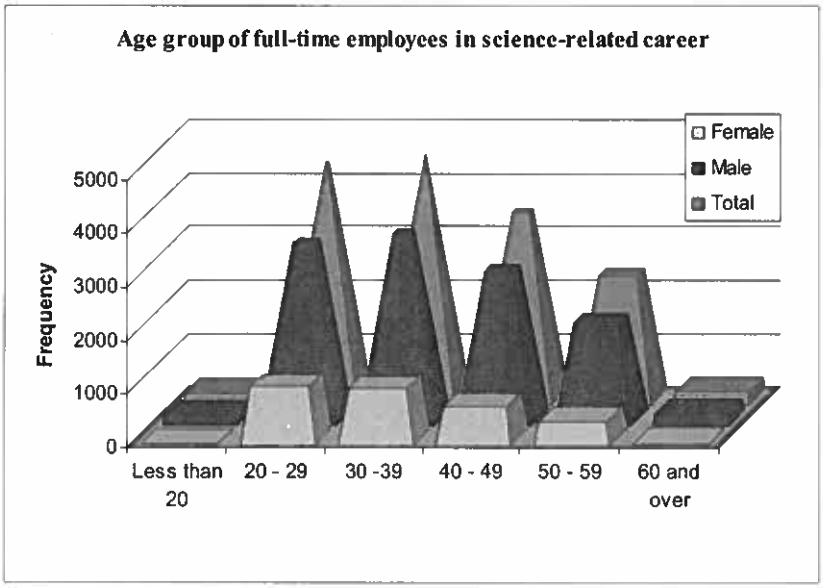


Figure 7.27: Average number of full-time employees in a science-related career according to age group

Full-time		2001	2002	2003	2004	2005	Average
Under 20 years	Male	216	176	173	150	150	**173**
	Female	23	21	15	15	16	**18**
	Total	*239*	*197*	*188*	*165*	*166*	***191***
20 – 29 years	Male	3,343	3376	3308	3241	3212	**3296**
	Female	1,089	1079	1089	1056	1053	**1073.2**
	Total	*4,432*	*4,455*	*4,397*	*4,297*	*4,265*	***4369.2***

30 – 39 years	Male	3,415	3476	3459	3464	3534	**3469.6**
	Female	1,014	1019	1036	1053	1077	**1039.8**
	Total	*4,429*	*4,495*	*4,495*	*4,517*	*4,611*	***4509.4***
40 – 49 years	Male	2,537	2,652	2,803	2,911	3,011	**2782.8**
	Female	617	653	707	754	820	**710.2**
	Total	*3,154*	*3,305*	*3,510*	*3,665*	*3,831*	***3493***
50 – 59 years	Male	1,875	1861	1866	1833	1905	**1868**
	Female	392	431	464	478	470	**447**
	Total	*2,267*	*2,292*	*2,330*	*2,311*	*2,375*	***2315***
60 and over	Male	164	146	184	250	257	**200.2**
	Female	21	23	39	39	48	**34**
	Total	*185*	*169*	*223*	*289*	*305*	***234.2***
Total	Male	11,550	11,687	11,793	11,849	12,069	**11789.6**
	Female	3,156	3,226	3,350	3,395	3,484	**3322.2**
	Total	*14,706*	*14,913*	*15,143*	*15,244*	*15,553*	***15111.8***

Table 7.21: Age group of full-time employees in a science-related career for the years 2001 to 2005

Taking the average over the years 2001 to 2005 in the case of part-time employees, it is noted that the majority still come from within the age-group '30 to 39 years', but these are followed by those having between 40 and 49 years. Male part-timers are again greater in number than their female colleagues in each age-group. The majority of male part-timers have between 30 and 39 years, with the second largest group being that between 40 and 49 years. In contrast to the male situation, the majority of the female part-timers have between 40 and 49 years of age, followed very closely by those having between 30 and 39 years and those in the '20 to 29 years' age-group, in this order. Figure 7.28 illustrates this situation while Table 7.22 gives the number of part-time employees for each year between 2001 and 2005, together with the average of the number of part-timers over the five years.

