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AWARDS FOR EXCELLENCE IN SCHOOLS

State Award Submission Cover Sheet

Successful Transition through Middle School Science

School/s:

- Townsville State High School
- Townsville South State School
- Townsville West State School
- Magnetic Island State School
- Garbutt State School
- Central State School

District: North Queensland

Region: Townsville

Key contact person: Sarah Chapman

Position: Science Teacher

Phone number: 0747218780

Mobile number: 0413136220

Email address: schap69@eq.edu.au

Principal

Name: Scott Stewart

Phone number: (07) 47218710

Email address: sstew66@eq.edu.au

Please nominate the Showcase category for your project. Please nominate one category only. (See section 1.2 of the guidelines for more information.)

	Showcase Award for Excellence in the Early Phase of Learning
X	Showcase Award for Excellence in the Middle Phase of Learning
	Showcase Award for Excellence in the Senior Phase of Learning
	Showcase Award for Excellence in Inclusive Education
	Showcase Award for Excellence in Leadership
	Showcase Award for Excellence in Innovation
	Showcase Award for Academic Excellence
	Showcase Award for Excellence in Community or Industry Partnerships

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AWARDS FOR EXCELLENCE IN SCHOOLS

Submission overview:
Townsville State High School has worked with Middle School students from eight cluster primary schools to develop specific skills and interest in science. Through the Australian School Innovation in Science, Technology and Mathematics (ASISTM) project "Transition through Middle School Science", many novel and dynamic approaches to teaching science have been implemented. It has promoted teacher confidence in teaching science in the primary area and improved school links with the community and local university, which in turn has aided students in the transition from primary to secondary school. Students have developed skills in scientific inquiry in upper Primary School and have further refined these skills in student driven inquiry in the Secondary School. The program has enhanced and extended students' learning experiences, along with promoting quality science teaching and learning to ensure more students are engaging in a life long passion of science.

OPTIONAL multimedia items for State Award Submissions ONLY:
(For further information see guidelines appendix L)
If included, please nominate ☑
To be supplied on one compact disc with the hard copy. Multimedia items are not required electronically.

Personnel involved in the project (names and roles):

Secondary Teacher: Sarah Chapman

Head of Department: Dale Collins

Primary Teachers: Diane Harris, Heloise Francis, Cat Johnson, Emmanuel Pavlou, Kacey Constantine

Tertiary Student Teachers: Neika Huss, Alisha Nolan, Krystal Pearson, Cath Wilson

Critical Friend: Steven Tobias Lecturer (James Cook University)

Research/Education Organisation: Heidi Streiner, Manager North Queensland Science Education Centre (NQSEC), CSIRO

Remember the following when submitting:

- ☐ Submission required in electronic copy version first for checking by EDs and then hard copy, once signed off.
- ☐ Maximum five pages of submission information and 10 pages of appendixes (excludes the cover sheet and project summary)
- ☐ Minimum font size of 11 points
- ☐ The following appendix items must be included:
  - a signed supporting statement from the principal
  - a signed supporting statement from the parents and citizens' association
  - a statement from any other person or organisation with an interest in submission is optional.

ENTERING YOUR STATE SUBMISSION

1. Ensure you have enclosed all compulsory information by completing the Entrants' Checklist in appendix E.
2. Ensure the principal signs this submission form.
3. Send your State Award Submission to your Regional Coordinator for feedback and sign-off by the Executive Director (schools) by 24 June 2009.
4. State Award submissions due to the Showcase Project Manager by 26 June 2009.

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AWARDS FOR EXCELLENCE IN SCHOOLS

SIGNATURE/S OF PRINCIPAL/S

_____

Date

_____

To be completed by the Executive Director (Schools) after completion of the checklist:

I support this submission and its entry in the Showcase Awards for Excellence in Schools 2009. This submission meets the requirements set out in the Executive Director's Checklist.

Signature of Executive Director (Schools) **Date**

_____ _____

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AWARDS FOR EXCELLENCE IN SCHOOLS

Successful Transition through Middle School Science

Description:
At Townsville State High School, the 'Transition through Middle School Science Project' has provided opportunities for primary and secondary students and their teachers within the local cluster, to engage in a range of middle school science programs that achieve the *Middle Phase of Learning Action Plan's* goals. Some of the practices and programs put together foster students' curiosity, imagination and enthusiasm as well as enhancing scientific literacy.

PROGRAM OVERVIEW

In 2003 the staff at Townsville State High School identified that students were entering high school in year eight with little or no knowledge of science and science literacy. It was also identified that staff in our eight cluster primary schools lacked confidence in teaching science in their classes. Work began to rectify the problem and formalise solutions to promote effective teaching and learning in the middle school, with Year 7 visits to Townsville State High School commencing to 'bridge the gap'. In 2004 developments were made to link this initiative into the Year 8 curriculum. After collaboration with our cluster schools in 2006, work began on improving the middle school transition program in the science curriculum. In 2007 funding was sought from the ASISTM grant, sponsored by the Department of Education, Employment and Workplace Relations. The aim of the grant funding was to implement a cutting edge, engaging science program based on fair testing and inquiry, to enhance the scientific literacy skills of primary students.

FOOD SCIENCE… TO TAKEAWAY – THE SECRET OF OUR SUCCESS

In 2007 the program called *Food Science…to TakeAway,* was implemented. This program incorporates a range of relevant and everyday topics where students are allowed to explore the complexities of science (Refer to Appendix A and Multimedia disc). The program allows students to engage in a range of investigations examining foods in a scientific way, which then leads them to engage in a range of scientific discourses and literacies to communicate their ideas and findings. Within this program, ICT's have been integrated to allow students to communicate their findings and questions via a learning blog located on The Learning Place. This allows students to formulate their own ideas and communicate and discuss with others in the blog. It also allows them to discuss questions with guest scientists and teachers, to encourage their enthusiasm and interest in science. Students have progressed from knowing little about science and the way to explore it, to engaging in scientific practice and discourse beyond their experience level. Their endeavours have been fuelled by their interest and enthusiasm in the prepared program.

FOOD SCIENCE… TO TAKEAWAY – PROCESS:

Each feeder cluster school has an intensive development period of one term, in which teachers are mentored in science teaching and curriculum development and students develop scientific literacy and investigative skills.

There are eight feeder schools that are linked with Townsville State High School. Each year in this project, progressive improvements have been made. The project commenced in 2008 and all schools will have participated in the modified program by mid 2010.

FOOD SCIENCE… TO TAKEAWAY INNOVATION & LINKS:

This unit of work examines the science behind the food we eat. It is designed to develop students' abilities in being able to design a Fair Test along with being able to record observations, analyse data and draw informed conclusions. This program has been designed to progress from scaffolded and supported activities for the teacher and student, through to more open-ended activities that promote higher order thinking and genuine scientific inquiry. This program reflects the inquiry processes of Primary Connections, including the 5 E model of inquiry, along with promoting the development of scientific literacy and high order thinking skills (Appendix A & B and Multimedia disc).

MENTORING ACROSS THE DIVIDE

In 2009 the 'Transition through Middle School Science Project' was taken to another dimension with the involvement of middle school mentors. After working with primary students for many years in this

program, it was identified that involving secondary students in the delivery of the program would promote cohesion amongst the students and provide a point of contact for primary students when they attend high school. A group of Year 9 students became involved in the program to assist with the delivery of the program within the high school environment and to provide mentoring support for the primary students as they completed their scientific inquiries. This was further strengthened when the mentored Year 7 students passed on their knowledge and experiences by mentoring their fellow Year 6 students, by teaching them how to conduct a range of scientific inquiries.

