Theme 2

EDUCATION FOR SUSTAINABLE DEVELOPMENT

Wednesday 7th November
(Parallel Session - morning)

Chair: Robin South
Rapporteur: Damien Sweeney

The gender gap in science and technology in Malta – evaluating the problem and tackling the issues

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Abstract
Women scientists in Malta are under-represented in the key positions of scientific research, and this is a result of a multitude of factors. The gap present in the area of science and technology in Malta has been discussed and disputed for quite some time. A lot has been said on the possible causes and consequences of this situation. However, although some gender data on these regards has been collected, no serious discussion and research has been made on this problem. The project "The gender gap in science and technology in Malta – evaluating the problem and tackling the issues" [2] was funded by UNESCO and coordinated by the NCPE, the ETC and the University of Malta. It was driven and inspired by the vision of changing into reality the desire for equal opportunities for all in the area of science and technology in Malta. It aimed at measuring and evaluating the extent of this problem and, subsequently, at working towards some possible measures and initiatives that can be taken to tackle this problem.

Introduction

Since the 1990s there has been a continuous increase in the awareness of the gender gap present in all fields of science and technology around the world. A lot has been said about the barriers present in the science and technology area which are hindering more women from entering this sphere. Many studies have been conducted on the subject and numerous articles and papers have been published. For a list of nearly 700 annotated publications on gender and technology in education available in 2005 the reader is referred to [3]. The conference 'Women in Industrial Research – Speeding up Changes in Europe' organised in Berlin in 2003 brought together over 350 experts from more than 40 countries to discuss how to enhance European research and competitiveness by recruiting, retaining and promoting more women in research and development, in particular in the area of science and technology. One of the outcomes of this conference was that "Europe needs more women in industrial research - and more women studying science and engineering." [1, p.7]

Despite all these various initiatives and many accomplishments, the limited number of women in decision making positions is still a reality today in many societies, including the Maltese scenario. Over the last decade we have indeed 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: first, to determine the rate of participation of women in science and technology in Malta; and, second, 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.

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 general picture of the situation present in Malta regarding the number of students following and graduating from a science-related course at all MCAST institutes and at the University of Malta, and regarding the number of people employed in a science-related career is presented below.

MCAST Statistics

The number of students frequenting the Malta College of Arts, Science and Technology (MCAST) has risen from just over 1500 in 2001 to almost 3800 over a period of five years, as shown in Figure 1. The increase in 2003 in the number of institutes, from six institutes to nine institutes and a Gozo Centre, has surely contributed to this drastic increase in students attending the courses offered at MCAST. Another reason that may explain this rise in the number of students is the yearly introduction of new courses in almost each institute. A number of these institutes offer different courses leading to qualifications in science-related vocations. 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

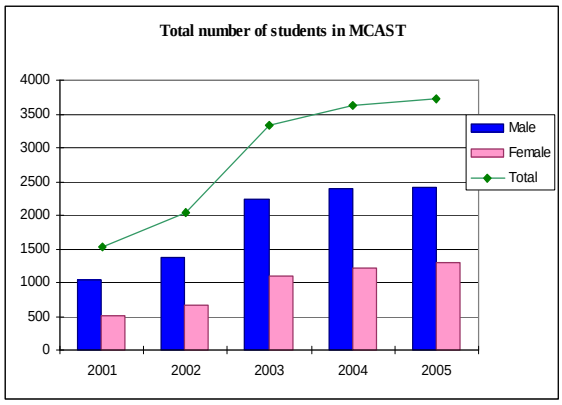

Fig. 1: Total number of students attending MCAST between 2001 and 2005

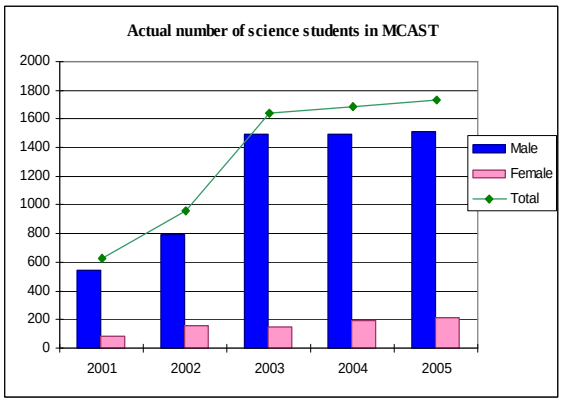

Fig. 2: Actual number of students following a science related course at MCAST

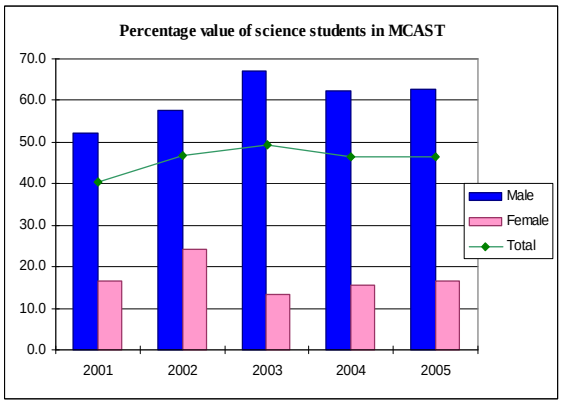

Fig. 3: Percentage number of students following a science related course out of the population of MCAST

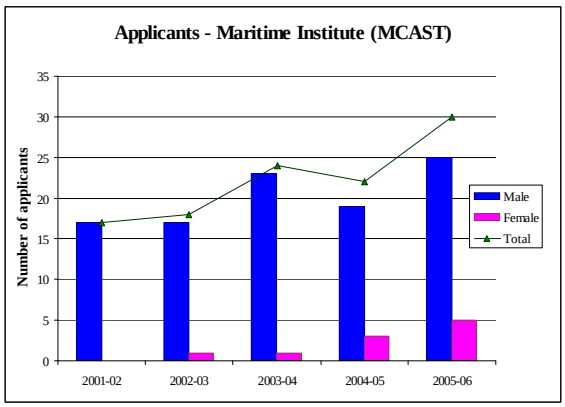

Fig. 4: Number of students following a course at the Maritime Institute

presented in Figure 2. It is evident from the figure that the male students outnumber the female counterparts. 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 3). In doing so, 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.

One of the institutes within MCAST is the Maritime Institute. Figure 4 shows the number of students following a course offered by this institute. As can be clearly seen, the number of female students has increased during these five years, although, when compared to the number of male students, it is still extremely low.

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 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 was faster than the rate of increase of the female graduates. When the percentage values of science graduates out of the total number of graduates were taken into consideration (refer to Figure 6), 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.

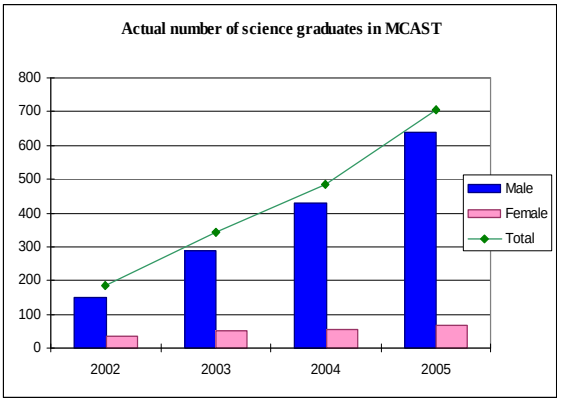

Fig. 5: Actual number of science graduates in MCAST

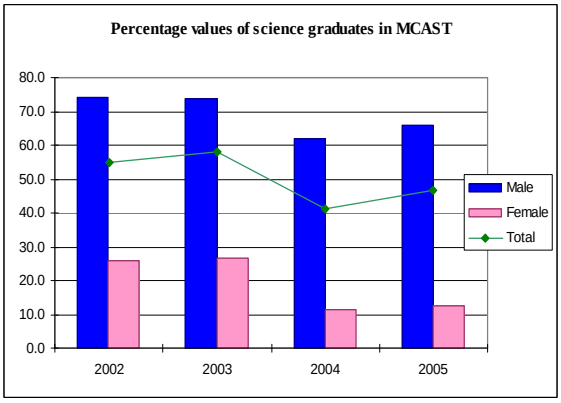

Fig. 6: Percentage number of science graduates out of all the graduates

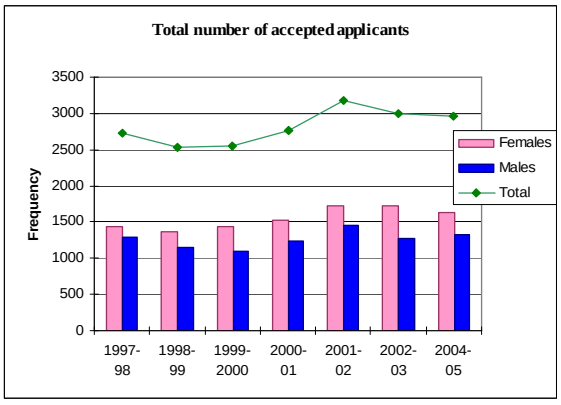

Fig. 7: Total number of accepted applications between 1997-98 and 2004-05

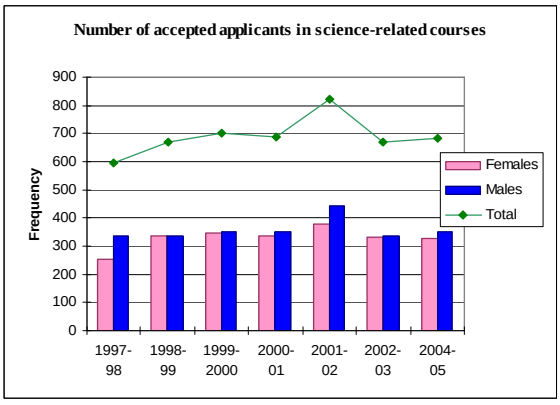

Fig. 8: Number of accepted applicants in science-related courses

University of Malta Statistics

The University of Malta is an institution that provides education at a tertiary level on the Maltese Islands. As shown in Figure 7, the number of accepted new applicants between 1997-98 and 2004-05 in all faculties was rather unstable, but the number of female applicants was always higher than the
number of male applicants. Figure 8 illustrates the number of accepted new applicants following a science-related course. Excluding 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.