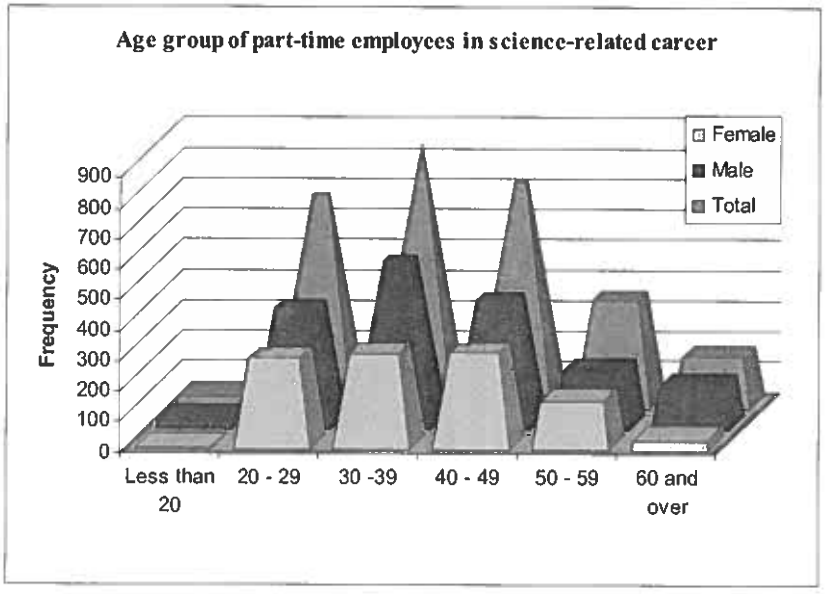


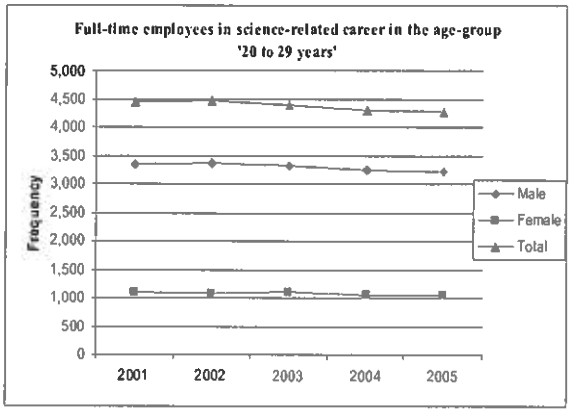
Figure 7.28: Average number of part-time employees in a science-related career according to age group

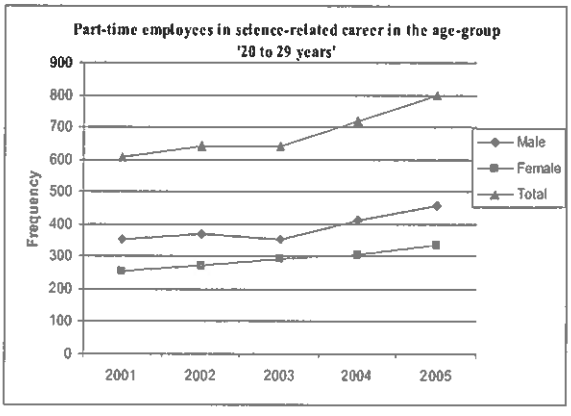
Part-time		2001	2002	2003	2004	2005	Average
Under 20 years	Male	25	34	21	30	34	**28.8**
	Female	8	6	5	9	11	**7.8**
	Total	*33*	*40*	*26*	*39*	*45*	***36.6***
20 – 29 years	Male	353	369	351	412	460	**389**
	Female	254	271	291	307	337	**292**
	Total	*607*	*640*	*642*	*719*	*797*	***681***
30 – 39 years	Male	502	520	518	550	593	**536.6**
	Female	298	296	295	309	343	**308.2**
	Total	*800*	*816*	*813*	*859*	*936*	***844.8***
40 – 49 years	Male	302	349	416	467	529	**412.6**
	Female	279	287	300	340	351	**311.4**
	Total	*581*	*636*	*716*	*807*	*880*	***724***
50 – 59 years	Male	169	177	183	201	212	**188.4**
	Female	117	134	166	176	199	**158.4**
	Total	*286*	*311*	*349*	*377*	*411*	***346.8***
60 and over	Male	114	113	124	152	182	**137**
	Female	24	25	28	36	37	**30**
	Total	*138*	*138*	*152*	*188*	*219*	***167***
Total	Male	1,465	1,562	1,613	1,812	2,010	**1692.4**
	Female	980	1,019	1,085	1,177	1,278	**1107.8**
	Total	*2,445*	*2,581*	*2,698*	*2,989*	*3,288*	***2800.2***

Table 7.22: Age group of part-time employees in a science-related career for the years 2001 to 2005

For clarity's sake, the movements in the number of employees within the four major age-groups is also illustrated in Figures 7.29 to 7.32 below.