PROGRAM PROFESSIONAL DEVELOPMENT

While a cutting edge science program for students promoted engagement and enrichment of learning experiences for teachers, it was also identified that primary teachers in our cluster needed assistance to ensure the teaching of engaging science learning experiences would be sustained. Within the program we incorporated a professional development program and package to engage the primary teachers in simple science pedagogy.

The professional development package for primary teachers included:

- ☐ One full day of professional development at the beginning of 2007
- ☐ Provision of a printed professional development handbook outlining science experiments and background information
- ☐ A scientific equipment kit for each school
- ☐ Student resource booklets to support the delivery of the program
- ☐ Mentoring by a secondary science teacher for a period of one term

Tertiary education students and lecturers were also involved in the project to support the teachers in implementing the program, also adding a third tier to the access of scientific knowledge and expertise for the primary students.

Effective communication with stakeholders was a critical factor in the success of the program. This was achieved through:

- ☐ Regular meeting with principals and teachers of primary cluster schools
- ☐ Visits to primary schools by project coordinator
- ☐ Regular email and telephone contact with primary teachers

Effective communication was critical for receiving feedback about the project and provided for the continual adaptation and improvement of the program to make it suitable for each primary school involved.

This professional development package has led to the co-delivery of a cutting edge science curriculum. From this professional development, primary teachers have become more confident in teaching engaging and stimulating science. Through the project it was found that when the teacher is confident and engaged in the learning process, student learning outcomes are enhanced along with their interest and enthusiasm in science.

TAKING IT FURTHER

'The Transition through Middle School Science Project' has enabled secondary teachers to effectively devolve the teaching of the compatible science curriculum at Townsville State High School to primary cluster teachers. In the local cluster, this provides a 'seamless' transition through the Middle School in the ways of working in science. Our science curriculum provides the opportunity for students to explore real world problems and questions and examine the scientific processes within areas of science that students have interest. The project incorporates student driven learning experiences into the lower secondary science curriculum, that allow students to choose a topic of interest and design and conduct experiments based upon their curiosity and interests. Students completing their research projects are then eligible to apply for the nationally recognised CREativity in Science and Technology (CREST) Award (See Appendix C). For students with an avid curiosity of science, the project provides them with access to visiting scientists, the opportunity to speak with students from other schools and work placements with scientists. They have also completed science projects with these scientists, allowing students to make real links with science research organisations and industry.

MAKING LINKS TO SENIOR SCHOOLING & BEYOND

To ensure the success of the 'Transition through Middle School Science Project' and to strengthen the seamless transition between the middle school and senior school within Townsville State High School, the project was aligned strongly with the middle school curriculum and senior science curricula (Appendix F). The journey of the development of scientific interests, inquiry and skills begins from Years 6 and 7 and continues through the whole of the students' studies to Year 12 (Appendix G). Further evidence shows that many of these students have taken these experiences to become life long learners of science by enrolling in tertiary studies to pursue a career in a science related field (Appendix G). This further confirms the immense impact this program has made on participating students.

MEASURING SUCCESS

In the short term of this project, students' semester results were reviewed to ascertain whether changes were being made in their learning outcomes. The long term effects of this program are just beginning to actualise with the 2008 Year 12 graduates being the first Year 8 students to participate in the program in 2004. Long term results are only beginning to be seen, with progressional improvements to achievements in the senior sciences and enrolments into science related tertiary programs (Appendix G).

CONNECTION TO QSE – 2010 AND/OR EDUCATION AND TRAINING REFORMS FOR THE FUTURE:

The Transition through Middle School Science Project has many strong links to the policies that underpin excellence in teaching and learning in Queensland. The following table outlines some of these links:

Transition Through Middle School Science Project	Links to ETRF and/or 2010 Outcomes
✪ Students are provided with an appropriate level of intellectual challenge and authenticity (in line with *Framework for Gifted Education)*, whilst experiencing a level in scaffolding with all learning activities to ensure improved learning outcomes (Appendix F).	**Outcome LE1:** Improved learning outcomes for the diverse range of students in Education Queensland schools
✪ Consultation between cluster primary schools and Townsville State High School has ensured that a cohesive seamless curriculum has been implemented to provide optimum opportunities for a broad range of learners. *"The program has activities designed to allow all students to feel success in their science learning. Learning experiences include scaffolded written activities, ensuring that students who experience difficulties in literacy are able to fully participate in the science activities. By providing real-life experiences for the students to examine, all students were engaged in the learning tasks, even those who in the regular classroom are disengaging from their learning. The program includes topics that are clearly exciting for the students, as has been shown by their enthusiasm for the program"* Kacey Constantine, Head of Curriculum, Townsville Central State School.	**ETRF:** Strengthens the connections in the middle school and enhances the learning outcomes for primary and secondary students. **Outcome LE2:** Improved alignment of curriculum planning, teaching, assessment and reporting that engages our diverse range of students in learning **ETRF:** Provides a basis of support to students through different stages of learning
✪ The complete framework of the Transition Through Middle School Science Program encompasses the idea of science in the everyday. The use of concrete experiences to foster curiosity in science, allows students to use prior learning experiences of everyday objects and develop a deeper understanding of the science behind it. Use of everyday objects to teach science enables the science experiences to be more accessible and relate to a wider range of students. The use of everyday materials also ensure that the cluster schools and parents who further the experiences of the students do not have large expenses in the purchase of additional materials.	**ETRF:** Provides innovative ways to improve student achievements in the middle years. **Outcome SC1:** Schools have innovative and distinctive strategies responsive to student, parent and community needs

✪ Providing professional development and support for primary teachers, in their development of their science pedagogy. The collaborative planning of a seamless curriculum has ensured productive partnerships between cluster primary schools and Townsville State High School. Collaboration with tertiary students from James Cook University and CSIRO, enable the extension of the science learning experiences for students. Continual collaboration with CSIRO, James Cook University and the Townsville State High School cluster ensures a supportive and productive professional framework to ensure professional development via mentoring and collaboration, along with the continual evolvement of the curriculum to sustain innovation.	**Outcome SC2:** Schools have productive partnerships with their parents and community, with business and industry, with other educational providers, and other government agencies **Outcome WO1:** A workforce that has the capability and flexibility to deliver the strategic objectives of the department through ongoing professional development opportunities **Outcome WO2:** Leadership that drives educational reform, supports productive relationships and promotes innovation

OUTCOMES: As a result of middle school students participating in the Transition through Middle School Science Project

- Progressional improvement in student performance in middle school science, compared to before the program was implemented (Appendix G).
- Continued interest in science by the Middle School students has seen an increase in the number of students enrolling in the mainstream senior sciences. The 2003 Year 7 cohort have exited as the 2008 Year 12 group (Appendix G).
- Increased performance of students in the senior school passing senior science (Appendix G).
- Increased participation levels in extension activities such as CREST and Student Research Scheme (Appendix D).
- Over 180 students have obtained their Bronze CREST Awards over the past five years (Appendix D).
- Approximately 15 students have completed research projects with scientists in various research organisations and industry over the past five years (Appendix D).
- Increased student involvement in the Transition through Middle School Science Project from Years 4 – 7, with over 1200 students having participated in the' Transition Through Middle School Science' Projects specialised transitional programs (Appendix C).
- Prior to project implementation 10 out of 15 primary teachers reported to conduct very little to no science in their classrooms. Following the implementation of the program 100% of teachers report to conduct engaging and extended science experiences regularly in their classrooms.
- Project Coordinator reports a consensus amongst the participating primary teachers that expertise and confidence in the teaching of science to the Middle School has improved. 14 out of 15 teachers report they are now using a greater range of strategies. All report that their primary students are engaging more often in scientific learning experiences.
- 100% of participating primary teachers report an increase in student enthusiasm following laboratory visits.
- All tertiary students involved in the program over the past two years have reported a greater level in confidence in teaching science and having a greater repertoire of pedagogical skills.
- Teachers of Year 8's claim that recent cohorts of students seem generally 'in tune' with the ways of working in science and level of preparedness entering Yr 8 is improving.
- Teachers of students in the Middle School, in both Primary and Secondary sectors report increased levels of engagement in student learning.
- Teachers of students in the Middle School, in both Primary and Secondary sectors report increased levels of engagement in identified Aboriginal and Torres Strait Island students.