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 9). 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 their female counterpart. Therefore, the female cohort was underrepresented in the science areas during the mentioned time-period.

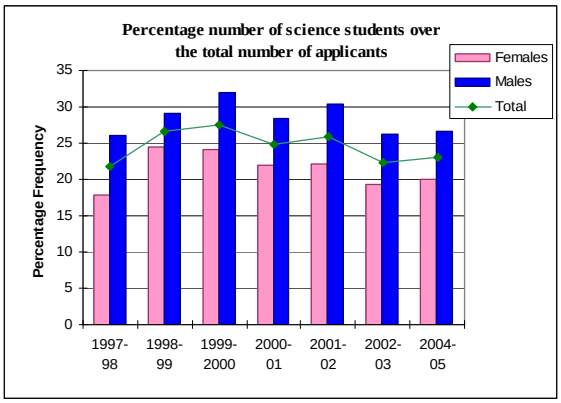

Fig. 9: Number of science applicants as a percentage of the total number of applicants

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 10 illustrates, the numbers of female and male graduates are almost equal to each other. However, considering the total number of graduates from University and computing the percentage number of the science graduates over the total number of graduates (Figure 11), it is again noted that the female graduates in science are still underrepresented.

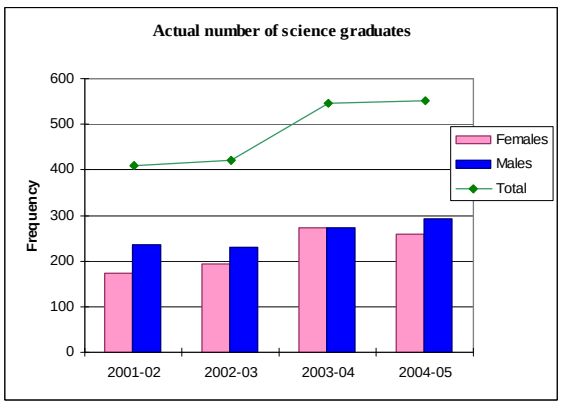

Fig. 10: Number of science graduates between 2001-02 and 2004-05

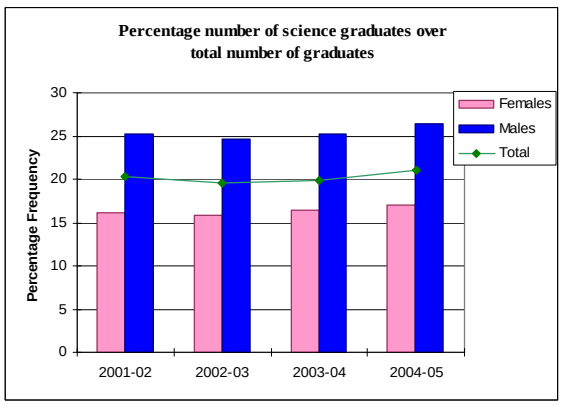

Fig. 11: Number of Science graduates as a percentage of total number of graduates

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).

From the statistics available, the number of employees employed in science- and technology-related occupations was analysed according to whether they are in full-time or part-time employment. Figure 12 below shows 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, albeit small. 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 in science related jobs between 2001 and 2005 was of 10.4%, contrasting with the 4.5% increase in the number of male full-time employees.

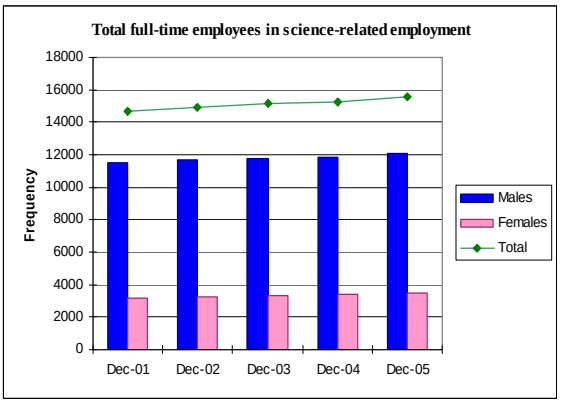

Fig. 12: Total full-time employees in science-related employment

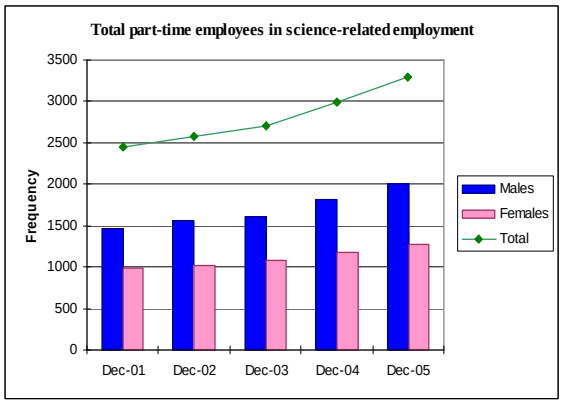

Fig. 13: Total part-time employees in science-related employment

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 in science related jobs increased by 37.2% when compared to the increase of 30.4% in part-time female employees. Figure 13 illustrates the situation for part-time employment.

Figure 14 below illustrates the overall total number of employees employed in 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 15 illustrates the number of employees in marine-related employment. The minimal contribution of the female sex in this category is overt. The massive gap between males and females is immediately evident.

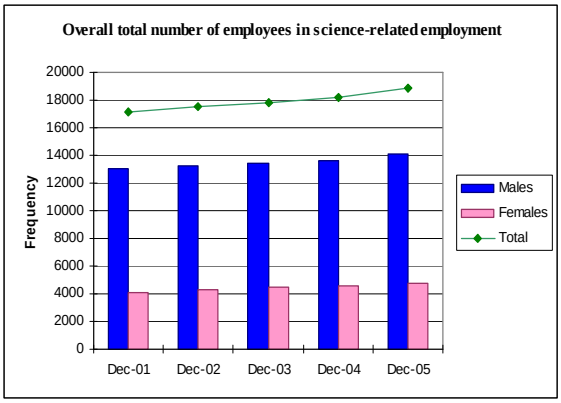

Fig. 14: Overall total number of employees in science-related employment

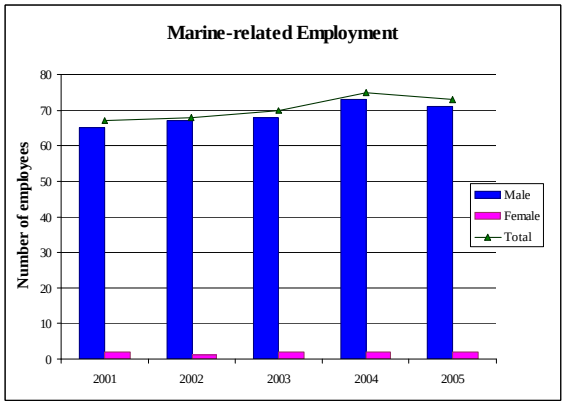

Fig. 15: Employees in marine-related employment

Dissemination and Promotion of Science

Various initiatives marked this project, aimed at tackling the issues relating to women and science as presented to us by the current situation in our islands. The objectives for 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, and counteracting the negative perceptions some people (students and parents) have in relation to science. Talks and discussion sessions were held with girls in secondary schools, to promote the choice of science subjects. A pilot project entitled 'Science Club for Girls' was also 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.

The project 'Science Club for Girls' was organised during the scholastic year 2006-2007 at the Carlo Diacono Girls' Junior Lyceum in Zejtun. Every Friday for a period of twelve weeks, a group of girls met together under the supervision of a teacher to conduct experiments in science. Before kicking off with the Science Club, a meeting for all parents of the participants was held in order to explain to them what the Science Club was all about.

Objectives

The objectives for this science club and how these objectives were fulfilled are discussed below.