The number of full-time male employees having between 20 and 29 years decreased slightly between 2001 and 2005, while the number of female full-timers in the same age group remained almost constant. On the other hand, both the number of male part-timers and female part-timers increased over these five years. The overall effect of these movements on the total number of employees having between 20 and 29 years was that both the number of male and female employees remained roughly the same in all the five years considered. This is illustrated in Figure 7.29.





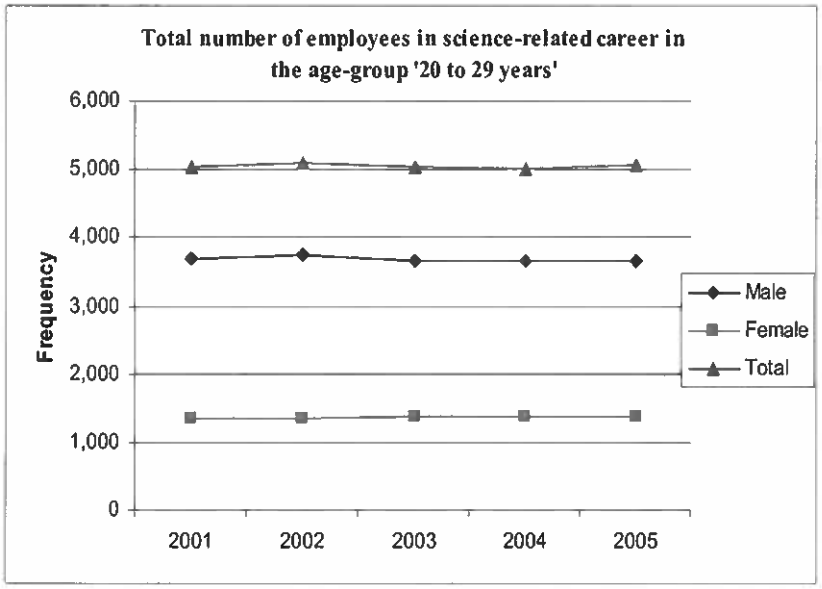


Figure 7.29: Number of employees in a science-related career in the '20 to 29 years' age group for 2001-2005

The situation with the '30 to 39 years' age group is shown in Figure 7.30. The full-time male and female employees increased slightly, but the increase in the number of part-timers was more substantial. In fact, the total number of employees in this age-group increased gradually between 2001 and 2005.