EVIDENCE:

Supporting evidence strongly confirms that we are achieving quality outcomes and ensuring continual improvement of teaching and learning experiences for students studying science across primary and secondary school in our cluster. (For detailed evidence please refer to Appendix G). The Transition through Middle School Science Project promotes engagement, enthusiasm and inclusivity of learning experiences for all students. The innovative topics, using everyday objects, ensure the sustainability of the project by minimising the costs to conduct the program. As everyday objects are used it also allows for the project to be transferable.

Teachers & Tertiary Student Teachers

- 100% of participating primary teachers have increased the amount of science being undertaken in their classrooms.
- Year 8 Secondary teachers report an increase in the numbers of students that are familiar with aspects of the scientific method and 'fair testing' as they enter Year 8. They report higher levels of enthusiasm and engagement compared to several years ago.
- 100% of participating tertiary students indicated that their confidence levels when entering the teaching profession and teaching science were higher due to their experiences in this program.

Sustained and continued Student Performance

- Prior to the commencement of the Transition through Middle School Science Project, students passing Year 8 science was at a base level of 62% of students achieving at a 'C' standard. The percentage of students that have a 'C' standard or higher has progressively increased each year due to strengthened science programs across the middle school. From 2005 to 2008 there has been a 30% increase in the number of students passing science. The main reason for this significant increase is attributed to the strengthening of the seamless curriculum in the middle school, providing students with stronger scientific literacy and investigative skills (Appendix G).

- The inception of the Transition through Middle School Science Project has also seen a flow on effect of improved student performance in Years 9 and 10. Passing levels of a 'C' standard or above from 2006 to 2008 have increased in Year 9 by 20% over three years. Progressive improvements of students in year 10 science of 19% have also been seen over three years (Appendix G).

- The Transition through Middle School Science Project has also started to influence student performances in senior science subjects, including chemistry, biology and physics. On average, students studying these three subjects have improved their performance of achieving a 'C' standard or above on average by 19.6% in Year 11 (Appendix G).

- Improved performance levels are also shown in Year 12 in the senior sciences of chemistry, biology and physics, with an increase in students achieving a passing grade by 15% (Appendix G).

- Sustained improvement in performance and the promotion of life long learning in science has seen an increase in the numbers of students making tertiary QTAC preferences to pursue tertiary study in a science related field. Students that participated in the Transition through Middle School Science Project (2003 Year 7 cohort) and exited in Year 12 2008, demonstrated a 59% increase in science QTAC enrolments from 2004.

- The extension of student learning experience has also been demonstrated with an increase of students participating in and being successful in the CREST Project Research Scheme. The increase in these levels has been by 60% since 2004 and suggests more students are engaging with scientific enquiry following the Project's inception. (Appendix D).

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AWARDS FOR EXCELLENCE IN SCHOOLS

APPENDICES

Appendix A: Framework of *Food Science… to TakeAway* - Some Projects incorporated in the *program – Linking to 5E Model*

The STRETCH Factor: Elasticity in Snakes **ENGAGE -** Examine elasticity/stretch in substances **Explore -** Plan and conduct a fair test about elasticity in lollies **Explain -** Students develop explanations as to why certain foods can stretch **Elaborate -** Students examine one of the main components in sweets that allows for stretch (alginate), investigate the influences of various preparative factors and link to real lollies **Evaluate -** Students reflect on their investigation and re-evaluate their initial results, relating it to alginate	**Thermochemistry: Is Chewing Gum *really* Cool?** **ENGAGE -** Examine heat of reactions, using substances found in various artificially sweetened foods **Explore -** Plan and conduct a fair test about heat of reactions **Explain -** Students develop explanations as to why certain foods absorb heat / release heat **Elaborate -** Students can use one of the main components in sweets to further investigate thermochemical reactions **Evaluate -** Students reflect on their investigation and re-evaluate their initial results	**Food Packaging: Looking after Food & the Environment** **ENGAGE -** Examine various methods of food packaging. Survey the local area and determine what takeaway packaging is found in the natural environment **Explore -** Examine how effective various types of packaging are at protecting various foods from crushing, cooling, spilling, etc **Explain -** Students develop explanations as to why foods are packaged in a variety of ways **Elaborate -** A comparative test between various shaped packaging and protection, the most effective packaging for retaining heat and between various take away packaging and decomposition rates **Evaluate -** Students reflect on their investigation and re-evaluate their results

Appendix B: Essential Learnings Addressed across the "Successful Transition Through Middle School Project"

This program also underpins the Essential Learning of Science, providing students with opportunities to develop their scientific curiosity by enabling them to investigate their world. The program enables students to develop and demonstrate a range of scientific ways of working, as well as their scientific understandings. This program also provides an avenue for students to develop their communication skills and reflect on their learning.

SCIENCE - *Using Science wisely* *Scientific investigation* *Properties of materials* *Materials can change*

TECHNOLOGY

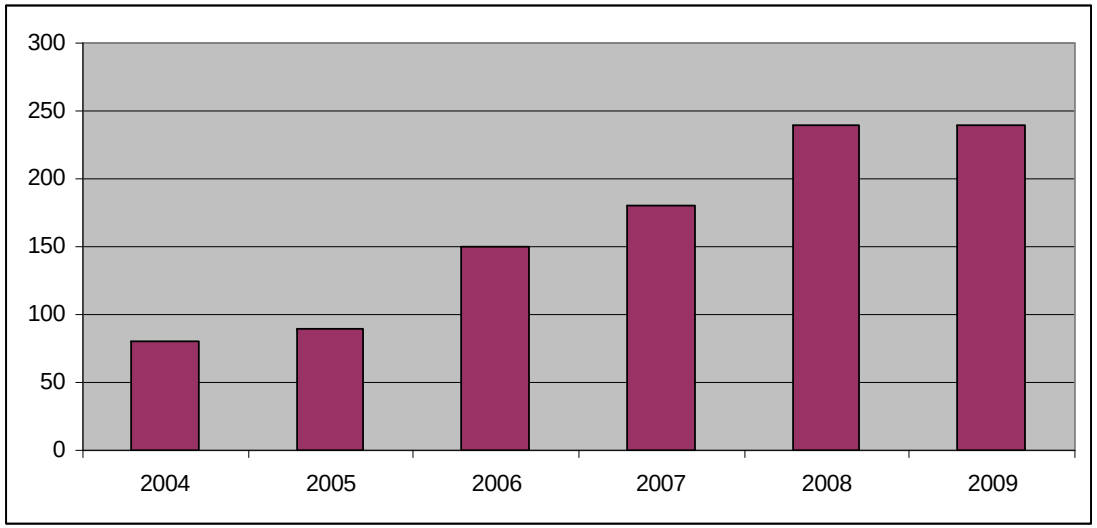
- *Investigates relevant technological developments and applications of technology, including implications for communities, societies and environments*
- *Generates and records design ideas in response to identified constraints*
- *Evaluates their intentions, plans and actions and considers refinements and modifications for improvement*