(i) "Creating opportunities for girls to experiment with, and hence discover for themselves, various scientific concepts, and hence provoke their thinking skills and capabilities in science."

This Science Club was all about students carrying out experiments on their own. The role of the teacher was more that of a facilitator, in helping the students realise and discover on their own what the underlying scientific concepts of each experiment were. Without any doubt, the students' thinking skills were stimulated and the students themselves were motivated to think in a scientific mode in order to explain what was happening. Furthermore, they also had to write a report on the experiments carried out. In doing so, their scientific capabilities were elicited.

(ii) "Reinforcing the concepts and knowledge learned during the normal school hours."

Classes are usually very crowded with approximately 30 students per class, and hence it is difficult for the Science teacher to take his/her class to the laboratory and have the students engaging themselves in experiments. During this Science Club, students had time to test their theoretical learning in a very informal way. In this sense, the activities carried out during the informal Science Club sessions were complementing the formal concepts and knowledge being learnt during the normal school hours.

(iii) "Bridging the gender gap in science."

This Science Club has bridged positively the gender gap that may exist in Science. First of all, it was a 'Science Club for Girls', being carried out in a girls' secondary school, with the support of a female Head of School. So the environment itself was already revolving around females. However, when the students started carrying out the experiments on their own, and in doing so, they started to learn and understand the scientific theories behind, then the students' line of thought of a male-dominated subject might have changed. Through their hands-on experience, students were encouraged to overcome the hurdles that society poses with regards to their choice of a science-related career.

(iv) "Building inter-generational relationships between women scientists."

Towards the end of this Science Club, the students participating in this Science Club had a meeting with three female guest speakers as role models in Science. During this meeting, participants had the time to ask the speakers about their science-related career and what it was all about, how they managed and how they were doing at it.

Three of the students who have participated in this science club recount their experience of this project.

Students' Experience – Nicole Vella, Shana Kirsty Atkins and May Bonnici

"This experience meant a lot for us. In all, we were about fifteen students attending this Science Club and every Friday, during the mid-day break, we used to meet together in one of the school laboratories. Everyone used to come prepared with various items from home, and we used to be very anxious to see, and after all perform, our next experiment. One of the most interesting sessions was called 'Colourful convection currents' during which we tested the relationship between cold and warm water. Over here we learned how convection currents occur and so, how our weather changes as well.

"During all the Science Club sessions, we enjoyed ourselves mostly because we were not just seeing the teacher carrying out the experiments on his own. Instead, we were touching the things with our hands and carrying out the experiments ourselves. Furthermore, we had to think in order to explain what was happening. The teacher was just there to help us understand what was happening. This

Science Club was beneficial for all students attending it, especially for those students who before participating in the Science Club were not interested in science at all. As a result of this Science Club, today these students are more interested in science subjects. Furthermore, this Science Club helped us when it came to choose our subject options for the coming years. In fact, most of the students that used to attend this Science Club have chosen various Science subjects such as chemistry and biology. One should also mention that thanks to this Science Club, we established new friends and indeed, we reinforced our older friendships.

"When all the Science Club sessions were over, we had a meeting with three female speakers who graduated, and who today are working within the Science sector. These speakers told us and described in detail how they started becoming keen on science and they explained to us why they have chosen a science-related career. We also organised an interactive exhibition for other female students coming from different secondary schools. The aim of this exhibition was precisely to encourage other girls' secondary schools to organise a Science Club at their schools. Through this we showed that even females can succeed in the science sector."

Conclusion

Through the analysis made, conclusions reached and possible courses of action suggested, it is hoped that awareness was created on the gender gap existing in science and technology in Malta and on possible remedies to this situation. The benefits of having a shared participation between males and females in science are clear, understood and unquestioned by many. It is desired that the work done in this project and the initiatives taken do not stop here, but this project should serve as an instrument to set the ball rolling for future efforts to translate the dream of equal opportunities for all into a reality.

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The City as a Learnscape- integrating sustainability learning in the Townsville (Qld, Australia) urban environment

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Abstract

Townsville is a major regional city located adjacent to the World Heritage listed Great Barrier Reef. With a strong and diversified economy, including mining, manufacturing, military, government and educational sectors, and an increasing population, Townsville faces the challenges and opportunities of sustainable development.

Townsville City Council is developing partnerships across Council and linking with utilities, businesses and the community to foster City-wide behavioural change towards sustainability. These initiatives build on co-learning curriculum-based programmes within schools as well as community-based education and involvement opportunities implemented by Townsville City Council that are designed to foster community partnerships and ownership of catchment management.

Education on sustainability is a key outcome in order to ensure that individuals and groups are able to take action to progress the vision of sustainable development and a sustainable future. This incorporates action on issues that are both locally and globally important, such as climate change, water use, sustainable cities, and waste management, amongst others. Townsville City Council, as a progressive regional local government authority, is engaging youth and adults in learning about sustainability through seeing, feeling, and understanding the City as a Learnscape. This active learning, combined with interpretive material, helps people understand the link between the environment, environmental processes, and urban life in everyday settings. Through the integration of the concepts of Community Based Social Marketing and Thematic Interpretation, learning about sustainability in the urban environment allows the community to critically reflect on how human behaviours and action impact on the environment, and hence, what behavioural changes and actions are needed to progress the vision of Townsville as a model Sustainable City. Importantly, education about sustainability requires building and showcasing frameworks for partnerships in order to emphasise the collective linkages needed to progress the vision of a sustainable future within a working-city Learnscape.

Introduction

As the saying goes, you can lead a horse to water, but you can't make it drink. The same is true for sustainability. You can tell everyone about sustainability (and the urgency for change), but you can't make them become (more) sustainable.

The need to embrace sustainability was recognised over three decades ago, when the Club of Rome released *Limits to Growth* (Donella et al., 1972), which opened significant dialogue around the world. Since then, we have seen countless reports (Our Common Future, 1992), conferences (the various Earth Summits in 1992, 1997, 2002), media stories, even movies and documentaries (an Inconvenient Truth) warning us about the need for sustainability, and the steps we can take towards it. But has the situation changed?

Though progress has been made towards sustainability, we still rely excessively on fossil fuels, we still overconsume, and produce too much waste. After countless awareness raising campaigns, media stories and reports, and the development of better tools and technologies, very few people actually take the steps necessary to live a more sustainable lifestyle by actively reducing their ecological footprint, maintaining biodiversity, and integrating ecology.

Even those with a high awareness of sustainability may not act in accordance with their beliefs. Of those from the developed world who attended the *Pacem in Maribus* conference in Malta, or any other environmental or sustainability focused conference, who can truly say that:

- They have solar hot water at their home?
- They have100% renewable energy supplied to their home, either through photovoltaics, or through their energy utility?

- They have made the best possible changes to ensure their house is energy efficient?
- They travel by fossil fuelled cars less often, or regularly use public transport?
- They offset their travel related greenhouse gas emissions?
- They always recycle and reduce their purchasing?

It may be that only a few of the already sustainability-aware readers of this paper can answer yes to all of these questions. How then can we ask the rest of the world, particularly those in developing countries or impoverished states, to make extremely difficult changes across entire societies that are needed to ensure a sustainable future?

Unfortunately, most people around the world are still acting like the horse. Learnings from applied environmental psychology have shown that there is little link between attitudes (such as "sending all waste to landfill is wrong") and specific behaviours (not recycling in the home, even when barriers are removed) (McKenzie-Mohr & Smith, 1999; Ham, 2007). Unsustainable behaviours have not decreased since Limits to Growth pointed out the future path; there are ever increasing pressures on the planet that show little sign of abating soon.

Though there is already a plethora of knowledge and technology available, there is little uptake. What is required is the translation of vision to reality through creating holistic on-ground actions towards sustainability (Bruce, 2007). Townsville City Council is using innovative behavioural change and targeted communication methods to inform programmes that foster sustainable behaviour and drive sustainable changes across the community.

Has education for sustainable development failed?

Education of not only people, but entire nations about sustainable development is a key issue, as we enter a period of increasing threats and opportunities posed by global issues such as climate change, urbanisation and exploitation of our marine environments. Yet society, particularly in the developed world, continues towards an unsustainable future, except for isolated examples. Sustainability needs to become the norm, not the exception. Reflecting on this knowledge, has education for sustainable development failed us?

In 2008, for the first time in history, more than half of the world's population will be living in towns and cities[4]. With this trend increasing, it is imperative that we address sustainability within an urban context, including the way we live, get around, obtain energy, source food and water, treat and dispose of our waste. Sustainability in an urban context often seems to juxtapose people *versus* the environment, instead of integrate *with*. Consideration of the environment, including maintaining ecological processes, and energy and water efficiency are often seen only as a cost for developers (Bruce, 2007). This does not need to be the case. Developing a broader awareness of sustainability initiatives can uncover opportunities to use whole-of-system approaches to development, including highlighting the benefits of additional outlay to reap long term rewards such as in the provision of solar energy systems.