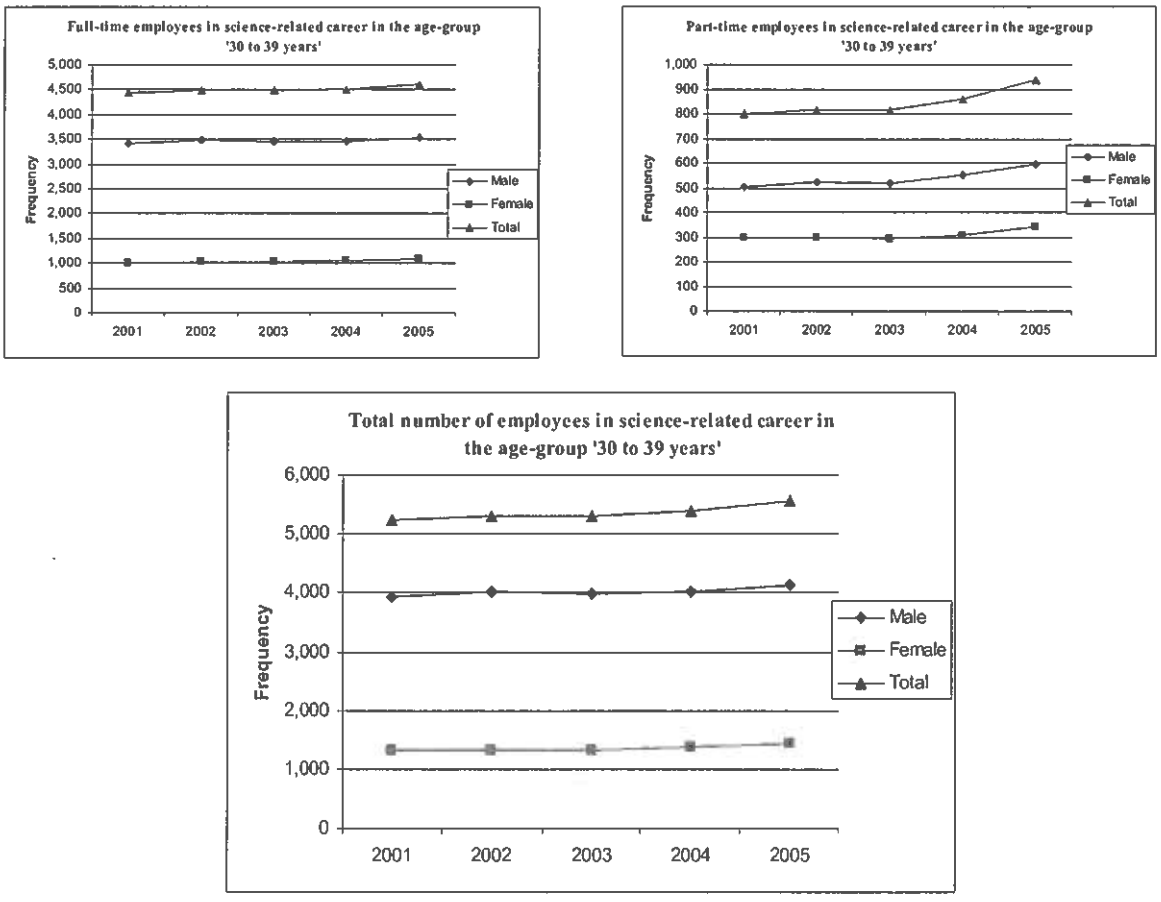


Figure 7.30: Number of employees in a science-related career in the '30 to 39 years' age group for 2001-2005

A totally different setting was present in the age-group '40 to 49 years. The increase in both the number of full-timers and part-timers is evident from Figure 7.31. In fact, the increase in male employees from 2001 to 2005 was of 700 employees, that is, a growth of 24.7%. The percentage increase in the number of female employees between 2001 and 2005 was even greater. This amounted to 275 employees, equivalent to a rise of 30.7%. The overall increase in the total number of employees between 2001 and 2005 was of 976 employees, or 25.1%.