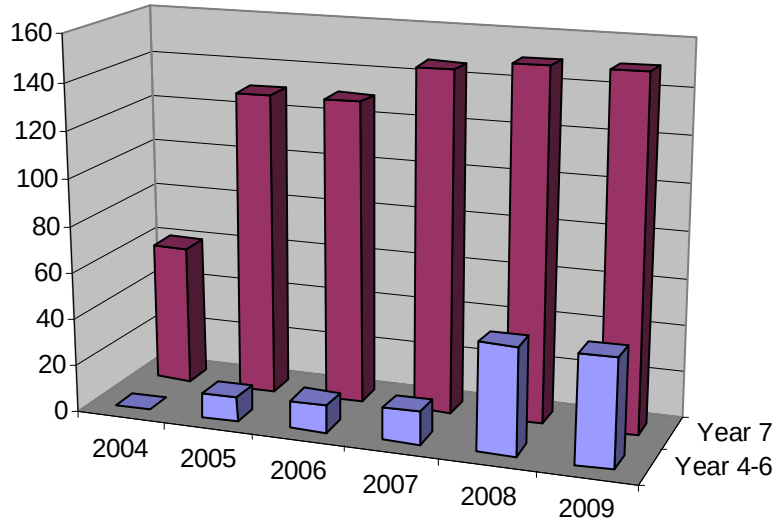
INFORMATION COMMUNICATION TECHNOLOGY - *Inquiring with ICT* *Creating with ICT* *Operating ICT*

STUDENTS DEMONSTRATE EVIDENCE OF THEIR LEARNING OVER TIME IN RELATION TO THE FOLLOWING ASSESSABLE ELEMENTS:

Knowledge and understanding *Investigating* *Communicating* *Reflecting*

Appendix C: Project Involvement Data - Student Participation in Middle School Science Project over the past 6 years





Student participation numbers (left hand graph) of the primary students involved in the middle school science project from 2004 to 2008 have increased. In 2008 and 2009 the student participation numbers reached a peak as the same schools were involved over a two year period. The 2008-2009 period has also involved a greater number of subsidiary students and teachers that have been indirectly involved in the program. These students and teachers have been involved in collaborative activities at their own schools, following their experiences with Townsville State High School. (More details in Appendix A) The second graph (right hand side) depicts student participation numbers of Year 4-6 (shown in blue) and Year 7 (shown in purple). The numbers increase to reach a peak in 2008, again for the same reason.

Appendix D: Some Projects completed by student for CREST & Student Research Scheme & Student Involvement Numbers

CREST

- ✪ Examining the three second rule (is dropped food still safe to eat?)
- ✪ What chemical best removes the residue from strapping tape?
- ✪ What process is best for composting?
- ✪ Flammability assessment of the fabrics that make up the school uniform
- ✪ Designing the best natural antibacterial agent
- ✪ Stain removal method investigations
- ✪ The performance of elastic bands after being immersed in various substrates
- ✪ UV resistance – An audit of Sun Safe products

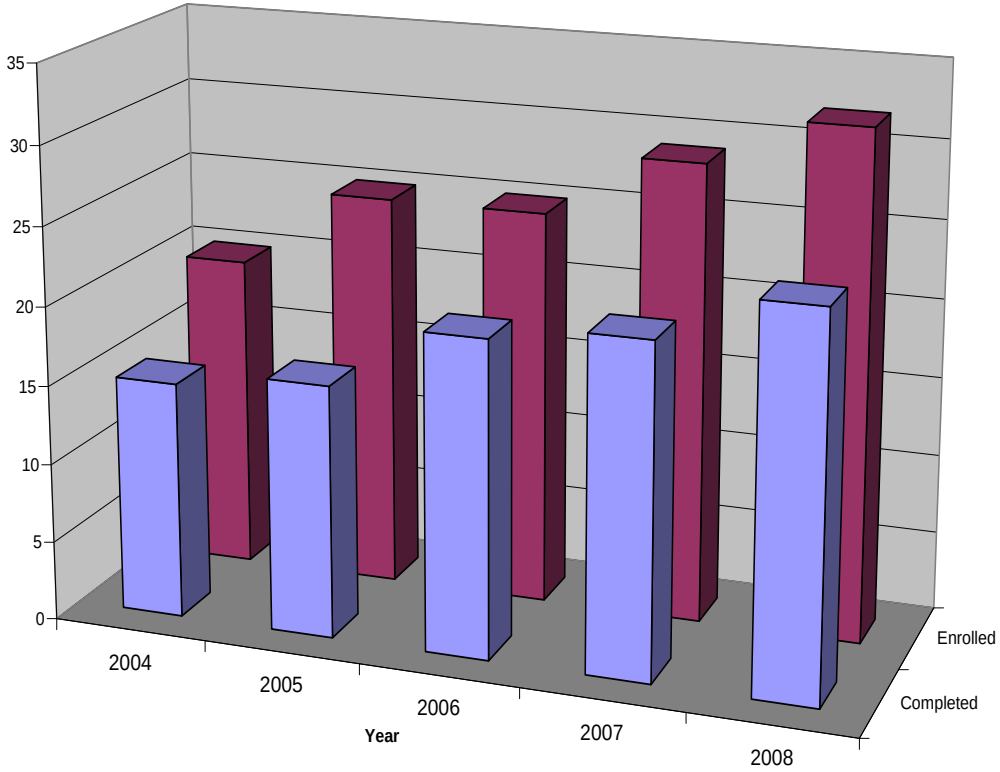
Student Research Scheme

- ✪ Assessment of seagrass beds in the Townsville Region
- ✪ An historical assessment of Townsville's first Astronomer
- ✪ Genetic mapping of a particular green tree ant known as *Oecophylla smaragdina*

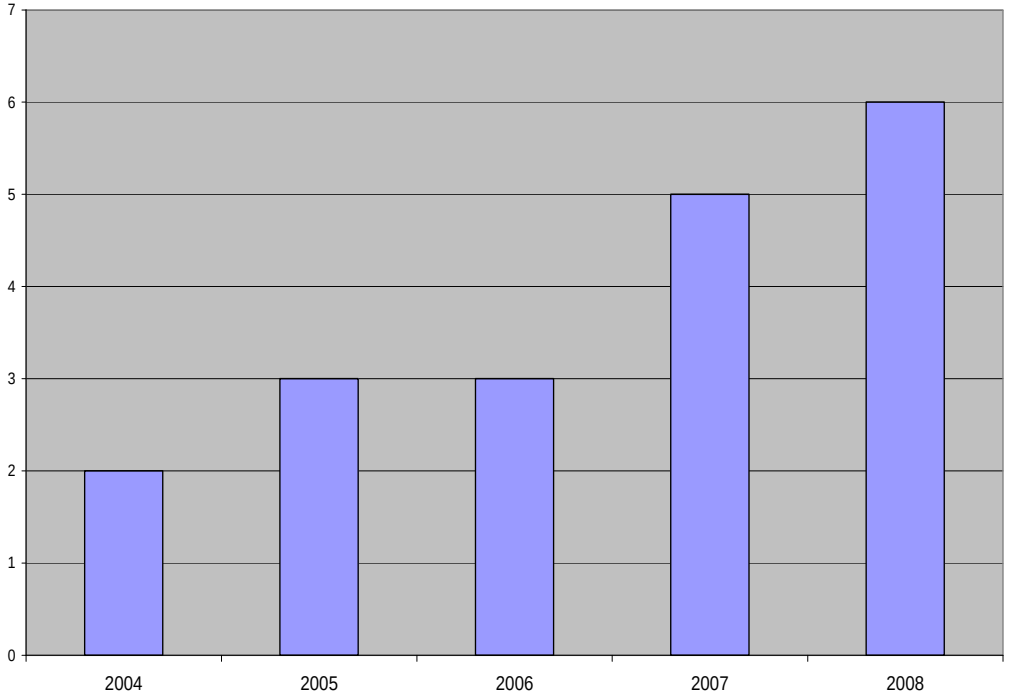
Crustacean behaviour study

- ✪ Marine health assessment of the junction between Townsville and Magnetic Island
- ✪ Biochemistry assay of the proteins in parrot fish species
- ✪ Insect identification on Mt Stuart