The term "sustainability" is itself prone to a wide range of interpretations, depending on the situation, the context, the potential and ability to change, as well as the individual's values, and personal background. As such, when we address education for sustainable development, we must not press upon our audience only our own individual notion of sustainability, but rather present sustainability as a concept for people to experience, interpret for themselves, internalise, and go on to transform their own view and behaviours.

Importantly, education for sustainable development must be a multidisciplinary approach (Cole, 2007). In defining or visioning sustainable urban environments, it is essential that we do not solely

[4] The United Nations Population Fund (UNFPA) predicts that by 2030, 5 billion people will be in urban centres, with growth concentrated in Africa and Asia. Most of the new growth will occur in smaller towns and cities, which have fewer resources to respond to the magnitude of the change. http://www.unfpa.org/pds/urbanization.htm

seek answers in science (the ecopolis) or engineering (the technopolis), but seek to redesign systems based on what we know works and does not work (Bruce, 2007). We need to ensure that we address the underlying relationships between community and the environment if we are to succeed in developing a sustainable future. We need to put people at the forefront of education for sustainable development if we are to successfully engage and bring people along the journey (Bruce & McKenzie, 2005).

As we progress through this United Nations Decade of Education for Sustainable Development (2005-2014), we must ensure that the initiatives and actions we undertake under the banner of "education" achieve their outcome - that of changing behaviour (see Figure 1).

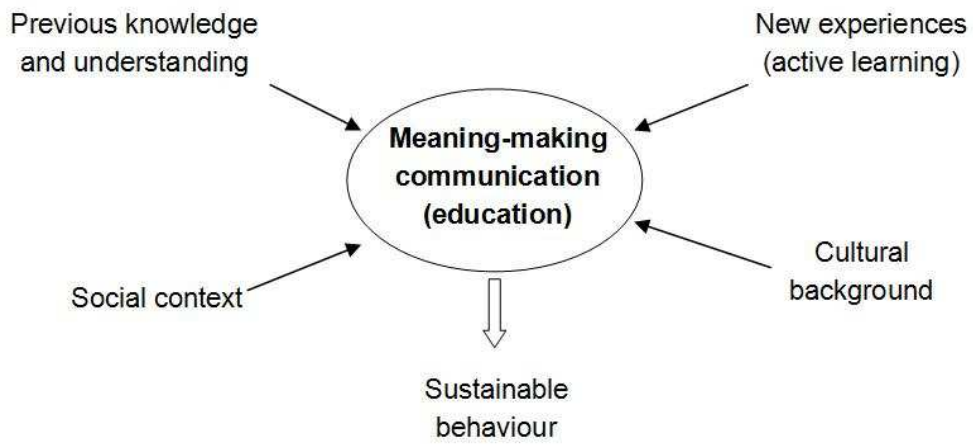

Fig. 1: Education for sustainable development requires targeted messages and active learning that take into consideration social context, cultural background, and previous knowledge.

For this to occur, several conditions need to be met (both individually and collectively).

1. Education needs to be crafted and targeted to address specific behaviours. Changes in general attitudes does not lead to changes in specific behaviours (McKenzie-Mohr & Smith, 1999; Ham, 2007);
2. Education needs to move from passive receiving (banking) to active (experiential) learning (Maloof, 2006);
3. Education needs to consider the social and cultural aspects of the community. For too long, many of the educational initiatives have been based on notions of universal values or themes that reflect environment and sustainability (Cole, 2007). How someone perceives sustainability in a large urban setting in a developed country, will differ vastly to the perception of a person in a remote atoll, or in a sprawling city in a developing country.
4. Education needs to consider the holism of the issues that face us, and needs to consider community-based integrated programmes and initiatives (Bruce & McKenzie, 2005; Bruce, 2007).

In Townsville, a major and growing regional city, the local government authority is addressing education for sustainable development through a holistic approach to sustainability based on multiple on-ground actions, sustainable behavioural change, and experiential learning (Bruce & McKenzie, 2006; Bruce, 2007). These interlinked and complementary approaches are articulated in the idea of the City as a Learnscape. This development has evolved organically from multiple actions and outcomes over a number of years that have merged into an integrated and holistic approach towards a community-focused model of sustainability (see Bruce, 2007).

Creating locally appropriate learnscapes, that are based on rigorous research into community behaviours, can drive the change required to progress sustainability. Following Townsville's successful bid for Federal government funding under the Solar Cities programme, this vision has catalysed a consortium of local government, electricity utility, developers, and community groups to collectively progress the concept of learnscapes and the idea of a sustainable learning city as a model at a regional, national and international scale.

Test driving sustainability – the need for active learning

Buying a car doesn't just involve looking at models in the showroom. An important factor is experiencing the car with the test drive - getting a feel of how the car drives and handles. Let's get people to experience sustainability and its benefits so that they buy the concept!

John Dewey, noted American philosopher, educator, and psychologist, quoted: "*Education is a social process; education is growth; education is not a preparation for life but is life itself*." Dewey drew attention to a critical point; that we never stop learning, and that life itself is an education. What does this pose to us in terms of education for sustainable development? New technology and knowledge makes sustainability a dynamic learning environment that can overwhelm people's sense of understanding or being able to take action. Active or experiential learning overcomes the barriers and failures of the passive banking model of education (Maloof, 2007). Learnscapes provide an avenue for people to experience themes and address specific behaviours.

A Learnscape is defined as a place where users can interact with their environment (Skamp & Bergmann, 2002). Learnscapes engage people interactively with their surrounding environment, and provide sustainable behaviour prompts for people to adopt in their everyday life, both at home and at work. The concept of Learnscapes emerged from educational & curriculum, and have been championed by organisations such as the OECD[5]. Learnscapes do not refer solely to formal learning, but include experiential learning. Learnscapes importantly provide an experiential approach to education, compared to traditional passive banking education.

We seek to extend the concept of Learnscapes from a curriculum setting to a wider urban setting. The goal of education for sustainable development needs to be the adoption of sustainable behaviour, not just awareness raising (McKenzie-Mohr & Smith, 1999; Ham, 2007). By providing an opportunity to interact with the environment in which people live - in this case an urban environment - the aim is for people to engage and reflect more thoroughly on the object of study, whether this be renewable energy, recycling, or sustainable transport.

In this way, people can "test drive" sustainability and experience the benefits that can arise from changing behaviour or adopting new technology. In Townsville, as part of the Federally-funded Solar Cities programme, Townsville City Council is working collectively with its partners to develop learnscapes focusing on sustainable living in the tropics, which address specific behaviours such as the benefits of solar hot water, white roofs, and energy efficient appliances.

Learnscapes provide a framework for extending learning in an urban setting, and complement the idea of "learning cities"[6]. Learning cities place learning and innovation at the core of development, and this paper, following on from Bruce (2007), extends the concept of learning cities from a focus on economy to that of sustainability. As John Dewey noted, education is about life itself, and if we are to collectively progress the vision of a sustainable future, we must keep learning throughout our life. This is particularly the case with sustainability, which is a very dynamic area that poses new challenges and throws in new opportunities and solutions with every passing day. Learnscapes, within a matrix of education, awareness, and experience, create the factors that can transform our urban environments into learning cities for a sustainable future (Figure 2).

[5] The OECD Environment and Schools initiative held a major conference on the Role of school grounds for environment education in Austria in 2001.

[6] The concept of learning cities dates back to the 1970s, but came to prominence in 1992 with an OECD conference in Gothenburg that promoted cities as learning centres to capitalise on the knowledge-based economy. http://www.oecd.org/LongAbstract/0,3425,en_2649_39263294_34931643_1_1_1_1,00.html

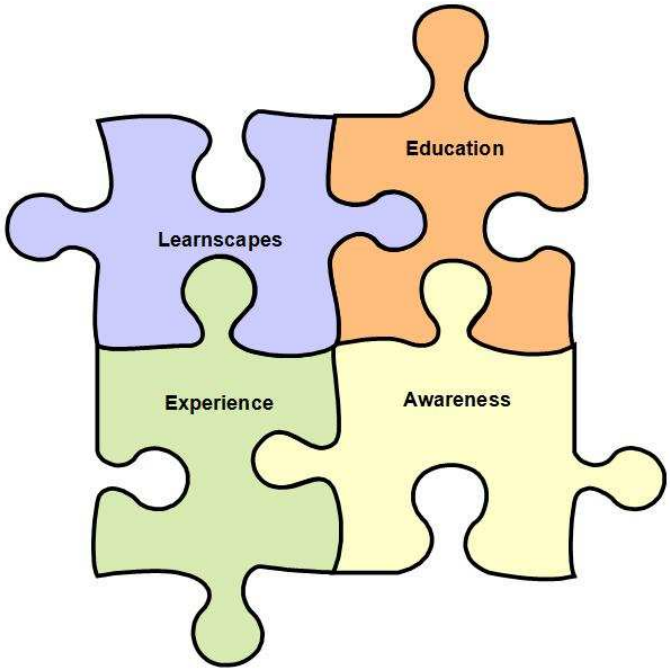

Fig. 2: Learnscapes, within a matrix of education, awareness, and experience, create the factors that can transform our urban environments into learning cities for a sustainable future

Townsville City Council is building on previous programmes and initiatives (see Bruce & McKenzie, 2005; Bruce, 2007) to engage the community through understanding the City as a learnscape. Through building partnerships with the engineering business unit of council, creek rehabilitation and stormwater pollution was incorporated, with support for local community involvement leading to the Creekwatch programme. This in turn led to catchment tours for students and the community, which are now Advanced Ecotourism accredited eco-catchment tours.