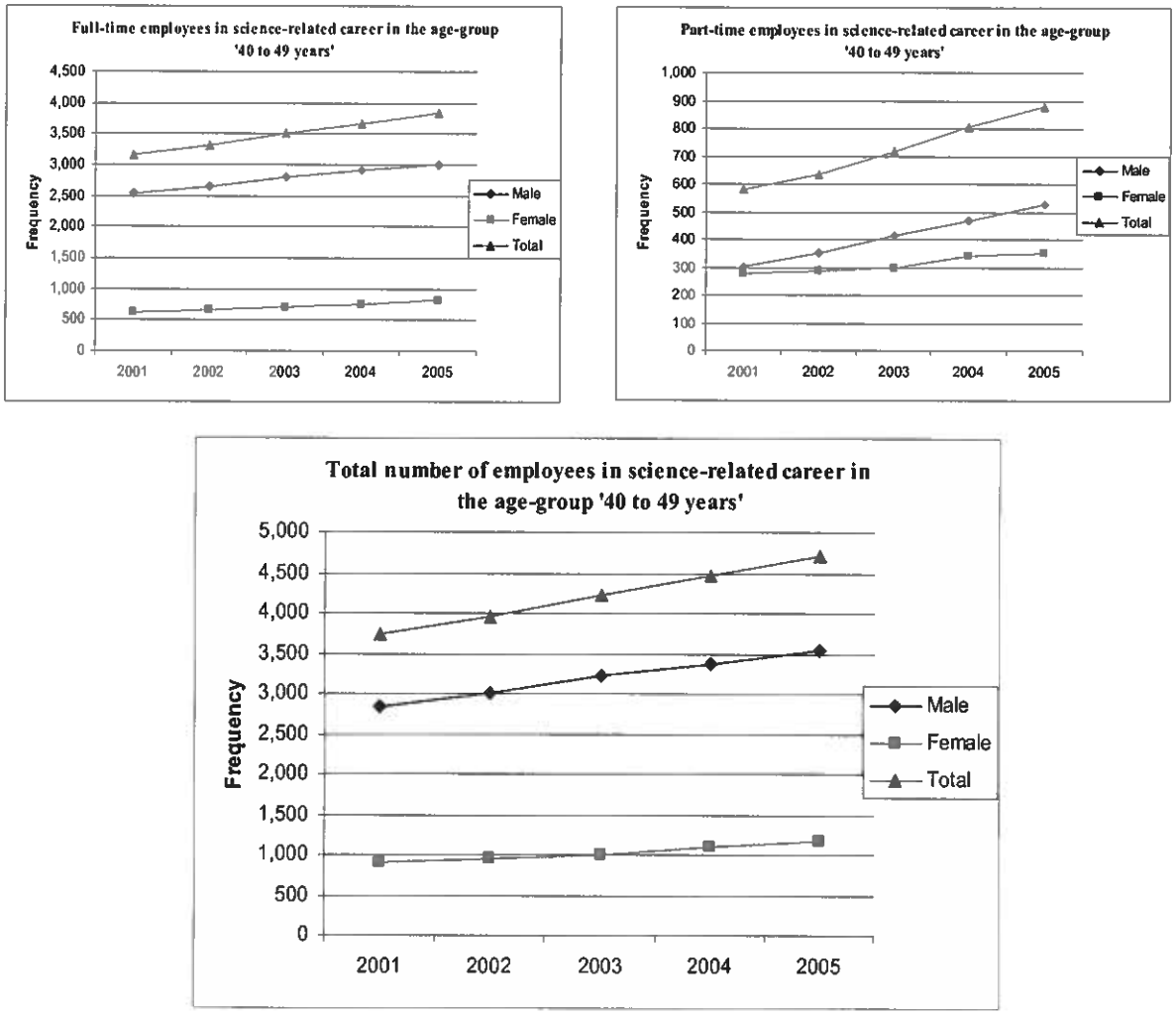
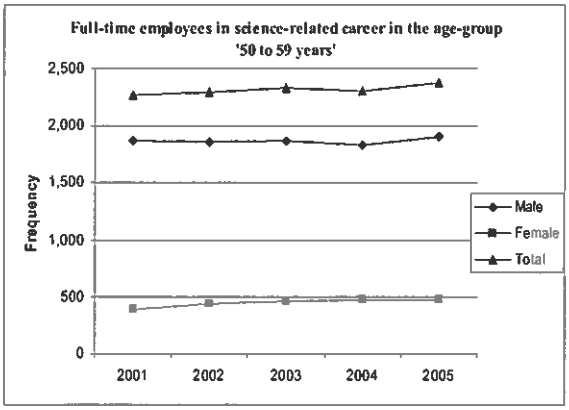
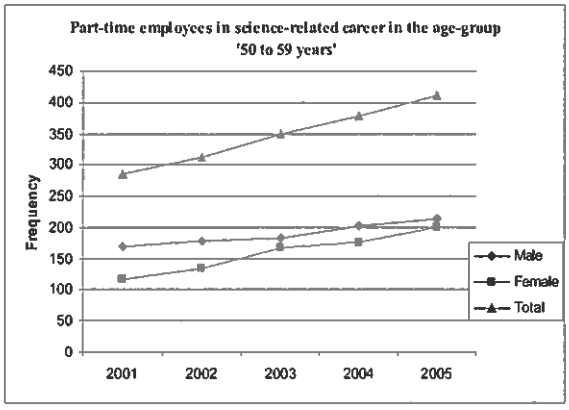


Figure 7.31: Number of employees in a science-related career in the '40 to 49 years' age group for 2001-2005

The graphical representations in Figure 7.32 illustrate the developments in the number of employees having between 50 and 59 years for the years 2001 to 2005. While the number of full-time employees went only through a slight increase, the number of part-timers increased substantially. This latter increase was mainly a result of the increase in the number of female part-timers, which almost doubled over the five years. Combining these figures for full-time and part-time employees, it is noticed that the increase in the age-group '50 to 59 years' was the second greatest increase. In fact, the increase in

male employees was of 3.6% while the increase in female employees was of 31.4%, giving a global increase of 9.1% in the employees having between 50 and 59 years.