Appendix D (continued): Some Projects completed by student for CREST & Student Research Scheme & Student Involvement Numbers



Number of students enrolling and then Completing CREST Project



Numbers of students participating in Student Research Scheme

Appendix E: Extra Achievements Drawn from the Project & Dissemination of the Project

1) Australian Schools Innovation in Science Technology and Mathematics Funding for 2008 – 2009
2) Project Coordinator Awarded Peter Doherty Excellence in Science Teaching Award 2008
3) Project Coordinator Guest Speaker at DETA's 2008 Sharing Practices Conference in Brisbane (State Conference)
4) Project Coordinator Keynote Speaker at STAQ's 2009 Middle School Science Conference at QUT (State Conference)
5) Project Coordinator Speaker at CONSTAQ 2009 Conference (State Conference)
6) Regional Showcase Award for Excellence in Schools 2009
7) Project Coordinator Speaker at CONASTA 2009 Conference (National Conference)

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AWARDS FOR EXCELLENCE IN SCHOOLS

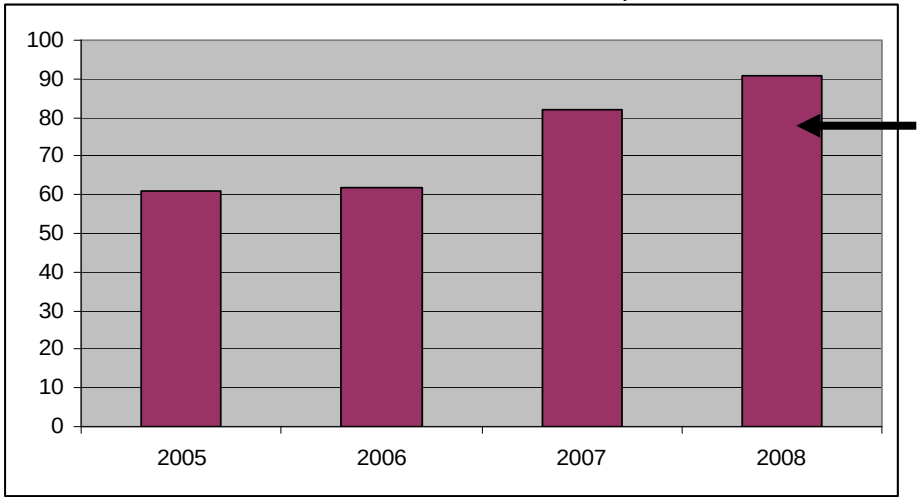
Appendix F: Linking of *Food Science to TakeAway* to the Senior Science Curriculum

Middle School Year 6 & 7 - Year 8 & 9	**Fundamental of Physics - Elasticity using lolly snakes** *This topic introduces the idea that different materials can have varying physical properties. It examines the idea of elasticity and the physical property of stretchiness. It allows students identify variables that may impact on the elasticity of a lolly.* Skills Developed: • Identification of variables • Fair Testing development • Scientific Inquiry & Communication • Safe use of scientific laboratory equipment • Basic scientific understanding of the concept of Elasticity	**Fundamentals of Chemistry –Thermochemistry using Chewing Gum** *This topic introduces the idea that different materials can have varying properties. It examines the idea that reactions can feel cool (absorb heat via an Endothermic reaction) or feel hot (give off heat, in the form of an Exothermic reaction). It allows students to identify variables that may impact on heated reactions.* Skills Developed: • Fair Testing development • Scientific Inquiry & Communication • Safe use of scientific laboratory equipment • Basic scientific understanding of endothermic and exothermic reactions
Year 10	**Developing Physics - Elasticity using mouse trap racers** *Design and build a mousetrap powered racer, which can safely accelerate from rest to cover a distance of 10 metres, whilst examining the properties of elasticity and Hooke's Law.* Skills Developed: • Fair Testing development • Identification of variables • Scientific Inquiry & Communication • Scientific analysis of data and evaluation	**Exploring Chemistry – Reaction Types** *This topic introduces the idea that different reactions can have varying properties. It examines classification and identification of different reactions.* Skills Developed: • Identification of variables • Fair Testing development • Scientific Inquiry & Communication • Scientific analysis of reaction data and evaluation
Year 11 & 12	**Elaborating Understandings of Physics – Elasticity of Wood Types** *To design and build a bridge, which can safely hold a mass of 10kg, whilst examining the properties of elasticity and Young's Modulus.* Skills Developed: • Identification of variables • Fair Testing development • Scientific Inquiry & Communication • Scientific analysis of data and evaluation	**Elaborating Understanding of Chemistry – Thermochemistry** *To examine the heats of dissolution, neutralisation, vaporisation reactions, whilst examining Hess' Law.* Skills Developed: • Identification of variables • Fair Testing development • Scientific Inquiry & Communication • Scientific analysis of data and evaluation

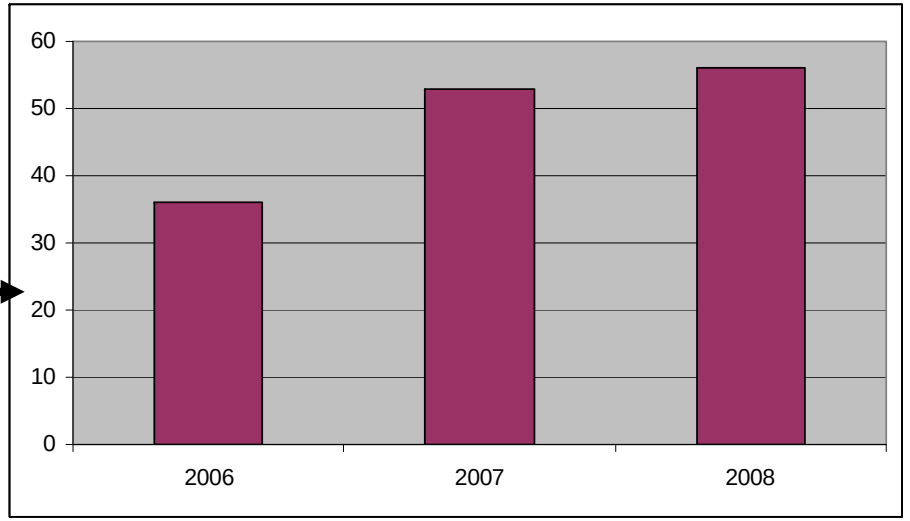
Appendix G: Outcomes Data

Student Achievement: Percentage of students in the Middle School (Years 8-9) and Pre-Senior (Year 10) achieving "C" or higher in science