These tours, which complement school curriculum, provide people with an understanding of total water cycle management, from rainfall, through treatment, use, wastewater, and outfall. Recently, local schools were involved in a "Capturing our Catchment" art competition, which provided an opportunity for students to internalise and reflect on their experiential education, and present it through their own experience, creating their own understanding of their place in the environment.

The eco-catchment tours provide a unique educational and interactive opportunity to use the City as a Learnscape, showcasing Townsville's diverse landscapes, catchments and 'coastal-scapes' transporting both community participants and school students on a visual and educational journey, through the water circulatory system of Townsville (both natural, urban and interlinked – rainfall, water storage, dams, wetlands, pipes, pumps, drains, waterways, wastewater treatments & marine to evaporation). With Townsville's success in securing Federal funding, the "Townsville: Queensland Solar City" project is building upon existing initiatives, including the eco-catchment tours, to add the energy supply and use element to form an integrated (water and energy) "eco-efficiency" tour (Figure 2).

The foundations for understanding the city as a learnscape is multifaceted, and reflects an important point to keep in mind, that *outcomes are non-linear*. It is important to remember this when embarking on on-ground actions, as too often success is measured through rigid structures against whether preconceived goals have been met within timeframes. This narrow view of success does not take into account the multiple feedback loops and communications that an action can set off, which can take a life of their own and enable other sustainability initiatives until a tipping point is reached, and behaviours change.

At this stage, changes in behaviour may be seen, either at an individual or organisational level, but cannot necessarily be clearly attributed to one particular action or initiative. This complexity is one of the dynamics that make education for sustainable development a non-linear process (Figure 3). Evidence of this can be seen in the involvement of the electricity utility and emerging partnership in electricity demand side management trials in Townsville, and the interest amongst varied organisations, including residential development, in creating sustainable communities. These multiple actions are being facilitated by the local government authority to ensure their integration into the Learning City and co-learning opportunities are captured.

Understanding how to make the horse drink

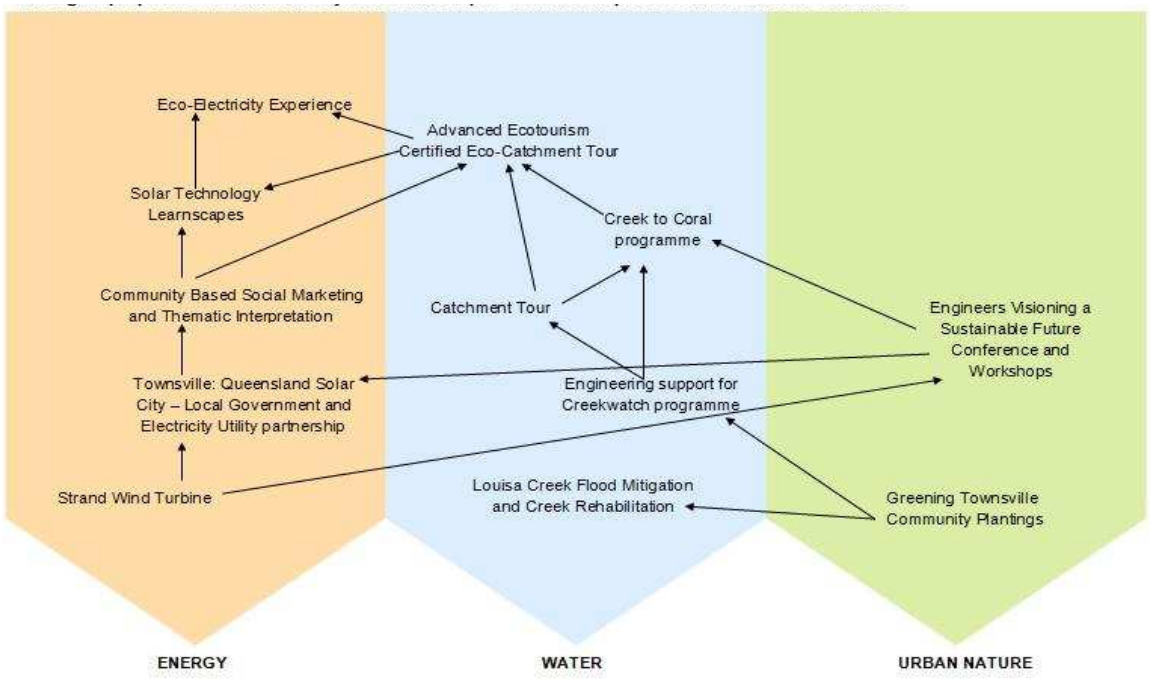

Fig. 3: Emergent properties towards the city as a learnscape – a non-linear process of actions and outcomes

It is important to understand the barriers to undertaking an activity. Once these barriers are known, communications can be tailored to highlight to the horse (and people) the benefits of drinking (and sustainable change).

The sustainability communication around Townsville's learnscapes is based on the learnings of environmental psychology. A key plank in progressing sustainability in the Townsville community is Community Based Social Marketing (CBSM). This methodology provides a framework to identify the often hidden barriers to and benefits of sustainable behaviour. CBSM posits that the cornerstone of sustainability is *behaviour change (*McKenzie-Mohr & Smith,1999). As such, sustainability requires individuals and businesses to act (e.g. increase water and energy efficiency, reduce waste, and prevent pollution).

To date, most awareness and educational programs have relied upon information based approaches to achieve these changes. McKenzie-Mohr and Smith (2006) indicate that research shows that simply providing information has little or no effect on how people or businesses actually act. CBSM provides a framework that goes beyond traditional awareness raising (adverts, brochures or booklets) and works at the community level and involves direct contact with individuals.

Citisolar, Townsville City Council's component of the Townsville Solar Cities programme, involves a CBSM pilot trial to uncover the community's barriers to reducing electricity use and the uptake of solar power. Dry Tropics Water Smart is another innovative Council project to reduce domestic water usage across our community, based on the same principles. CBSM provides a rigorous process to identify the

tools of change that can be used to address the unsustainable behaviours. This then provides key learnings that can be incorporated into ongoing experiential education approaches, such as in Learnscapes.

Thematic Communication is the second key tool that shapes the development of learnscapes, and both complements and integrates with CBSM in our approaches to community education and involvement. Drawing on cognitive and behavioural psychology, thematic communication is based on the premise that while people remember key themes through experiential learning activities, they do forget isolated facts. These "schemas", or sentences in the head, are the ways we interpret our context and surroundings (see Ham, 2007).

Thematic communication seeks to provoke thought, rather than instruct. Through this framework, people can internalise and act on the message that is being communicated, not just remember the surface facts. For this reason, it is important to structure and target our communications, so that we communicate the "right" sentences, creating new meanings and connections in people's heads towards sustainable actions. This method provides a basis for stimulating people to change their actions and behaviour. By communicating themes and providing experiential learning opportunities we can succeed in influencing people's beliefs about specific behaviours, and can ultimately influence how people think, feel and behave (Ham, 2007).

Taking these actions creates the preconditions for creating a sustainable "Learning City". Townsville City Council has forged strong partnerships with the energy utility, a residential development company, and a property developer to progress the vision of a sustainable city. This partnership, with the impetus of the Federally-funded "Townsville: Queensland Solar City" project, has developed to the extent that the Council's partners are embracing the vision of the City as a Learnscape.

Sustainability is an organic process in that people must come to their own understanding after acceptance of the broad concept and its underlying benefits. Effective education about sustainability requires taking innovative steps toward building and showcasing frameworks for partnerships within the community. We need emphasise the collective linkages needed to progress the vision of a sustainable future within a working-city Learnscape. These partnership frameworks encompass all levels of government, schools, businesses, industry, utilities and residents, and work in collaboration to progress the vision and create the reality of Townsville as a sustainable tropical city.

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Youth and Children Program:
Marine Environment Education for Children

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Abstract

The sea is a vast source of natural resources that is very valuable for mankind and has been widely used by humans through exploration and exploitation. Wise use and continuous preservation starts from the awareness of every human of the need to participate in protection and conservation of all marine life. That awareness must be taught from an early age. Therefore, the Youth and Children Program of IOI – Indonesia is specially addressed for elementary school and junior high school children.

The objectives of the program are to give basic knowledge of the components that build the marine ecosystem, and to increase awareness on, interest and passion for the sea, to help protect and conserve it in the future. The program was defined into three approaching methods, which are: awareness publications, writing or drawing competitions, and a field trip.