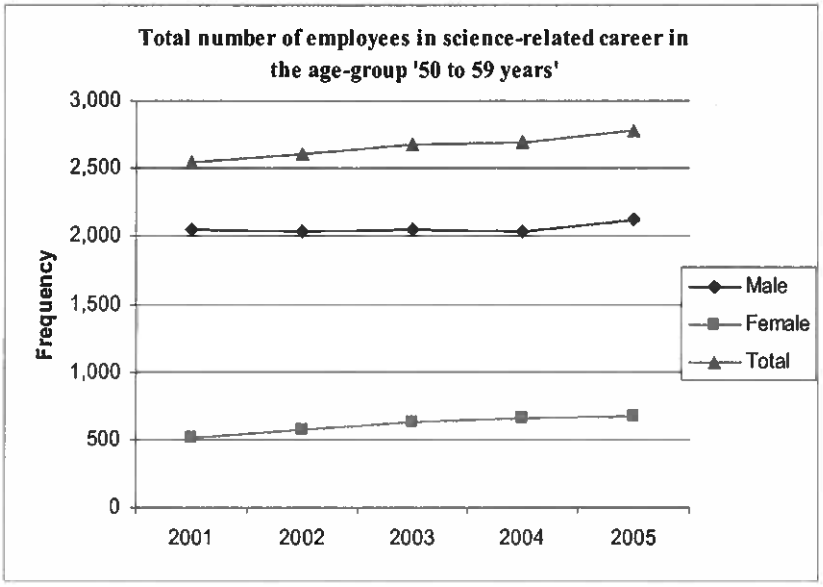


Figure 7.32: Number of employees in a science-related career in the '50 to 59 years' age group for 2001-2005

The median age for the male and female, full-time and part-time employees was also calculated. The calculations were made using the original age-groups provided by ETC, that is 'less than 18 years', '18 to 20 years', '20 to 24 years', '25 to29 years', '30 to 39 years', '40 to 44' years, '45 to 49 years', '50 to 54 years', '55 to 59 years', '60 to 64 years', and '65 years and over'. The results are illustrated in Figure 7.33 below. It can be noted that, throughout the five years taken into consideration, the median age of the female full-timers was considerably less than that for the male part-timers. On the other hand, the median age of the female part-time employees was higher than that for their male counterparts, although only slightly.

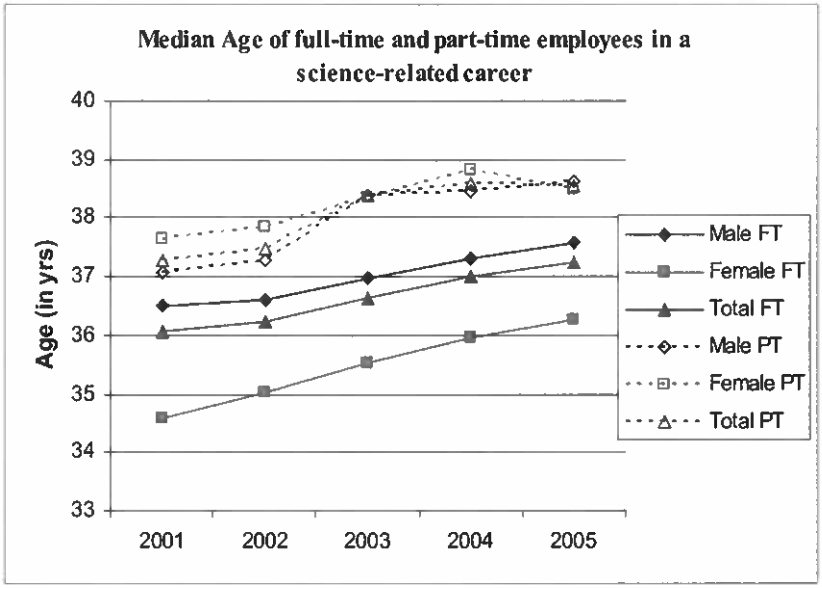


Figure 7.33: Median age of full-time and part-time employees in a science-related career for 2001-2005

Amalgamating these results, the situation for the total number of employees is shown below. Figure 7.34 shows how the median age of male employees is higher than that of female employees. It is noted that the average median age for the male employees over the five years considered was of 37.1 years, while that for the female employees was of 36.1 years.