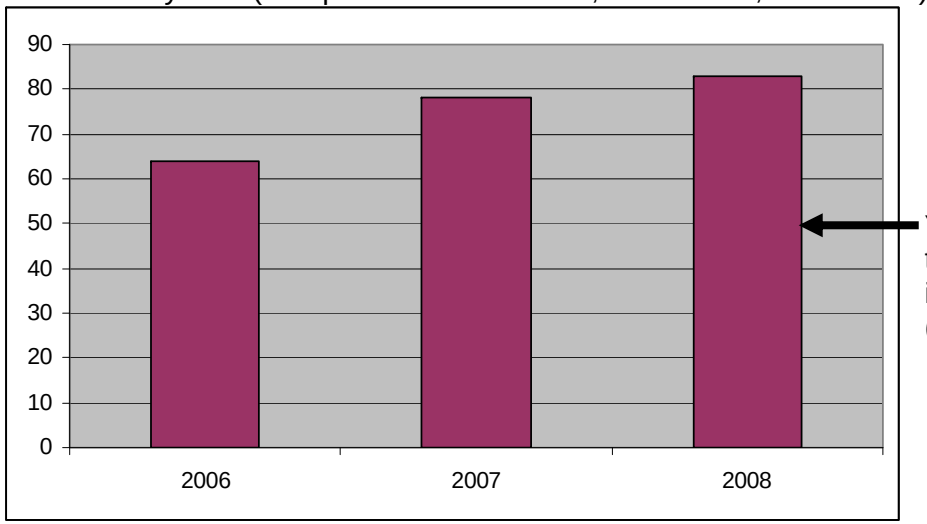
When examining the student results in the Middle School at Townsville State High School, the relationship between the implementation of a seamless curriculum in Year 8 in 2004 and the improvement of results is significant. It is also notable that the student results increased markedly in 2007, which was a result of improvements that were made to the Middle School Science Program in 2006. Greater consultation with Primary Schools and a strengthened curriculum in the middle school has lead to these improved results.



YEAR 8: The percentage of students that have a 'C' standard or higher has progressively increased each year due to strengthened science programs across the middle school. From 2005 to 2008 there has been a 30% increase in the number of students passing science. The main reason for this significant increase is attributed to the strengthening of the seamless curriculum in the middle school, providing students with stronger scientific literacy and investigative skills. (Sample Size: 2005 = 115, 2006 = 117, 2007 = 207, 2008 = 141)



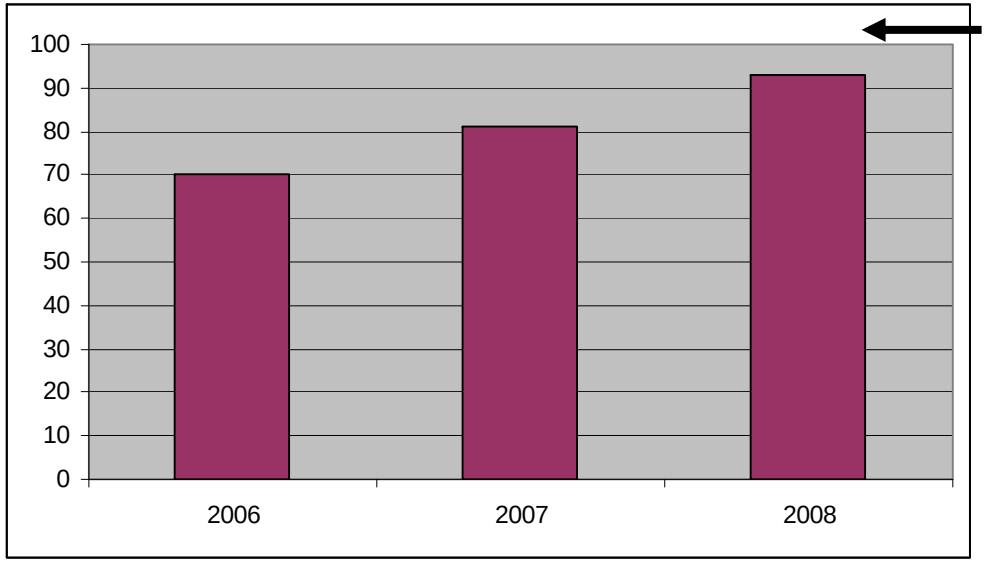
YEAR 9: The second graph to the right also demonstrates once again an increase in passing levels from 2006 to 2008. The increase in passing rates in Year 9 increases by 20% over three years. (Sample Size: 2006 = 119, 2007 = 115, 2008 = 159)



YEAR 10: The third graph confirms the strengthening of the science curriculum in the middle school has shown progressive improvements of 19% over three years in the pass rates of students in year 10 science.
(Sample Size: 2006 = 119, 2007 = 115, 2008 = 82)

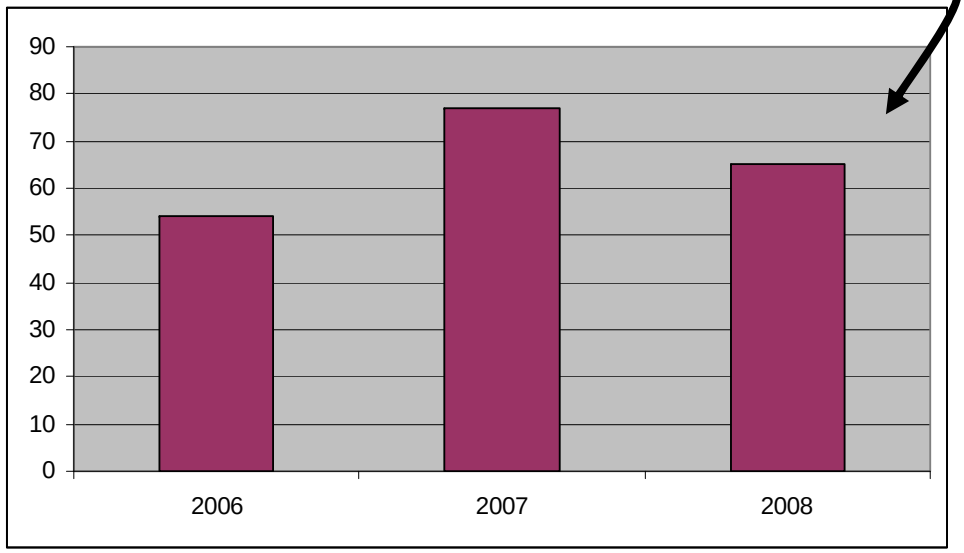
Appendix G (continued): Outcomes Data

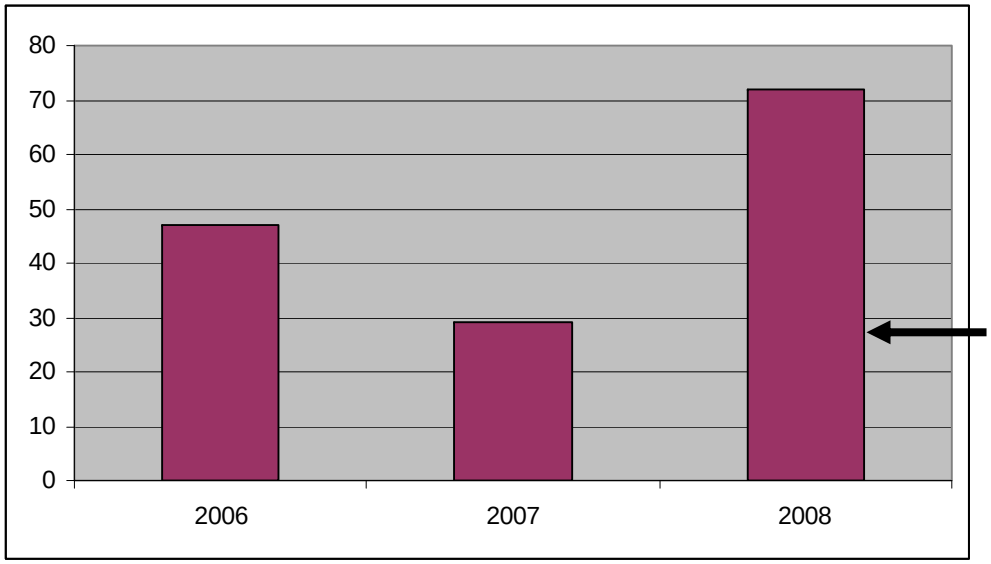
Student Achievement: Percentage of students in the Senior School achieving "C" or higher in the Senior Sciences in Year 11