Through this program, it was shown that most of the children were already aware of the condition of their marine environment and that degradation and pollution has already occurred in many coastal areas. They also showed great appreciation of the marine environment and its conservation, and good knowledge on various marine organisms. Through the field trip activity, children directly learned about marine organisms and life under the sea, understood the components that build marine ecosystems, and participated in marine environment conservation.

Introduction

Overview

The sea is a vast source of natural resources that is very valuable for mankind and has been widely used by humans through exploration and exploitation. Wise use and continuous preservation starts from the awareness of every human towards participating in protection and conservation of all marine life. That awareness must be thought from an early age. Therefore, the Youth and Children Program of IOI – Indonesia is specially addressed for elementary school and junior high school children.

The objectives of the program are to give basic knowledge of the components that build the marine ecosystem, and to increase awareness, interest and passion about the sea, so they could help in protecting and conserving it in the future. The program was defined into three approaching methods, which are: publications on awareness, writing or drawing competitions, and field trip.

Throughout this program, it was shown that most of the children were already aware of the condition of their marine environment, and that degradation and pollution has already occurred in many coastal areas. They also showed great appreciation of the marine environment and its conservation, and a good knowledge on various marine organisms. By means of the field trip activity, children directly learned about marine organisms and life under the sea, understood about the components that build marine ecosystems, and got involved in marine environment conservation.

Background

The sea is a vast source of natural resources that is very valuable for mankind such as fishery and mining resources. Other than that, the sea can also support many human economic sectors such as industry, sailing and even tourism. In other words, the potential and natural resources of the sea have been widely used by humans through exploration and exploitation.

The increasing acts of exploration and exploitation have reduced the quality and quantity of the sea. If there is an imbalance between the sea carrying capacity and the amount of exploitation, there will be an accelerated decrease of natural resources that will put man at loss.

Wise use and continuous preservation starts from the awareness of every human towards participating in protection and conservation of all marine life. That awareness must be taught from an early age. Therefore, it is necessary to educate and arouse a love for the sea in the younger generation and children of Elementary Schools (age 10-12), and Junior High Schools (ages 13-18).

The objectives of the program are: to give basic knowledge of the components that build the marine ecosystem; to increase awareness, interest and passion about the sea, so children can help protect and conserve it in the future; and to teach practical skills on how to protect and conserve the sea.

The intended outcomes from the program will be: the increase of knowledge about the marine ecosystem in the young generations; the increase of basic skills on how to protect and conserve the sea; and the generation of awareness leading towards greater participation in conservation of the sea and its marine ecosystem.

Project Planning and Design

The program targeted on the area where there are big cities/ urban areas, and small islands surrounding/ rural areas. Locations with Marine National Park are preferable. The contrast locations were selected in order to understand how far the urban areas had been affected the rural areas, especially when the urban areas were already known as a source for major exploitation and pollution. Jakarta, as the capital city of Indonesia, with Seribu Islands Marine National Park surrounding was the proper location for this program to conduct.

The program was defined into three methods:

1) Publications, to arouse the interest of children to increase their knowledge about the components that make up the marine ecosystem, through:

- the production of picture stickers;
- the production of comic books.

2) Competition, to encourage children to express their creativity in order to find out the level of interest and knowledge that they have concerning the marine and coastal ecosystems, including:

- story writing competition;
- drawing competition;
- marine campaign.

3) Field Trip, to teach about marine life and its conservation directly in the field, including:

- snorkeling in coral reefs area
- releasing baby sea turtle into the sea
- mangrove planting
- coral transplantation
- bird watching

The time and schedule of each activity are explained in detail in the table hereunder:

No.	Activities	April	May	June	July
1.	Publication Stickers and comic books design, printing for 1000 exemplars, and distribution into schools and libraries	▨	▨	▨	
2.	Story writing or drawing competition		▨	▨	
3.	Field trip into small island with coral reef areas				▨

Fig. 1, 2: 'Basir' serial comic books with the title "Blodog's Birthday Party" (about mangrove areas conservation) and "Nia the Green Turtle"
(about sea grass beds preservation)

Field Trip

The activity aimed to pass on knowledge about marine life and conservation directly in the field. This trip was open to elementary school children of grades IV - VI grades or junior high school children of grades VII – IX in the Jabodetabek area. The trip activities included snorkelling in a coral reef area, bird watching, coral transplantation, mangrove planting, releasing of a baby sea turtle, and various interactive games.

The field trip was conducted on Pramuka Island, which is one of the islands in the Seribu Islands district. Twenty-five (25) children participated in this activity, namely 15 (fifteen) children coming from various schools in Jabodetabek and 10 (ten) children from the Pramuka Islands district. Participants had accommodation in the island villages for 2 nights. For the field activities, participants also had basic snorkelling equipment (masks and snorkels), safety buoys, and binoculars.

The first activity of the field trip was a visit to some turtle nursery cages and the mangrove ecosystem, where direct observation was guided by the marine park ranger and field instructor. The purpose of this observation was to make children understand the characteristics of themangrove ecosystem and obtain information on turtles as one of the protected marine biota. By this activity, children learned the differences between land vegetation and mangrove vegetation and between sea turtles and common turtles.

The second activity was a snorkeling trip, which included snorkeling in the coral reefs area guided by experienced field instructors. The purpose of the trip was to introduce life under the sea directly to children. Participants, supported by basic snorkelling equipment namely a snorkel, a mask, as well as safety buoys. The participants were guided by experienced mentors, i.e. every two participants were guided by one mentor. The mentor's duties, besides overlooking the participants' safety and security, also imparted knowledge about marine organisms which also included simple tips on marine conservation (like not to throw away garbage into the sea, or not to step over coral reef surfaces). The purpose of the trip was to introduce life under the sea, especially of the coral reef area, directly to children. This activity has successfully improved the love and care of participants for marine organisms, especially coral reefs. Before the trip activity, children carried out a snorkeling rehearsal in shallow waters. This was important for the children so that they could become familiar with snorkeling and use the snorkeling tools properly.

The third activity was coral transplantation, where each child transplanted one coral into new substrate, guided by the field instructors. By this activity, children participated in one of the coral reef conservation and rehabilitation efforts. The other activity was mangrove planting, where each child planted one mangrove seed in the mangrove rehabilitation area. The objective of the activity was for children to obtain knowledge and directly participate in the mangrove rehabilitation program.

The forth activity of the field trip was baby sea turtle releasing, where each child released one baby sea turtle into the sea. The aim of this activity was for children to be directly involved in marine organism conservation. Participants were also invited to conduct bird watching in several locations in Pramuka Island. The objective of this activity was for participants to learn about other coastal organisms, especially marine and coastal birds which are commonly found on the island.

The last main activity of this field trip was poster drawing for the marine conservation campaign. Children learned how to express their ideas on marine conservation issues and how to invite other people and friends to join the conservation program. The activity was carried out by drawing posters collectively about marine conservation, and present each posters to the others.

	Fig 3: Children during sea turtle observation at the nursery cages
	Fig 4: Participants, organizing committee, and mentors took photograph together before snorkelling trip
	Fig 5: Snorkeling rehearsal in shallow water

	Fig 6: Participants during snorkelling trip in coral reef areas, provided by snorkel masker and safety buoys, and guided by experienced mentors.
	Fig 7: Participants during coral transplantation, guided by field instructors
	Fig 8: Participants involved in the mangrove planting activity

	Fig 9: Baby sea turtle from nursery cages released by children participants into the sea
	Fig 10: Participants during coral transplantation, guided by field instructors
	Fig 11: Participants involved in the mangrove planting activity

Lessons Learned

The competitions were conducted in order to find out the level of interest and knowledge that the children had about the sea and its marine ecosystem. From story writing and drawing competitions we could conclude that children from the city also showed an interest in the marine environment just like children from the islands. By participating in the competitions, the children from the city expressed their care for marine sustainability. But generally, they recognized the sea only theoretically and were not emotionally involved with it. Children from the islands understand the sea empirically and more realistically. They recognize the sea as part of their life, so they are more emotionally in touch with the sea.

The field trip activity was organized in order to impart knowledge about marine life and its conservation directly in the field. This activity increased the love and passion of children from the city or from the islands. Children from the city showed their admiration for marine ecosystem, especially during the snorkelling trip, where they could directly and closely observe the coral reefs ecosystem. They also showed a willingness to conserve the marine ecosystem and share their valuable experiences with others. Children from the islands also expressed their strong will in protecting their marine environment, especially when they recognized that their friends from the city showed a feeling of amazement at the beauty of the marine ecosystem of their islands.

Future Plans

Results from this activity show that the relationships among children participants from the city (Jabodetabek areas) and from the islands (Seribu islands) was becoming closer, so that the big differences between them, especially with regards to the social and economic background, were not so obvious anymore. Each participant became more understanding about the conservation of marine and coastal areas, so that they were able to continue and practice what they had studied and understood. Similar activities would be more effective if conducted every year, with different targeted participants (elementary school until junior high school). In the long term, the conservation cadres from the young generation, which has been supplied with the meaning of marine and coastal environmental conservation, will be well established.