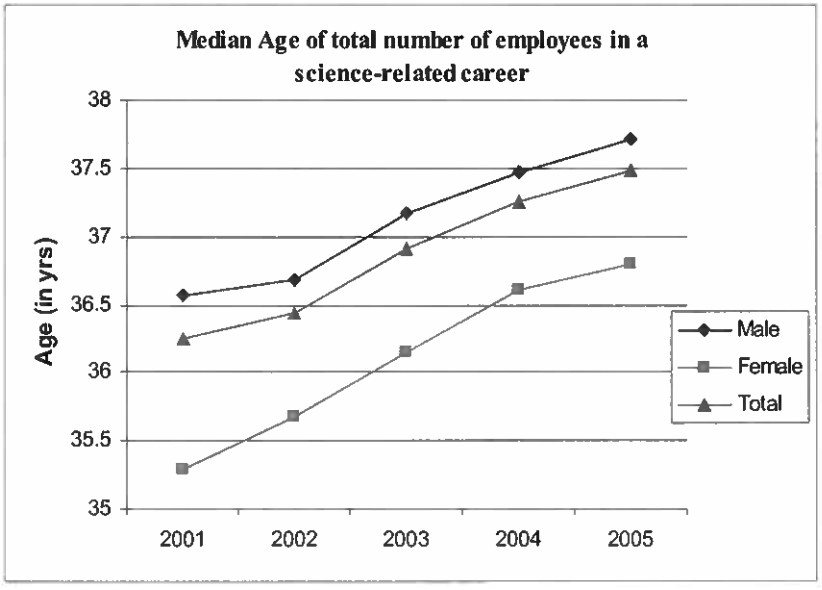


Figure 7.34: Median age of employees in a science-related career for 2001-2005

Chi-squared tests for significance (at 5% level of significance) were conducted for each year between 2001 and 2005 to test for gender difference in the age of employees. The results of the tests confirmed the gender difference existing in the age of the employees (both full-time and part-time) in all the five years considered. A common conclusion for the tests conducted on the full-time employees showed

that the female employees in the age-group '25 to 29 years' were considerably over-represented, while the age groups '50 to 54 years' (for 2001 and 2002) and '45 to 49 years' (for 2002, 2003 and 2004) were under-represented. In the case of part-time employment, in 2001 and 2002 there was an over-representation of the female employees having age between 45 and 49 years, and in 2003, 2004 and 2005 the females in the '50 to 54 years' age-group were over-represented.

Duration of employment

A last variable that was studied was the duration of the employees in their employment at the end of each year. The table below (Table 7.23) gives the average number of employees over the five years for each time-duration indicated. As can be seen, on average, the majority of male and female full-timers were in their current employment for between 10 and 20 years. On the other hand, the majority of male and female part-timers were in their current employment for between 5 and 10 years.

Duration in employment (in years)	*Full-time*		*Part-time*	
	Male	*Female*	*Male*	*Female*
0 to 0.5	775.2	197.8	145.2	103.4
0.5 to 1	475.6	84.2	124.2	72.4
1 to 2	1223.4	271.8	251.6	175
2 to 3	863.4	225.4	163.8	118.2
3 to 4	759	189.8	127.8	89.2
4 to 5	780.8	205.8	108.2	79
5 to 10	2652.4	736.6	512.8	292.6
10 to 20	2841.6	1018.4	210.4	131.6
20 to 30	1060.8	340.8	30.4	46.4
30 to 40	304	50.6	13.2	0
40 to 50	51.4	1	4.8	0
50 to 60	2	0	0	0
Total	*11789.6*	*3322.2*	*1692.4*	*1107.8*

Table 7.23: Average number of employees in a science-related career according to the duration in their current employment

Due to the difference in the number of female and male employees, the above table is not suitable to determine if male or female tend to stay longer in the same employment. Thus, a table with percentage numbers was constructed, whereby the number of employees in each of the time-duration section was expressed as a percentage of the total number of employees in the respective category (as shown in Table 7.24). It can be noted that, while there is a greater percentage of male full-timers who stay in the same employment between 0 and 10 years, the percentage of female full-timers who stay in the same employment for between 10 and 30 years is larger. The situation is completely reversed in the case of

part-time employment. In fact, a greater percentage of female part-timers than male part-timers stay in the same employment for between 0 and 5 years, while the male part-timers who stayed in the same employment for 5 to 20 years are more in percentage terms than their female counterparts.