CHEMISTRY:
The graph to the left depicts the trends in passing results of students completing their studies in Year 11 Chemistry. The results show that from 2006 to 2008 there has been a 23% increase in the numbers of students receiving a "C" standard or above. (Sample Size: 2006 = 20, 2007 = 14, 2008 = 63)

BIOLOGY:
The graph below depicts the numbers of students receiving a "C" standard or above in Year 11 Biology. Although there is a rise in 2007, the number of students with a passing grade increased by 11% from 2006 to 2008. (Sample Size: 2006 = 30, 2007 = 14, 2008 = 52)





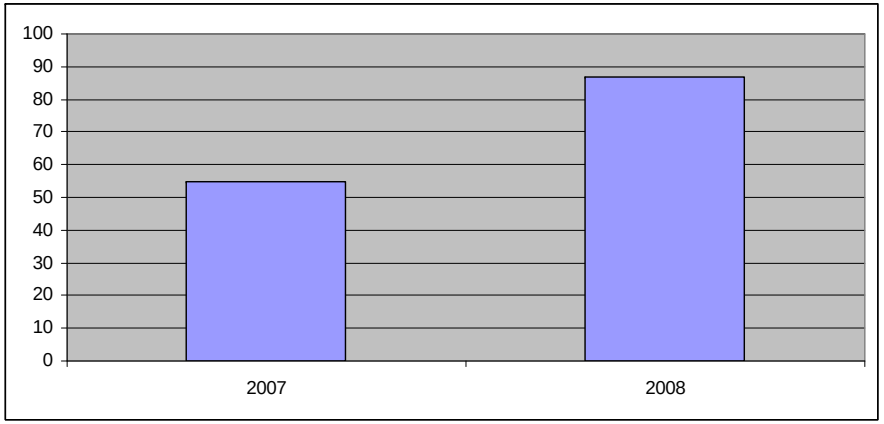
PHYSICS:
The graph to the left depicts the numbers of students receiving a "C" standard or above in Year 11 Physics. Although there is a dip in 2007 (due to a change in the work program), the number of students with a passing grade increased by 25% from 2006 to 2008. (Sample Size: 2006 = 15, 2007 = 8, 2008 = 47)

Appendix G (continued): Outcomes Data

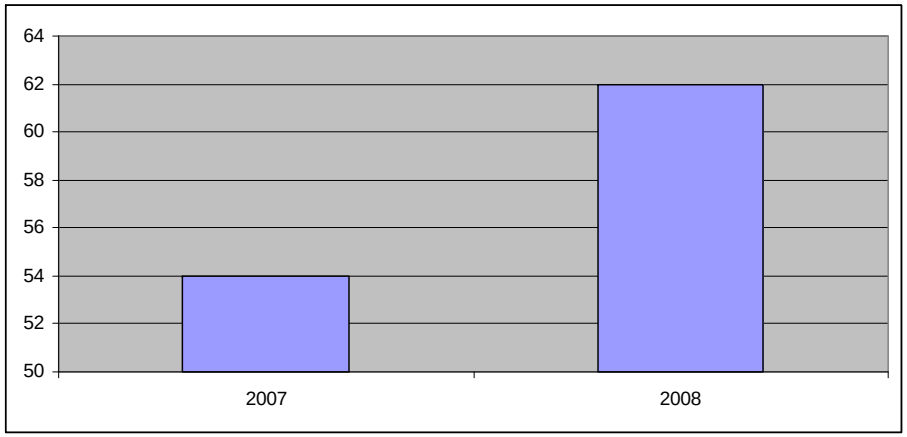
Student Achievement: Percentage of students in the Senior School achieving "C" or higher in the Senior Sciences at Exit

The following data depicts the exits standards of the four authority registered subjects at Townsville State High School. The data in 2007 depicts results obtained from students that would have been in the 2003 Year 7 cohort, when ideas of the Middle School Science program were being initiated. The 2008 exiting Year 12 cohort were the first group in 2004 to participate in the Middle Schooling Science program in Year 8. There is a significant increase in all exit standards across the four subjects from 2007-2008. This data confirms the impact that the early development of scientific skills has had on student learning outcomes.

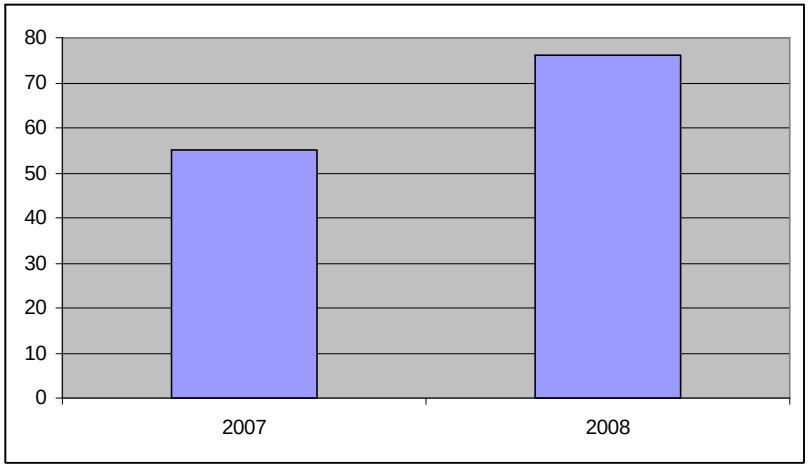
Year 12 Exit in Chemistry:



Year 12 Exit in Physics:



Year 12 Exit in Biology:

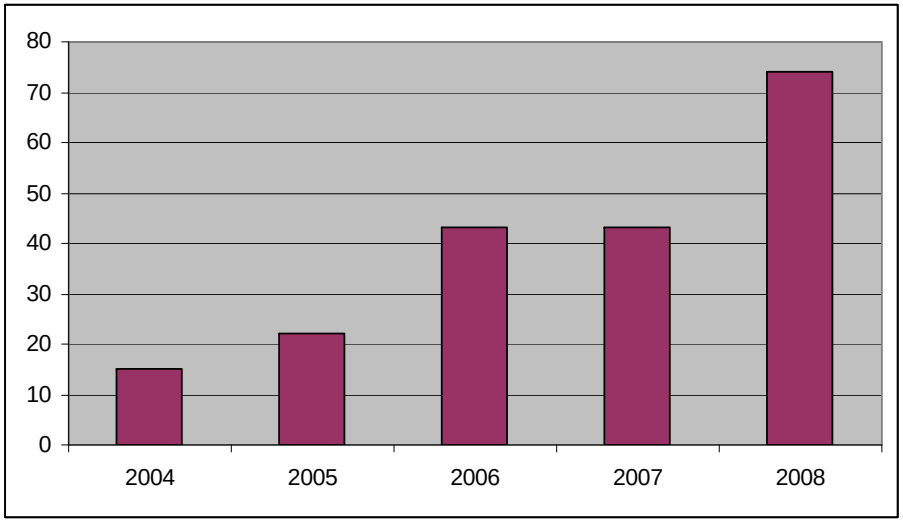


Percentage of Students at Exit Achieving a 'C' Standard or Above:

Subject	2007	2008
Biology	55% Sample = 30	76% Sample = 14
Chemistry	55% Sample = 20	87% Sample = 14
Physics	54% Sample = 15	62% Sample = 8

Appendix G (continued): Outcomes Data

Year 12 Exit Data:



The graph (on the left hand side) depicts QTAC preferences of Year 12 OP eligible students exiting Townsville State High School. This graph shows the increase of students' preferences of a Science related field of study as their first options.