Empowering young female geography graduates in Malta for ocean and coastal management

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Abstract
The development of a Geography curriculum at tertiary level is one of the best media through which the aims of the Millennium Development goals and the ideals of the United Nations' Decade of Education for Sustainable Development can be achieved. Geography straddles the social, natural and environmental sciences through skills that span the academic, practical, technical and mathematical and managerial realms. It provides learners not only with the basic tools of knowing the earth, coasts and oceans, but also helps to identify the triggers behind spatial processes and areal patterns that assist in the interpretation of various phenomena at an array of scales.

The paper presents first an outline of the development of the geography curriculum which is designed to cater for the needs of local professionals in the spatial sciences. Then it details the various courses on offer within the geography programme that have an ocean and coastal emphasis as a theoretical base. These include: oceanography, coastal processes and landforms, sustainable development, coastal and ocean management, and coastal geomorphology. In addition, an array of human geographic themes that have a bearing on coastal and ocean issues are also included in the programme of studies, such as coastal tourism, ports and harbours and coastal settlements. The second emphasis of the paper is on the field and practical studies included in the courses, such as geographic information systems and remote sensing and a regular programme of coastal field studies. All courses use the global, Mediterranean and local scenarios for case studies. In the third part, women and young graduates who obtained qualifications in geography and are now engaged in ocean and coastal policy and governance will be invited to present their hands-on experience and, through this, their contribution to sustainability.

Introduction

In ensuring sustainability there is an inherent need to produce enough skilled expertise to supply the increasing demand in the fields of sustainable development. This paper looks at the teaching efforts of the Geography Division at the Mediterranean Institute, University of Malta, since its inception in 1987. The paper will first give an overview of the development of the University and the Geography Programme within the Mediterranean Institute. It will then detail some of the most important aspects of Geography at the University of Malta, whilst presenting some of the recent research carried out by the Geography Division in ascertaining the skills pertaining to geographers but also to the workplaces where geographers are employed.

The conclusion looks at the employment sectors in which geographers in Malta end up working in and, therefore, playing a role in perpetuating sustainable development principles through their background knowledge gained throughout their years of study.

The University of Malta

The origins of the University of Malta can be traced to the Collegia Extensorum. These colleges were founded and run by the Jesuit Order and were intended for non-Jesuit students. They were established through a Papal Bull by Pope Pius IV in 1561 and confirmed by another Papal Bull by Pope Gregory XIII in 1578. The Colleges were empowered to confer degrees of Magister Philosophiae and Doctor Divinitatis. The foundation deed specified that, in addition to Philosophy and Theology, Grammar and the Humanities could be taught. Table 1 identifies the main historical milestones (University of Malta, 2007a).

It was during the time of the Knights of St. John (1530-1798) that the Malta College, known as the Collegium Melitense, was founded on the 12th November 1592. In 1676 a School of Surgery and Anatomy was set up by Grand Master Nicolas Cotoner at the buildings of the Sacra Infermeria, at Valletta, the site of the hospital of the Knights. It was during the reign of Grand Master Manuel

Pinto, on the 22nd November 1769, that the School and Collegium were fused into a Public University (Vella, 1969).

The University continued to expand throughout the British period (1800-1964) with Royal patronage awarded in 1937 by King George VI. The post-independence period saw the building of a new University campus at Msida, the re-foundation of the University in 1988 with the introduction of new areas of study and the establishment of Institutes as additional seats of teaching and research to compliment the academic base provided by the Faculties. Two of these areas, the History of Mediterranean Civilizations and Contemporary Mediterranean Studies, paved the way for the Mediterranean Institute to establish further academic disciplines amongst which was Geography.

The Mediterranean Institute comprises a number of Divisions: Anthropology, Music and Theatre Studies, Mediterranean Civilizations, Spanish and Geography. These run research and lecturing programmes leading to the award of degrees and diplomas with members of staff participating in a series of international research networks. Together with the research and lecturing mobility that academic members of staff and students follow actively within the Erasmus and Socrates Student and Staff Exchange programmes, the Institute maintains links with major European seats of learning.

Table 1: Milestones in the development of the University of Malta and the establishment of the Mediterranean Institute.

1592	Collegium Melitense founded
1676	Medical School established
1769	Collegium and School fused into a Public University awarding degrees
1937	Royal Charter by King George VI
1987	Establishment of the Mediterranean Institute by then university rector, Rev. Professor Peter Serracino Inglott

Source: University of Malta (2007a) History of the University.
http://www.um.edu.mt/about/uom/history

Geography in Higher Education

Geography is mainly concerned with interrelationships over space and their variation on both the physical and human phenomena occurring on the earth's surface. Emphasis is also made on the links between aspects of the natural environment of an area and the human population that occupies and modifies it. Geographers tend to study spatial patterns, spatial processes, people-environment relationships, change and its impact, and the issues that arise from change (Raw and Atkins, 1995). The themes can be tackled from a range of scales: the global, the regional such as Europe and the Mediterranean and the Middle East, the national level such as the Maltese Islands, and the local by focusing on a part of the Maltese environment.

"*Geography is that branch of knowledge that is concerned with the study of the material and human phenomena in the space accessible to human beings and their instruments. Geography is concerned with the patterns of, and variation in, their distribution in that space, on all scales, in the past or present. Geography involves description, classification, analysis, synthesis, explanation*."
(Clark, 1989)

The Geography Programmes of Study

At the University of Malta three undergraduate programmes of study are offered: B.A. and B.A.(Hons) through the Faculty of Arts and B.Ed. (Hons.) through the Faculty of Education. The Bachelor of Arts programmes are divided into two parts. Part ONE is of one year's duration and common to the BA and BA (Hons.) programmes. The study-units offered include introductory courses and basic units in both physical and human geography. Students also have to take additional options from another major area of study within the broader B.A. programme, plus a number of extra study units. Part TWO is followed for two years, both for the BA degree (in which another subject is taken concurrently with the principal area of study) and for the BA (Hons.) degree programme where the subject is treated in greater detail with emphasis made on the systematic treatment of the subject. This is done through units in physical geography, human geography and techniques in geography. The versatility of the subject is seen through the sections on applied geography and a number of multidisciplinary units.

The B.Ed (Hons) degree is a professional course running for four years with the programme divided into the content components, presenting a number of topics from both the physical and human aspects, study-units centred around the needs of a graduate in preparation for the teaching profession, teaching practice sessions with students developing pedagogic skills throughout with lectures and practical experience in local secondary schools. Geography is taken concurrently with another subject throughout the course. Ocean and coastal studies are followed in all three programmes.

Over the years the Geography programme attracted an increasing number of students (Figure 1). This increase in interest is also synonymous to the growing popularity of geography in Malta.

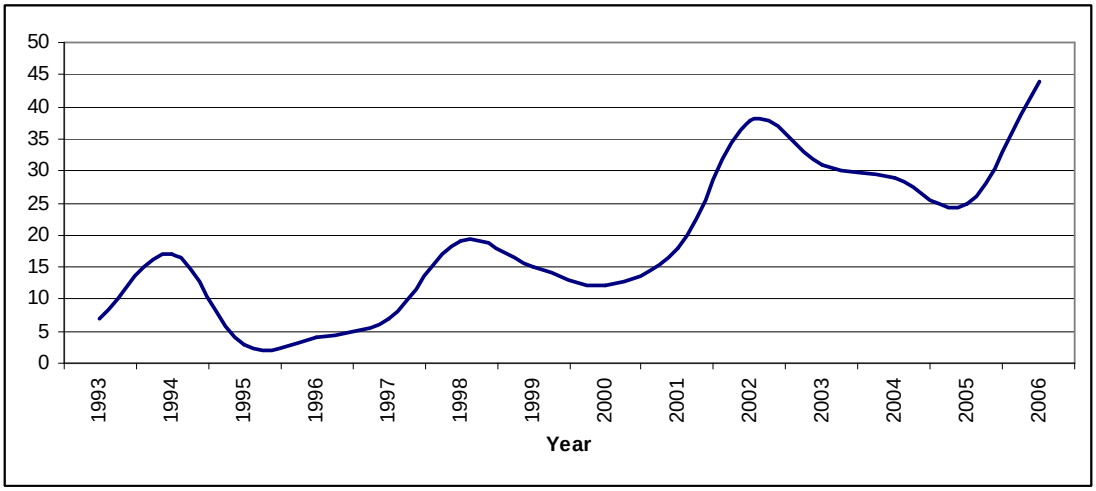

Fig. 1: Students graduating in Geography and Geography Education at the University of Malta 1993-2007. Compiled by the author.

Student mobility and research

Student exchanges with foreign universities are available through the Erasmus programmes. These include the universities of Liverpool Hope, Portsmouth and Canterbury at Kent in the UK, the French universities at Lille, Le Havre and Limoges, the university of Modena and Reggio Emilia in Italy, the universities of Santander in Spain, and Salzburg and Innsbruck in Austria. Students can follow courses in any of these institutions for one or two semesters normally during the second year of their studies. Students are also encouraged to participate in the research of the Division through their dissertation. The interests here lie in the coastal environment with coastal geomorphology, coastal landuse, sealevel changes and tourism. Population geography, transport and village core area studies and agriculture are other areas of interest.