Duration in employment (in years)	*Full-time*		*Part-time*	
	Male	*Female*	*Male*	*Female*
0 to 0.5	6.6	6.0	8.6	9.3
0.5 to 1	4.0	2.5	7.3	6.5
1 to 2	10.4	8.2	14.9	15.8
2 to 3	7.3	6.8	9.7	10.7
3 to 4	6.4	5.7	7.6	8.1
4 to 5	6.6	6.2	6.4	7.1
5 to 10	22.5	22.2	30.3	26.4
10 to 20	24.1	30.7	12.4	11.9
20 to 30	9.0	10.3	1.8	4.2
30 to 40	2.6	1.5	0.8	0.0
40 to 50	0.4	0.0	0.3	0.0
50 to 60	0.0	0.0	0.0	0.0
Total	*100*	*100*	*100*	*100*

Table 7.24: Average percentage number of employees in a science-related career according to the duration in their current employment

The above can be confirmed by looking at the mean duration time in the current employment of the full-time and part-time, male and female employees for each year between 2001 and 2005. This is illustrated in Figure 7.35. In fact, the mean duration time for female full-timers has been on the increase since 2001, and was always greater than that for their male colleagues. On the other hand, in the case of part-timers, the mean duration time for females was greater than that of males in the first couple of years, but this was reversed in the last two years.

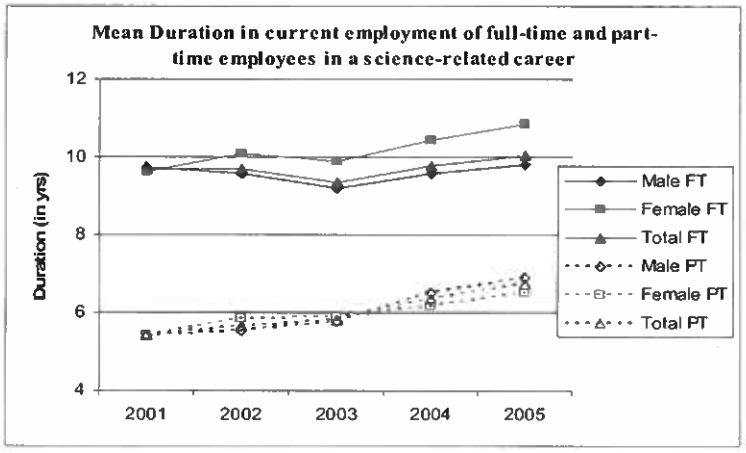


Figure 7.35: Mean duration time in current employment of full-time and part-time employees for 2001-2005

Combining the results for full-time and part-time employment, it can be noted that in the last three years, female employees were inclined to stay in their current employment for a longer time than male employees. This is clear from Figure 7.36 below.

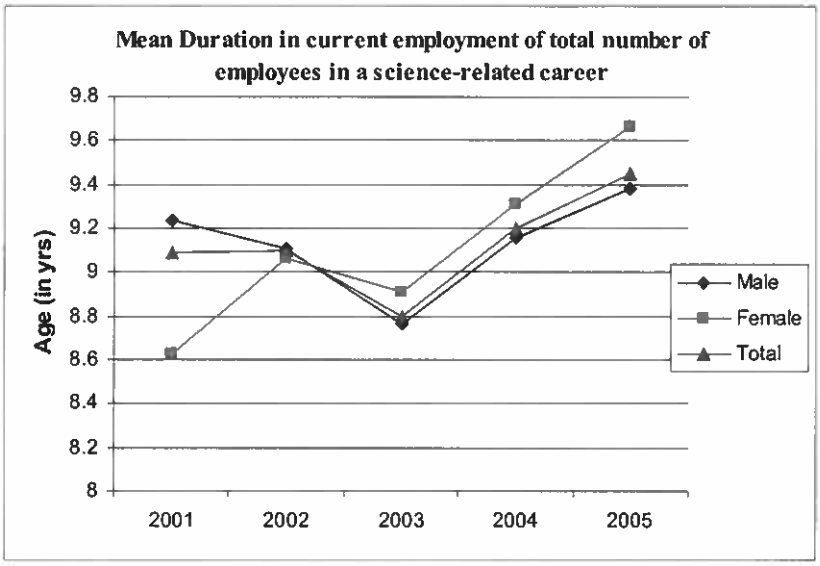


Figure 7.36: Mean duration time in current employment of employees in a science-related career for 2001-2005

Chi-squared tests for significance were conducted to test for gender difference at the 5% level of significance in the duration time in the current employment. The results confirmed that a gender difference existed throughout the five years considered, both in the case of full-time and part-time employees. The case of full-time employees is more interesting since the results were very stable. The tests showed that in the years 2001 to 2004, the female full-timers who were in their employment for 10 to 20 years were considerably over-represented, while, in 2005, the female full-timers who were in their employment for 20 to 30 years were over-represented.