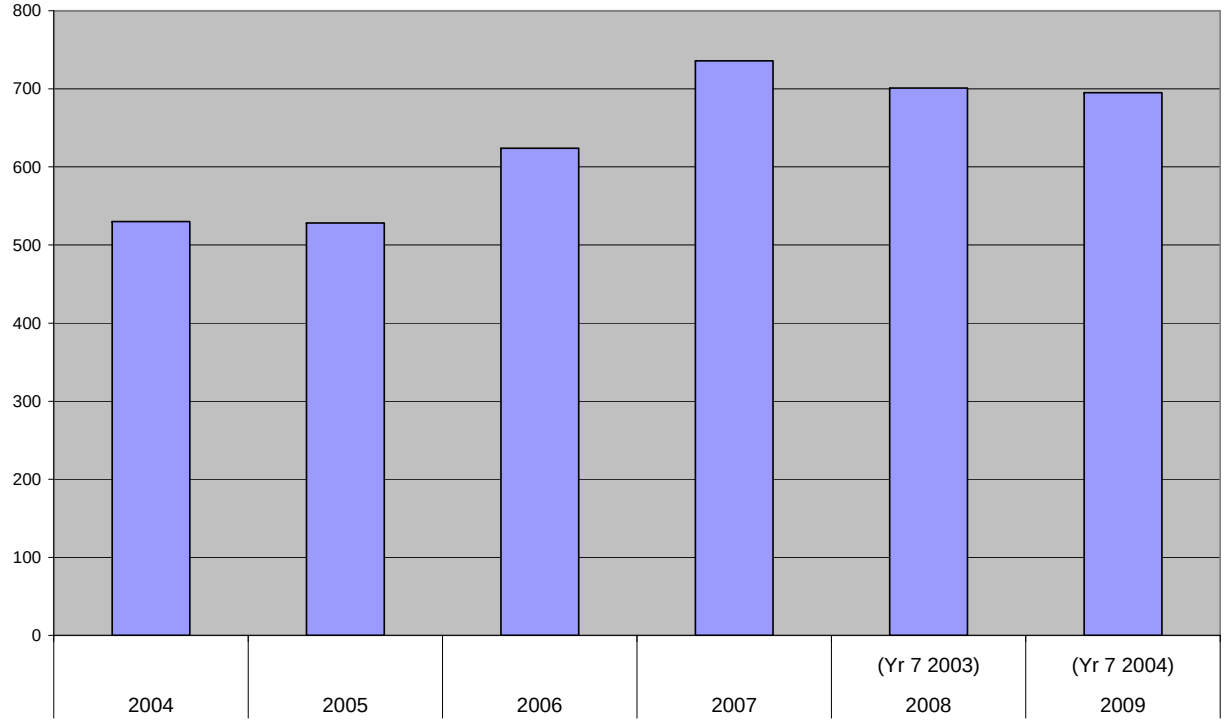
From 2004 to 2008 there has been a significant increase in students choosing science as their first preference, it has increased by 59%.

The 2008 graduates were the first Year 8's in 2004 to participate in the Transition to Middle School Science program. Even though the program was in its early beginnings, it shows that the promotion of science at an early age in the middle schooling years has a flow on effect to the choices made by students later on in their academic careers. (Sample Size: 2004 = 45, 2005 = 32, 2006 = 35, 2007 = 30, 2008 = 34)

Enrolments at Townsville State High School

The middle school science program commenced in 2003 and has attributed significantly to an increase in enrolment numbers into the school.

The graph to the right hand side indicates the increase in enrolment numbers once the middle school program was commenced in 2004. From 2004 to 2007 enrolments increased by 37%. This increase in enrolment numbers has been sustained at a constant rate in 2008 and 2009.



showcase09
AWARDS FOR EXCELLENCE IN SCHOOLS

Appendix H: Principals Endorsement

Townsville State High School

19 March 2009
RE: Townsville State High School Showcase Submission

The "Transition through Middle School Science" is worthy of consideration for a Showcase Excellence in Middle Schooling Award for the following reasons:

- The program successfully engages students and there is clear evidence of significant value adding to the level of science skills of students through the Middle School, specifically Year 7 students transitioning to Year 8 at Townsville State High School. Student achievement data indicates there is a significant difference between those students who participate in the program in Year 7, and those that do not participate.
- Primary school teachers involved in the program have undertaken significant professional development in planning for the Essential Learnings, including an in-depth investigation into the Ways of Working specifically focusing on Scientific Inquiry.
- The program is sustainable due to the high level of ownership and commitment to the program delivery by all staff. The quality of teaching is outstanding across the schools involved in the program as exemplified by the level of achievements attained by students.
- The program challenges students to 'think like a Scientist' by connecting them to real world problem solving and discovery. Students are encouraged to undertake extended learning through the Science CREST Awards program that develops intellectual currency through academic rigor involving scientific research in a chosen area.

The "Transition through Middle School Science" promotes confidence in primary school teachers in developing and exploring scientific concepts and understandings that make Science fun yet challenging to students. The program encourages a seamless curriculum by closing the chasm that exists between primary and secondary school science curriculum.

Finally, this program has invigorated the teaching and learning of Science in the Middle School and between schools, and thereby demonstrating that through working together as professionals, teachers can achieve quality learning outcomes for all students at a high level.

Yours sincerely,

Scott Stewart
Principal

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Queensland Government
Education Queensland

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AWARDS FOR EXCELLENCE IN SCHOOLS

Appendix I: Parent's and Citizen's Endorsement

25th June, 2009

Townsville State High School Showcase "Successful Transition through Middle School Science"
The P&C of Townsville State High School support the school's Showcase submission "Successful Transition through Middle School Science". Townsville State High School has worked with Middle School students from eight cluster primary schools and the high school developing the students' skills in science for many years. Through this program many novel and dynamic approaches to teaching science have been implemented. Some of these approaches include:

- Teaching science using everyday objects, to make science more accessible and concrete
  - Examining the concept of elasticity using lolly snakes
  - Examining endo-/exothermic reactions using chewing gum
  - Examining caramelisation using the toasting of bread
- Mentoring of Primary teachers to support the development of their science teaching practices
- Allowing students to pursue areas of interest and undertake science research projects relating to their interests

The Science Department and Ms Chapman at Townsville State High School should be commended on making Science fun and assisting students in engaging in a life long passion of science.

Yours sincerely

Narelle Searston
SECRETARY
TOWNSVILLE SHS
P&C ASSOCATION

Appendix J: Primary Teacher, Tertiary Student Teacher & Primary Student Support

Student Teacher feedback:
"*What had the most impact was to see and be part of some simple experiments which were conducted with ease. It reaffirmed that science doesn't have to be too complicated or too hard in order to implement it into the classroom"* Karrie Ross

"*I look forward to working with my colleagues and implementing the program in the classroom with plenty of student involvement and hands on experience"* Neika Huss

Teacher Feedback:
"Science is important…Keeping students smoothly moving from Primary to High School is very important…Great Resources, Great Networking for Science in our schools" Kacey Constantine

"It means that I am going back to the classroom excited about teaching Science"

"This program will give me the confidence and the competence to teach science more effectively" Cat Johnson

"I think the idea that primary school students come, visit and undergo science learning experiences that are hands on and very relevant to them is fantastic!"

Student Feedback:
"Dear Ms Chapman, Thank you for the exciting science lessons" Yr 6&7 Townsville West State School

"Dear Ms Chapman, We love science, it is really fun! I enjoyed it all but I would have liked it to go for longer, but don't worry, I really really liked it and would really want to do it again! Hopefully I have you as my science teacher next year" Yr 7 Student from Primary Cluster School