Composition of Geography Study-units

A practical element is evident throughout the programme. Facilities at various sites at the University are utilised. These include: the Laboratory at the Institute of Masonry and Construction Research for studies in Geology, Earth materials and Geomorphology; Wied Ghollieqa, a valley located adjacent to the University campus for a number of field physical studies; and the Geographic Information Systems Laboratory at the University for computer cartography and GIS. Fieldwork is an essential part of any geography programme and a number of units have a field element in the great outdoors. In addition, a number of site visits are also organised.

Table 2 presents the study-units developed over a number of years and in essence the present programme of studies. Following the general courses in the first year the final two years are divided into courses in human, regional and systematic geography, techniques in geography, geology and geomorphology and multidisciplinary units. Courses with a Mediterranean orientation are shown with an asterisk.

Table 2: List of study-units in the Geography programme

First year
Human geography:
POPULATION, CULTURE AND SOCIETY I
*POPULATION, CULTURE AND SOCIETY II
APPLIED HUMAN GEOGRAPHY
Physical geography:
*/**CLIMATE AND BIOGEOGRAPHY
*/**OCEANOGRAPHY AND GEOMORPHOLOGY
**APPLIED PHYSICAL GEOGRAPHY
Practical techniques:
TECHNIQUES IN GEOGRAPHY I: Cartography and Cartometry
**FIELDWORK I: PHYSICAL GEOGRAPHY
FIELDWORK II: HUMAN GEOGRAPHY
Second and Third year
Human Geography:
*HISTORICAL AND POLITICAL GEOGRAPHY
*ECONOMIC GEOGRAPHY
TRANSPORT GEOGRAPHY
Regional Geography:
*/**PHYSICAL GEOGRAPHY OF THE MEDITERRANEAN
*GEOGRAPHY OF THE MALTESE ISLANDS
*/**ECOLOGY AND CUTURE OF THE MEDITERRANEAN (with Anthropology)
Geology and Geomorphology:
GEOLOGY
APPLIED GEOLOGY
**APPLIED GEOMORPHOLOGY
*ECOLOGICAL COMMUNITIES
PEDOLOGY
HYDROLOGY

Multidisciplinary study-units:
*/**ASPECTS OF THE MEDITERRANEAN ENVIRONMENT
*LAND DEGRADATION AND REHABILITATION
*/**OCEAN AND COASTAL MANAGEMENT
*/**SUSTAINABILITY AND DEVELOPMENT
Techniques in Geography:
TECHNIQUES IN GEOGRAPHY II: Aerial Photography
GEOGRAPHIC INFORMATION SYSTEMS
PHYSICAL GEOGRAPHY LAB
Independent research investigation:
DISSERTATION

* Study-units having a Mediterranean component
** Study-units having an Ocean and Coastal environment component

Source: compiled by author from the University of Malta (2007b)
http://home.um.edu.mt/medinst/geography/index.html

Skills in Geography

It is the skills that one develops during the years at university that are important to the development of the personality, and the flexibility and reliability needed to compete on the job market. Table 3 highlights the basic skills that a geography programme of studies normally imparts on students.

Table 3 highlights the skills that a geography graduate learns throughout his studies and the emphasis placed by foreign universities in their recruitment. At the University of Malta geography skills are catered for through courses in surveying, cartography, fieldwork sessions and laboratory work - these incorporate map reading and interpretation, and laboratory techniques. The analytical and scientific investigation is examined through units in statistics and Geographic Information Systems. Finally, investigating the interrelationships and linkages between different disciplines is done through units on environmental management and ecological communities. These also help to consolidate the academic and technical experiences into a spatially-coherent whole.

Table 3: Basic skills in geography

Literacy: the ability to write well, this can include the correct interpretation of texts, and the technique of writing geography, giving light to issues using, for example, scale-dependent jargon. **Numeracy**: the ability to do simple mathematics and to interpret data, this also includes a degree of facility with basic statistics. **Personality**: the ability to get on effectively with people and confidence in presenting results in public. **Graphicacy**: the ability to draw a sketch of the field in view, maps on a script and an input/output systems diagram **Facility with computers**: keyboard skills and an understanding of computers, this includes facility in the use and interpretation of Geographic Information Systems (GIS).

Source: adapted from Kneale, 2003.

Assessing the graduate skills in Geography

In 2005, the Geography Division carried out a survey as part of the TUNING[7] Project to: i) identify the subject specific skills which a geography graduate should have; and ii) assess to what extent the skills were developed in the Geography Programme offered by the University of Malta. The research was part of an effort jointly made with other European universities who participated in HERODOT, which is the European Thematic Network for Geography in Higher Education (HERODOT, 2007).

For the purpose of conducting the TUNING exercise, questionnaires were filled in by academic members of staff, students (graduates) and employers. This paper however presents only the results of the student surveys conducted by the Geography Division at the University of Malta. Full results of the TUNING study across Europe have been published by Donert (2007).

The first column in Table 4 shows the competences which graduates in Geography are expected to have by the end of their studies. The second column gives the maximum index level which a particular competence is expected to achieve during a degree programme. These skills and the level of importance were identified through discussions held at European level amongst academics in Geography departments. The third column shows the level which the respondents considered having achieved, from the specific skill, during their studies.

The results in Table 4 represent student responses for Malta. There is an overall positive response particularly on teamwork and ability to work in an interdisciplinary team scoring the highest values, whilst dealing with uncertainty being the lowest scored. Other important skills that require further attention are the use of information and communication technology and information management. However, the ability to work in an international context, appreciation of diversity and multi-culturality and knowledge of other languages demonstrate that skills pertaining to bridging the local physical isolation are in the forefront of the young people who responded to the questionnaire.

Table 4: Generic skills/competences

Generic Skills/Competences	Importance (Max index level)	Level to which developed by University Degree (Max level by respondents)
Capacity for analysis and synthesis	18.50	18.00
Capacity for applying knowledge in practice	21.50	18.75
Planning and time management	21.25	17.25
General knowledge in the field of study	21.50	20.25
Knowledge of the profession in practice	22.00	17.00
Oral and written communication in the national language(s)	19.00	17.00
Knowledge of other languages	12.50	11.25
Use of information and communications technology	21.00	14.75
Research skills	21.50	20.25
Information management skills (ability to retrieve and analyse information from different sources)	21.25	17.25
Critical and self-critical abilities	19.50	18.25
Capacity to adapt to new situations	18.75	15.25
Capacity for generating new ideas (creativity)	21.50	17.00
Problem solving	21.50	16.25
Decision-making	16.00	14.50

[7] The TUNING Educational Structures in Europe Project focuses not on educational systems, but on educational structures and content of studies. Whereas educational systems are primarily the responsibility of governments, educational structures and content are that of higher education institutions. As a result of the Bologna Declaration the educational systems in all European countries are in the process of reforming (European Commission, 2007).

Teamwork	16.75	21.75
Interpersonal skills	20.50	18.50
Leadership	20.25	15.75
Ability to work in an interdisciplinary team	18.25	18.25
Ability to communicate effectively with non-experts (in the field)	20.00	16.00
Appreciation of diversity and multi-culturality	17.25	16.75
Ability to work in an international context	15.00	15.00
Ability to work on their own	19.25	19.50
Ability to work on own initiative	22.25	20.75
Project design and management	19.00	18.00
Concern for quality	20.75	21.25
Responsibility	21.00	21.00
An entrepreneurial spirit	16.25	16.25
Commitment to work related ethics	18.50	15.75
A systematic approach to accuracy and precision	20.00	19.00
Dealing with uncertainty	19.00	14.00

Compiled by author.

Conclusion: Geography graduates and employability

The increase in the number of graduates in geography since the start of the programmes has increased geography's exposure to society as well as prospective employers. Over the years the number of agencies, government and private, to employ geographers has grown. Some of the main government agencies such as the Malta Commission for Higher Education, the Malta Environment and Planning Authority, the Malta Transport Authority, the Malta Tourism Authority, the Malta Police Force and the National Statistics Office employ geographers. Other private corporations and companies, mainly dealing with environmental management, employ geographers as experts in handling projects, studies and research.

A number of students have also opted to leave the islands and follow postgraduate degree courses abroad. Some of the Universities that have welcomed Maltese geographers include the Universities of Durham, Oxford, Cambridge, Southampton, Modena, Sunderland and London. Many have also completed post-graduate studies at Master's Level at the University of Malta in various subjects.

The Geography degree at the University of Malta provides a broad first step into the world of sustainable development. Through its programmes on physical, human and applied geography it prepares graduates to be flexible and adaptable to a number of jobs in the workplace. This has been a key success factor in the employability of geographers, but also in their opportunity to apply sustainable development principles.

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